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# *Literary Analysis Of Uzbek And English Adventure And Detective Prose*

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**Abstract – This article is about literary interpretation of adventure and detective Uzbek and English novels, types of authors' expressing thoughts; the article discusses some specific features of detective works, poetic details which are used by a writer.**

**Keywords – Explicit, Implicit, Characteristic Feature, Adventure, Detective, Hidden Meaning, Innocent, Crime, Murder, Puzzle, Detail, Novel.**

## I. INTRODUCTION

The novel is such a great form of the epic genre of modern literature. The most common features are the followings: the complex forms of the human image are the life process, the versatility of the plot, and it is a larger volume than other genres. The emergence of the genre or its preconditions often dates back to antiquity or the Middle Ages. Thus, they are the "antique novel" ("Daphne and Chloe Long"; "Metamorphoses or the Golden Donkey", "Apuleius"; "Petronius") and the "knightly novel" ("Tristan and Isolde", XIIth century); "Parsifal", (1198 -1210) by Tungsten von Eschenbach, "Death of Arthur"). These are the examples of earlier prosaic narratives with some features that bring them closer to the novel.

The novel is one of the largest genres of literature prose, creating a comprehensive picture of society through an in-depth analysis of personal life. The novelist focuses on the fate of ordinary people, their daily, everyday lives. Originally, the word "novel" meant a narrative work in romantic language. Furthermore, the term acquired a specific modern meaning. Modern novels can be distinguished by the followings: the assessment of reality determined by human beings; a person's interest in life; the saturation of the action with conflicts (external and internal); plot branching; analysis of wide life events; a large number of characters; significant time interval; There are different genres of novels in literature. They are autobiographical, military, historical, political, adventure, detective, fantasy, satirical, sentimental, woman, family and home, educational, philosophical, intellectual, and psychological and others.

## II. LITERATURE REVIEW

When describing adventure novel in literature, experts refer to the works that tell interesting stories about strange events that have taken place or have been fabricated; They are characterized by the extraordinary mystical nature of the plot, the richness of sharp intrigues, unexpected changes in the course of events, the reversal of the characters, the protagonists face various trials and overcome various obstacles and survive various disasters.

There are also a number of adventure works in world literature. The writers - Cervantes' "Don Quixote", F. Rable's "Gargantua and Pantagruel", J. Swift's "Gulliver's Travels", R. L. Stevenson "Kidnapped" are considered to be adventure works.

A popular Uzbek writer Kh. Tukhtaboyev was one of the creators of this adventure genre in Uzbek literature. He began his literary work writing stories for both teenagers and children, one of which he wrote for teenagers «Riding the Yellow Giant," won a competition prize. He became famous for his first adventure story for children, "The Magic Hat". It was in these two works that his diligence, his true talent, was evident. Luckily, both works were well received by readers and literary critics. Inspired by this, the young writer expanded the story "Magic Hat" and in 1969 turned it into the novel under the title "Riding the Yellow Giant." In 1973, "The Death of the Yellow Giant" was published as a logical continuation of this work. Then he wrote "The Boy with Five Children" (1976), "The Golden Head of the Avengers" (1980), "Years and Roads" (1983), "The Land of Sweet Melons" (1986), and "People in Heaven" (1986). Many of these novels have become popular both in his native country and abroad, and have won various awards. Thus, Kh. Tukhtaboyev became the leader of Uzbek national adventure literature, he set a world record by writing the novels of "Riding the Yellow Giant" and "Death of the Yellow Giant". His novels were published in about thirty countries and became one of the leading works of adventure novels.

The main hero in "Riding the Yellow Giant" Hashimjon was a very simple, handsome, polite, gentle boy. When his mother called him, he would reply: "Yes, mammy," and when his mother ordered to do some household chores, he answered reluctantly: "Okay, mammy." In fact, he was a very cunning, sly, funny boy. He did not give his sister a day off, he ordered her to do the household chores, and when she did not obey to her brother, she got into trouble: he used to show her his fist and kick her with his feet. At school he had his home assignments done by his close friend. He tried to settle problems at school; once he wrote a complaint letter to the school principal asking him to remove difficult lessons from the schedule. So, he had no problem with anything, he used to look for the easiest way to solve anything. However, the boy's goals did not give him much fame, he had to leave his school and his family to prove that "A person can become a great man without education".

By not losing his temper, the naive child did not stop hoping from getting the highest position in life. He was still looking for a way to fame and a good career without studying or working hard. In the meantime, it seemed to him that all things were getting better and better. Suddenly, he found a legendary magic hat that provided whatever he wished and he travelled around the country with it.

Thus, the protagonist experienced some interesting hilarious stories and adventures in his life.

At that moment the boy was obsessed with proving his teachers without being educated, he would be able to achieve his goals, and that he wished he would return to his village with a full of pride and great glory. Alas, even the legendary magic hat could not help Hashimjon in this case. The facilities provided by the magic hat always lead to unexpected and unfortunate consequences; every time the hero's happiness turned into misfortune: When he became an agronomist, a poet, an artist and an engineer, his lack of knowledge damaged to his reputation. Consequently, the boy comprehended that "A person can never become a great man in his future without gaining knowledge".

### III. ANALYSIS

If we analyze detective novels, we can notice the following characteristic features in them: the great queen of the detective world, Agatha Christie's novel "The death on the Nile" brought the writer great fame. The novel was about the people who were travelling by sea. The author portrayed the character of detective Poirot as a man who had reached the level of Arthur Conan Doyle's Sherlock Holmes. Young, handsome, smart, entrepreneur and the owner of a big property Linnet Ridgeway wanted to get married and live happily. But the girl's fate ended tragically. Someone killed him while she was sleeping. Poirot became a popular detective with his mastery and capability. He noticed that Linnet Ridgeway had something to worry about: "I saw," said Poirot solemnly, "that the girl's eyes darkened, and that her finger-joints became pale as her hand gripped the umbrella handle tightly again."<sup>1</sup> {33}

The author continued to describe the story of young lovers who were having dinner at the restaurant "Chez Ma Tante". A detective Poirot watched these young couples having dinner. These lovers made a great impression on him. One of these lovers was Jacqueline de Bellefort, a close friend of Linnet Ridgeway. Poirot came to the conclusion that "that girl loved her fellow too much." The events of the novel develop through this node. Suddenly, Linnet got married the fellow of her close friend Jacqueline de

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<sup>1</sup> A. Christie "The Death on the Nile", Tashkent, "Yangi asr avlodi" 2019.

Bellefort, and they go on a voyage to Egypt, and Linnet's death was the topmost point which was decisive importance for the personages' destinies. The death of Linnet was unexpected murder case for the travelers on the ship.

Every writer can express their thoughts in two ways in their novels:

**1. Explicit-** a writer expresses his ideas explicitly and the reader comprehends the story of the novel in pragmatic situations.

**2. Implicit-** a writer expresses the main idea or the theme which may give a deep consideration and realization of a novel to readers.

The main idea was conveyed implicitly; it was given in a hidden form in Agatha Christie's novel "The death on the Nile". While reading, a reader can guess the hidden meaning of the novel. On the one hand, the murder was kept secret by the writer. Of course, readers could guess who the real murderer was. But because of the writer's immense skills, the murderer remained a mystery until the end of the novel. The protagonist of the novel- detective Poirot was invented by Agatha Christie herself. On the other hand, detective Poirot used to find innocent suspects every time. Of course, there might be a question in everybody's mind: "Who dared to kill the young, wealthy and attractive Linnet Ridgeway?"

Agatha Christie's novel "The death on the Nile" was eventful; mysterious which showed the negative aspects of the characters. The plot of the novel took place on the ship Al-Karnaku. The murder which was considered to be one type of crime was premeditated beforehand. A. Christie described poor people like Simon Doyle who was ready for everything in order to have luxury life. The mastery of the writer was that she concealed the crime of the protagonists. She punished murderers according to their deeds. Their punishment was that the murderer was killed by his beloved lover.

It is noteworthy that typical detective novels include a murder case which is investigated by detectives; the detective Poirot who pursued the crime could win the case at the end of the novel. Firstly, Jacqueline de Bellefort asked from her friend Linnet to hire her boyfriend. But under that "offer" the author kept a secret a malicious purpose of Simon Doyle from the reader. This puzzle would be solved at the end of the novel. Once Simon Doyle told to Jacqueline: "If I'm lucky enough to marry Linnet, then she'll die and leave all her money to me."<sup>2</sup>{248}

When Poirot met Jacqueline, he thought she was a woman who had gone mad in the way of love, and even gave her advice: "You have taken a very dangerous way, Mademoiselle. All the people on this ship are traveling, and so are you; only your voyage is different. It is the voyage of the human soul in a raging river, in which it hides untested underwater rocks, a world of misfortune." In the novel, we can observe not only the crime of a couple, but also the petty crime of Tim Allerton, who was never tired of stealing money. Tim Allerton was one of the few French masters to steal precious gems and replaced them with counterfeits. The main goal of the writer was to show the travelers who had lost their minds and consciousness for wealth and property. For example, behaving like a queen Van Shuyler used to look at everyone with scorn: "Van Shuyler had a disease of stealing valuables, this disease was called idiosyncrasy (hypersensitivity of the human body to certain objects or events). She would steal what she liked and put them in her stockings." We can not only see the travelers like Van Shuyler, but also women like the ordinary servant, the greedy Louise Bourget in the novel. Her greediness exacerbated her life which caused to her premature death. How was the crime exposed by the writer? Detective Poirot bent his fingers and began to count: "Aswan garden, testimony given by Mr. Allerton, two bottles of nail polish, a bottle of my wine mixed with sleeping pills, the velvet blanket, and a handkerchief with a stain. A pistol which had been left at the crime scene, death of Louise and Mrs. Otterbourne."<sup>3</sup>{222} These were the exact proofs for the murder case which was obviously solved by detective Poirot.

A writer selects convenient poetic details for himself when writing his works. Poetic details have different functions in imaginative literature. Poetic details are classified into following groups:

1. Depicting details;

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<sup>2</sup> A. Christie "The Death on the Nile", Tashkent, "Yangi asr avlodi" 2019.

<sup>3</sup> A. Christie "The Death on the Nile", Tashkent, "Yangi asr avlodi", 2019.

2. Details of authenticity;
3. Characterological details;
4. Details of implicitness.

**1. In depicting details-** a writer can give a description of nature or personal appearance of his personages in his novel. He tries to connect the nature with personages' mood; he expresses his point of view by conveying his emotional attitude while describing nature:

" Although winter has already been over and spring has just started to show its features: It was March 25," he said. The air is clear, the sky is clear like glass. But there has been a thunderstorm and a downpour at night. Today, for the first time, Megre has left his coat at home, his the buttons were pulled from his vest in the light breeze, and the commissioner took pleasure out of it."<sup>4</sup> {3}

French writer Georges Simenon combined natural landscape with his police commissioner Megre's psychological state. By this way, he tried to show the black vices and crimes which were the main issues of society .

**2. Details of authenticity** – a writer denotes the names of countries, towns, cities, houses, avenues to show a real place. Readers can imagine real places when they read the names of places, they will try to find those places from real life.

For example, Arthur Conan Doyle placed his protagonist Sherlock Holmes in Baker Street in the house №221. Readers try to see the place where their favorite character had lived; they think that there exists a house №221B in Baker street.

Agatha Christie showed an exact time to emphasize authenticity of the novel: "You were recommended by the Skilled Women's Agency. I am sure that they know you well. Tell me how much you would like to be paid for your work. I agree with anything in advance. From August 8, you will take up your duties. The train leaves Paddington Station at 12.40 p.m. You will be met at Oakbridge Station. I'll enclose an extra £ 5 for your travel expenses.

Sincerely, Una Nancy Owen."<sup>5</sup> {5}

The author gathered the protagonists of his novel at the same time on August 8, on Indian island in "And There were none". These heroes were vicious criminals who were punished according to their degree of guilt.

**3. Characterological details-** a writer tries to show a new trait of a character while describing his personages in his novels. Psychological and intellectual qualities of a protagonist are scattered over the novel which represents the characteristic feature of personages. Their merits and demerits are revealed by a writer recurrently: "Megre rarely talked to his wife about his work. He could give direct instructions without telling even his closest assistants. This was his style of work. He tried to get to the bottom of everything on his own, trying to learn people's lives and behaviors vividly."<sup>6</sup> {71}

**4. Implication detail-** a writer can use the only word or word collocations to create undercurrent information in his works. In this case this word or word collocation denotes a hidden meaning that's to say, this deep-lying meaning is supposed to be guessed by readers. For instance, 'Ten Little Indian boys' symbolize people who committed crime and had to be punished to establish justice in society in Agatha Christie's novel "And Then There Were None".

The word 'louse' is used negatively which shows a despicable person like a usurer who is too greedy enough that is going to take all money from the poor in Fyodor Dostoevsky's "Crime and Punishment"

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<sup>4</sup> George Simenon "Megre and Swagman", Tashkent, "Yangi asr avlodi",2018

<sup>5</sup>A. Christie "And Then There Were None" Tashkent, "Yangi asr avlodi",2018

<sup>6</sup> George Simenon "Megre and Swagman", Tashkent, "Yangi asr avlodi",2018

#### IV. DISCUSSION

In addition to Uzbek children's adventure novels, we can analyze one of famous Scottish writer Robert Louis Stevenson's novel "Kidnapped". The novel was written in the adventure genre; it is about the adventures of a sixteen-year-old boy. After the death of David Balfour's father, he was sent to his paranoid uncle Ebenezer. His uncle was the master of the castle. He was different from other teenage boys in his resilience. After the death of his father, according to his father's will, he bravely traveled to Edinburgh to stay with his uncle.

The boy's uncle was not glad to see his nephew. Furthermore, David was the rightful heir to the estate who had emerged at the castle at that moment. He wanted to kill his nephew. When he failed to kill the boy, then he sold him for money. Ebenezer confessed his sin at the end of the novel: "... the truth is, God forbid, I paid £ 20 to Hoseason To be honest, I also had to give a certain amount of money after I sold the teen to Carolina."

A young teenager was hit on the head with something and he was abducted on a ship. Thus, David's adventurous life began. At first, he was in despair on the ship. He compared the ship to a "cowshed": "I have confused the days, and, whether it was day or night on the ship; The ship was in a mess: dirt and filthiness covered all over the place as if disgraceful state stretched twice as long as usual."

The novel's protagonist, David Balfour, was presented to the reader as a patriotic, strong and courageous teenager who set out on a journey to start happy life with big hopes. Although he was morally and mentally determined, he could not tolerate the mistakes of others. For instance, David found it daunting difficult to forgive his close friend for taking and losing his money. He also experienced challenges associated with idealistic, practical problems in life. Without thinking of putting himself in great danger, David simply pursued the murderer of a rebel leader named Red Fox. He couldn't understand why he required Alan to move forward with unbearable speed, because he was too young to fully realize their danger. After their shipwreck, he did not panic, even if he did not know how to swim. , David learnt many important things about life during his adventures. He realized that judging a person was not good because everyone had good and bad sides. David also realized that true friendship was the most precious feeling in the world. His close friend Alan Breck Stewart had proven himself to be his true friend. Writer Stevenson described clearly David Balfour's courage and bravery when the hero fought with pirates: "He slipped through the hole and landed on his partner, who was lying down. It was impossible not to hit the target, but there was no opportunity to sit on purpose: I hit the barrel with a pistol ..."

The boy did not lose his heart after the shipwreck. Being hungry, he ate sea shell-fish and satiated his stomach with them: There were small slugs on the island: they were called "buckies" in Scotland; it is said that they are "minors" in English. That's what I mean, the "food" consisted of "buckies" and I would swallow them when they were alive and cold: because I was so hungry as a horse and such "dishes" seemed delicious at first."

David was tormented by the loss of his close friend and being left alone. He looked around in agony. His limbs seemed to be frozen, he wished he saw a black man on the island: "My head, especially my socks, were torn, and my whole body was aching: the constant humidity made my hands be numb. As I had a sore throat, and I was getting exhausted and tired day by day. I had to eat the disgusting things which made me feel sick. I felt alone with dead rocks and fowls on the island. <sup>7</sup> {111}

But the boy did not lose hope in life, even though he was surrounded by dead rocks, wild birds, and the icy sea. He wanted to find Alan Breck, they had been separated and thrown away after the shipwreck. When he found his friend, he became attached to him. Eventually, he returned to Queensferry and recovered his identity and took back his estate from his uncle.

Furthermore, we can notice loyalty and friendship between two friends. Stevenson wanted to show friendship relations between Alan and David, that's to say wigs and Jacobites can be friends despite their bloody history. The concept of friendship soon became the main theme of the novel. For example, David and Alan were suspected of murder. Although Alan borrowed money from his friend, David felt a great deal of loyalty to Alan. We can see the pinnacle of the novel in Chapter XXIV: the controversy emerged between two friends which caused to verbal attacks of David against Alan Breck Stewart. His words were sharp enough and he had no choice but to call Alan for a duel. However, knowing it would be murder Alan refused his insistence. But soon Alan realized his mistake and apologized to Alan for his deeds. Consequently, the boy got sick. Alan took his friend to a safer place to

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<sup>7</sup> R.L.Stevenson, "Kidnapped", Tashkent, "Ilm Ziyi Zakovat", 2019.

recover. From there, the two came to Corstorphine. There, Alan helped David restore his legacy. The book ended with their separation.

### V. CONCLUSION

To wrap up, all **adventure novels** are about heroes who experience dangerous and unusual events. The plot develops as fast as possible in adventure novels. The protagonists of adventure novels go to faraway places to open a new page in their life. However, they face dangerous hurdles in new places. They will overcome these obstacles by showing their courage, power and they will have a happy future in their life. The main characteristic feature of **detective novel** is a criminal case that is investigated until the end of the novel.

The issue of implicitness denotes a specific importance in detective novels. The compositional structure of detective novel gives a reader an impression that he is a witness of events, facts in these novels; the novel's implication is given by specific words or word collocations by a writer that that readers have to guess the murderer by themselves. For investigating a murder case, a writer selects a wise detective who will help to expose crime for readers: Arthur Conan Doyle chose Sherlock Holmes, Agatha Christie selected detective Poirot, French writer George Simenon represented Megre as his commissioner who investigated crime cases for all of his detective works.

### REFERENCES

- [1] Qahharova M. Y. THE IMAGE OF ADOLESCENT PSYCHE IN WORLD AND UZBEK CHILDREN'S PROSE// *Academicia, An International Multidisciplinary Research Journal*, 2020, Vol. 10, Issue 9, Sept 2020 Impact Factor: SJIF 2020 = 7.13 ISSN(online) 2249-7137 p. 352-359
- [2] *ACADEMICIA: An International Multidisciplinary Research Journal* <https://saarj.com>
- [3] Qahharova M. Y. Various approaches to the study of English set expressions and the problems of classification // *Scientific Reports of Bukhara State University*, 2020, № 4 p.135-139
- [4] <http://uzjournals.edu.uz/buxdu>
- [5] Kakhkharova M.Y. THE EVOLUTION OF ADVENTURE AND DETECTIVE NOVELS IN WORLD AND UZBEK CHILDREN'S PROSE, *Scientific Reports of Bukhara State University*, 2021, № 1 p.180
- [6] <http://uzjournals.edu.uz/buxdu>
- [7] 4.Qahharova M.Y. THE TRANSLATION OF GRAMMATICAL DISCREPANCIES// *International Journal of Psychological Rehabilitation*, ISSN: 1475-7192 London, volume 27 January, 2020
- [8] <https://www.psychosocial.com/article-category/issue-1-volume-24/>
- [9] Jamilova B.S. and Qahhorova M.Y. Bolalar detective nasrida o'smirlar ruhiyati tasviri// *International scientific methodical journal*, ISSN 2181-1709(P),
- [10] 2181-1717(E) , 2020,1.
- [11] <http://interscience.uz/>
- [12] J.B. Sattorovna, K.M.Yusufovna, Comparative interpretation of the characters in English and Uzbek novels// *Journal of Contemporary Issues in Business and Government* Vol. 27, No. 2, 2021 P-ISSN: 2204-1990; E-ISSN: 1587-1594 DOI: 10.47750/ci
- [13] <https://cibg.org.au>
- [14] A. Christie, *Ten Little Negroes*, Tashkent, "Yangi asr avlodi" 2018.
- [15] A. Christie "And Then There Were None" Tashkent, "Yangi asr avlodi", 2018
- [16] R.L.Stevenson, "Kidnapped", Tashkent, "Ilm Ziyozakat", 2019.
- [17] George Simenon "Megre and Swagman", Tashkent, "Yangi asr avlodi", 2018

# *Innovations And Modern Approaches To Teaching English At School*

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**Abstract** – The article provides information on English teaching methods, modern approaches and innovations used in English teaching at school. The essence of innovative teaching in English teaching is that the learning process involves almost all students in the cognitive process; they have the ability to understand and reflect what they know and think.

**Keywords** – English teaching methods, innovative teaching, modern approaches, innovations, cognitive process, innovative technologies.

## I. INTRODUCTION

Innovative technologies include:

- Dialogic communication
- Acquisition of self-experienced knowledge and skills
- Development of critical thinking
- Develop problem-solving skills
- Integrated interaction at the level of reproduction, perception
- Formation of personal qualities of students.

Innovative education solves several problems at the same time: it develops communication skills, helps to establish emotional connections between the participants of the learning process, and solves information problems because it provides students with the necessary information; offers, without which it is impossible to carry out joint activities; provides general education skills and abilities with an educational task as they are accustomed to working in a team.

## II. LITERATURE REVIEW

At the current stage of development, when a qualitatively new relationship has emerged between our country and members of the world community on the basis of new political and socio-economic realities, favorable conditions have been created for learning English and using it in communication with other countries. Nowadays, successful mastering of English is necessary to get an interesting job at home and abroad, to strengthen friendships with representatives. For further study in different countries, international universities and professional growth in the chosen specialty; all this filled the task of teaching English in the country with new content and demanded the expansion of its functions as a task, taking into account the best world experience in teaching English and the socio-cultural features of its study.

### III. ANALYSIS

Several technologies are widely used in teaching English:

Carousel technology.

Like many innovative technologies, the carousel is also a borrowed psychological preparation. Children usually enjoy such work. Two rings are formed: inner and outer. The inner ring is for students standing motionless facing the outer circle, the outer ring is for students moving around the circle every 30 seconds. So they can talk about several topics in a matter of minutes and try to convince the interviewer that they are right. Dialogues of an ethical nature, the subject of acquaintance, the conversation in the nation, in a public place, etc., are perfectly elaborated. The guys speak enthusiastically; the lesson is dynamic and effective.

“Theater” technology is something like a spectacle in which the audience plays the role of observers, experts, critics and analysts. Several students play the situation in a circle, while the rest observe and analyze. The task of the actors is to convey the appropriate mood, emotion, character traits, and the task of the audience is to pay attention, to explain the findings, to talk about what they are based on, what they are focused on.

Case Study technology involves the movement of children across the office to gather information on a proposed topic. Each participant receives a sheet with a list of questions. The teacher helps to formulate the questions and answers, ensuring that the interaction is conducted in English.

“Incomplete Bid” technology. Children are encouraged to read the unfinished sentence and continue it quickly with any words, which is the first thought that comes to mind. The offers start out very vaguely, so the guys have almost limitless possibilities to finish it. They belong to different areas of life and can cover any topic.

“Group History” technology comes in two forms. During the first method, each student adds one sentence to an event that has already begun. An unfinished story sheet is then passed around in a circle with a specific signal (per minute). The second method is very suitable for practicing the topic of “Question Words”. The teacher asks questions in a specific order, each participant in the process writes an answer, and folds a sheet of paper so that no one can see it and pass it on to a neighbor. The movement is done in a circle. Thus, in the end, several surprises are taken at once.

Technology “Do you believe this ...” This type of language practice can be used on any topic. In addition, students are first invited to “trust” the teacher and then express their views on the topic.

Brain ring technology is very suitable for lessons - generalization of the material studied. The content of the genres is completely diverse and includes sections such as vocabulary, grammar, reading, listening and writing. This technology requires serious preparatory work, including: choosing a topic, creating a task, creating a presentation, thinking through questions to attract attention, blank answer forms, preparing diplomas. At the beginning of the game, the jury is selected; the students are divided into teams. Each round lasts 3 minutes, after which the answers are sent in writing to the board members. The correctness of the answers is checked and discussed after each round, followed by a series of questions that bring additional points to the teams.

Role-playing technology. Role-playing is a simultaneous speech, play and educational activity. From a student perspective, role-playing is a play activity that moves in different roles. The educational nature of the game is often not recognized by them. The goal of the game for the teacher is to shape and develop students' speaking and speaking skills. The role play is managed; its educational feature is clearly recognized by the teacher. Because role-playing is based on interpersonal relationships, it evokes a need for communication, arousing interest in participating in a foreign language; i.e. performs a motivational and motivating function. Role play in many ways determines the choice of language tools, helps to develop speaking skills, and allows students to imitate communication in a variety of speech situations. In other words, it is an exercise to master skills in interpersonal communication. In this regard, role-playing provides a learning function. Role-playing games in school students shape the ability to play the role of another. There are a large number of forms of role-playing games in English classes: presentations, interest clubs, interviews, correspondence, roundtables, press conferences, excursions, fairy tales, reports and more. The results of the training show that the use of role-playing in English lessons is both qualitative (different dialogic unity, initiative of speech partners, emotional statements) and quantitative (correct speech, volume of speech, speech) in students' speech speed) contributes to positive change.



#### IV. DISCUSSION

Today, in the world practice of teaching the language of international relations, English as a means of intercultural communication, as a means of mutual enrichment of peoples, countries, continents, a way to get acquainted with national and universal cultural achievements, the citizens of their country and the world community. The tasks of cognition are set as a method of self-awareness.

The main task of teaching modern English is not only to provide a wide range of information, but also the independent acquisition of knowledge by the growing person, the desire to constantly deepen in the field of knowledge, the formation of constant cognitive motives for learning, the main is cognitive interest. It is important to look for a number of factors in shaping students' interest in knowledge, including ways and forms of organizing learning activities. There is no doubt that the task of the teacher is to find and develop forms of work that unite teachers and students into a single creative team and enhance their role, independent work, student activities during the learning process.

Thus, the main tasks of teaching modern English included:

1) Communicative and socio-cultural development of the student, his preparation for intercultural communication.

- Formation and development of communicative competence (linguistic, verbal, sociological) necessary for communication in the fields of education, household, business, leisure and entertainment;

- Development of a culture of perception of real texts (fiction, newspapers and magazines, advertising and reference books);

- The formation of students' ideas about the dialogue of cultures as a consciously chosen philosophy of life, its participants are required to respect other cultures, language, ethnic and racial tolerance, speech etiquette, readiness to learn, cultural heritage, peace, spiritual enrichment with the achievements of other cultures, the search for non-violent ways to resolve conflicts and disputes;

- To acquaint students with the culture of the countries where the language is studied its relationship with the branches of world culture.

2) To teach students the technology of learning English and to develop its unique educational potential to meet their personal interests in learning English in the fields of communication, knowledge.

- Study the methods of working with local and foreign directories;

- On teaching methods of schematics of communicative-cognitive information (language, speech and communicative tables, diagrams);

- Development of skills in working with books, audio and video materials, computer programs;

- To get acquainted with international tests to determine the level of language proficiency;

- Communicative activity in English on the study of forms of independent monitoring of educational, communicative and cognitive effectiveness.

2. Innovative approaches in the process of teaching English.

It is important to highlight some of the technologies used in English language teaching practice.

I. 1) design technologies; 2) information technologies; 3) language portfolio technology; 4) modular block technologies.

II. 1) communication-oriented technologies; 2) installed technologies; 3) design technologies.

III. 1) student-oriented educational technology; 2) communicative learning technology; 3) computer technologies; 4) multimedia technology.

Person-centered technology.

In addition to addressing this issue, it provides practical experience in implementing student-centered learning.

In the process of getting acquainted with the technology, we found that it could not be fully used in the classroom system. It is this technology that can bring the process of foreign language teaching closer to the process of language acquisition in the natural

environment and direct the language to practice, creating in its basic parameters the microclimate of life in the listener on the basis of all real interpersonal relationships. Therefore, when studying the whole technology, we can only talk about the elements of person-centered technology that are being introduced into the practice of teaching English. The essence of person-centered technology is that the teacher does not have ready-made template methods for interacting with different students; it depends on the personality of the student, his interests, abilities and capabilities. Of course, this requires a comprehensive diagnosis.

### V. CONCLUSION

Modernity is increasingly driven by the need to teach practical English in everyday communication. Today, we can say with confidence that innovative approaches to teaching English, such as multimedia, computer, information technology, have a great advantage over traditional teaching methods. They allow you to teach different types of speaking activities and combine them in different combinations; assists in creating communicative situations, automating language and speech movements; implement an individual approach and contribute to the activation of the student's independent work.

### REFERENCES

- [1] QA Maxmutovich, GN Nematovna, SN Nabiyevna, NR Fayzulloevna; “Charles Dickens and William Thackeray: two styles of one genre, one period” International Journal of Psychosocial Rehabilitation (Indexed by Scopus) ISSN: 1475-7192 DOI: 10.37200/IJPR/V2413/PR200797; pages: 423-429.
- [2] Gafurova.N. “Modern problems of linguistics and methods of teaching English” Proceeding of The ICECRS INDONESIA November, Vol 4 (2019): International onference on World Science and Education. Case of Asia Articles
- [3] Gafurova.N.N. “General and modern linguistical features and their conditions in application” International Scientific Journal ISJ Theoretical & Applied Science Philadelphia, USA issue 04, volume 84 published April 30, 2020
- [4] Gafurova.N.N., Rashidov N.N.; “The role of the English language in the education system” “Buxoro islom madaniyatini modernizatsiyalash va turizimni barqaror rivojlantirish istiqbollari”; Xalqaro ilmiy-amaliy anjuman; 24-fevral 2020 yil Buxoro.
- [5] Juraeva M.M. Theoretical Views of Concept, Frame, Tale-Concept, Tale-Frame in Cognitive Linguistics. International Journal of Engineering and Advanced Technology (IJEAT) Volume-8, Issue-5S3, 2019. – P. 392-395. <https://www.ijeat.org/wp-content/uploads/papers/v8i5S3/E10840785S319.pdf>
- [6] Juraeva M.M. National-cultural similarities of uzbek and french folk tales. JCC Impact journals (ISSN (P): 2374-4564) International Journal of Research in Humanities, Arts and Literature. V. 3, Issue-2. IJRHAL. 2015. – P.51–56. [https://scholar.google.com/scholar?hl=ru&as\\_sdt=0%2C5&q=juraeva+malohat&btnG](https://scholar.google.com/scholar?hl=ru&as_sdt=0%2C5&q=juraeva+malohat&btnG)
- [7] Juraeva M.M. The national, cultural and linguocognitive peculiarities of modality of the french and uzbek fairytales. GIF. LangLit. An International Peer-reviewed Open Scess Journal. V.3, №2. 2016. India, 2016. – P. 81–86. [https://scholar.google.com/scholar?hl=ru&as\\_sdt=0%2C5&q=juraeva+malohat&btnG](https://scholar.google.com/scholar?hl=ru&as_sdt=0%2C5&q=juraeva+malohat&btnG)
- [8] Juraeva M.M. The use of modalities expressing national and cultural similarities in the Uzbek and French folk tales. МОЛОДОЙ УЧЁНЫЙ. ISSN 2072-0297. №8, 67. Молодой Учёный. Казань, 2014. – С. 947-950.
- [9] Juraeva M. Cognitive Peculiarities of Folk-Tales Structure in French and Uzbek Languages. Young Scientist USA. HUMANITIES. Lulu, 2014. – P. 68–70. <http://www.YoungScientistUSA.com/>
- [10] Juraeva, M., Bobokalonov, O. Pragmalinguistical study of french-uzbek medicinal plant terminology. Electronic journal of actual problems of modern science, education and training: Modern problems of philology and linguistics, 6(1), 2020. – Pp. 1-7.
- [11] 11. Shodiyeva I. “The process of developing a child’s self-awareness and motivation” International Journal on Integrated Education. Current Issue
- [12] Vol. 3 No. 4 (2020): IJIE Published Apr 4, 2020
- [13] A.G.Umarboyevna “Psychological characteristics of child game activity” International Journal on Integrated Education. Current Issue Vol. 3 No. 4 (2020): IJIE Published: Apr 4, 2020

- [14] Achilova R.A. "THE SEMANTIC VALUE OF ANTONOMASIA IN THE WORKS OF SHAKESPEARE". International Journal of Word Art. Volume 4, Issue 2. – Toshkent.,2021.- 6 p. ISSN 2181-9297
- [15] Achilova R.A. THE ROLE OF ANTONOMASIA IN THE PROSE OF ALISHER NAVOI. Scientific reports of Bukhara State University. Volume 6,- Bukhara.,2020.-188p.
- [16] Mamedova Madina Ashuraliyevna "THE ROLE OF COMPUTER TECHNOLOGIES IN TEACHING ENGLISH TO SECONDARY SCHOOL STUDENTS" Namangan Davlat Universiteti ilmiy axborotnomasi, 10-son, 2020 yil
- [17] Мамедова, М.А. 2020, Омонимия как одна из трудностей английского языка. Педагогик маҳорат. №5, ISSN 2181-6883, Бухара, Узбекистан.
- [18] Мамедова, М.А. 2020, Роль компьютерных технологий в обучении английскому языку учащихся общеобразовательных школ. Научный вестник Наманганского государственного университета №10. ISSN 2181-0427, Наманган, Узбекистан.
- [19] Mamedova, M.A. 2020, "Methodical features of teaching homonyms of English language using computer technology", International Journal of psychosocial Rehabilitation, ISSN: 1475- 7192, England.

# *Increasing The Credibility Of Forecasting Random Time Series Based On Fuzzy Inference Algorithms*

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**Abstract** – Methods for the identification of linear, nonlinear dependencies help models of fuzzy logic and neural network (NN), data preprocessing, design of a computational training scheme for a five-layer neuro fuzzy network (NFN) are proposed. A software and algorithmic complex has been implemented, including modules for computational circuits of the NFN, parametric and structural identification. The effectiveness of methods for forecasting random time series is shown using the example of numerical results.

**Keywords** – Random Time Series, Forecast, Fuzzy Model, Database, Knowledge Base, Neuro-Fuzzy Network, Identification, Optimization.

## RELEVANCE OF THE TOPIC

Existing models, algorithms for predicting random time series (RTS) are based on the use of methods for imitations dynamic processes based on complex analytical dependencies represented by various mathematical expressions such as differential, difference equations, etc. [1].

Finding an adequate model of the forecasting object in conditions of insufficient a priori information, parametric uncertainty becomes difficult to describe modeling task, which will be associated with complex calculations [2, 3].

An effective and promising approach to increasing the reliability of the forecast is to use the properties and features of random time series (RTS), fuzzy sets, models, fuzzy logic algorithms, neuro-fuzzy networks (NFN) [4, 5].

NFNs manifest themselves on the positive side when identifying and approximating non-stationary processes, large structure uncertainty, and limited information about the parameters.

Methods for forecasting RTS based on NFN require the implementation of modified computational schemes for structural and parametric identification, fuzzy logic models, and the use of a knowledge base (KB), including a wide set of fuzzy rules instead of complex analytical functions and equations describing a nonstationary process [6].

The formal model for the identification of RTS in the data mining system (DMS) based on the NFN is generally represented as

$$J = F(u(t - \Delta t), w, a), \tag{1}$$

where  $u(t - \Delta t)$  – parameter obtained to configure the process of identifying the RTS according to the values set in the previous step of the system execution;  $W$  – vector of unknown parameters and random disturbances;  $a$  – vector of known parameters.

When a priori information about the parameters, structure, properties, and distribution laws of the RTS is insufficient, or even absent, then in these cases an approach is considered effective, which is aimed at building methods and algorithms for increasing the reliability of the forecast based on the use of the properties of models of fuzzy inference.

The introduction of fuzzy modeling is due to the fact that modeling methods based on statistical approaches do not take into account complex nonlinearities, parameter measurement errors, information distortions, time delays in the real dynamics of nonstationary objects. Under these conditions, algorithms with fuzzy rules successfully perform the tasks of ensuring the accuracy of analysis and data processing, as well as increasing the reliability of the forecast of the RTS through the use of the unique properties of self-adaptation, self-organization, and approximation [7].

The system under study implements the Sugeno fuzzy inference model of zero-order and NN with five layers, which perform the following functions: the first layer - forms the terms of the input variables; the second layer - antecedents (premises) of fuzzy rules; the third layer - normalizes the degree of rule execution; the fourth layer is the conclusion of the rules; fifth layer - aggregation of the result obtained according to different rules [8].

NN training with the determination and adjustment of the parameters of the membership function (FP) is performed with backpropagation of the error according to the hybrid model, which is a combination of the least-squares method and the gradient method [9].

Initially, to execute the algorithm, the data set is transformed

$$X = [x_1, x_2, \dots, x_p] \tag{2}$$

Many

$$Z = [z_1, z_2, \dots, z_p], \tag{3}$$

represented in the range (-1, 1) with a uniform distribution law.

At the next stage, the input data normalization algorithm is implemented, which includes the following steps [10].

Step 1. Determine the mean and standard deviation of the set (3):

$$\bar{x} = \frac{1}{p} \sum_{i=1}^p x_i; \tag{4}$$

$$\sigma = \frac{1}{p} \sum_{i=1}^p (x_i - \bar{x})^2, \tag{5}$$

where  $p$  – number of RTS measurements;  $x_i$  – input variable ( $i = \overline{1 \dots p}$ );  $\bar{x}$  – average value;  $\sigma$  – standard deviation of the input variable.

Step 2. The set (3) is normalized according to the function:

$$z_i = \frac{2}{1 + \exp[-K(x_i - \bar{x})]} - 1 \tag{6}$$

where  $K$  – adjustable normalization factor;  $z$  – transformed variable.

Step 3. The entropy of the resulting set is determined by K. Shannon's formula:

$$H(Z) = -\sum_{j=1}^h P_j(z) \log P_j(z), \tag{7}$$

where  $h$  – the number of options in the variation range;  $P_j(z) = a_j / a$  – frequency of occurrence of variable  $z$  in the set;  $a_j$  – the number of measurements included in the training sample;  $a$  – total number of measurements.

Step 4. The  $K := K + 0,01$  coefficient is increased and steps 2 and 3 are recalculated until the functional (7).

The belonging of the transformed set to the range (-1,1) is guaranteed by function (6), and the uniformity of the distribution law is ensured by searching for the coefficient  $K$  by functional (7).

The next stage of training the NN is to launch the algorithm for determining the rational size of the training sample and the architecture of the NN [11].

The algorithm is presented in the following steps.

Step 1. The rational size of the training data set is determined by the formula

$$p \approx [2^d (4d + 1)]^2 / d, \tag{8}$$

where  $p$  – the number of measurements in the training sample;  $d$  – the size of the vector of measurements submitted for training.

Step 2. The number and values of nodes in the NNS layers are determined, when  $t_k \leq 0$  and  $m_k = 1$  according to the system:

$$\begin{cases} m_1 = (m_0 - t_1) / d, \\ m_2 = (m_1 + t_1 - t_2) / d, \\ m_3 = (m_2 + t_2 - t_3) / d, \\ \vdots \\ m_k = (m_{k-1} + t_{k-1} - t_k) / d. \end{cases} \tag{9}$$

$$M = [m_1, m_2, \dots, m_k],$$

where  $k$  – number of network layers;  $m_k$  – the number of nodes in the  $k$ -layer, rounded to the lower integer from division  $m_{k-1} / d$ ;  $t = m_{k-1} - d \cdot m_k$  – remainder of division, which determines the number of unused features in the  $k$ -layer and passing to the next layer  $m_0 = n$ .

Step 3. For the  $j$  node of the  $l$  layer, a training sample is formed:

$$y_i = [x_1, x_2, \dots, x_d]_{l,j,i}, \quad l = \overline{1 \dots k}, \quad j = \overline{1 \dots m_l}, \quad i = \overline{1 \dots p}. \tag{10}$$

In the work, the results of identification of a certain conditional technological indicator are obtained, at which the implemented algorithms for learning neural networks based on the Sugeno and Mamdani models are tested [12].

It is determined that the optimal value of the identification quality functional without the use of fuzzy rules is equal to 275; for the Sugeno fuzzy model - 675 and for the Mamdani fuzzy model - 650. The Sugeno model gives the best result when calculating the predictive reliability of the conditional RTS.

The results of testing the computational schemes of the network show that the problem of learning the neural network remains the possible "noise" of the training data. The implemented methods of training NN create an opportunity for automatic correction of the parameters of the RTS model and more accurate results of analysis and processing of information are obtained with strong variations in statistical parameters and non-stationary properties of the RTS.

### REFERENCES

- [1] Хайкин С. Нейронные сети: полный курс, 2-е издание.: Пер. с англ. – М.: Издательский дом «Вильямс», 2006. 1104 с.
- [2] Ярушкина Н.Г. Основы нечетких и гибридных систем: Учебное пособие. – М.: Финансы и статистика. 2004. 320 с.
- [3] Егупов Н.Д. Методы робастного, нейро-нечеткого и адаптивного управления. - М.: Изд-во МГТУ им. Баумана, 2002. - 744 с.
- [4] Жуманов И.И., Исроилов Н.О. Метод адаптивного контроля достоверности технологических параметров на основе нейро-нечеткой сети // Республиканская научно-техническая конференция «Перспективы развития информационных технологий и телекоммуникационных систем», ТУИТ, часть 1. – Ташкент, 2014. – с. 293-295
- [5] Жуманов И.И., Бекмуродов З.Т., Жумаёзов У.З. Оптимизация извлечения скрытых свойств и обработки данных нестационарных объектов на основе нечетких генетических алгоритмов // «Химическая технология. Контроль и управление», ТГТУ. - Ташкент, 2018. - № 1-2 (79-80). - с.125-131.
- [6] Жуманов И.И., Бекмуродов З.Т., Каюмова Н.М. Повышение достоверности обработки данных на основе нечеткой модели идентификации случайных временных процессов // Научно-методический журнал «Наука, техника и образование», Изд-во «Проблемы науки», Москва. №3(44), 2018. – с. 26-29.
- [7] Жуманов И.И., Бекмуродов З.Т., Прогнозирование нестационарных процессов на основе настройки параметров нечетких множеств генетическими операторами // «Илмий тадқиқотлар ахборотномаси» илмий-назарий, услубий журнал. – Самарқанд: СамДУ. - №3, 2014. – с. 48-55.
- [8] Жуманов И.И., Ахатов А.Р., Каршиев Х.Б. Оптимизация достоверности информации многомодульных систем управления на основе адаптивной нейро-нечеткой сети // XXVIII-XXIX Международная научно-практическая конференция «Научная дискуссия: вопросы технических наук», г. Москва, декабрь 2014 г.- с.47-53.
- [9] Жуманов И.И., Холмонов С.М. Нейронечеткая система контроля точности сигналов при управлении нестационарными объектами // «Илмий тадқиқотлар ахборотномаси» илмий-назарий, услубий журнал. – Самарқанд: СамДУ, 2012. - №3 (73) – 40-46 б.
- [10] Borgelt Ch. Neuro-Fuzzy-Systeme: von den Grundlagen kuenslicher Neuronaler Netze zur Kopplung mit Fuzzy- Systemen / Wiesbaden: Vieweg, 2003. - 434 p.
- [11] Nelles O. Nonlinear system identification with local linear neuro-fuzzy models / Aachen: Shaker, 1999. - 179 p.
- [12] Jumanov, I.I and Bekmurodov, Z.T. Methods of optimizing data processing based on fuzzy correction of time series elements and variable identification models // Chemical Technology, Control and Management: Vol. 2018 : Iss. 2 , Article 15. DOI: <https://doi.org/10.34920/2018.3.78-84>

# *Urotensin-2 Receptor Antagonist - Palosuran Decreases Blood Pressure And Plasma Renin Concentration In Laboratory Rats With Renovascular Hypertension*

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**Abstract – We were aimed to study effects of the Urotensin-2 receptor antagonist - Palosuran on blood pressure and plasma rennin concentration in laboratory rats with renovascular hypertension (2 kidneys + 1 clip). Blood pressure was measured using noninvasive “tail cuff” method.**

**Studies have shown that in experimental rats palosuran (10 mg/kg/daily, during 4 weeks) reveal hypotensive effect. Blood pressure was decreased even after administration NO-synthase inhibitor - L-NAME (10 mg/kg, single dose), supposedly due to its urotensin-2 receptor antagonistic properties.**

**In hypertensive rats plasma renin concentration was increased progressively compared to the data of healthy rats. In palosuran-treated hypertensive rats renin concentration was significantly lower than in untreated hypertensive rats. Decreased renin concentration was maintained after administration of L-NAME, except during the late-onset of treatment.**

**It could be concluded that in experimental rats with renovascular hypertension the vasodilatory effect of palosuran outweighs the inhibitory effect of L-NAME on NO production and urotensin-induced endothelium-independent vasoconstrictive effect, especially at the early stages and early onset of treatment of hypertension. Palosuran might represent a new therapeutic option in individuals with hypertension disease.**

**Keywords – Renovascular hypertension, urotensin-II receptors, renin, palosuran, L-NAME.**



## I. INTRODUCTION

According to the World Health Organization, arterial hypertension is a serious medical condition that can increase the risk of heart, brain, kidney and other diseases. About 26% of the population dies each year due to arterial hypertension. It is a major cause of premature death worldwide. A review of current trends shows that the number of adults with hypertension increased from 594 million in 1975 to 1.13 billion in 2015. WHO estimates that 54% of strokes and 47% of cases of ischemic heart disease are the direct consequence of high blood pressure, which thus takes its place among the main risk factors for cardiovascular morbidity and mortality [1].

The objectives of antihypertensive treatment are to prevent the occurrence/progression/recurrence of cardiovascular disease related to sustained high blood pressure, reduce mortality and help patients with hypertension lead their lives as normally as do healthy people [2]. The prescription of antihypertensive drugs to achieve the recommended target blood pressures remains the main step of the management of hypertensive patients. Drugs, targeting BP must be well tolerated, economically affordable, and simple to take, thus supporting long-term persistence [3].

Nowadays, four major classes of antihypertensive drugs are available: diuretics, calcium antagonists, blockers of the renin-angiotensin system (RAS), and beta blockers. Despite their ability to lower blood pressure, significantly improve the long-term prognosis of patients and reduce cardiovascular outcomes, it is important to consider the tolerability profile of antihypertensive drugs as tolerability is the major determinant of the long-term persistence on therapy and side effects. For instance, Diuretics/Thiazides may produce hyponatraemia, hypokalaemia, hyperuricaemia, increase in cholesterol and LDL, serum creatinine/urea, risk of diabetes. Patients may suffer with weakness, muscle cramps, impotence, gout attacks. Antialdosterone diuretics may lead to dizziness, drowsiness, allergic reactions, sexual disturbances, nausea, vomiting, hyperkalaemia. ACE inhibitors result in persistent dry cough, angio-oedema, dry mouth, nausea, rash, hyperkalemia, increased serum creatinine. Hyperkalaemia, increased serum creatinine, nausea, dry mouth, abdominal pain are common manifestations of Angiotensin receptor blockers. Calcium antagonists/dihydropyridines result in peripheral edema, headache, flushing, palpitations, constipation, nausea, gingival hyperplasia. Beta blockers Increase risk of diabetes, increase triglycerides, decrease HDL, aggravate asthma, produce fatigue, insomnia, nightmares, reduced ability to exercise, rash, weight gain [4]. Thus, could be said that the problem of effective treatment of arterial hypertension has not lost its importance and its solution in a particular clinical situation often remains very difficult.

In recent years, the interest of researchers and scientists in cyclic vasoactive neuropeptide urotensin-2 has increased significantly. The role of the UII system in human pathophysiology is not yet fully understood. Urotensin-II (U-II), as a regulator of vascular tone, is found in the cardiovascular and central nervous systems, kidneys, lungs, liver, ovaries, endocrine glands and is involved in many physiological and pathological processes [5], [6], [7], [8], [9]. Circulating blood levels of human UR-II, the most potent vasoconstrictor peptide identified to date, are increased in patients with essential hypertension. U-II binds to the U-receptor, activates the Gq-protein, and induces activation of the inositol-triphosphate cycle by phospholipase-C activation [10], [11]. U-II is a more potent vasoconstrictor than endothelin-1, vasopressin, and vasoconstrictor prostaglandins. U-II acts as an endothelium-independent vasoconstrictor and endothelium-dependent vasodilator [12], [13], [14], [15], [16].

Vasoconstriction is mediated by receptors on smooth muscle cells (SMCs) and appears to be variable and highly dependent on the vascular bed, whereas vasodilation is endothelium-mediated [17]. However, in a disease state of chronic heart failure or essential hypertension, U-II loses its dilatory ability [18]. It is understood that such a loss and dysfunction of endothelial cells would favor a contractile response over a relaxant one [19].

Increased levels of U-II and over expression of urotensin receptors (UTR) detected during hypertension, heart failure, diabetes, portal hypertension, and renal failure, suggest that U-II/UTR system may play a crucial role in the development of these diseases [20], [21]. In this regard, investigation of UTR antagonists seems interesting and prospective in treatment of hypertension and other diseases accompanying hypertension.

Palosuran is a non-peptide UTR antagonist with promise in drug development has been developed to inhibit the accumulation of calcium by U-II and the phosphorylation of mitogen-activated protein kinase. Data in the literature on the use of palosuran in hypertensive individuals are scarce and mutually exclusive [22], [23], [24], [25]. In rat models of acute renal failure and diabetes,

palosuran significantly improved renal function, decreased the number of tubular and tubulointerstitial lesions and improved survival [26].

Based on all of the above, it is interesting to study the effect of urotensin receptor antagonist - Palosuran on blood pressure in laboratory rats with experimental arterial hypertension.

## **II. MATERIALS AND METHODS**

The study was performed on male Wistar rats weighing 200-250 g. after an adaptation period of at least 1 week. All rats were housed in the lab as a group of eight per cage in climate-controlled conditions with a 12-h light/dark cycle and free access to normal pelleted rat chow and drinking water. The protocol used in this study for the use of rats as the animal model for research was overseen and approved by the Tbilisi State Medical University Animal Welfare and Use Ethics Committee (N39 - 17/08/2019).

For experimental modelling of hypertension we used the Reno-vascular (the two-kidney, one-clip - 2K1C) H. Goldblatt model [27], [28], [29]. Under general anaesthesia (Nembutal - 50 mg / kg), after separation of the renal artery from the vein and nerve, the silver clip (0.2 mm internal diameter) was placed on the left renal artery close to the aorta.

The experimental animals were divided into 3 groups: Group I - healthy, intact rats; Group II - hypertensive rats; Group III - hypertensive rats, subjected to treatment with palosuran, started after 4 weeks of disease modelling; Group IV - hypertensive rats, subjected to treatment with palosuran, started after 8 weeks of disease modelling. Palosuran was injected intraperitoneally with the dose of 10 mg/kg, daily, during 4 weeks.

In the groups II and III rats, NO-synthase inhibitor - L-NAME (10 mg/kg, single dose) was administered intraperitoneally also after completion of the treatment with palosuran.

Systemic arterial pressure (systolic pressure, diastolic pressure) was measured once a week for 12 weeks using arterial pressure measurement system "Систола" (non-invasive tail-cuff method for BP measurement). The mean arterial pressure was calculated. Plasma renin concentration was determined using ELISA (HumaStar HS).

All statistical tests were conducted using IBM SPSS Statistics. Differences between control and treated animals were determined by using the Independent-Samples T test. The criterion for significance was set to  $P < 0.05$ .

## **III. RESULTS**

In experimental rats at different stages of the renovascular hypertension changes in mean arterial pressure (MAP) was detected compared to MAP of the group 1 animals (healthy rats).

Results of experiment (Tab. N1, N2) have shown that after 1 week of disease modelling, MAP was not increased significantly, after 2 weeks - MAP increased by 24% ( $p < 0.05$ ), after 4 weeks, MAP increased by 42% ( $p < 0.02$ ), after 8 weeks there was a significant increase in MAP by 44% ( $p < 0.02$ ) and after 12 weeks of disease modelling, MAP was increased by 53% ( $p < 0.001$ ) compared to MAP of the group 1 animals;

In healthy rats, after administration of palosuran the MAP reduced by 33% ( $p < 0.02$ ). On the background of palosuran after injection of L-NAME, there was a 23% increase in MAP compared to palosuran-treated rats, and a statistically unreliable decrease of MAP by 17% compared to data from healthy rats.

In hypertensive rats after treatment with palosuran started on the 4<sup>th</sup> weeks of disease modelling on the 8<sup>th</sup> weeks of hypertension MAP was reduced by 32% ( $p < 0.001$ ) compared to control, untreated hypertensive rats.

L-NAME on the background of palosuran have shown increase tendency of MAP by 18% compared to palosuran-treated rats and statistically significant reduction of MAP by 20% ( $p < 0.02$ ) compared to MAP of the group I animals.

In hypertensive rats, after treatment with palosuran started on the 8<sup>th</sup> weeks of disease modelling on the 12<sup>th</sup> weeks of hypertension, palosuran revealed relatively less effect on MAP than at treatment started earlier. However, MAP was still reduced significantly by 23% ( $p < 0.02$ ) compared to control group (untreated, hypertensive rats).

After administration of L-NAME on the background of palosuran there was a 16% increase tendency in MAP compared to palosuran-treated rats and compared to untreated rats, the decrease in MAP by 10% was not statistically significant also.

Table N1. Systolic and diastolic blood pressure in healthy and hypertensive rats after treatment with Palosuran and L-NAME injections at different stages of renovascular hypertension.

N	Groups		Systemic Blood Pressure (mm/Hg)		
			Without treatment	Palosuran	Palosuran + L-NAME
1	Healthy rats	Systole	110 ± 3,4	81 ± 4,1**	98± 3,2
		Diastole	87± 4,8	55 ± 3,1**	69± 4,2*
2	1 week after hypertension modeling	Systole	114± 4,1	-	-
		Diastole	91± 4,5	-	-
3	2 weeks after hypertension modeling	Systole	159 ± 2,7**	-	-
		Diastole	98 ± 4,2*	-	-
4	3 weeks after hypertension modeling	Systole	117± 5,7	-	-
		Diastole	93 ± 4,5	-	-
5	4 weeks after hypertension modeling	Systole	185 ± 9,3**	-	-
		Diastole	110 ± 5,4**	-	-
6	Treatment started after 4 weeks of hypertension modeling - 8 <sup>th</sup> week	Systole	192 ± 9,3**	134 ± 5,7***	143 ± 11,3**
		Diastole	110 ± 5,4**	72 ± 3,1**	94± 4,3**
7	Treatment started after 8 weeks of hypertension modeling - 12 <sup>th</sup> week	Systole	205 ± 10,1***	149± 8,1**	181± 10,7
		Diastole	115 ± 7,1***	94± 5,2**	104± 6,1

\*- p<0.02; \*\*- p<0.01; \*\*\*- p<0.001

Table N2. Mean arterial pressure (MAP) in healthy and hypertensive rats after treatment with Palosuran and L-NAME injections at different stages of renovascular hypertension.

N	Groups		Mean Arterial Pressure – MAP (mm/Hg)		
			Before treatment	Palosuran	Palosuran + L-NAME
1	Healthy rats	95 ± 3,1	64± 3,0**	79± 2,5	

2	1 week after modeling hypertension	97±3,5	-	-
3	2 weeks after modeling hypertension	118±4,1*	-	-
4	3 weeks after modeling hypertension	101 ±9,2	-	-
5	4 weeks after modeling of hypertension	135 ± 10,0**	-	-
6	8 weeks after modeling of hypertension	137± 8,3**	93 ± 5,5***	110± 8,2**
7	12 weeks after modeling of hypertension	145 ± 10,0***	112± 7,2**	130±9,5

\*-  $p < 0.05$ ; \*\* -  $p < 0.01$ ; \*\*\* -  $p < 0.00$

#### IV. DISCUSSION

As the results of study have shown, 1 week after hypertension modeling, only a tendency for an increase in MAP was observed, while a statistically significant increase in blood pressure was created after 2 weeks of disease modeling. After 4 weeks, progressive increase in blood pressure was reliable and statistically significant.

The increase in blood pressure at renovascular hypertension first of all develops due to the renal artery ischemia in the clipped kidney leading to hypoxia, activation of the renin-angiotensin-aldosterone system (RAAS), total peripheral vasoconstriction and water retention.

3 weeks after modelling of hypertension, reduction in MAP could be explained by the compensatory reaction of the second, intact kidney, decreasing rennin production and inhibiting RAAS system to restore homeostasis. However, on the 4 weeks of renovascular hypertension, compensatory reaction of the intact kidney fades away, pressure regulatory system unable to maintain the blood pressure within the normal range and it increases significantly. At this stage of hypertension, increased blood pressure and MAP manifested in experimental animals supposedly is caused due to the complex action of RAAS and activated sympathetic nervous system. The latter, results in further increase in renin production and peripheral vasoconstriction.

After treatment with palosuran, the blood pressure significantly was decreased in all study groups. The antihypertensive effect of palosuran was demonstrated in both cases, at early treatment (started after 4 weeks of renovascular hypertension modeling) and at relatively late treatment (started after 8 weeks of hypertension modeling) of hypertensive rats.

Palosuran is known to have an antagonistic effect on U-II receptors, thereby reducing the vasoconstrictive effect of U-II. According to the literature, U-II in a small doses induce the active production of NO (by activating NO-synthase) and consequently, the dilation of blood vessels as an endothelium-dependent vasodilator. This phenomenon can explain the decline in MAP in all study groups of experimental animals [30].

After administration of L-NAME there was not a statistically significant increase in MAP compared to animals treated with palosuran, while MAP was decreased compared to control, untreated hypertensive rats, but this decrease was statistically significant only in group of rats, where treatment was started earlier.

After administration of L-NAME, as NO-synthase inhibitor, a significant increase in blood pressure was expected compared to the data of the control group animals. But, experiments revealed just the opposite reaction in palosuran-treated rats, especially in case of the early-onset of treatment. This may be explained by the fact that palosuran inhibiting the effect of urotensin is likely increased NO production thereby inhibiting the vasoconstrictive effect of L-NAME.

## Urotensin-2 Receptor Antagonist - Palosuran Decreases Blood Pressure And Plasma Renin Concentration In Laboratory Rats With Renovascular Hypertension

In case of treatment started relatively later, the antihypertensive effect of palosuran was less manifested. We suppose that damaging effects of hypertension on blood vessels increase production of U-II and enhance the endothelium-independent vasoconstrictive effect of urotensin [31].

In experimental rats the plasma rennin concentration (PR) at different stages of modelling of renovascular hypertension was changed compared to the norm (tab N3). In particular, after 1 week of disease modelling, there was a tendency of increase in PR by 4%; On 2<sup>nd</sup> week, PR was increased significantly by 45% ( $p < 0.01$ ); In the 3<sup>rd</sup> weeks of hypertension increase in PR was relatively less - 42% ( $p < 0.01$ ). By the 4<sup>th</sup> week PR decreased and it was not statistically different compared to the norm; After 8 weeks, the PR increased by 162% ( $p < 0.001$ ) and after 12 weeks the PR was increased extremely by 234% ( $p < 0,001$ ).

In healthy rats after administration of palosuran decrease in PR by 12% was not statistically significant. Administration of L-NAME in rats treated with palosuran showed only a tendency of increase in PR by 9% also, and compared to untreated hypertensive rats, decrease in PR by 4% PR was not statistically significant as well.

In hypertensive rats treated with palosuran started 4 weeks after disease modelling, by the 8<sup>th</sup> week of hypertension, palosuran induced a statistically significant decrease in PR by 33% ( $p < 0.01$ ) compared to data from hypertensive, untreated rats. Administration of L-NAME in rats treated with palosuran showed a tendency of increase in PR by 9%. PR was reduced by 26% ( $p < 0,05$ ) compared to data of untreated hypertensive rats.

In hypertensive rats subjected to treatment with palosuran, started after 8 weeks of disease modelling, on the 12th week of hypertension PR was decreased by 24% ( $p < 0.01$ ) compared to control, untreated rats. In treated rats injection of L-NAME increased PR by 30%. Compared to the control, untreated rats, effect of L-NAME on PR was not statistically significant.

Table N3 Plasma Renin concentration (PR) in healthy and hypertensive rats at different stages of hypertension after treatment with palosuran and injections of L-NAME.

N	Groups	Renin – PR (ng / ml)		
		Before treatment	+ Palosuran	Palosuran + L-NAME
1	Healthy rats	1,72 ± 0,5	1,52 ± 0,3	1,65 ± 0,4
2	1 week after hypertension modeling	1,79 ± 0,3	-	-
3	2 weeks after hypertension modeling	2,49 ± 0,4**	-	-
4	3 weeks after hypertension modeling	2,45 ± 1,3**	-	-
5	4 weeks after hypertension modeling	1,94 ± 0,1	-	-
6	8 weeks after hypertension modeling	4,5 ± 1,4***	3,02 ± 0,9**	3,32 ± 0,5*
7	12 weeks after hypertension modeling	5,75 ± 1,5***	4,39 ± 1,5**	5,71 ± 1,2

\* –  $p < 0,05$ , \*\* –  $p < 0,01$ , \*\*\* –  $p < 0,001$

Thus, the experiment revealed that changes in PR were observed at different stages of modelling of renovascular arterial hypertension, compared to PR in hypertensive rats. In particular, by the 2nd and 3rd weeks after disease modelling, PR was increased almost uniformly compared to the norm, 1.45-fold and 1.42-fold, most likely due to renal ischemia.

4 weeks after modelling of hypertension PR decreased and it was not different from the PR of healthy rats. Although PR was within the normal range that could be explained by a second, intact kidney-compensatory mechanism decreasing renin production [32], [33], the BP was remained at high levels.

High arterial pressure which was revealed by experiment in the presence of relatively low PR could be explained by increase in blood osmotic pressure, increase in circulating blood volume and increase in vascular basal tone due to hyperproduction of aldosterone, leading to the increased sodium reabsorption with further increase in blood osmolality and increased production of antidiuretic hormone, stimulating secretion of adrenocorticotrophic hormone and potentiating peripheral vasoconstriction [34], [35].

The increase in basal tone supposedly is caused by an increase in the amount of sodium in the blood vessel walls, leading to the water retention causing their swelling and thickening. In addition, sodium increases the sensitivity of  $\alpha$ -adrenoceptors in blood vessel walls in response to catecholamine. Aldosterone also facilitates the release of norepinephrine from the sympathetic nerve endings and as a result, increases vascular neurogenic tone also [36], [37].

By the 8th week of disease modelling, PR was increased 2,6-fold compared to the norm, and 3.34-fold by the 12th week of hypertension correlating with the data of systemic blood pressure and MAP.

Palosuran produced significant decrease in PR in all study group animals compared to control (especially in case of early onset of treatment), except in healthy rats, where only a tendency of decrease in PR was observed.

In healthy rats after administration of palosuran arterial pressure and PR were not changed significantly that could be explained by the fact that urotensin production is relatively low in healthy rats, hence the effects of the palosuran is less respectively. It should also be noted that in healthy rats, both palosuran and L-NAME were administered at a single dose and samples were taken 2 hours after injection of preparations. The hypotensive effect of palosuran supposedly develops due to its vasodilatory effect, which later is reflected on renin production. Probably, this short period of time (2 hours) at single administration of the drugs is not sufficient for the reliable changes in PR. The same could be said for the tendency of increase in PR after injection of L-NAME in treated rats.

The decreasing effect of palosuran on PR was revealed in both, early-onset and late-onset of treatment by 8<sup>th</sup> and 12<sup>th</sup> weeks of hypertension, but PR was significantly lower at early onset of treatment than at late-onset of treatment.

## V. CONCLUSION:

Based on the results of experiments could be concluded that palosuran reveals the hypotensive effect in both, healthy and hypertensive rats. The vasodilating effect of palosuran exceeds the inhibitory effect of L-NAME on NO and the urotensin-induced endothelium-independent vasoconstrictive effect, especially in the early stages of hypertension. At stable hypertension the PR progressively increases compared to the norm. Palosuran significantly decreases PR compared to untreated, hypertensive rats, which is maintained in case of administration of L-NAME, except for late-onset of treatment. Palosuran might represent a new therapeutic option in individuals with hypertension disease.

## REFERENCES

- [1] Lawes CM, Vander Hoorn S, Rodgers A. Global burden of blood-pressure-related disease, 2001. *Lancet*. 2008;371:1513–1518;
- [2] *Hypertension Research* 2014;37:279–285;
- [3] Burnier M., Kjeldsen S., Heagerty A., Williams B. Drug treatment of hypertension Oxford Medicine Online <https://oxfordmedicine.com/view/10.1093/med/9780198784906.001.0001/med-9780198784906-chapter-569>;
- [4] Podzolkov V., Tarzimanova A., Georgadze Z. Modern Principles of Treatment of Uncontrolled Hypertension. *Rational Pharmacotherapy in Cardiology Home*. 2019; 15(5): 736-741;

- [5] Suguro T, Watanabe T, Ban Y, et al. Increased human urotensin II levels are correlated with carotid atherosclerosis in essential hypertension. *Am J Hypertens.* 2007 Feb; 20(2):211-7;
- [6] Totsune K, Takahashi K, Arihara Z, et al. Elevated plasma levels of immunoreactive urotensin II and its increased urinary excretion in patients with Type 2 diabetes mellitus: association with progress of diabetic nephropathy. *Peptides.* 2004 Oct; 25(10):1809-14;
- [7] Bousette N., Hu F., Ohlstein E. H., Dhanak D., Douglas S. A., Giaid A. Urotensin-II blockade with SB-611812 attenuates cardiac dysfunction in a rat model of coronary artery ligation. *J. Mol. Cell. (2006). Cardiol.* 41, 285–295.10.1016/j.yjmcc.2006.05.008;
- [8] Desai N, Sajjad J, Frishman WH. Urotensin II: a new pharmacologic target in the treatment of cardiovascular disease. *Cardiol Rev.* 2008 May-Jun; 16(3):142-53;
- [9] Suguro T, Watanabe T, Ban Y, et al. Increased human urotensin II levels are correlated with carotid atherosclerosis in essential hypertension. *Am J Hypertens.* 2007 Feb; 20(2):211-7;
- [10] Douglas SA, Ohlstein EH. Human urotensin-II, the most potent mammalian vasoconstrictor identified to date, as a therapeutic target for the management of cardiovascular disease., *Trends Cardiovasc Med.* 2000 Aug; 10(6):229-37;
- [11] Gardiner SM, March JE, Kemp PA, et al. Regional heterogeneity in the haemodynamic responses to urotensin II infusion in relation to UT receptor localisation. *J Pharmacol.* 2006 Mar; 147(6):612-21;
- [12] Lapp H, Boerrigter G, Costello-Boerrigter LC, et al. Elevated plasma human urotensin-II-like immunoreactivity in ischemic cardiomyopathy. *Int J Cardiol.* 2004 Mar; 94(1):93-7;
- [13] Bottrill FE, Douglas SA, Hiley CR, White R, Br. Human urotensin-II is an endothelium-dependent vasodilator in rat small arteries. *J Pharmacol.* 2000 Aug; 130(8):1865-70;
- [14] Matsushita M, Shichiri M, Imai T, et al. Co-expression of urotensin II and its receptor (GPR14) in human cardiovascular and renal tissues. *J Hypertens.* 2001 Dec; 19(12):2185-90;
- [15] Maguire JJ, Davenport AP. Is urotensin-II the new endothelin? *Br J Pharmacol* 137: 579–588, 2002;
- [16] Douglas S. A., Dhanak D., Johns D. G. From “gills to pills”: urotensin-II as a regulator of mammalian cardiorenal function. *Trends Pharmacol. Sci.* 2004; 25:76–85.10.1016/j.tips.2003.12.005.
- [17] Sondermeijer B., Komp A., Komesaroff P., Krum H. Effects of exogenous urotensin-II on vascular tone in skin microcirculation of patients with essential hypertension. *Am.J. Hypertens.* 2005; 22:1341–1344
- [18] Lim et al., 2004 Lim M., Honisett S., Sparkes C. D., Komesaroff P., Kompa A., Krum H. Differential effect of urotensin II on vascular tone in normal subjects and patients with chronic heart failure. *Circulation.* 2004; 109, 1212–1214;
- [19] American Journal of Hypertension. *Am J Hypertens* 2007;20: 211–217;
- [20] Lim M, Honisett S, Sparkes CD, et al. Differential effect of urotensin II on vascular tone in normal subjects and patients with chronic heart failure. *Circulation.* 2004 Mar 16; 109(10):1212-4;
- [21] Clozel M, Hess P, Qiu C, Ding SS, Rey M J. The urotensin-II receptor antagonist palosuran improves pancreatic and renal function in diabetic rats. *Pharmacol Exp Ther.* 2006 Mar; 316(3):1115-21;
- [22] Pehlivan Y, Turkbeyler IH, et al. Urotensin inhibition with palosuran could be a promising alternative in pulmonary arterial hypertension. *Onat AM1, Hypertension.* 2010; 55 (5):1206-9;
- [23] Sidharta PN, Wagner FD, Bohnemeier H, et al. Pharmacodynamics and pharmacokinetics of the urotensin II receptor antagonist palosuran in macroalbuminuric, diabetic patients. *Clin Pharmacol Ther.* 2006 Sep; 80(3):246-56;
- [24] Vogt L1, Chiurchiu C, Chadha-Boreham H. et al. Effect of the urotensin receptor antagonist palosuran in hypertensive patients. *Trends Pharmacol Sci.* 2004 Feb; 25(2):76-85;

- [25] Clozel M, Binkert C, Birker-Robaczewska M, et al. Pharmacology of the urotensin-II receptor antagonist palosuran (ACT-058362; 1-[2-(4-benzyl-4-hydroxy-piperidin-1-yl)-ethyl]-3-(2-methyl-quinolin-4-yl)-urea sulfate salt): first demonstration of a pathophysiological role of the urotensin system. *J Pharmacol Exp Ther.* 2004; 311: 204–212;
- [26] Clozel M, Hess P, Qiu C, Ding SS, Rey M. The urotensin-II receptor antagonist palosuran improves pancreatic and renal function in diabetic rats. *J Pharmacol Exp Ther.* 2006; 316: 1115–1121;
- [27] Goldblatt P. The Goldblatt experiment: a conceptual paradigm. In: *Hypertension: Pathophysiology, Diagnosis and Management*, edited by J. H. Laragh and B. M. Brenner. New York: Raven, 1995; pp. 23–35;
- [28] Mitchell K., Navar L.. Intrarenal actions of angiotensin II in the pathogenesis of experimental hypertension. In: *Hypertension: Pathophysiology, Diagnosis, and Management*, edited by J. H. Laragh and B. M. Brenner. New York: Raven, 1995, pp.1437–1450;
- [29] Ploth D. Angiotensin-dependent renal mechanisms in two-kidney one-clip renal vascular hypertension. *Am. J. Physiol.* 245 (Renal Fluid Electrolyte Physiol. 14): F131–F141, 1983).
- [30] Ishihata A, Ogaki T, Aita T, Katano Y. Role of prostaglandins in urotensin II-induced vasodilatation in the coronary arteries of aged rats. *Eur J Pharmacol* 523: 119–126, 2005;
- [31] Lin L., Ding WH., Jiang W., Zhang YG., Qi YF., Yuan WJ., Tang CS. Urotensin-II activates L-arginine/nitric oxide pathway in isolated rat aortic adventitia. *Peptides* 25: 1977–1984, 2004;
- [32] Katano Y, Ishihata A, Aita T, Ogaki T, Horie T. Vasodilator effect of urotensin II, one of the most potent vasoconstricting factors, on rat coronary arteries. *Eur J Pharmacol* 402: 209–211, 2000;
- [33] Gibson A. Complex effects of Gillichthys urotensin II on rat aortic strips. *Br J Pharmacol* 91: 205–212, 1987;
- [34] Kimiko Ishiguro, Hiroyuki Sasamura, Yusuke Sakamaki, Hiroshi Itoh, Takao Saruta. Developmental Activity of the Renin-Angiotensin System during the “Critical Period” Modulates Later L-NAME–Induced Hypertension and Renal Injury. *Hypertension Research.* 2007, p.30–75;
- [35] Liffert Vogt, Carlos Chiurchiu, Harbajan Chadha-Boreham, et al. Effect of the Urotensin Receptor Antagonist Palosuran in Hypertensive Patients With Type 2 Diabetic Nephropathy. *Hypertension.* 2010;55:1206-1209;
- [36] Wendy J. Bottinor, Megan M. Shuey, Ali Manouchehri, et al. Renin-Angiotensin-Aldosterone System Modulates Blood Pressure Response During Vascular Endothelial Growth Factor Receptor Inhibition. *JACC: CARDIOONCOLOGY*, 2019;1(1); <http://creativecommons.org/licenses/by-nc-nd/4.0/>;
- [37] Marisa K. Ames, Clarke E. Atkins, Bertram Pitt. The renin-angiotensin-aldosterone system and its suppression. *J Vet Intern Med.* 2019;33(2):



# *The Effects of *Tinospora Crispa* Aqueous Extract on C - reactive protein Level and Development of Atherosclerotic Plaques*

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**Abstract** – *Tinospora crispa* is reported to have anti-atherosclerotic effects and has great potential for use in traditional medicine, supplements and pharmaceutical preparations. However, to date there is not much literature documenting the effects of this plant on C-reactive protein and the development of atherosclerotic plaques in the event of hypercholesterolemia. Therefore, this study aimed to examine the effect of *Tinospora crispa* aqueous extract (TCAE) on C-reactive protein levels and the development of atherosclerotic plaques to better understand the possible mechanisms contributing to the anti-atherosclerotic effects of this plant. The results showed that TCAE was found to inhibit the development of atherosclerotic plaques caused by dietary cholesterol. The anti-atherosclerotic potential of TCAE is demonstrated by its ability to reduce CRP levels, atherosclerotic plaque coverage area and foam cell thickness at atherosclerotic lesions and maintain endothelial healing after arterial injury. Administration of 450 mg / kg of *T. crispa* extract was found to be the optimal concentration to control hypercholesterolemia and in turn reduce the risk factors of coronary artery disease.

**Keywords** – *Tinospora Crispa*, Hypercholesterolemic Rabbits, C-Reactive Protein, Atherosclerosis.

## I. INTRODUCTION

Preliminary evidence suggests that elevated plasma levels of C-reactive protein (CRP) have become one of the strongest independent predictors in the development of atherosclerosis and coronary heart disease (CVD) [1]. CRP directly participates in the process of atherogenesis by modulating endothelial function and its concentration known to predict cardiovascular events [2]. Higher concentrations of CRP are associated with increased levels of serum triglycerides (TG) [3]. Thus, CRP may play a direct role in promoting the inflammatory component of atherosclerosis, and reduction of therapeutic CRP has the potential to be targeted for the treatment of atherosclerosis [4].

High concentrations of plasma low density lipoprotein (LDL) cholesterol and high plasma triglycerides (TG) or known as hypercholesterolemia are major risk factors for the development of atherosclerosis and cardiovascular disease (CVD) [5]. Atherosclerosis, characterized by chronic inflammation in arteries, involves the accumulation of oxidized lipoproteins (OxLDL), an increased number of inflammatory cells (monocytes and lymphocytes), and infiltration of macrophages and degeneration of the arterial intima (Jain & Joshi [6] Accumulation of OxLDL and other substances, promotes the immune system cells [7] to migrate

into the layers of the endothelium causes the breakdown of various substances and the attraction of LDL cholesterol particles to the site [8]. These LDL particles are further engulfed by monocytes, which then differentiate into macrophages (foam cells) leading to the formation of atherosclerotic lesions [9]. These lesions, known as atheromatous plaques, enlarge as cells and lipids accumulate in them, and begin to swell into the vessel lumen, consequent to the rupture of the plaque, thus causes lipid fragments and cellular debris released into the vessel lumen [10]. These particles are exposed to thrombogenic agents on the endothelial surface, resulting in the formation of thrombus, or blood clot. If the thrombus is large enough to block circulation of coronary or cerebral blood vessels, this results in a heart attack or stroke [11]. Atherosclerosis complications often occur suddenly, and they can seriously jeopardize patients' lives [12], and therefore any interventions aimed at reducing hypercholesterolemia are of great interest.

*Tinospora crispa* is a climber that can be found in primary rainforest of South East Asia including Malaysia, Indonesia, Thailand and Vietnam. Studies showed that the crude extracts and isolated compounds of *T. crispa* possessed a broad range of pharmacological activities such as cardioprotective, anti-diabetic, anti-inflammatory, antioxidant, immunomodulatory, cytotoxic and antimalarial activities [13]. Moreover, it was discovered that *T. crispa* possessed an anti-hypercholesterolemic activity and is beneficial in preventing the heart-related diseases [14], [15].

However, to date there is not much literature documenting the effects of aqueous extract of *T. crispa* on C-reactive protein and its anti-atherosclerotic effects in the event of hypercholesterolemia. Therefore, this study was aimed at measuring the level of C-reactive protein as an inflammatory marker, in addition with a histological analysis of the aorta to further understand the possible mechanism contributing to the anti-atherosclerotic effects of TCAE.

## II. OBJECTIVES

The objectives were to assess the role of CRP in the development of atherosclerosis and to assess the atherosclerotic plaque formation in hypercholesterolemic induced rabbits supplemented with TCAE.

## III. MATERIALS AND METHODS

### 3.1 Collection of Raw Material and Preparation of TCAE

About 10kg of fresh stem of *Tinospora crispa* were collected from Forest Research Institute Malaysia (FRIM) at Kepong, Selangor. The plant was authenticated by FRIM botanist (Voucher number: SBID009/15). The stems were cleaned, washed, cut and dried using an oven dryer with operating temperatures of about 55°C. The weight of the samples was monitored every day until constant weight was obtained. Subsequently, the dried stems of the plant are ground to a particle size of about 1 to about 4 mm by using a 20 hp pilot scale grinder. The ground stem sample is kept at room temperature in a sealed environment prior to the extraction process.

The grounded stems of *T. crispa* were extracted with reverse osmosis water. The extraction processes used were 60° C temperature, 1:15 g/ml solvent to solid ratio and 1 hour of extraction time. The liquid extract then was filtered through Whatman No 1 filter paper (Whatman plc, Maidstone, UK). The filtrate was collected, and excess water was evaporated under reduced pressure using freeze dryer.

### 3.2 Animals and Experimental Procedures

Forty two (42) healthy adult male New Zealand White rabbits (East Asia Rabbits, Malaysia) with initial mean weighting between 2.5 to 3.0 kg were used in the experiments. The animals were randomly housed in individual cages with free access to food and water with a regular light/dark cycle and under room temperature ( $28 \pm 2^\circ\text{C}$ , relative humidity 60-70 %) for 2 weeks for acclimatization before commencement of administration (Prasad, 1993). Following acclimatization, the animals were randomly segregated into six groups of seven rabbits each. The experiment was designed in order to evaluate the ability of TCAE at different concentrations, to prevent or delay the progression of atherosclerosis. Hence, the induction of experimental hypercholesterolemic rabbits were established by giving chow diet which were enriched with 0.5 % cholesterol continuously for ten (10) weeks to 5 groups of rabbits namely; group 1: Hypercholesterolemic-induced (H), group 2: Simvastatin control (SC), group 3: Low dosage of TCAE (200 mg/kg), group 4: Medium dosage of TCAE (450 mg/kg), and group 5: High dosage of TCAE (600 mg/kg). In the control group, the rabbits were given normal chow diet. Food and water were given *ad libitum* throughout the experiment. The TCAE and simvastatin were given via oral gavage while blood sampling was performed at week 0 and at week 10 of experimental

period. The experimental protocol and animal handling throughout the study were in accordance with guidelines approved by the institution ethics committee with Certificate number: IACUC-FRIM/1 (2013)/07-5.

### **3.3 C-Reactive Protein**

Human CRP was purchased from Sigma (solution in 0.02 mol/L Tris and 0.25 mol/L sodium chloride, pH 8.0). CRP was purified from human plasma by using  $\text{Ca}^{2+}$ -dependent affinity of the protein to phosphorylcholine. Purity of the protein is  $\geq 98\%$ , as determined by SDS-PAGE. The preparation displayed a single protein band of  $M_r \approx 21\,000$ . The physical state was examined by centrifuging 100  $\mu\text{g}$  in 5 mL of a linear 10% to 40% (wt/vol) sucrose density gradient in 20 mmol/L Tris, 100 mmol/L NaCl, and 2 mmol/L  $\text{Ca}^{2+}$  buffer (50 000 rpm, vertical rotor VTi 65, 4 °C, 60 minutes, Beckman ultracentrifuge model L60). The protein sedimented in a symmetrical peak of  $\approx 5.5S$ , and protein was not detected in higher  $M_r$  fractions ( $>19S$ ). Thus, the CRP did not autoaggregate. During preparation, precautions were taken to avoid lipopolysaccharide contamination. The latter was excluded by *Limulus* endotoxin assay (Kinetic-QCL, BioWhittaker). Sensitivity of the assay is 0.015 to 400 IU/mL.

### **3.4 Histology Study**

#### **3.4.1 Aorta Preparation**

At the end of week 10, the rabbits were sacrificed. Midline thoracotomies were performed. Aorta tissue between its origin and bifurcation into the iliac arteries was taken gently, free of adhering tissues and washed with cold normal saline solution. The large part of origin was cut into 3 mm, and was put into 10% formalin for histology study (haematoxylin and eosin staining), while the ascending large part of aorta between its origin and bifurcation into the iliac arteries was opened longitudinally and prepared for plaque assay (Sudan IV staining).

#### **3.4.2 Sudan IV Staining: Assessment of Atherosclerotic Plaque Lesions**

Atherosclerotic plaque areas were assessed by a previously described method (Prasad & Kalra, 1993). Briefly, the aortic strips were dissected from the ascending arch to the iliac bifurcation, and extraneous adipose tissue was removed. The aortas were opened longitudinally, rinsed several times with ice-cold saline and stretched onto a piece of cardboard. Then, fixed in neutral 100 g/L buffered formalin solution for 24 h and then rinsed in 70% alcohol. The tissue was then immersed in Herxheimer's solution containing Sudan IV (5 g), ethyl alcohol (70%, 500 mL) and acetone (500 mL) at room temperature for 15 min and washed in running water for 1 h. This staining allowed a clear depiction of the plaques due to their deep red colour.

#### **3.4.3 Macroscopic Study**

The photographs of the intimal surface of the aorta were taken using digital camera (EOS Canon, Japan) and the intimal lipid lesions were determined quantitatively by estimation of the percentage of sudanophilic stained areas in the total aortic intimal area in photographs using Image Analysis Software. The total atherosclerotic area of the intimal surface of the aorta was measured in  $\text{mm}^2$ . The extent of atherosclerosis was expressed as a percentage of the luminal surface that was covered by atherosclerotic plaques using the formula below:

$$\text{Extent of atherosclerosis} = \frac{\text{Luminal surface covered by atherosclerotic plaques} \times 100\%}{\text{Whole area of the aorta}}$$

#### **3.4.4 Tissue Blocking**

An approximately 3mm of aortic arch were fixed in 10% formalin for a few days and prepared for light microscopy by dehydrating the tissue samples in an ascending series of alcohol dehydration, clearing with xylene and wax impregnation with paraffin wax for 14 h in an automatic tissue processor machine.

#### **3.4.5 Tissue Sectioning and Staining**

The tissues were embedded into block by paraffin wax at 62 °C and were cooled at 0 °C for 3 h to form solid block. This is followed by the sectioning process, whereas the tissues were trimmed and sectioned with the thickness of 4 to 5  $\mu\text{m}$  ranges using a microtome machine. The tissues were then placed in the water bath, attached on glass slides and then were dried on a hot plate at 50 to 55 °C for 30 min and then kept at 37 °C.

The tissues sections were then stained with Haematoxylin and Eosin (H&E) staining method using Autostainer Machine. The slides underwent processing, colorization and dehydration. After thoroughly dried from xylene, the slides were mounted with cover slips and mounted with DPX. The slides were then dried at room temperature for a few days before being analysed under light microscopy (Olympus CK2).

### 3.4.6 Quantitative Analysis of Histological Data

For each slide of aorta, the plaque accumulation was analysed for the average determination of the thickness of the foam cells by using an image analysis system consisted of a Macintosh Iix computer (Apple) equipped with a Frame Grabber Card (Quick capture, data translation), a Sony high-resolution video camera and a Trinitron Super Mac 21 in. color monitor.

### 3.5 Statistical Analysis

All data were expressed as mean ± standard deviation (SD). One way ANOVA was used to compare the statistical differences between the treatment groups and the control group using SPSS version 21. Turkey post-hoc test was used for multiple group comparison analysis. Significant difference was set at  $p < 0.05$ .

## IV. RESULTS

### 4.1 C-Reactive Protein

Figure 1 shows the results of CRP in all groups throughout the experimental period. At the beginning of the study period, there was no significant difference of CRP levels observed among all groups. However, feeding 0.5 % high cholesterol diet alone to the rabbits caused a significant increase ( $p < 0.05$ ) in the CRP levels at week 10 (1.61 mg/ml) compared to week 0 (1.14 mg/ml). In contrast to the H group, SC group showed a significant reduction ( $p < 0.05$ ) of CRP concentration throughout the experiment conducted with the CRP value 1.13 mg/L at week 0 and 0.88 mg/L week 10, respectively. Result also revealed that, the CRP level in rabbits supplemented with 200 mg/kg of STCAE was significantly increased ( $p < 0.05$ ) from week 0 to week 10 with the CRP value of 1.12 and 1.35 mg/L, respectively. On the other hand, it was observed that there was no significant different of the CRP concentration in rabbits supplemented with 450 mg/kg of STCAE from week 0 (1.14 mg/L) to week 10 (1.13 mg/L), respectively, in which the CRP level was significantly decrease ( $p < 0.05$ ) when compared to H group. Whereas, the CRP level in rabbits supplemented with 600mg/L at week 10 was significantly reduced ( $p < 0.05$ ) compared to week 0 and H group with the CRP concentration of 0.94 mg/L and 1.15 mg/L, respectively. Meanwhile, there was no significant difference observed in CRP level throughout the experiment conducted in the NC group.

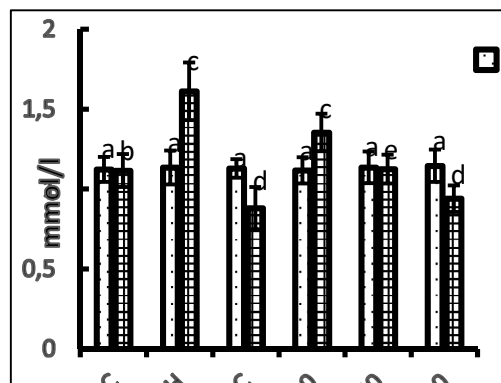


Figure 1. C-Reactive Protein (CRP) Level of Experimental Rabbits.

Notes: NC = Negative control, H = high cholesterol diet control, SC = 0.5% cholesterol + simvastatin, TCAE 200 = 0.5 % cholesterol + 200 mg/kg/day of *T. crispa* aqueous extracts, TCAE 450 = 0.5 % cholesterol + 450 mg/kg/day of *T. crispa* aqueous extracts, TCAE 600 = 0.5 % cholesterol + 600 mg/kg/day of *T. crispa* aqueous extracts.

#### 4.2 Photomicrograph of Aorta with H&E Staining

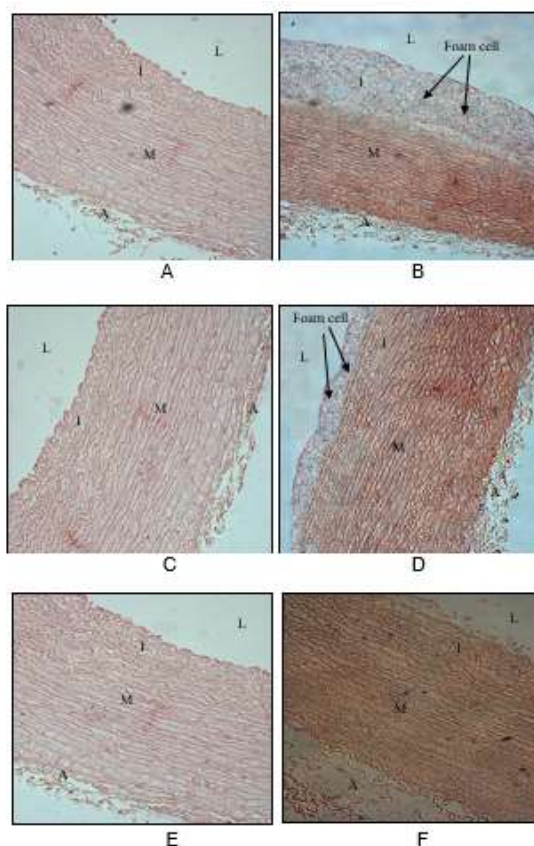


Figure 2. Photomicrographs of Aorta Stained with H&E at Magnification 10X.

Notes: I=Intima. M=media, A=Adventitia, L=Lumen. Group: NC (A), H (B), SC (C), TCAE 200 (D), 450 (E), 600 (F). A microscopy study of the tissue slices from the aorta of the NC group showed normal histology but the aorta of H group showed a remarkable foam cells formation. The result indicates that the hypercholesterolemia diet alone was responsible for the development of the foam cell and such anomalies were significantly improved in the simvastatin and TCAE treated groups.

#### 4.3 Effect of TCAE on Atherosclerotic Plaques Coverage

Percentage of atherosclerotic plaques coverage for each treatment groups are shown in Table 1. Atherosclerotic plaques coverage of rabbits fed with the normal diet and rabbits supplemented with simvastatin and different concentration of TCAE measured using NC as a baseline. It was observed that almost no visible atherosclerotic plaques or lesion area in aorta of rabbits in the normal group. High cholesterol diet group showed marked increase of plaques coverage with  $31.12 \pm 2.18$  % of coverage. Rabbits supplemented with 200, 450 and 600 mg/kg of TCAE showed marked reduction of atherosclerotic plaques coverage with 18.32, 50.87 and 66.25 % reduction respectively, when compared to hypercholesterolemic rabbit. Simvastatin reduced plaques coverage to a greater extent with 92.80 % of reduction.

Table 1. Percentage of Atherosclerotic Plaques Coverage of All Groups

Parameter	TCAE (mg/kg)					
	NC	H	IN	200	450	600
SI						
M						
VA						
ST						
AT						

		31.12	2.2	25.	13.	15.
% of	0.00±	±	4±	42±	14±	29±
cover	0.00*	2.18*	0.3	0.6	0.6	0.5
age	#	#	5*#	0*#	3*#	7*#

Notes: Each value represents the mean + SD. Values with the asterisk (\*) are significantly difference (p < 0.05) compared to hypercholesterolemic model group. Values with # are significantly different (p < 0.05) compared to normal control group. NC, normal control; H, high cholesterol diet group; TCAE, *T. crispa* aqueous extracts.

#### 4.4 Effect of TCAE on Thick of Foam Cells

The aorta’s atherosclerosis extension was further observed on its area of fatty region by using the detection of the formation of foam cells in the atherosclerotic lesions. Result found that there was no visible of foam cells observed in the thoracic aorta of rabbits fed with the normal diet and rabbits supplemented with simvastatin, 450 and 600 mg/kg of TCAE. The foam cells formation appeared much more severe in rabbits supplemented with high cholesterol diet than in rabbits supplemented with 200 mg/kg of TCAE. The thickness of tunica intima in the high cholesterol diet group and in the group supplemented with 200 mg/kg of TCAE were 186.50 ± 9.69 µm and 69.92 ± 4.82 µm respectively with significance different at p<0.05 (Figure 3).

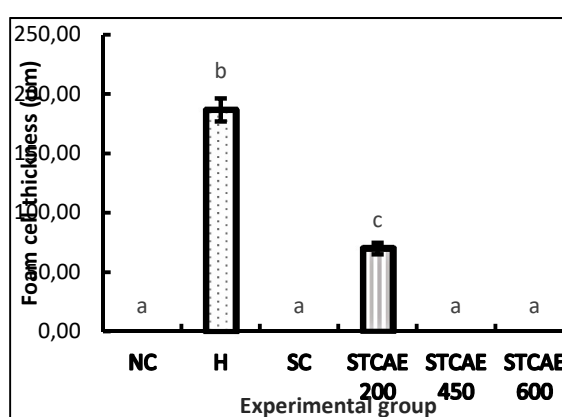


Figure 3. Foam Cell Thickness of All Groups. Notes: Each value represents the mean ± SD. Bars with different alphabet are significantly difference (p<0.05). NC, normal control; H, high cholesterol diet group; TCAE, *T. crispa* aqueous extracts

### V. DISCUSSION

Cholesterol derived from diet has been reported to contribute to a significant increase in plasma cholesterol. Increased cholesterol levels in diet has been reported to elevate serum and aortic tissue cholesterol which subsequently increase aortic atherosclerotic [16], due to endothelial dysfunction [17]. The genesis of atherosclerosis associated with an increased level in markers of inflammation such as CRP and characterized by inflammation of the endothelium of the coronary arteries [18]. Evaluation of the CRP levels could provide a rapid indicator for determining individual risk factors of atherosclerosis in which individuals with elevated levels of CRP have a risk about 2 to 3 times higher than the risk of those with low CRP levels [19].

From the result obtained, feeding high cholesterol diet to the rabbits for 10 weeks resulted in a significant increase of CRP levels compared to rabbits in the normal control group, indicating the incidence of early progression of atherosclerosis. The finding was supported by Yu, [20] who reported that the plasma CRP levels were significantly higher in the cholesterol-fed rabbits than those of the control rabbits after 28 weeks of experiment. Similar finding was reported by Sun [21] who stated that the elevated CRP levels in plasma were correlated with the severity of atherosclerosis and hypercholesterolemia in rabbits. The excess of LDL in the circulation in the hypercholesterolemic-induced rabbits will cause more LDL to be accumulated in the sub-endothelial matrix which may undergo oxidation [22], and later mediates OxLDL uptake by macrophage [23]. According to Mehta [24], CRP reduces the expression of nitric oxide synthase and prostacyclin synthase, binds with LDL and promotes its uptake by macrophages thus causing inflammation of the endothelium during early development stage of atherosclerotic process. In addition, accumulation of inflammatory cells, especially macrophages can produce a variety of cytokines that may stimulate the hepatic expression of the CRP gene and CRP production by the liver [21].

In contrast, administration of simvastatin to the hypercholesterolemic-induced rabbits significantly decreased ( $p<0.05$ ) the CRP levels when compared to rabbits feeding with high cholesterol diet alone. A similar finding was reported by Shrivastava [18], who found that statin reduces CRP levels in many patients primarily by lowering the LDL cholesterol. The reduction of LDL levels in the circulation means less substrate available to be oxidized to produce oxidized-LDL (oxLDL) [25]. The less oxLDL in the intima caused the reduction of CRP levels resulting less formation of atherosclerotic plaque in the aorta [3].

Meanwhile, it was observed that supplementation of different concentration of TCAE to the hypercholesterolemic-induced rabbits were able to decrease the CRP levels in dose dependent manner as compared to the group of rabbit fed with high cholesterol diet alone. Interestingly, no significant different in the CRP concentration observed between the groups supplemented with 600 mg/kg of TCAE and the group supplemented with simvastatin. TCAE at 600 mg/kg and simvastatin reduce 41.7 and 45.4 % of CRP concentration respectively, compared to hypercholesterolemic group. These results demonstrated the beneficial effect of supplementation with TCAE in inhibiting the production of CRP and subsequently reducing the extent of atherosclerosis, therefore provide evidence that TCAE may have anti-inflammatory effects in addition to its lipid-lowering effects.

According to Dave [26], plaque stabilization and plaque regression were considered among the current approaches in managing atherosclerosis. Plaque stabilization focus on stabilizing the content of plaque and strengthening the overlying endothelium whereas plaque regression focuses on the overall reduction in plaque volume and to reverse the arterial endothelium to its normal functional state.

The basic idea of plaque stabilization is to make the plaques more fibrous and reduce their lipid content with interventions such as lipid-lowering, anti-thrombotic, and anti-coagulant agents [27]. Decreased macrophage counts and MMP expression, and increased interstitial collagen content had led to increase the plaque stability [28]. Plaque regression on the other hand, emphasizes on long-term therapy in removing lipids and necrotic material, restoring normal endothelial function and repair of uncovered areas to bring about changes beyond just stabilization of vulnerable plaques [26].

In the present study, histological examination of tissues from hypercholesterolemic-induced-rabbits after 10 weeks of study period showed morphological changes in the aorta indicating that daily intake of high cholesterol diets causes development of early atherosclerosis lesions which consistent with the previous reports [14], [15]. It was revealed that, the percentage of atherosclerotic plaques in rabbits fed with high cholesterol diet were significantly higher ( $p<0.05$ ) compared to rabbits in any other groups. Similar findings were reported by Yanni [29], who found that administration of 0.5 %, w/w amount of cholesterol diet to the rabbits initiated the development of early atherosclerosis lesions similar to those in humans. According to Zulkhairi [14], atherosclerosis occurred concomitant with an increase of MDA level in serum and aorta, indicating an increase in oxygen radical. Increase of oxygen radicals level can contribute to the high incident of endothelial injury which represents a critical initiating event in the development of atherosclerosis [30].

Interestingly, it was observed that the morphological changes of the aorta can be reversed by oral administration of TCAE. The results obtained in the present study showed that, administration of different concentration of TCAE were able to reduce significantly ( $p<0.05$ ) the atherosclerotic plaque in dose dependent manner with 18.32, 50.87 and 66.25 % reduction respectively, compared with rabbits fed with high cholesterol diet, indicating the plaque regression ability of TCAE in inhibiting the atherosclerotic plaque progression and restoring normal endothelial function in the aorta.

Meanwhile, supplementation of 1.2 mg/kg/day simvastatin to the hypercholesterolemic-induced rabbits was able to reduce the lowest percentages of atherosclerotic plaque when compared with rabbits fed with high cholesterol diet. This indicates that simvastatin, which are already in clinical use to reduce cholesterol levels, are indeed effective in atherosclerotic patients. Studies carried out by Kano [31] and Soma [32], demonstrated statins reverse or impede the progression of atherosclerosis in rabbits. Whereas, a study by Gaist [33] revealed that statins show a good safety profile in patients with high cholesterol levels and cardiovascular disease, however, statins may be potentially associated with development of many side effects including hepatic damage, myalgias or polyneuropathy [34].

The results were then supported with evidence of severe thickness formation of foam cells in the thoracic aorta of rabbits fed with high cholesterol diets following 10 weeks experimental period. It was observed that the thickness of foam cells in rabbits fed with high cholesterol diet was significantly higher ( $p<0.05$ ) compared to any other group, in line with the previous reports [14], [35].

Meanwhile, the data from histopathological examination of simvastatin treatment fed rabbits revealed the absence of foam cells comparable with rabbits fed with the basal diet. The findings was supported by Libby [36] and Sukhova [37] who reported that statin reduced significantly macrophage content, adhesion molecules, cytokines and tissue factor expression in the lesions, as compared with dietary intervention alone. Clinical studies of plaque stabilization therapy by statin have consistently demonstrated increase in fibrous tissue content and reductions in the plaque lipid pool, however statin showed only modest reductions in plaque volume [38].

On the other hand, result showed that the thickness of foam cells in hypercholesterolemic-induced rabbits supplemented with 200 mg/kg of TCAE was significantly lower ( $p < 0.05$ ) with the reduction of 65.52 % as compared to the group without supplementation. Remarkably, there were no presence of foam cells observed in the thoracic aorta of rabbits fed with the 450 and 600 mg/kg of TCAE respectively, comparable with rabbits in the normal control and in the simvastatin groups, indicating the plaque stabilization ability of TCAE in stabilizing the content of plaque by reducing its foam cell and improving the endothelial functional. Yu [20] reported, reduction in macrophage and increase in smooth muscle cells in advanced lesions may affect plaque stability in rabbits.

The finding was in accordance to Zulkhairi [14] who reported that, no presence of foam cells in aorta of rabbit fed with high cholesterol diet after supplemented with 450 mg/kg *T. crispa* water extract. The ability of this plant in attenuating aortic fatty streak development could be associated to its lipid lowering activity [39], [40]. *T. crispa* inhibits the formation of macrophage foam cells by preventing the survival and differentiation of monocyte into macrophage, thus reduce the risk of atherosclerosis-related diseases [15].

The development of atherosclerosis has been associated with the oxidative modification of LDL [20]. Therefore, the numerous and abundant antioxidant components in *T. crispa* including phenolics [14] and flavonoids namely catechin, luteolin, morin and rutin [14]. Studies have shown that the consumption of flavonoid antioxidant is inversely related to the risk of developing coronary heart disease. Flavonoids reduce LDL oxidation and also inhibit the aggregation and adhesion of platelets in the blood [41].

Other than oxidation of LDL, atherosclerosis is also associated with inflammation in the intima of arteries [42]. It was reported that, expression of adhesion molecules such as vascular adhesion molecule 1 (VCAM-1) and intercellular adhesion molecule-1 (ICAM-1) promote the recruitment of leucocytes to the site of injury and later contribute in the development of the pro-inflammatory state and atherosclerotic lesion [43]. The macrophage colony-stimulating factor (M-CSF) will promote the transition of monocytes to macrophages and foam cells [19]. Those adhesion molecules can be stimulated by pro-inflammatory agents including cytokine Tumor Necrosis Factor (TNF)- $\alpha$  and oxidative stress along with several well established risk factors such as hypercholesterolemia, hyperglycemia and hypertension which play important roles in the pathogenesis of coronary artery disease [44]. It is therefore believable that suppression of the pro-inflammatory endothelial cell state will limit the atherosclerosis process thus benefited in inhibiting the development of atherosclerotic lesions [45].

Previous *in vitro* study by Kamarazaman [46] exhibited that, supplementation of *T. crispa* aqueous and methanol extracts significantly reduced ( $p < 0.05$ ) secretion of ICAM-1, VCAM-1 and M-CSF, while in contrast significantly increased ( $p < 0.05$ ) secretion of nitric oxide (NO) in TNF- $\alpha$  induced HUVEC compared to untreated HUVECs. Increase in NO secretion could promote vascular vasodilatory effect thus preventing from the development of atherosclerotic plaque. NO is a potent endogenous vasodilator which plays a pivotal role in vascular homeostasis [47]. A reduction in NO synthesis may contribute to the initiation and progressivity of atherosclerosis [48].

According to Pandey & Rizvi [52], among the important mechanisms to prevent the development of atherosclerosis are by lowering cholesterol levels, reducing LDL oxidation, protecting the endothelium and suppressing the synthesis of proinflammatory cytokines and adhesion molecules. Improvement in lipid profiles and cholesterol levels, reductions in LDL oxidation and protection from inflammatory factors as well improvement on the injury of endothelium have all been demonstrated with the intake of TCAE. However, further investigations are necessary required to further understand the exact mechanism of action of *T. crispa* as an anti-atherosclerotic agent.

## VI. CONCLUSION

Administration of TCAE was found to inhibit the progression of atherosclerotic plaque development induced by dietary cholesterol. The anti-atherosclerosis potential of TCAE was demonstrated by its ability to reduce the CRP levels, coverage area of



atherosclerotic plaque and thickness of foam cells in the atherosclerotic lesions and preserves endothelial healing following arterial injury. Supplementation of 450 mg/kg of *T. crispa* extract was found to be the optimal concentration to control hypercholesterolemia.

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#### REFERENCES

- [1] Cardoso & Paulos, (2017). Cardoso, I.L., Paulos, A.T. (2017). C Reactive Protein and Cardiovascular Disease. *Int Arch Cardiovasc Dis* 1:003
- [2] Pasceri et al., (2000) Pasceri, V., Willerson, J. T., Yeh, E. T. H. (2000). Direct proinflammatory effect of C-reactive protein on human endothelial cells. *Circulation* 102 (18), 2165-2168
- [3] Ibrahim, M., Ahmed, I. A., Mikail, M. A., Ishola, A. A., Draman, S., Isa, M. L. M., & Yusof, A. M. (2017). *Baccaurea angulata* fruit juice reduces atherosclerotic lesions in diet-induced Hypercholesterolemic rabbits. *Lipids in health and disease*, 16(1), 134.
- [4] Otto, C., Geiss, H. C., Empen, K., Parhofer, K. G. (2004). Long-term reduction of C-reactive protein concentration by regular LDL apheresis. *Atherosclerosis*, 174 (1), 151-156.
- [5] Welty, F. K. (2013). How do elevated triglycerides and low HDL-cholesterol affect inflammation and atherothrombosis? *Current cardiology reports*, 15(9), 400.
- [6] Jain, P. K. and Joshi, S. C. (2016). Atherosclerosis, inflammation and oxidative stress. *SGVU Int J Env Sc and Technol*, Vol 2, Issue 2, 2016, pp.17-29, ISSN: 2394-9570.
- [7] Merkel, M., Velez-Carrasco, W. C., Hudgins, L. C., & Breslow, J. L. (2001). Compared with saturated fatty acids, dietary monounsaturated fatty acids and carbohydrates increase atherosclerosis and VLDL cholesterol levels in LDL receptor-deficient, but not apolipoprotein E-deficient, mice. *Proceedings of the National Academic of Sciences*, 98, 13294-13299.
- [8] Lusis, A. J. (2000). Atherosclerosis. *Nature*, 407, 223-241.
- [9] Steinberg, D. (2002). Atherogenesis in perspective: hypercholesterolemia and inflammation as partners in crime. *Nat Med* 8(11): 1211-1217.
- [10] Mendis, S., Puska, P., Norrving, B. (2011). World Health Organization. World Heart Federation. World Stroke Organization. Mendis S., Puska P., Norrving B., editors. Global Atlas on Cardiovascular Disease Prevention and Control. Availableonline:[http://whqlibdoc.who.int/publications/2011/9789241564373\\_eng.pdf](http://whqlibdoc.who.int/publications/2011/9789241564373_eng.pdf).
- [11] Longo-Mbenza, B., Longokolo Mashi, M., Lelo Tshikwela, M., Mokondjimobe, E., Gombet, T., Ellenga-Mbolla, B., et al. (2011). Relationship between younger age, autoimmunity, cardiometabolic risk, oxidative stress, HAART, and ischemic stroke in Africans with HIV/AIDS. *ISRN cardiology*, 2011.
- [12] Steinberg, D. (2004). Thematic review series: the pathogenesis of atherosclerosis. An interpretive history of the cholesterol controversy: part I. *J Lipid Res.* 45:1583–1593.
- [13] Ahmad, W., Jantan, I., & Bukhari, S.N.A. (2016). *Tinospora crispa* (L.) Hook.f. & Thomson: A review of its ethnobotanical, phytochemical, and pharmacological aspects. *Frontiers in pharmacology*, 7(59), 1-19.
- [14] Zulkhairi, A., Hasnah, B., Sakinah, I., Nur Amalina, I., Zamree, M.S., Mohd Shahidan, A. (2009). Nutritional composition, antioxidant ability and flavonoid content of *Tinospora crispa* stem. *Adv. Nat. Appl. Sci.* 3, 88–94.
- [15] Kamarazaman, I.S., Amom, Z., & Ali, R.M. (2012a). Inhibitory properties of *Tinospora crispa* extracts on TNF- $\alpha$  induced inflammation on human umbilical vein endothelial cells (HUVECS). *Int. J. Trop. Med.* 7, 24–29. doi:10.3923/ijtmed.2012.24.
- [16] Krauss, R. M. (2005). Dietary and genetic probes of atherogenic dyslipidemia. *Arteriosclerosis, thrombosis, and vascular biology*, 25(11), 2265-2272.
- [17] Chen, J., Zhao, H., Yang, Y., Liu, B., Ni, J., Wang, W. (2011). Lipid-lowering and antioxidant activities of Jiang-Zhi-Ning in Traditional Chinese Medicine. *J. Ethnopharmacol.* 134(3): 919-930.
- [18] Shrivastava et al. Shrivastava, A. K., Singh, H. V., Raizada, A., & Singh, S. K. (2015). C-reactive protein, inflammation and coronary heart disease. *The Egyptian Heart Journal*, 67(2), 89-97.

- [19] Ridker, P. M., Buring, J. E., Cook, N. R., & Rifai, N. (2003). C-reactive protein, the metabolic syndrome, and risk of incident cardiovascular events: an 8-year follow-up of 14 719 initially healthy American women. *Circulation*, 107(3), 391-397.
- [20] Yu, Q., Li, Y., Waqar, A. B., Wang, Y., Huang, B., Chen, Y., & Liu, E. (2012). Temporal and quantitative analysis of atherosclerotic lesions in diet-induced hypercholesterolemic rabbits. *BioMed Research International*, 2012.
- [21] Sun, H., Koike, T., Ichikawa, T., Hatakeyama, K., Shiomi, M., Zhang, B., & Chen, Y. E. (2005). C-reactive protein in atherosclerotic lesions: its origin and pathophysiological significance. *The American journal of pathology*, 167(4), 1139-1148.
- [22] Walzem, R. L. (1995). Older plasma lipoproteins are more susceptible to oxidation: a linking mechanism for the lipid and oxidation theories of atherosclerotic cardiovascular disease. *Proceedings of the National Academy Sciences of the USA*, 92, 7240.
- [23] Zwaka, T. P., Hombach, V., & Torzewski, J. (2001). C-reactive protein-mediated low density lipoprotein uptake by macrophages: implications for atherosclerosis. *Circulation*, 103(9), 1194-1197.
- [24] Mehta, S. K., Rame, J. E., Khera, A., Murphy, S. A., Canham, R. M., Peshock, R. M., & Drazner, M. H. (2007). Left ventricular hypertrophy, subclinical atherosclerosis, and inflammation. *Hypertension*, 49(6), 1385-1391.
- [25] Shukla, R., Gupta, S., Gambhir, J. K., Prabhu, K. M., & Murthy, P. S. (2004). Antioxidant effect of aqueous extract of the bark of Ficus bengalensis in hypercholesterolaemic rabbits. *Journal of ethnopharmacology*, 92(1), 47-51.
- [26] Dave, T., Ezhilan, J., Vasawala, H., Somani, V. (2013). Plaque regression and plaque stabilisation in cardiovascular disease. *Indian Journal of Endocrinology and Metabolism*, 17(6); 983-989.
- [27] Ambrose, J. A., & Martinez, E. E. (2002). A new for plaque stabilization. *Circulation*. 105:2000-2004
- [28] Aikawa, M., Rabkin, E., Okada, Y., Voglic, S. J., Clinton, S. K., Brinckerhoff, C. E., et al. (1998). Lipid lowering by diet reduces matrix metalloproteinase activity and increases collagen content of rabbit atheromas: A potential mechanism of lesion stabilization. *Circulation*. 97:2433-44.
- [29] Yanni, A. E. (2004). The laboratory rabbit: an animal model of atherosclerosis research. *Lab Anim (UK)* 38:246-256
- [30] Ross, R. (1986). The pathogenesis of atherosclerosis—an update. *New England Journal of Medicine*, 314(8), 488-500.
- [31] Kano, H., Hayashi, T., Sumi, D., Esaki, T., Asai, Y., Kumar, N., et al, (1999). A HMG-CoA reductase inhibitor improved regression of atherosclerosis in the rabbit aorta without affecting serum lipid levels: possible relevance of up-regulation of endothelial NO-synthase RNA. *Biochem. Biophys. Res. Commun.* 259:414-419.
- [32] Soma, M. R., Donetti, E., Parolini, C., Mazzini, G., Ferrari, C., Fumagalli, R., & Paoletti, R. (1993). HMG CoA reductase inhibitors. In vivo effects on carotid intimal thickening in normocholesterolemic rabbits. *Arteriosclerosis, Thrombosis, and Vascular Biology*, 13(4), 571-578.
- [33] Gaist, D., Jeppesen, U., Andersen, M., Garcia-Rodriguez, L. A., Hallas, J., Sindrup, S. H. (2002). Statins and risk of polyneuropathy. *Neurology*, 58: 1333-1337.
- [34] Golomb, B. A., & Evans, M. A. (2008). Statin Adverse Effects: A review of the literature and evidence for a mitochondrial mechanism. *Am J Cardiovasc Drugs*; 8(6):373-418.
- [35] Lee, P., & Prasad, K. (2003). Effects of flaxseed oil on serum lipids and atherosclerosis in hypercholesterolemic rabbits. *Journal of cardiovascular pharmacology and therapeutics*, 8(3), 227-235.
- [36] Libby, P. (2001). Current concepts of the pathogenesis of the acute coronary syndromes. *Circulation* 104 (3), 365-372
- [37] Sukhova, G. K., Williams, J. K., & Libby, P. (2002). Statins reduce inflammation in atheroma of nonhuman primates independent of effects on serum cholesterol. *Arteriosclerosis, thrombosis, and vascular*
- [38] Schartl, M., Bocksch, W., Koschyk, D. H., Voelker, W., Karsch, K. R., Kreuzer, J., & German Atorvastatin Intravascular Ultrasound Study Investigators. (2001). Use of intravascular ultrasound to compare effects of different strategies of lipid-lowering therapy on plaque volume and composition in patients with coronary artery disease. *Circulation*, 104(4), 387-392.
- [39] Van Niekerk, J. L., Hendriks, T., Gevers Leuven, J. A., Havekes, L., de Boer, H. H. (1984). The lipid lowering effects of 3-hydroxy-3-methylglutaric acid and bile acid drainage in WHHL rabbits. *Clin Sci*. 67:439-444.
- [40] Di Padova, C., Bosisio, E., Cighetti, G., Rovagnati, P., Mazzochi, M., Colombo, C., et al, (1982). 3-Hydroxy-3-methylglutaric acid (HMGA) reduces dietary cholesterol induction of saturated bile in hamster. *Life Sci*. 30:1907-1914.
- [41] Khurana, S., Venkataraman, K., Hollingsworth, A., Piche, M., & Tai, T.C. (2013). Polyphenols: Benefits to the cardiovascular system in health and in aging. *Nutrients*, 5, 3779-3827.
- [42] Reape, T. J., & Groot, P. H. (1999). Chemokines and atherosclerosis. *Atherosclerosis*, 147(2), 213-225.
- [43] Springer, T. A. (1994). Traffic signals for lymphocyte recirculation and leukocyte emigration: the multistep paradigm. *Cell*, 76(2), 301-314.

- [44] Kunsch, C., Luchoomun, J., Grey, J. Y., Olliff, L. K., Saint, L. B., Arrendale, R. F., ... & Medford, R. M. (2004). Selective inhibition of endothelial and monocyte redox-sensitive genes by AGI-1067: a novel antioxidant and anti-inflammatory agent. *Journal of Pharmacology and Experimental Therapeutics*, 308(3), 820-829.
- [45] Ashby, D. T., Rye, K. A., Clay, M. A., Vadas, M. A., Gamble, J. R., & Barter, P. J. (1998). Factors influencing the ability of HDL to inhibit expression of vascular cell adhesion molecule-1 in endothelial cells. *Arteriosclerosis, thrombosis, and vascular biology*, 18(9), 1450-1455
- [46] Kamarazaman, I. S., Amom Z., Ali, R. M., Akim, A.M., Azman, K.M., Arapoc, D.J., et al. (2012b). Protective effects of *Tinospora crispa* extracts on H<sub>2</sub>O<sub>2</sub> induced oxidative stress and TNF- $\alpha$ -induced inflammation on human umbilical vein endothelial cells (HUVECs). *J. Med. Plants Res.* 6, 3013–3021
- [47] Ignarro, L. J., Cirino, G., Casini, A., Napoli, C. (1999). Nitric oxide as a signaling molecule in the vascular system: An overview. *J. Cardiovasc. Pharmacol*, 34: 876–884.
- [48] Anderson, T. J., Gerhard, M. D., Meredith, I. T., Charbonneau, F., Delagrang, D., Creager, M. A., et al. (1995). Systemic nature of endothelial dysfunction in atherosclerosis. *Am. J. Cardiol.*, 75: 71B–74B.
- [49] Pandey, K.B., & Rizvi, S.I. (2009). Plant polyphenols as dietary antioxidants in human health and disease. *Oxid. Med. Cell. Longev.* 2, 270–278.

# *Prevalence and Prognosis of Candidiasis among Covid-19 Patients: Data from ICU Department*

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**Abstract** – Yeast species belonging to the *Candida* genus, including *Candida albicans*, *Candida glabrata*, *Candida parapsilosis*, *Candida tropicalis*, and *Candida krusei*, are the most prevalent fungal species inhabiting various mucosal surfaces, such as the skin and the respiratory, digestive, and urinary tracts [1]. Although being commensal within the human host, *Candida* species are equipped with virulence attributes, enabling them to invade when opportunities arise and cause various infections in humans, especially when the immune system is impaired.

We retrospectively studied total lymphocytes count and *Candida* infection in 142 patients who were admitted to TSMU The First university Clinic Intensive care unit department between 14.10.20 – 02.02.21 . Among 142 patients *Candida* spp were isolated in 15,4%(22/142) patients. In all this patients total lymphocytes count were low. Candidemia was not detected. Candiduria was observed in 2 patients(9%, 2/22). Our data is close to the White, P.L. et al studies from UK which have reported 12.6%(17/135) of Candidiasis.

**Keywords** – Candidiasis, Covid-19, ICU Department, Lymphopenia, Treatment.

## I. INTRODUCTION

The recent global pandemic of COVID-19 has predisposed a relatively high number of patients to acute respiratory distress syndrome (ARDS), which carries a risk to develop super-infections. *Candida* species are major constituents of the human mycobiome .Yeast species belonging to the *Candida* genus, including *Candida albicans*, *Candida glabrata*, *Candida parapsilosis*, *Candida tropicalis*, and *Candida krusei*, are the most prevalent fungal species inhabiting various mucosal surfaces, such as the skin and the respiratory, digestive, and urinary tracts [1,2]. Although being commensal within the human host, *Candida* species are equipped with virulence attributes, enabling them to invade when opportunities arise and cause various infections in humans, especially when the immune system is impaired [2]. Superficial infections, such as skin disorders; mucosal infections, including oropharyngeal or vulvovaginitis candidiasis; and invasive candidiasis are established clinical entities of candidiasis [3]. *Candida* is

among the most frequently recovered pathogen in the intensive care unit (ICU), affecting between 6% and 10% of patients, and some studies have noted an increasing trend for candidemia [4]. The estimated mortality attributed to invasive candidiasis is 19–40% [5]. This mortality is even higher among ICU patients, approaching 70% [6]. Awareness of the possibility of fungal co-infection is essential to reduce delays in diagnosis and treatment in order to help prevent severe illness and death from these infections.

Despite the marked immune dysregulation in COVID-19, no prominent defects have been reported in immune cells that are critically required for immunity to *Candida*. This suggests that relevant clinical factors, including prolonged ICU stays, central venous catheters, and broad-spectrum antibiotic use, may be key factors causing COVID-19 patients to develop IYIs. Cell types important for host defense against *Candida*, such as neutrophils and monocytes/macrophages, are not affected by SARS-CoV-2, suggesting that they are not responsible for COVID-19 associated candidiasis (CAC). Similarly, an increased peripheral neutrophil-to-lymphocyte ratio was also observed in severe cases of COVID-19, and was likely associated with unfavorable prognosis [7]. The clear immune defect in patients with COVID-19 is, on the other hand, lymphopenia; however, an isolated decrease in lymphocyte numbers, as also experienced by HIV patients, is not associated with an increase in susceptibility to systemic *Candida* infections. The risk factors for CAC can be divided into two groups. The first group includes common risk factors predisposing ICU patients to invasive candidiasis. These include diabetes mellitus, renal failure requiring hemodialysis, abdominal surgery, triple lumen catheters, parenteral nutrition, receipt of multiple antibiotics, length of ICU stay >7 days, and prior abdominal infections [10,47,48]. Additionally, indwelling central venous catheters are widely used among COVID-19 patients residing in ICUs [8]. Indeed, catheters are historically known as a portal of entry for acquiring nosocomial *Candida* infections, such as *Candida auris* and *C. parapsilosis* [9,10,11,12].

Corticosteroids have immunosuppressive effects on neutrophils, monocytes and macrophages and predispose patients to invasive candidiasis. Lastly, whether the severe lung epithelium damage exerted by SARS-CoV-2 facilitates *Candida* adherence to basement membrane causing subsequent invasive pulmonary candidiasis is not known. To date, primary *Candida* pneumonitis is considered to be rare.

Aim of our study was to analyze a connection between total lymphocyte count and *Candida* infection with surveillance rate in Covid-19 patients.

## **II. MATERIAL AND METHODS:**

We retrospectively studied total lymphocytes count and *Candida* infection in 142 patients who were admitted to TSMU The First university Clinic Intensive care unit department between 14.10.20 – 02.02.21. All of them needed mechanical ventilation. Tracheal aspirates, blood and urine were collected and processed for culture. All specimens were examined for the identification of bacteria and fungi for their sensitivity to antibiotics. The examinations were done in Laboratory for microbiology of TSMU The First University Clinic. Samples were brought to microbiology laboratory immediately and were processed within 30 minutes of collection. If a delay of more than 1–2 h was expected, the specimen was refrigerated (Urine and tracheal aspirate). Blood (10ml) were inoculated into signal blood culture bottles (Oxoid Ltd., Basingstoke, United Kingdom). All specimens were cultured on blood agar, Macconkey and Sabouraud dextrose agar and incubated at 37°C for 24 h. All samples were subjected to the following: (a) gram stain of the colonies, (b) biochemical reactions by API identification system (API20E, API 20 NE, APIstaph, APIstrep, BioMérieux, France) and (c) identification and antimicrobial sensitivity test by Kirby-Bauer disk diffusion method. Fungi were tested for flucytosine, amphotericin B, fluconazole, itraconazole and voriconazole (ATB FUNGUS3 strips manual, BioMérieux, France).

## **III. RESULTS:**

Among 142 patients *Candida* spp were isolated in 15,4%(22/142) patients. In all this patients total lymphocytes count were low. Candidemia was not detected. Candiduria was observed in 2 patients(9%, 2/22). The patients with low levels of lymphocyte and *Candida* infection had unfavorable prognosis. We found that 1. patients with low levels of total lymphocytes and *Candida* infection had a poor overall survival. 2. Isolation of *Candida* in patients with low levels of lymphocytes, was significantly higher than that in patients with high level lymphocytes. 3. Low level of lymphocytes was closely related with *Candida* infection in these patients, suggesting that impaired lymphocytes further induced *Candida* infection which is the member of the normal microbiota.

#### IV. DISCUSSION:

The extent of Covid-19 associated candidiasis (both superficial and invasive) varies by country and region. Studies from Spain [12] India [13], Iran [14], Italy [14], the UK [15], and China [16] have reported rates of 0.7% (7/989), 2.5% (15/596), 5% (53/1059), 8% (3/43), 12.6% (17/135), and 23.5% (4/17) [16]. Although a previous study from Iran indicated a relatively low level of oral candidiasis (OC) among patients with COVID-19 (53/1059), apparently that study included all the patients who presented with COVID-19 but not those developing ARDS, which may have resulted in an underestimation of OC in the context of COVID-19 [16]. Our data is close to the studies White, P.L. at all from UK have reported 12.6%(17/135).

#### REFERENCES

- [1] Hallen-Adams, H.E.; Suhr, M.J. Fungi in the healthy human gastrointestinal tract. *Virulence* 2017, 8, 352–358.
- [2] Rolling, T.; Hohl, T.M.; Zhai, B. Minority report: The intestinal mycobiota in systemic infections. *Curr. Opin. Microbiol.* 2020, 56, 1–6
- [3] Azoulay, E.; Timsit, J.-F.; Tal et, M.; De Lassence, A.; Darmon, M.; Zahar, J.-R.; Adrie, C.; Garrouste-Orgeas, M.; Cohen, Y.; Mourvillier, B.; et al. Candida Colonization of the Respiratory Tract and Subsequent Pseudomonas Ventilator-Associated Pneumonia. *Chest* 2006, 129, 110–117
- [4] Lortholary, O.; The French Mycosis Study Group; Renaudat, C.; Sitbon, K.; Madec, Y.; Denoeud-Ndam, L.; Wol, M.; Fontanet, A.; Bretagne, S.; Dromer, F. Worrisome trends in incidence and mortality of candidemia in intensive care units (Paris area, 2002–2010). *Intensiv. Care Med.* 2014, 40, 1303–1312.
- [5] Kullberg, B.J.; Arendrup, M.C. Invasive Candidiasis. *New Engl. J. Med.* 2015, 373, 1445–1456
- [6] Marra, A.R.; Camargo, L.F.A.; Pignatari, A.C.C.; Sukiennik, T.; Behar, P.R.P.; Medeiros, E.A.S.; Ribeiro, J.; Girão, E.; Correa, L.; Guerra, C.; et al. Nosocomial Bloodstream Infections in Brazilian Hospitals: Analysis of 2,563 Cases from a Prospective Nationwide Surveillance Study. *J. Clin. Microbiol.* 2011, 49, 1866–1871.
- [7] Zheng, M.; Gao, Y.; Wang, G.; Song, G.; Liu, S.; Sun, D.; Xu, Y.; Tian, Z. Functional exhaustion of antiviral lymphocytes in COVID-19 patients. *Cell. Mol. Immunol.* 2020, 17, 533–535
- [8] Pittiruti, M.; Pinelli, F. Recommendations for the use of vascular access in the COVID-19 patients: An Italian perspective. *Crit. Care* 2020, 24, 1–3.
- [9] A Chow, N.; Gade, L.; Tsay, S.V.; Forsberg, K.; A Greenko, J.; Southwick, K.L.; Barrett, P.M.; Kerins, J.L.; Lockhart, S.R.; Chiller, T.M.; et al. Multiple introductions and subsequent transmission of multidrug-resistant *Candida auris* in the USA: A molecular epidemiological survey. *Lancet Infect. Dis.* 2018, 18, 1377–1384.
- [10] Eyre, D.W.; Sheppard, A.E.; Madder, H.; Moir, I.; Moroney, R.; Quan, T.P.; Griths, D.; George, S.; Butcher, L.; Morgan, M.; et al. A *Candida auris* Outbreak and Its Control in an Intensive Care Setting. *New Engl. J. Med.* 2018, 379, 1322–1331
- [11] Chowdhary, A.; Sharma, A. The lurking scourge of multidrug resistant *Candida auris* in times of COVID-19 pandemic. *J. Glob. Antimicrob. Resist.* 2020, 22, 175–176.
- [12] Tóth, R.; Nosek, J.; Mora-Montes, H.M.; Gabaldon, T.; Bliss, J.M.; Nosanchuk, J.D.; Turner, S.A.; Butler, G.; Vágvölgyi, C.; Gácsér, A. *Candida parapsilosis*: From Genes to the Bedside. *Clin. Microbiol. Rev.* 2019, 32.
- [13] Antinori, S.; Bonazzetti, C.; Gubertini, G.; Capetti, A.; Pagani, C.; Morena, V.; Rimoldi, S.; Galimberti, L.; Sarzi-Puttini, P.; Ridolfo, A.L. Tocilizumab for cytokine storm syndrome in COVID-19 pneumonia: An increased risk for candidemia? *Autoimmun. Rev.* 2020, 19, 102564
- [14] White, P.L.; Dhillon, R.; Cordey, A.; Hughes, H.; Faggian, F.; Soni, S.; Pandey, M.; Whitaker, H.; May, A.; Morgan, M.; et al. A national strategy to diagnose COVID-19 associated invasive fungal disease in the ICU. *Clin. Infect. Dis.* 2020.
- [15] Chen, N.; Zhou, M.; Dong, X.; Qu, J.; Gong, F.; Han, Y.; Qiu, Y.; Wang, J.; Liu, Y.; Wei, Y.; et al. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: A descriptive study. *Lancet* 2020, 395, 507–513

- [16] Salehi, M.; Ahmadikia, K.; Mahmoudi, S.; Kalantari, S.; Siahkali, S.J.; Izadi, A.; Kord, M.; Manshadi, S.A.D.; Seifi, A.; Ghasvand, F.; et al. Oropharyngeal candidiasis in hospitalized COVID-19 Patients from Iran: Species identification and antifungal susceptibility pattern. *Mycoses* 2020

## *Covid-19 Appointments: Hospital Management for Patients*

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**Abstract** – The deadly virus (covid-19) came as a shock to the world. It has left most of the world in a state of panic. During this time most of the world has decided that the best way for people to stay safe is to stay locked in their homes and only go out when absolutely necessary. Places like malls, schools, church and even the hospitals become a danger to people because of the spread of the COVID-19 virus. People still catch the flu and people still have cancer and so on and people need to go to the hospital. For people to do this they have to book appointments. In most countries, appointments are still done locally by going to the hospital which will be dangerous to the well-being of both the doctor and the patients in the hospital. This paper talks about an effective system for managing appointments during the COVID-19. With the help series of interviews through questionnaire and observation method of data collection this paper ascertains how covid-19 should be handled mostly by telehealth.

**Keywords** – Covid-19, Appointments, Management, Telehealth, Patients.

### I. INTRODUCTION

Coronaviruses are a large family of RNA viruses that infect birds and many mammals including humans. These viruses cause illnesses that range from common cold to more severe respiratory diseases and rarely gastroenteritis. The entire world is confronting the COVID-19 pandemic which is otherwise called Covid. This influencing all areas of incredible country and one of the principle areas that has endured a significant shot is the medical care area of various countries. Envision going to a clinic for an arrangement and during this time and you seat alongside somebody who has COVID. What might be the final product of this case or envision a patient enduring side effect of Covid and needs to see a specialist does he simply ponder into an emergency clinic to look for clinical consideration putting the lives of different patients present in risk. These arrangements are not normal everyday arrangements they are a portion of these arrangements which are significant. Person-to-person transmission has been established between people who are in close contact with one another (within about 2 metres/6 feet), primarily via respiratory droplets. Droplet transmission occurs when respiratory droplets generated via coughing, sneezing or talking contact susceptible mucosal surfaces, such as the eyes, nose or mouth. Transmission may also occur indirectly via contact with contaminated fomites with hands and then mucosal surfaces.

Accordingly, the motivation behind this examination is to portray a compelling route for emergency clinics to deal with arrangements during the COVID-19 time in order to decrease the spread of the Covid pandemic.



## II. WAYS OF CONNECTING COVID-19

Covids are a colossal gathering of contaminations that are standard in a couple of kinds of animals, including bats, camels, steers, and cats. Sometimes, animal Covids can pollute people and thereafter spread between people, as seen with Middle East Respiratory Syndrome (MERS)- CoV, Severe Acute Respiratory Syndrome (SARS)- CoV, and now with this new contamination (named SARS-CoV-2). The SARS-CoV-2 contamination is a beta Covid, like MERS-CoV and SARS-CoV. Every one of the three of these contaminations have their beginning stages in bats. Relative groupings between patients from U.S. besides, beginning patients in China most likely suggest a single, progressing ascent of this disease from an animal store. First thing, gigantic quantities of the patients at the point of convergence of the erupt in Wuhan, Hubei Province, China had some interface with a colossal fish and live animal market, proposing animal to-singular spread. A short time later, a creating number of patients apparently didn't have prologue to animal business sectors, showing individual to-singular spread. Individual to-singular spread was thusly definite outer Hubei and in countries outside China, Risk of Exposure is extended for:

1. People in places of reported, ongoing community spread of the virus that causes COVID-19, with the level of risk dependent on the location.
2. Healthcare workers caring for patients with COVID-19.
3. Close contacts of persons with COVID-19.
4. Travelers returning from affected international locations where community spread is occurring, with level of risk dependent on where they traveled.

### 2.1. Patient appointment procedures

These procedures is of two types: Pre-patient appointment and clinic appointment.

#### A. *Pre-patient appointment*

Patients ought to be evaluated for COVID-19 manifestations and any self-isolate prerequisites preceding participation at outpatient arrangements. Clinics should keep on after their nearby operational COVID-19 screening and IP&C rules. For patients who meet COVID-19 suspect or affirmed case models:

- a. If clinically fitting and in fact conceivable, consider changing the patient to a telehealth/virtual arrangement utilizing an advanced wellbeing methodology for example phone, videoconferencing.
- b. If an advanced wellbeing methodology isn't shown, rescheduling of the arrangement is suggested forthcoming a negative test outcome or after the 14-day disengagement period (if clinically fitting). In the event that this is unimaginable, proceed to the rules underneath.

#### B. *Clinic appointment for patient*

Patient administrations should proceed with set up COVID-19 screening measures when patients present for their arrangements. For instance, place signage at gathering inquiring as to whether they have manifestations, are anticipating COVID-19 test outcomes, have been abroad or highway over the most recent 14 days, or have been in contact with an individual with affirmed COVID-19 over the most recent 14 days.

- a. If a patient requires clinical evaluation before move to COVID-19 testing center or Emergency Department, follow transmission-based safeguards and climate cleaning as laid out in COVID-19 Infection Prevention and Control in Western Australian Healthcare offices.
- b. For patients who meet screening models, staff ought to give a veil to the patient to wear; and advise their administrator for additional guidance and follow-up.
- c. Patients can be joined by a general who ought to likewise consent to IP&C models [1].

## 2.2. Review of related literature

This section, examines methods, strategies and approaches used by researchers on the pandemic (Covid-19). Various approaches and guidelines have been used in management of Covid-19 and they can be seen below, we give a concise survey of research studies that have been conducted using these different approaches the pandemics.

In [2], proposed an operation plan to combat Covid-19 pandemic. The primary goal of the operation plan is to protect veterans and staff from acquiring Covid-19 infection by leveraging technology, communications as well as using dedicated staff and space to care for COVID -19 patients. The Department of Veterans Affairs (VA) will create a safe environment by implementing a system where one VA facility operates as two separate “zones” (Standard and COVID-19) for inpatient care. VA will provide most outpatient care for Veterans through telehealth services as appropriate. This approach minimizes the risk of infection, supports expansion to meet an increasing need for COVID-19 services, and provides Veterans in routine VA care consistent access to VA care. The plan includes strategies to address a large number of COVID-19 cases to include alternative sites of care for Veterans with COVID-19.

According to [3], issues an unprecedented array of temporary regulatory waivers and new rules to equip the American healthcare system with maximum flexibility to respond to the 2019 Novel Coronavirus (COVID-19) pandemic. Made possible by President Trump’s recent emergency declaration and emergency rule making, these temporary changes will apply immediately across the entire U.S. healthcare system for the duration of the emergency declaration. The goals of these actions are to expand the healthcare system workforce by removing barriers for physicians, nurses, and other clinicians to be readily hired from the community or from other states; ensure that local hospitals and health systems have the capacity to handle a potential surge of COVID-19 patients through temporary expansion sites (also known as CMS Hospital Without Walls); increase access to telehealth in Medicare to ensure patients have access to physicians and other clinicians while keeping patients safe at home; expand in-place testing to allow for more testing at home or in community based settings; and put Patients Over Paperwork to give temporary relief from many paperwork, reporting and audit requirements so providers, health care facilities, Medicare Advantage and Part D plans, and States can focus on providing needed care to Medicare and Medicaid beneficiaries affected by COVID-19.

According to [4], states a multi-disciplinary guideline/approach with reference to the best information for maternity care for mothers and babies during covid-19 pandemic. This guideline is intended as a guide and provided for information purposes only. This guideline does not address all elements of standard practice and accepts that individual clinicians are responsible for:

Providing care within the context of locally available resources, expertise, and scope of practice, supporting consumer rights and informed decision making, including the right to decline intervention or ongoing management. Advising consumers of their choices in an environment that is culturally appropriate and which enables comfortable and confidential discussion. This includes the use of interpreter services where necessary, Ensuring informed consent is obtained prior to delivering care, Meeting all legislative requirements and professional standards, Applying standard precautions, and additional precautions as necessary, when delivering care, Documenting all care in accordance with mandatory and local requirements.

According to [5], proposed an effective response system at the primary health care and community levels. The National Primary Healthcare Development Agency in line with its mandate to provide technical and programmatic support to states on the development of Primary Healthcare in Nigeria deemed it necessary to set up Covid-19 command/operations Centers (CoCC) to coordinate the COVID 19 response activities of the Agency. The National Command Center shall be referred as NCoCC and domiciled in the NEOC, led by the NEOC IM and supported by DIM. The NCoCC shall have real time linkage with NCDC COVID19 EOC through the NPHCDA support team lead deployed to the NCDC and the Agency’s support to Presidential Task Force on Covid-19. The strategic approach of the NCoCC shall be anchored on the following: Leadership coordination in liaison with FMOH, NCDC and Presidential Taskforce on COVID-19 and key partners towards effective control of the current COVID -19 outbreaks in Nigeria at the PHC and community level. Minimize the impact of the Covid-19 pandemic on PHC service provision and ensure the availability and adequacy of medicines, equipment and other essential commodities in the event of a surge in patient care needs, Leverage existing structures to strengthen surveillance and case detection of Covid-19 at PHC and community level, Development and implementation of a robust COVID-19 risk communication plan for PHC, Provision of capacity building and support to PHC staff on COVID-19 prevention and control.

Develop real-time situation report on the caseload of COVID-19 including number exposed, number tested and the outcome, among staff and their families and disseminate same to all staff platforms.

In [6] Appoints a management strategies during the pandemic (Covid-19). This report provides a system-wide assessment that can be used to guide medical facilities' efforts to ensure all patients with canceled appointments receive the follow-up required to meet their needs. VHA and its medical facilities took measures to protect patients and employees from COVID-19 by canceling scheduled non urgent face-to-face appointments. VHA issued its initial guidance to medical facilities for canceling appointments on March 15, 2020, and followed up with a series of memorandums that contained additional guidance or clarification. VHA created a monitoring tool for its appointment cancellation data that should allow it to identify and communicate specific issues to leaders and facilities. According to VHA's Office of Veterans Access to Care (OVAC) personnel, OVAC developed training and tools for facilities to manage appointments and consults during and following the pandemic. OVAC stated that facilities have been instructed to review all cancellations, and that each facility is responsible for executing follow-up actions based on its clinical review.

### **III. COVID-19 PREVENTION AND CONTROL**

For a safe community's proper screening and legitimate IPC measures ought to be consolidated into all local area based medical services exercises [7]. Adherence to the utilization of standard insurances for all patients consistently ought to be reinforced, especially with respect to hand cleanliness, surface and natural cleaning and sterilization, and the proper utilization of PPE. Physical removing ought to be carried out however much as could be expected. Coordination's arranging, planning and inventory network and waste administration for PPE and hand cleanliness supplies should address the requirements of the local area based wellbeing labor force [8]. Possible deficiencies in PPE should be tended to proactively, and clear direction should be given on the most proficient method to adjust fundamental exercises and administrations without PPE.

The following is Coronavirus preventive safety measures:

1. Hand cleanliness: Always clean hands when direct tolerant contact, these incorporates purging hands either with a liquor based hand rub (if hands are not noticeably filthy) or with cleanser and water and drying them with a solitary use or clean towel, if accessible.

#### **3.1 Tracking indications of follow-up to canceled appointments**

During the pandemic, VHA tracked data on cancellations and whether the canceled appointments had any indication of follow-up. Specifically, VHA was tracking whether canceled appointments had indications that they were rescheduled, converted to a virtual appointment (telephone or video), linked to an open consult or return to clinic order, or associated with a recall reminder to schedule the appointment later.

#### **3.2 Data collection**

A questionnaire survey was used to collect the data. The people that the questionnaire was given to where people of medical background. It was divided into two parts. The first part entailing asking the people which they preferred or thought was the best methods for handling appointments during the COVID 19 pandemic which are of two types. That is the local method of going to the hospital and standing in line or booking of the appointments online. The second category of the questionnaire dealt with different appointment scenarios and how they should be dealt with they had the option of virtual appointments, opening up of medical centers specifically for the illness or coming to the hospital for appointments to receive treatment.

### **IV. RESULT FOR THE FIRST ANALYSIS OF THE QUESTIONNAIRE DATA COLLECTION**

In this section the individuals where asked to choose based on these two options which was best for handling appointments during the COVID 19 pandemic faced in the world today. As I said before they were each given the option of traditional method of appointments which means going to the hospital to book appointments or online appointment as the name entails it means going booking your appointments online.

s/n	Names	Local method of appointment	Online appointment
1	COLLINS SMITH	No	Yes
2	Miss Sandra Rim	No	Yes
3	Dr. Vlad PAUL	No	Yes
4	TAOUFIK AHMED	No	Yes
5	CLINTON BUSH	No	Yes

6	OBAMA STANLEY	No	Yes
7	CYRIL CHARLES	No	Yes

The result above table shows that 100% of the individuals given the questionnaire where in agreement with online appointments being the best form of appointments during the COVID 19 pandemic.

#### **4.1 Result for the observation of data collection carried out.**

Over the range of my examination I tracked down that most crisis facilities abroad use telehealth as an approach to defend social eliminating as prosperity work power manage patients. They do this using telemedicine care. As such, things like video conferencing plans or virtual courses of action are been used and arrangements are been given to patients on the web. I moreover found from my investigation that in-person care where used to manage certain cases yet a huge load of protections were taken in other to ensure the prosperity of the prosperity work power and patient. Center plans where just used various emergencies and in disapproving out courses of action which required the clinical facility's clinical office. Interesting center where by and large set up of things like testing and dental game plans. While game plans like treatment where done using telemedicine besides.

### **V. RESULTS AND DISCUSSION**

My research reveals that based on the COVID 19 pandemic that the local method of reserving appointments is not the best way of handling appointments because it removes the whole idea of social distancing and causing wider spread of the virus. Rather it shows that my using methods such as telemedicine, in-person care it can help reduce the spread of this know global pandemic.

The COVID 19 pandemic according to research is probably going to be around for two years or more and people will still experience other illnesses during this period so the best way of handling these appointments is to use telehealth to our advantage. Health care centers should apply online techniques in handling their appointments. A hospital with a high patient rate and the best way to handle their appointments is by using telehealth. Social networking is made possible with the health of computer science it should be adopted into the medical system and used in combating the spread of coronavirus.

### **VI. CONCLUSION**

During the COVID 19 pandemic handling appointments using the local means is challenging and will create problems than the ones it has solved. So, the best way to handle appointments are from a distance unless it requires more attention than normal this will help stop the spread of coronavirus. I believe telehealth is the best way for the Niger foundation hospital to handle appointment during the COVID 19 pandemic.

#### **REFERNECE**

- [1] Phase 4 COVID response, government of west Austria (2020). "COVID-19 guidelines for outpatient services" Department of health.
- [2] Veterans health administration-office of emergency management (March 2020). "COVID-19 response plan". Incedent – specific Annex to the VHA High consequence infection (HCI) Base plan. Version 1.6
- [3] Centers for medicine and medic aid services (august 2020). "Hospitals: CMS flexibility to fight COVID-19". United States of America.
- [4] Queensland clinical guidelines (march 2020). "Maternity care for mothers and babies during the COVID-19 Pandemic. Queensland clinical guidelines steering committee statewide maternity and neonatal clinical network.
- [5] National primary health care development agency (2019). "Preparedness and response to corona virus disease (COVID-19) at primary health care and community level.
- [6] Veterans health administration (2020). "Appointment management during the COVID-19
- [7] Coronavirus disease (COVID-19) technical guidance (2020). "Infection prevention and control/WASH [website]. Geneva: World Health Organization; (<https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/infection-prevention-and-control>, accessed 29 April 2020).

- [8] Strategies to optimize the supply of PPE and equipment (2020). “Atlanta (GA): Centers for Disease Control and Prevention”. (<https://www.cdc.gov/coronavirus/2019-ncov/hcp/ppes-strategy/index.html>, accessed 29 April 2020).

# *Development of Microbiology Learning Animation Videos for Biology Students at Padang State University*

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**Abstract** – Along with the development of era , science knowledge and technology are also experiencing growth. There for a media learning is a means or a tool that is used by educators to convey a message of learning to students. This study aims to produce a learning media product in the form of an animated video on a microbiology course on the basic concepts of microbiology. Subject Test try on research this is a student of biology S1 Faculty of Mathematics and Science Knowledge Natural (Natural Sciences), University of Negeri Padang (UNP) half of July to December 2020 . The results showed that the learning media products in the form of animated videos were validated and in the very valid category. Classically the results of validation by experts (material, media and language experts) on the didactic aspect were 95.83% , on the construct aspect, the value was 93.75% , on the technical aspect, the validation value was 91.66% and the validation value on the graphic aspect gets a value of 100% . The practicality test that was tested on lecturers who taught basic microbiology courses and tested on students got very practical results. In the practicality test, the subject lecturer got a score of 92.50%, the practicality test for small group students got a score of 90.53% and the practicality test for large group students got a value of 91.06%.

**Keywords** – Animation Video, Microbiology, Development.

## I. INTRODUCTION

Biology, according to the education curriculum in Indonesia, must be given to students to accommodate learning activities with a systematic step through scientific approach. Those approach should be supported by interactive learning process, as stated in Minister of Education and Culture Decree No. 24 of 2016 on Process Standards that the learning process should be interactive, inspiring, fun, challenging, motivating learners to participate actively, and providing sufficient space for initiative, creativity and independence in accordance with talent, interest, and learner physical and psychological development.

According to Maryani (2009) Learning material, as subject matter that is systematically arranged to be used by teachers in learning, is one of the learning tools that can support the process standard of curriculum. Due to the current technological developments, learning materials used must be able to accommodate printed materials and digital materials. Suartama (2010) effectiveness of digital material is better than the textbook in learning. Digital material combine the computer program consisted of texts, graphic, sound and images and animations (Hamidi, et al., 2011; Islam, et al.,2014).

Along with the times, science and technology are also experiencing developments. The development of science and technology which from day to day is becoming increasingly sophisticated, directly or indirectly giving a considerable influence on several aspects of human life. One aspect of human life that has been influenced by the development of science and technology is the aspect of education.

According Hwang, et al (2012) video provides more flexible media to support students learning activities, able to explain concept related to mechanism or process, can be repeated and stopped according to the students need.

According Cardoso, et al (2009) video can also engage the students' attention in class, clarify the idea and illustrate the concept so that students can get long term memory of the material. Putri, (2012) Economically, video relatively cheaper than printed materials both in price and in operation). One kind of good video in learning is animation. Ainsworth (2008) also added, animation videos can enrich students' experience and competence on a variety of learning materials. According to Hegarty (2004) Along with technological development, animated video is able to provide a stronger visual appearance of various phenomena and abstract information to improve the quality of learning process and learning outcomes.

According Dahar (2011) basic microbiology courses are a requirement for taking advanced courses such as biotechnology, and other applied microbiology courses, such as soil microbiology, medical microbiology, food microbiology, and industrial microbiology. Meaningful learning in science, especially microbiology, requires students to understand and relate a concept, and apply these concepts to support other scientific concepts. This process aims to direct students to associate experiences, phenomena, and new facts into their knowledge structure. So it is necessary to have learning media to support student knowledge in the learning process.

Education and learning media have a very close relationship, the learning process will not run smoothly without the right learning media. Media is an intermediary or messenger from the giver to the recipient of the message. According to AECT (1977), media are all forms and channels that people use to transmit messages or information. The use of appropriate media is able to convey information and the message conveyed by the messenger can be received clearly by the recipient of the message. Likewise, when the media is used in the learning process in the classroom, the information conveyed by the lecturer as a messenger in class can be received clearly by students as message recipients in class.

Learning media is a means or tool used by educators to convey learning messages to assist in the teaching and learning process so that students can absorb the information conveyed by the lecturer properly. Learning media must be able to provide motivation to students, stimulate students to what they have learned and stimulate learning to what will be learned and be able to encourage students to provide feedback, feedback, and encouragement to do good practices. According Djamarah (2010) argues that media play a role in the learning process, because in the event the obscurity of the material presented can be helped by presenting the media as an intermediary. Besides, learning media also helps learners improve understanding, presents data with interesting and reliable, facilitate interpretation of data, and compact information.

One of the learning videos that can be used for the learning process is an animated video. In the Big Indonesian Dictionary by John M. Echols and Hassan Sadily quoted by Prakoso (2010) animate means that which is alive, has soul: (1) animates, animates, inflames, enlivens, Animated: (1) which is fun, (2) life.

Based on the results of preliminary observations, information was obtained that students said the microbiology course was an interesting subject to study because it was related to everyday life, but students also stated that microbiology courses were abstract subjects or could not be seen directly with the eye without using a microscope. The results of interviews with lecturers who teach microbiology courses are some of the obstacles faced in microbiology lectures, namely supporting media for deepening the material which is done by presenting the material with PowerPoint (PPT) but not maximally like video, it has not been maximally obtained by students to support understanding of the material later. Based on those, authors will conduct a research to develop a learning media that is valid, practical, and effective to facilitate college student understanding ability.

With regard to the results of observations and interviews obtained, it is necessary to develop learning media that can increase student attractiveness in microbiology learning. Based on the problems raised, the author will conduct research "Development of Learning Animation Videos to Support Microbiology E-Module on the Topic of Basic Biology Concepts in Biology Students, Padang State University".

## II. RESEARCH METHODS

The type of research that will be used is development research (R & D) conducted at the Padang State University (UNP). Sugiyono (2009) states that research development (Research and Development) is a research method used to produce a particular product, and test the effectiveness of the product. The test subjects in this study were undergraduate biology students of the Faculty of Mathematics and Natural Sciences (FMIPA), Padang State University (UNP) July-December 2020 semester.

Plomp and Nieveen (2013) this research design uses the developer of the Tjeerd Plomp model, namely the preliminary research phase, the development or prototyping phase, and the assessment phase.

Data collection techniques were carried out by means of observation and questionnaires. Expert validation data analysis was obtained from the assessment of media experts, material experts and linguists. Analysis of data from the animated video validity assessment sheet that was developed in terms of didactic, construct, technical and graphic aspects based on the questionnaire given.

The validation data is calculated using the formula:

$$\text{Value} = \frac{\text{The number of scores obtained}}{\text{The highest number of scores}} \times 100\%$$

Table 1 Animated video validity value

0% - 20%	= invalid
21% - 40%	= not valid
41% - 60%	= valid enough
61% - 80%	= valid
81% - 100%	= very valid

modification of Riduwan (2009)

To test the practicality of instructional video animation media in the practicality trial of teaching lecturers, small groups and large group trials with the formula:

$$F = \frac{\text{The number of scores obtained}}{\text{The highest number of scores}} \times 100\%$$

F = Percentage of practicality

Table 2 The practical value of animated videos

0% - 20%	= impractical
21% - 40%	= not practical
41% - 60%	= practical enough
61% - 80%	= practical
81% - 100%	= very practical

modification of Riduwan (2009)

## III. RESULTS AND DISCUSSION

The result of this research is that the product of microbiology learning animation video is ready to be validated by experts, namely media experts, material experts and linguists, data analysis from the animated video validity assessment sheet developed in terms of didactic, construct, technical and graphic aspects as well as the practicality test on the lecturer, small group test and large group test. The following is an explanation of the presentation and analysis of the data from the assessment results by validation of experts, the practicality test of lecturers, the small group practicality test and the large group practicality test.



3.1. Expert Validation (Media, Material, Language)

3.1.1. Didactic Aspects

In the didactic aspect, the microbiology learning animation video was declared valid by the validator with a validity value of 95.83% with very valid criteria. Based on the criteria on the didactic aspect, it is known that the animation video developed is in accordance with the syllabus and student characteristics. The developed microbiology learning animation video can support the lecture process, help students understand the material, and improve student understanding of concepts.

Table 3 The validation value of the didactic aspects of the microbiology learning animation video

No.	Aspect	No.	Validator			total	Score	Criteria
			1	2	3			
1	Didactic	1	4	4	4	12	95.83	Very Valid
		2	3	4	4	11		
	Total		8	8	7	23		

The didactic aspect of the microbiology learning animation video on the basic concepts of microbiology was declared very valid by the validator. The validation results indicate that the subject matter of lecture activities contained in the learning animation video is in accordance with the syllabus used. Didactic requirements are requirements relating to the process of determining the correct concepts according to the syllabus and learning outcomes. According to Lufri (2007) validation extends to the accuracy, meaning and usefulness of a conclusion made by the researcher. This didactic requirement regulates the use of instructional animation videos on the basic concept material of universal microbiology that can be used well for students with low, medium, and high abilities.

3.1.2. Construct Aspects

In the construct aspect, the microbiology learning animation video is stated valid by the validator with a validity value 93.75% with very valid criteria. Based on the criteria in the construct aspect, it can be stated that the developed microbiology learning animation video has an identity, it is concluded that it is equipped with a clear identity and is systematically structured. Based on the use of language, the animated video developed is in accordance with the rules of Indonesian that are good and correct and the terms used in the textbook are correct.

Table 4 The validation value of the construct aspects of the microbiology learning animation video

No.	Aspect	No.	Validator			total	Score	Criteria
			1	2	3			
2	Construct	1	4	3	4	11	93.75	Very Valid
		2	4	4	3	11		
		3	4	3	4	11		
		4	4	4	4	12		
	Total		15	14	16	45		

The construct aspects of the microbiology learning animation video on the basic concepts of microbiology were stated to be very valid by the validator. Based on this, it can be concluded that the microbiology learning animation video on the basic concepts of microbiology already uses language that is easily understood by students, uses language that is in accordance with the rules of Indonesian that is good and correct and is in accordance with enhanced spelling (EYD), and has clear sentences. . Animated microbiology learning videos on the basic concepts of microbiology have been presented systematically in accordance with the learning outcomes in the syllabus.

3.1.3. Technical Aspects

On the technical aspect, the microbiology learning animation video was declared valid by the validator with a validity value 91.66% with very valid criteria. Trianto (2012) terms or criteria for technical aspects related to writing, images, and appearance in the manufacture of a product [16]. Based on the criteria on the technical aspect, it can be stated that the animated video developed uses a type and size of letters that can be read clearly, and the use of punctuation marks is correct.

Table 5 The validation value of the technical aspects of the microbiology learning animation video

No.	Aspect	No.	Validator			total	Score	Criteria
			1	2	3			
3	Technical	1	4	4	4	12	91.66	Very Valid
		2	4	3	4	11		
		3	4	2	4	10		
		4	4	4	3	11		
		5	4	3	4	11		
		6	4	3	4	11		
		7	4	4	3	11		
Total			26	23	28	77		

The assessment of the technical aspects assessed by experts on the microbiology learning animation video on the basic concepts of microbiology was stated to be very valid by the validator. The validation results indicate that all components in the technical aspects including written, visual, and audio have been fulfilled properly. Very valid values are given by the validator based on several indicators.

#### 3.1.4. Graphic Aspects

On the technical aspect, the microbiology learning animation video was declared valid by the validator with a validity value 100% with very valid criteria.

Table 6 The validation value of the graphic aspects of the microbiology learning animation video

No.	Aspect	No.	Validator			Total	Score	Criteria
			1	2	3			
4	Graphics	1	4	4	4	12	100	Very
Total			4	4	4	12		Valid

The assessment of the graphic aspects assessed by experts in the microbiology learning animation video on the basic concepts of microbiology was stated to be very valid by the validator. graphics that can be seen from the display design in the animated video being developed. Color in the animation video and the display of the microbiology learning animation video on the material basic concepts of microbiology can make readers interested in knowing about the material being discussed, this is because of the attractive color combination and good color combination. According to Trianto (2009) the technical requirements are related to writing, pictures, and appearance in the making microbiology learning animation on the basic concepts of microbiology.

#### 3.2. Practicality Test

##### 3.2.1. Practicality Test by Lecturers of Microbiology Subjects

The practicality test conducted by a lecturer who teaches microbiology courses on the topic of basic concepts of microbiology is Dr. Dwi Hilda Putri, M.Biomed. the results of the analysis of practicality test data by the lecturer who were able to get a percentage value of 92.50% which was stated in the very practical category.

Table 7 The value of practicality by a lecturer who teaches microbiology courses

No.	Aspect	Score (%)	Category
1.	Ease of Use	87.50	Very Practical
2.	Animation Video Efficiency	100	Very Practical
3.	Attractiveness	87.50	Very Practical

No.	Aspect	Score (%)	Category
4.	Easy to Interpret	100	Very Practical
5.	Has Equivalence	87.50	Very Practical
	<b>Total</b>	462.50	
	<b>Average</b>	<b>92.50</b>	<b>Very Practical</b>

### 3.2.2. Small Group Practicality Test

The small group trial involved 6 students with low, medium and high abilities obtaining a percentage of 90.53% which was stated in the very practical category.

Table 8 Small group practicality value (Small Group)

No.	Aspect	Score (%)	Category
1.	Ease of Use	89.58	Very Practical
2.	Animation Video Efficiency	95.83	Very Practical
3.	Attractiveness	91.66	Very Practical
4.	Easy to Interpret	83.33	Very Practical
5.	Has Equivalence	95.83	Very Practical
	<b>Total</b>	<b>239</b>	
	<b>Average</b>	<b>90.53</b>	<b>Very Practical</b>

### 3.2.3. Large Group Practicality Test (Field Test)

The large group trial involved 30 students who were studying the microbiology course in semester 3. The results of the practicality analysis in the large group obtained a percentage of 91.06% which was stated in the very practical category.

Table 9 Large group practicality value (Field Test)

No.	Aspect	Score (%)	Category
1.	Ease of Use	91.54	Very Practical
2.	Animation Video Efficiency	95.00	Very Practical
3.	Attractiveness	91.25	Very Practical
4.	Easy to Interpret	86.66	Very Practical
5.	Has Equivalence	92.50	Very Practical

<b>Total</b>	<b>1202</b>	
<b>Average</b>	<b>91.06</b>	<b>Very Practical</b>

#### IV. CONCLUSION

Based on the results of data analysis, discussion and results of developing microbiology learning animation videos on the basic concepts of microbiology with the Tjeerd Plomp development model, it can be concluded that, 1) the animation video of microbiology learning on the basic concept material of microbiology has been validated by experts, namely media experts, material experts and linguists get an overall percentage of 93.45% in the very valid category. 2) the microbiology learning animation video on the basic concept material of microbiology has been practiced by the microbiology subject lecturer getting an overall percentage of 92.50% including in the very practical category. 3) the video animation of microbiology learning on the basic concepts of microbiology has been put into practice by small group student tests with an overall percentage of 90.53% so that it is included in the very valid category. 4) the video animation of microbiology learning on the basic concepts of microbiology has been put into practice by the large group student test getting an overall percentage of 91.60% including in the very practical category.

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#### REFERENCES

- [1] Maryani, S. (2009). Pengembangan bahan ajar berbasis multimedia interaktif mata kuliah komputerisasi akuntansi (Studi kasus: myob accounting 17 pada modul banking). Retrieved from <http://www.gunadarma.ac.id>.
- [2] Suartama, I. K. (2010). Pengembangan multimedia untuk meningkatkan kualitas pembelajaran pada mata kuliah media pembelajaran. *Jurnal Pendidikan Dan Pengajaran*, 43(3), 253–260.
- [3] Hamidi, F., Kharamideh, Z. M., & Ghorbandordinejad, F. (2011). Comparison of the training effects of interactive multimedia (CDs) and non-interactive media (films) on increasing learning speed, accuracy and memorization in biological science course. *Procedia Computer Science*, 3, 144–148. <https://doi.org/10.1016/j.procs.2010.12.025>.
- [4] Hwang, I., Tam, M., Lam, S. L., & Lam, P. (2012). Review of use of animation as a supplementary learning material of physiology content. *The Electronic Journal of E-Learning Volume*, 10(4), 368–377.
- [5] Cardoso, D. C., Arent, C. O., & Cristiano, M. P. (2009). Development of new didactic materials for teaching science and biology: the importance of the new education practices. *OnLine Journal of Biological Sciences*, 9(1), 1–5. <https://doi.org/10.3844/ojbs.2009.1.5>.
- [6] Putri, N. (2012). Efektifitas penggunaan media video untuk meningkatkan pengenalan alat musik daerah pada pembelajaran IPS bagi anak tunagrahita ringan di SDLB 20 Kota Solok. *Jurnal Ilmiah Pendidikan Khusus*, 1(12).
- [7] Ainsworth, S. (2008). How do animations influence learning. *Current Perspectives on Cognition, Learning, and Instruction: Recent Innovations in Educational Technology That Facilitate Student Learning*, 37–67.
- [8] Hegarty, M. (2004). Dynamic visualizations and learning: Getting to the difficult questions. *Learning and Instruction*, 14, 343–351.
- [9] Dahar, R., W. 2011. *Teori Belajar dan Pembelajaran*. Jakarta: Penerbit Erlangga.
- [10] AECT. 1977. *The Definition of Educational Technology*. Washington: Association for Educational Communication and Technology.
- [11] Djamarah, S, B. 2010. *Strategi Belajar Mengajar*. Jakarta: Rineka Cipta, 120.
- [12] Prakoso, Gotot. (2010). Animasi (Pengetahuan Dasar Film Animasi Indonesia). Jakarta: Nalar.

- [13] Sugiyono. 2009. *Metode Penelitian Kuantitatif Kualitatif dan R&D*. Bandung: Alfabeta.
- [14] Plomp, T and Nieveen, N. 2013. *Educational Design Research*. Netherland: Netherlands Institute for Curriculum Development.
- [15] Lufri.a. 2017. *Kiat Memahami dan Melakukan Penelitian*. Padang: UNP.
- [16] Trianto. 2012. *Mendesain Model Pembelajaran Inovatif-Progresif: Konsep, Landasan, Dan Implementasinya Pada Kurikulum Tingkat Satuan Pendidikan (KTSP)*. Jakarta: Kencana Prenada Media Group.

# *Analysis of the Results of Different Methods of Surgical Treatment of Varicocele*

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**Abstract** – This work is based on the results of treatment of 376 patients with left-sided varicocele. Of 376 patients, 363 (96.5%) patients had varicocele for the first time and 13 (3.5%) patients had a relapse. The patients were between the ages of 11 and 18. Depending on the method of surgery, 2 groups of patients were identified. 181 (48.1%) patients underwent conventional surgical interventions (Ivanissevich's or Polomo's operations), which made up the comparison group. 195 (51.9%) patients underwent subinguinal selective operations (antegrade endovascular sclerotherapy of the left testicular vein and Marmara operation), which were included in the main group. Selected 26 practically (control group) healthy children data of ultrasound and Doppler ultrasound of the testicular veins, we took as the norm. During the surgical treatment of varicocele, an individual, differentiated approach was chosen for each patient depending on the hemodynamic type. The analysis of the surgical treatment of patients with varicocele revealed a relapse of the disease in 15% of cases. The developed methods of treatment, taking into account the type of blood flow, are low-traumatic and exclude the possibility of recurrence. The proposed methods of surgical treatment of varicocele have reduced the number of complications from 24.8% to 2.3%.

**Keywords** – Varicocele, Children, Subinguinal Selective Operations, Ultrasound Doppler, Hemodynamic Type.

## I. RELEVANCE

According to the WHO, "... the etiology of male infertility is currently represented by almost 30 reasons. In this case, the idiopathic form accounts for up to 16-25% of all cases and varicocele is the cause of infertility in 9-40% of patients. «Such large differences in these indicators indicate the controversy of this situation. The prevalence of varicocele among children and adolescents aged 10-18 years reaches 19%.

Early detection of varicocele can correct impaired fertility and maintain reproductive function in childbearing age. Adolescents, like fathers-to-be, socially represent demographic potential. Therefore, this disease is attracting increased attention not only from a medical, but also from a socio-demographic position.

The existing methods of surgical treatment do not in all cases relieve the patient of infertility and cannot guarantee the recurrence of the disease. So, according to Dunphy L. (2019) "venous renal hypertension on the left due to compression of the mouth of the left renal vein (aorto-mesenteric forceps) leads to the development of retrograde blood flow along the left testicular vein, and, as a result, varicocele occurs". Therefore, there is still an opinion that ligation of the left spermatic vein is a pathogenetically justified method of treatment, since one of the main causes of varicocele is a violation of venous outflow through the left renal vein system and its valve insufficiency. However, this condition is also possible in healthy people, so it remains unclear why not everyone has varicocele. Despite the large number of proposed methods of operations, the choice of the optimal method of surgical treatment of varicocele remains a subject of discussion (Gurevich A.I.).

## II. THE AIM OF THE STUDY

Was to improve the results of diagnosis and surgical treatment of varicocele in children.

## III. MATERIALS AND RESEARCH METHODS

This work is based on the results of treatment of 376 patients with left-sided varicocele who received treatment at the 2-clinic SamMI for the period from 1997 to 2018. Of 376 patients, 363 (96.5%) patients had varicocele for the first time and 13 (3.5%) patients had a relapse. The patients were between the ages of 11 and 18. The average age of the patients was  $16.5 \pm 2.3$  years. Depending on the method of surgery, 2 groups of patients were identified. In 1997-2010. 181 (48.1%) patients underwent conventional surgical interventions (Ivanissevich's or Polomo's operations), which made up the **comparison group**. 2008 to 2018 195 (51.9%) patients underwent subinguinal selective operations (antegrade endovascular sclerotherapy of the left testicular vein and Marmara operation), which were included in the **main group**.

Selected 26 practically (**control group**) healthy children data of ultrasound examination (UE) and ultrasound Doppler (UD) of the testicular veins, we took the norm. In addition, 17 adult men with varicocele over 20 years of age were studied, in whom sperm analysis was performed before and after surgery. All patients admitted with a diagnosis of varicocele underwent a complex of clinical, laboratory and instrumental studies.

Ultrasound examinations of the scrotum were routinely performed with the patient in a horizontal position, lying on his back, and no preliminary preparation was required. In all cases, both testicles were necessarily examined, which made it possible to carry out a comparative assessment. To assess the condition of the testicular vein, all patients underwent ultrasound Doppler. Vein diameter and duration of the reflux wave were measured both at rest and during the Valsalva test. The state of spermatogenesis was assessed in accordance with the WHO guidelines.

## IV. RESEARCH RESULTS

Not all patients with asymptomatic varicocele were operated on, but only those who had grade II and III disease. Patients with grade I varicocele underwent surgical treatment only when they had one of the above signs of the disease. A comparative analysis of clinical symptoms (Table 1) showed that the asymptomatic course of varicocele was the highest number 328 (81.4%) of all examined patients.

Table 1. Revealed symptoms of varicocele in the study groups

Symptoms	Comparative group (n=181)	Main group (n=195)	Total
Asymptomatic course	156 (81,7%)	172 (81,1%)	328 (81,4%)
Pain and discomfort in the left groin and testicle area	17 (8,9%)	16 (7,6%)	33 (8,2%)
Scrotal enlargement	11 (5,8%)	15 (7,1%)	26 (6,4%)
Testicular hypotrophy	7 (3,6%)	9 (4,2%)	16 (4,0%)
Total	191 (100%)	212 (100%)	403 (100%)

$\chi^2=0,583$ ; critical value  $\chi^2 =7,815$  ( $p<0,05$ );  $p=0,901$  ( $p>0,05$ )

Note: one patient had 2-3 symptoms at the same time.

When performing varicocelectomy until 2010, they used exclusively traditional conventional methods. Of the comparison group, 103 (56.9%) patients underwent Ivanissevich's operation and 78 (43.1%) patients underwent Palomo's operation. The distribution of patients in the comparison group according to the degree of disease and the choice of surgical intervention are presented in Table 2.

Table 2. Distribution of patients in the comparison group depending on the degree of varicocele and the choice of surgery

Varicocele grade	Comparative group (n=181)	
	abs.	%
I degree	1	0,6
II degree	71	39,2
III degree	109	60,2
Total	181	100

Since 2011, in the surgical treatment of varicocele, depending on the clinical course of the disease and the hemodynamic type, we choose an individual, differentiated approach for each patient. Thus, all patients of the main group with primary varicocele with renospermatic I type (106 - 82.2%) and mixed type with prevalence of renospermatic reflux (III A type 23 - 17.8%) used antegrade endovascular sclerotherapy of the left testicular vein.

The method of varicocelectomy developed by us - antegrade endovascular sclerotherapy of the left testicular vein (AES LTV) is a minimally invasive method of treating varicocele (patent for invention No. IAP 04234, Intellectual Property Agency of the Republic of Uzbekistan "Method for treating varicocele"), interruption of pathological blood flow.

The proposed method has several advantages:

- Minimally invasive.
- Does not require expensive equipment - cost effective.
- The leakage of the sclerosing substance into the renal vein and its reflux into the veins of the groin-like plexus are excluded.
- Reliably prevents the development of postoperative complications and recurrence of the disease.
- The length of hospital stay for patients is reduced.

The indicators of treatment results were as follows: the course of the postoperative period, the nature of the healing of the postoperative wound, the time of the patient's stay in the hospital (bed-day), the duration of the operation (min), the duration of the temperature (days), UD signs of persistence of reno- or ileo-testicular pathological venous refluxes (Table 3).

The use of ultrasound and Doppler sonography for postoperative monitoring of the results of surgical treatment of varicocele indicates the need for this non-invasive and more informative research method.

Table 3. The incidence of postoperative complications in patients after varicocelectomy

Complication type	Patient group				Total, n=376	
	Comparative group n=181		Main group n=195			
	abc.	%	abc.	%	abc.	%
Testicular hypotrophy	5	2,75	-	-	5	1,3



Hydrocele	5	2,75	1	0,5	6	1,6
Number of patients with complications	10	5.5	1	0,5	11	2,9
$\chi^2=1,977$ ; critical value $\chi^2=9,488$ ( $p=0,05$ ); $p=0,741$ ( $p>0,05$ )						

The median postoperative follow-up time was 12 months. In addition to the disappearance of signs of varicocele, in the long-term postoperative period spermogram indices were compared, the effect of surgical treatment on the onset of pregnancy in women in a sexual couple was assessed.

Long-term results were analyzed in 236 (62.8%) of 376 operated patients with varicocele (Table 4).

Table 4. The number of patients observed in the late postoperative period

Hemodynamic type	Comparison group n=105		Main group n=131				Total (n=236)	
	abs	%	AES LTV (n=89)		Operation Marmar (n=42)		abs	%
			abs	%	abs	%		
I type	17	16,2	78	59,5	4	3,0	99	41,9
II type	5	4,8	-	-	32	24,4	37	15,7
III A type	2	1,9	11	8,4	-	-	13	5,5
III B type	1	0,9	-	-	6	4,6	7	3,0
In the preoperative period, hem.type not identified	80	76,2	-	-	-	-	80	33,9
$\chi^2=130,970$ ; critical value $\chi^2=13,277$ ( $p=0,01$ ); $p<0,001$ ( $p<0,01$ ) AES LTV AЭC $\chi^2=105,744$ ; critical value $\chi^2=13,277$ ( $p=0,01$ ); $p<0,001$ ( $p<0,01$ ) Operation Marmar $\chi^2=151,152$ ; critical value $\chi^2=13,277$ ( $p=0,01$ ); $p<0,001$ ( $p<0,01$ ) Comparison group								

To assess long-term results, patients underwent a thorough survey, outpatient and inpatient examination. Long-term results were studied in the period from 1 to 12 years. One of the main indicators characterizing the effectiveness of surgery for varicocele is the frequency of disease relapses. When studying the nature of the relapse, the hemodynamic type of varicocele was compared. Of 236 patients observed in the late postoperative period, the hemodynamic type of pathological venous reflux according to Coolsaet (1980) in the preoperative period was determined in 156 (66.1%), in 80 (33.9%) patients from the comparison group in the preoperative period, the hemodynamic type was not defined.

In a retrospective analysis of long-term results, the overwhelming majority of patients with relapses were of types II and III (85.0%), in patients of the comparison group, where the hemodynamic type was not taken into account when choosing a surgical intervention.

Relapse of varicocele was observed in 20 (8.5%) patients, out of 236 examined in the long-term, while in the group of patients operated on in 2005-2010, this indicator reached 17.1%. Subsequently, due to the application of the above innovations and measures of disease prevention, the frequency of disease relapses was reduced in the main group of patients to 1.5%.

In order to identify the quality of life of the patients we operated on in the long-term postoperative period, the reproductive function of 78 volunteers over 18 years old was studied, in whom the spermogram was examined earlier in the preoperative period.

Table 5. The state of spermatogenesis and the function of the gonads in a group of men with varicocele before and after surgery n = 17

Indicators	before surgery	after operation	WHO standards	P
Ejaculate volume (ml)	2,5±0,8	3,8±0,8	2,0-6,0	0,259325

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Sperm concentration (mln / ml)	36,0±33,0	61,0±33,0	more than 20	0,915370
Live sperm (%)	42,0±4,0	77,0±4,0	more than 50	<b>0,019002</b>
Actively motile sperm (%)	29,0±14,0	36,0±14,0	more than 25	0,960042
Sedentary (%)	25,0±6,0	23,0±6,0	more than 25	0,906946
Normal forms (%)	31,0±11,0	37,0±11,0	more than 50	0,949158
Spermatogenesis cells (%)	2,3±0,3	2,0±0,3	1-2	0,484782
Fructose (mM / L)	14,0±4,3	13,0±4,3	more than 13,0	0,870450
Citric acid (mM / L)	13,1±5,3	13,9±5,3	more than 53,0	0,915688
Zinc ions (mM / L)	0,9±0,3	1,5±0,3	more than 2,0	0,167265

Table 5 shows the results of a study of ejaculate in adult men for comparative analysis before and after surgical correction. There was a higher scatter of digital indicators for all parameters of the ejaculate. The value of each parameter before surgery was close to the values of the same parameters in adolescents. After surgery, the level of sperm motility did not change; the number of normal forms of germ cells did not increase.

Table 6 shows the results of assessing the state of spermatogenesis in patients 2-4 years after surgery. The results obtained indicate the normal state of the ejaculate parameters corresponding to the WHO standards for adults.

Since 2016, male fertility was assessed according to a program developed by us (certificate of official registration of a computer program No. DGU 05025, Intellectual Property Agency of the Republic of Uzbekistan "Program for assessing and predicting the reproductive state in men after various types of surgery with varicocele disease"), including objective and subjective signs, instrumental data on which it is possible to assess the reproductive state of men after varicocelelectomy.

By the presence of points scored from the program by objective signs and instrumental data in the postoperative period, the reproductive state was assessed in 96 men who underwent varicocelelectomy in our clinic in various ways in childhood. Of these, 17 (17.7%) were men from the comparison group and 79 (82.3%) were men from the main group (Table 6).

Table 6. Distribution of patients depending on the assessment and prediction of the reproductive state in men after different types of operations for varicocele

Study groups	Research results					
	Favorable		Moderately favorable		Adverse	
	abs.	%	abs.	%	abs.	%
Comparison group (n=79)	43	54,4%	24	30,4%	12	15,2%
Main group (n=17)	14	82,4%	2	11,8%	1	5,8%
$\chi^2$ criterion between groups	$\chi^2 = 25,023$ ; critical value $\chi^2 = 9,21$ ( $p=0,01$ ); $p<0,001$					
Total (n=96)	57	59,4%	26	27,1%	13	13,5%

As can be seen from Table 8, the reproductive state of men in the main group improved in contrast to men in the comparison group. Thus, a favorable result in the main group was 82.4% (in 14 out of 17 men); while in the comparison group, this indicator

was 54.4% (in 43 out of 79). In general, for all the results taken together, a reliable best value was obtained in the main group (between the groups, the criterion  $\chi^2 = 43.087$ ; Df = 3;  $p < 0.001$ ).

Thus, in a retrospective analysis of long-term results, the overwhelming majority of patients with relapses were of types II and III (85.0%), in patients of the comparison group, where the hemodynamic type was not taken into account when choosing a surgical intervention.

### V. CONCLUSION

1. The conducted analysis of the surgical treatment of patients with varicocele revealed a relapse of the disease in 15% of cases, during the study it was determined that the latter were associated with the fact that the types of hemodynamics were not taken into account.

2. The developed method of treatment, taking into account the type of blood flow, is low traumatic and excludes the possibility of relapse.

3. The proposed methods of surgical treatment of varicocele made it possible to reduce the number of complications from 24.8% to 2.3%.

### REFERENCES

- [1] Akilov F.A., Shomarufov A.B., Abbosov S.A. Analysis of the combined effect of age and duration of infertility on the effectiveness of varicoelectomy // *Urological Bulletin*. - 2019. - T. 9. - No. 1S. - S. 8-9.
- [2] Akramov N.R., Akhunzyanov A.A., Khamidullin A.F. et al. Choice of treatment tactics for patients with varicocele // *Kazan Med. g.* - 2005. - No. 3. - S. 201-204.
- [3] Hamidov S., Ovchinnikov R., Popova A., Nikitin P., Izhbaev S. Varicocele: current state of the problem // *Doctor*. - 2013. -- T. 1. - S. 12.
- [4] Zhukov OB, Verzin AV, Penkov PL Regional renal venous hypertension and left-sided varicocele // *Andrology and genital surgery*. - 2013. - No. 3.S. 29-37.
- [5] Kadyrbekov NM, Muravyov AA Development of ultrasonic Doppler sonography for varicocele // *European research: innovation in science, education and technology*. - S. 70.
- [6] Makhin.Yu.Yu. Angiosurgical treatment of varicocele in children and adolescents. Abstract dissertation. for a job. scientific degree of candidate of medical sciences, St. Petersburg - 2013, p. 22.
- [7] Osadchuk L.V., Popova A.V., Voroshilova N.A. Influence of prostatitis and varicocele on reproductive indices of young men // *Experimental and clinical urology*. - 2014. - No. 2. - S. 77-81.
- [8] Shamsiev A.M., Kodirov N.D. Analysis of the results of surgical treatment of varicocele // *Journal of Problems of Biology and Medicine*. Samarkand city. No. 3, 2019. Pp. 145-148.
- [9] Bogaert G., Orye C., De Win G. Pubertal screening and treatment for varicocele do not improve chance of paternity as adult // *The Journal of urology*. – 2013. – T. 189. – №. 6. – C. 2298-2304.
- [10] Shamsiev A.M., Shamsiev J.A., Yusupov Sh.A., Kodirov N.D., Boimuradov N.S., Pulatov P.A. Application of an improved method of surgical treatment of varicocele in children. // *Materials of the scientific and practical conference with international participation "Men's health - the health of a generation."* J. "Problems of biology and medicine", Samarkand No. 4.1 (92), 2016, –S.120 (14.00.00. No. 19).
- [11] Shamsiev A.M., Kodirov N.D. Structural Features of the Seminal Veins with Varicjcele // *American Journal of Medicine and Medical Sciences* 2019, 9(11): 445-452

## *Care In A Surgical Hospital Of One Day In The 2-Clinic Of Samarkand Medical Institute*

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**Abstract – A one-day surgical hospital was organized at the 2nd clinic of the Samarkand Medical Institute in 1991, and uses its resources. The task of the department is to provide specialized advisory and operational assistance to patients with pediatric surgical diseases that do not require inpatient treatment. The department serves the population of Samarkand and Samarkand region. More than 1500 operations are performed in the department per year.**

**Keywords – One-Day Surgical Hospital, Children, Outpatient Surgery.**

One of the promising areas of modern healthcare in providing medical care to the population is the development of hospital-replacing surgical technologies (outpatient surgical care, outpatient surgery centers, one-day hospitals, etc.) [1, 2, 3, 6, 9]. In the surgical rooms of outpatient clinics and polyclinics, about 80% of people who do not need hospitalization are treated [4, 5, 7, 8]. Surgical hospital for one day (SHOD) was organized at the 2nd clinic of the Samarkand Medical Institute in 1991 on the initiative of Professor A.M. Shamsiev. SHOD is located based on 2-clinic SamMI, and uses its resources.

The tasks of SHOD are to provide specialized advisory and operational assistance to patients with pediatric surgical diseases. The department serves the population of Samarkand and Samarkand region. For more than thirty years of history, the department has developed methods for the surgical treatment of not only purulent-septic diseases requiring urgent, but also planned operations, such as a short frenum of the tongue, ritual circumcisions, uncomplicated inguinal hernias and dropsy of the testicle. In addition, SHOD doctors provide consultations to patients with non-surgical diseases. Also, through the department of SHOD, follow-up patients are examined and recorded, patients undergoing staged treatment.

In the 2nd clinic of SamMI, where the SHOD operates, there are the departments of pediatric surgeons for undergraduate and postgraduate education of doctors. In addition to the therapeutic functions inherent in SHOD, its functions include the scientific development of urgent problems of outpatient and minimally invasive surgery, the introduction of new methods of surgical treatment, training of students, and advanced training of practicing doctors.

The following principles were laid down in the concept of creation of SHOD in the 2-clinic of SamMI:

1. To deploy the functioning of the bed fund on the basis of a hospital
2. Territorial and transport accessibility of the population.
3. Multidisciplinary provision of surgical care.

The implementation of the proposed concept consisted in organizing the following structures:

1. Consultative and diagnostic room.
2. Treatment block:
  - a) operating rooms for 2 tables, dressing and treatment room;
  - b) a surgical hospital for 10 beds;
  - c) anesthetic and resuscitation service (1 position of a doctor);
  - d) surgical service (2 positions of a doctor).

The algorithm for working with patients in SHOD is structured as follows - the surgeon of the admission department of the clinic registers a patient with an established diagnosis for hospitalization, the patient is examined by a surgeon and, if necessary, an anesthesiologist, the volume of the operation, the type of anesthesia allowance is determined, analyzes are taken and the date of the operation is set. When selecting patients, the presence of concomitant diseases requiring treatment before surgery, the possibility of conditions for caring for a child in the postoperative period are taken into account. In the admission department of the clinic, the necessary minimum of preoperative examination is carried out (complete blood count, urine analysis, ultrasound and ECG), children are examined by a pediatrician and anesthesiologist. After that, the child is assigned a date for the operation. On the eve of the operation in the admission department of the clinic, the operating surgeon and anesthesiologist examine them. Parents are given recommendations on the direct preparation of the child for surgery the day before and in the morning before surgery. The child is delivered to the SHOD on the day of the operation in the morning at 8 o'clock and a medical history is drawn up. Before the operation, the surgeon and anesthesiologist examine the child again, and the body temperature is measured. In the preoperative ward, the patient is premedicated. The operation is performed under general anesthesia. After the operation, a doctor and a ward nurse observe the child until he comes out of anesthesia.

After lunch, a surgeon and anesthesiologist to resolve the issue of discharge home examine the operated children. The dressing is being changed; the documents for the discharge are being prepared. Upon discharge, the surgeon conducts a conversation with the parents, gives advice on caring for the child, diet, warns of possible complications, in the event of which the parents can contact by phone and take the child to the clinic. If complications arise, patients are left in the hospital for a longer period, until recovery. The surgeon who operated on days 5-7 in the admission department of the clinic, where the immediate result of the operation is assessed, the question of whether the child can attend a kindergarten, school, etc. is resolved removes the sutures.

More than 1500 - 2000 operations are performed in the SHOD clinic annually, with an average patient staying in a bed for 1 day.

### CONCLUSION

1. SHOD 2-clinic SamMI is an effective organizational structure that allows you to provide qualified assistance to sick children of the surgical profile and give a significant economic effect.

2. SHOD is a good school for novice surgeons and anesthesiologists.

3. SHOD has a number of advantages over the traditional form of providing surgical care to children - it excludes the mental trauma of children associated with a multi-day stay in a surgical hospital for children without parents, minimizes the possibility of nosocomial infection of patients.

4. Questions of the organization of modern structures of outpatient and minimally invasive surgery in our republic, the peculiarities of surgical interventions in these conditions. The management of patients in the postoperative period, the social and economic significance of reforming the outpatient service in general and numerous aspects of hospital-saving surgery are relevant for scientific medicine and practical health care, and require further study, both scientifically and practically.

#### REFERENCES

- [1] Cullen, K. A., Hall M. J., Golosinskiy A. Ambulatory surgery in the United States.// National health statistics reports. – 2009. – № 11. – P. 1–25.
- [2] International association for ambulatory surgery ambulatory (day) surgery suggested international terminology and definitions. Approved by the Executive Committee – Paris 9/27/2003. [http://79.171.35.173/joomla/images/stories/uploaded\\_files/IAAS\\_definitions.pdf](http://79.171.35.173/joomla/images/stories/uploaded_files/IAAS_definitions.pdf) (accessed May 2010).
- [3] Gaynor, M. Whata do we know about competition in health care markets? / M. Gaynor// Paper for federal Trade Commission. 2006. December.
- [4] Jackson, I. Day surgery overview: where are we now, how did we get there and where are we going? // Current Anaesthesia and Critical Care. 2007; 18: 176–80.
- [5] Shamsiev J.A., Makhmudov Z.M., Atakulov D.O. Long-term results of surgical treatment of acute hematogenic osteomyelitis of the bones of the hip joint in children // VI-congress of surgeons of the south of Russia with international participation, - 4-5 october 2019, - Rostov on Don, p 433-434.
- [6] Medicare, Payment Advisory Commission (MedPAC). June 2008 Healthcare Spending and the Medicare Program: A Data Book. Available at: [http://www.medpac.gov/documents/Jun08. Data Book\\_Entire\\_report. pdf](http://www.medpac.gov/documents/Jun08_Data_Book_Entire_report.pdf). Accessed February 16, 2010.
- [7] Ermolovich, M. Financing of the social sphere: approaches to reforming // Finance, accounting, audit. - 2012.– No. 3. - P. 23–27.
- [8] J Shamsiev, A Shamsiev, J Ruziev, A Isakov, S Zainiev, K Boboyarov, O Ibragimov. Analysis of aspirated foreign bodies of the respiratory ways in children // International Journal of Pharmaceutical Research | Jan - Mar 2020 | Vol 12 | Issue 1. 1284-1287..
- [9] Zharko, V.I. Achievements of health care in the Republic of Belarus // Questions of organization and informatization. - 2012. - No. 4. - P. 4–11.

# *Training Of Competitive Specialists In The System Of Professional Education*

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**Abstract – This article analyzes the foreign experience of training competitive specialists in the system of vocational education, the educational strategy, an integrated approach to the standardization of the system of vocational education, the role of the system of advanced training in retraining and continuous improvement of their qualifications in the training of competitive personnel.**

**Keywords – Professional Education, Competitive Personnel, International Experience, Educational Standards, Advanced Training.**

## I. INTRODUCTION

Today, a modern specialist should not only have scientific and practical knowledge in their specialty, but also have the qualifications and skills that consist of a natural science complex that defines professional culture. On September 6, 2019, the decree of the President of the Republic of Uzbekistan "On additional measures for further improvement of the system of vocational education" was adopted in order to improve the system of vocational education on the basis of advanced foreign experience, training qualified and competitive personnel for the labor market by introducing the stages of primary, secondary and secondary specialized vocational education. This decree also defines such tasks as the organization of vocational education programs in accordance with the UNESCO International Standard Classification of Levels of Education (ISCED) and the broad involvement of employers in this process.

## II. LITERATURE REVIEW

The main goal of the educational system of developed countries is to train competitive specialists. In our country, this issue is given the main attention. Therefore, the analysis requires a radical reform of the vocational education system. So, what are the shortcomings in training personnel who can compete with specialists from developed countries in the education system?

First of all, one of the main drawbacks in the training of a specialist was the training of a narrow circle of specialists who could not massively meet the requirements of the market without studying the material and technical (equipped) base at the necessary level, as well as the potential of teachers, masters of education, and at the same time the specialists themselves. As a result, in this situation, the quality of qualifications in the training of specialists has significantly decreased, and they have lost their positions in the labor market, have not responded to the demand for competitiveness.

Today, our country is consistently working to reform the education system by training highly qualified personnel in accordance with the requirements of the labor market, introducing international standards for assessing the quality of education, creating effective mechanisms for applying innovative scientific achievements in practice<sup>1</sup>.

An analysis of the education system of developed countries, such as the United States, Germany, Japan, and France, has shown that developed countries give priority to the training of highly qualified, competitive specialists:

- Creation of educational programs based on the latest achievements of science in the activities of educational institutions of various directions, equipped with modern equipment, technologies, inextricably linked scientific research and production;
- Ensuring a high level of interaction between the education system and the production process;
- To attract highly qualified masters to the system of professional education, to encourage them financially and spiritually;
- Turn the vocational education system into a priority and profitable sector of the economy;
- Involvement of highly qualified professors, teachers and specialists in the system of professional education
- Involvement of highly qualified professors, teachers and specialists in the system of professional education;
- Complete computerization of the educational process and provision of modern information programs;
- Ensuring a high level of material and social security of teaching staff.

### III. MATERIAL AND METHOD

The study of the experience of training specialists in developed countries shows that the next 3 stages in the training of competitive personnel consist of three accompanying:

**First**, the need for a qualified specialist is determined and the requirements for a specialist are established, that is, the "specialist" model is formed. To do this, a list of mature production enterprises (state, non-state) that need specialists (by industry) and their application will be formed. The production masters working in them are identified and involved in the educational process (by providing incentives, benefits).

**Secondly**, a mature training of specialists is being introduced, which can meet the current demand. When implementing this issue, a Special selection Committee will be created and the selection of graduates will be introduced with the participation of a representative of the customer (the person responsible for the production).

**Third:** to ensure that trained professionals constantly work independently in the course of their work, to ensure continuous professional development, to conduct constant monitoring of their activities and to take measures to encourage them.

The implementation of these tasks requires the faultless provision of the educational plan of educational institutions, the standards of the educational system, the relevant regulatory documents and the relevant legal framework.

In the educational standards, attention remains relevant to the fact that in the requirements for a specialist completing an educational institution, a student must master modern knowledge, be able to use the latest technical and software tools.

In the implementation of these strategic objectives, the basis will be educational standards as a regulatory document. At the same time, the standardization of the vocational education system requires a comprehensive approach.

**First**, the standards should cover the process of training a highly qualified specialist from an ordinary worker to a specialist and ensure consistency and continuity in the system of professional education;

**Secondly**, educational standards should cover all stages of training of specialists and ensure interaction between them;

**Third**, the content of educational standards should be formed in proportion to the standards of developed countries. This, in turn, ensures the training of competitive specialists who meet international requirements.

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<sup>1</sup> Ilkxomov B.I. Economic competence in the management of vocational education institutions and efficient use of financial resources // An International Multidisciplinary Research Journal. ISSN Online: 2249 –7137, Vol.10, Issue 6, June 2020



#### IV. RESULTS AND DISCUSSIONS

Based on the above international experience, the implementation of the educational strategy and, ultimately, the training of competitive personnel requires the following work:

- Develop a system of continuous professional orientation, taking into account the requirements of the labor market, the socio-economic situation, as well as support the development of young talents, identify and choose the best way to employ them;
- Effective use of the opportunities of the education system in the development of the network and regional economy, ensuring the integration of education, science and production in the training of competitive personnel;
- Formation of modern educational standards that meet international requirements with the use of science, technology, modern pedagogical technologies and advanced economic achievements;
- Development of qualification requirements for personnel from the entire working professionalism to the level of a mature specialist based on the requirements of the labor market;
- Introduction of graduates of professional educational institutions by the competent state commission;
- Revision, improvement of curricula and programs of scientific programs based on the use of the latest pedagogical, information, computer and other innovative technologies in the educational process;
- To ensure the wide use of audiovisual and multimedia programs in the educational process. Implementation of the introduction and application of new pedagogical technologies, the results of scientific research, the wide application of methodological works in the educational process;
- Development and implementation of a scientifically based system for monitoring and evaluating the quality of training of specialists in professional educational institutions. Creation of a set of relevant regulatory and legal documents that support the activities of an educational institution;
- Full adaptation of the material and technical base of vocational education institutions to the new requirements, provision of modern educational, scientific and methodological literature necessary for the educational process;
- Full compliance with the requirements of the state when conducting practical classes in the system of vocational education, providing material and technical equipment and appropriate materials;
- For the implementation of high-quality training of specialists in the system of professional education, it is necessary to fully ensure the retraining and advanced training of the teaching staff, the widespread use of advanced training in developed foreign educational institutions;
- Introduction of recruitment of professors and teachers, as well as masters of practice only on the basis of choice. Determining their "rating" and developing and widely implementing material and spiritual incentives;
- Sharp update, improvement of the financing mechanism of educational institutions: ensuring that the indicators of material and technical support are at the level of established demand. We emphasize that this indicator is one of the main requirements for the training of competitive personnel;
- To provide freedom to educational institutions in the implementation of independent economic support in educational institutions, to ensure that educational institutions are brought to a level that brings income to the state budget;
- To create a unified system for monitoring and evaluating the quality of vocational education, for this purpose, to carry out educational monitoring with the involvement of responsible production workers, formed on the basis of modern requirements.

In the section of work carried out to ensure the quality and competitiveness of training, a special place is occupied by the correct orientation and objective assessment of the quality of training of specialists. This in turn requires addressing the following two issues:

**First:** to find out what qualitative indicators are necessary, what specialists should master in order to ensure certain trends in the development of science, the technical and technological sphere and public life.

**Secondly:** what methods can be used to reliably, accurately and objectively assess the quality of training and functioning of specialists for vocational education?

It should be noted that at the same time, for a teacher of professional education, only the qualities of "knowledge", "skills" and "qualifications" are not enough.

The criteria for assessing the quality of professional training in developed countries, in addition to professional knowledge, relate to the level of intellectual development, individual characteristics of abilities.

It is these qualities of a specialist that ensure free, comprehensive, stable development. Ultimately, this will serve to ensure the socio-economic development of the country.

### V. CONCLUSION

The implementation of the quality of personnel training is, of course, directly related to the retraining of teachers working in the professional education system and the continuous improvement of their qualifications. When carrying out this process, it is necessary to pay attention to the following main directions:

- Ensuring continuous and continuous improvement of the professional and qualification, psychological and pedagogical, cultural and educational potential of teachers and masters of education in the system of advanced training, taking into account the latest achievements of science, technology and economics
- It is necessary to exchange experience at modern enterprises and organizations, in mature scientific institutions, including scientific and practical internships in developed foreign countries
- Ensure that the professional education system has a high level of legal and economic knowledge of teachers and students
- Due to the demands of socio-economic development, the demand for specialists in the labor market is naturally constantly changing and updating, and, of course, the demand for specialists with high modern knowledge will continue to grow.

In connection with the requirements of socio-economic development, much attention is also paid to the level of legal, economic, cultural and educational knowledge of specialists.

Therefore, the content of the concept of "getting an education" is also considered radically. Now the lexical meaning of the word "education" requires not only to have knowledge, but also to master new educational methods and means, which include education, to be able to apply them in the framework of their activities.

At the same time, only those specialists who will take a step along with the achievements of rapidly developing science, will be able to introduce their knowledge and experience into the educational process, compete with the specialists of a developed country, and will be able to contribute to the development of the country. To do this, our country has and is creating all the opportunities. You just need to be able to use them wisely, purposefully, which is the duty of each of us.

### REFERENCES

- [1] The Law of the Republic of Uzbekistan "On Education" of September 23, 2020 No.637. [www.lex.uz](http://www.lex.uz)
- [2] Decree of the president of the Republic of Uzbekistan. On additional measures to further improve the Professional education system. Number PF-5812. 06.09.2019. <https://lex.uz/>
- [3] 3. Kurbanov Sh. E., Seitkhalilov E. A., Tulaganov R. D. Harmonically developing generation: scientific and methodological development resenzenti: D. Sharipova, N. Azizkhodzhaeva // Tashkent, generation of the new century, 2014. –P. 74.
- [4] Kurbanov Sh. E., Seitkhalilov E. A. Leadership in the quality of education.- T "Turan-Iqbal", 2006.
- [5] Kurbanov Sh. E., Ilkhamov B. I. Economic competence and financial issues in the management of professional educational institutions. The publication is permitted by Order No. 418 of the Ministry of Higher and Secondary Special Education of the Republic of Uzbekistan dated August 14, 2020.
- [6] Ilkomov B.I. Economic competence in the management of vocational education institutions and efficient use of financial resources // An International Multidisciplinary Research Journal. ISSN Online: 2249 –7137, Vol.10, Issue 6, June 2020
- [7] Kurbanov Sh. E. Pedagogical science in professional education // Professional Education Magazine 3 issue 2020

# Removal of Methyl Violet from Aqueous Solutions using $Sr_2ANbO_{5.5}$ ( $A = Ca^{+2}, Sr^{+2}$ & $Ba^{+2}$ )

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**Abstract** – Three members of the *A*- site doped Nb perovskites with general formula  $Sr_2CaNbO_{5.5}$ ,  $Sr_3NbO_{5.5}$  and  $BaSr_2NbO_{5.5}$  were synthesised by solid-state methods and their removal efficiency of Methyl violet from aqueous solutions investigated. The X-ray diffraction measurements demonstrated that the three samples have a faced cubic perovskite-type structure in space group  $Fm\bar{3}m$ . The additions of  $Ba^{2+}$  and  $Ca^{2+}$  into the *A*-site of  $Sr_3NbO_{5.5}$  have influenced the cell volume, crystal size and density. Subsequently, the removal capacity was also impacted. The crystallite size of the three oxides was calculated to be less than 82 nm. The maximum removal capacities of Methyl violet are found to be 46.5, 13.1 and 8.0 mg/g using  $BaSr_2NbO_{5.5}$ ,  $Sr_3NbO_{5.5}$  and  $CaSr_2NbO_{5.5}$  respectively. The amounts of the adsorbed dye have decreased as the ionic radii of the doped cations decreased. The removals of Methyl violet have positive relationship with pH, temperature and the mass of the oxides.

**Keywords** – Aqueous, Removal, Methyl violet, *A*-site Doping.

## I. INTRODUCTION

The release of wastewater from the textile industry to the environment causes aesthetic problems in the ecosystem. The coloured effluents have a toxic chemical content and influence each temperature, pH and turbidity of water<sup>[1]</sup>. They usually exhibit high resistance to microbial degradation and remain in the environment for long periods of time. Thus, the treatments of the wastewater have to satisfy: firstly, all coloured effluents are separated from water environment and secondly, that at least a partial or a complete mineralization or decomposition of the coloured wastes. These points can be achieved by physical, biological and chemical processes. The separation methods can be classified based on fluid mechanics to sedimentation, centrifugation, filtration and flotation or on synthetic membrane to nano-filtration and reverse osmosis. Biological methods are used in connection with activated sludge processes and membrane bioreactors. Chemical processes include the advanced oxidation of effluents with ozone or hydrogen peroxide which can be run concomitantly under ultra violet irradiation. Additionally, physical-chemical techniques such as adsorption, chemical precipitation, coagulation, flocculation, and ionic exchange can be used to separate dissolved, emulsified and solid components from the water environment.

Adsorption technique is considered to be one of the most effective treatments of coloured effluents. It is economic and feasible process that generates high quality water<sup>[2]</sup>. It consists in the transfer of soluble effluents from water to the surface of an adsorbent which is highly porous solid material. Adsorbents can be natural or manufactured organic or inorganic materials. Examples of

natural organic adsorbents are peat and woodchips. Typical Inorganic adsorbents are china clay, bentonite clays, silica gel, zeolites and metal oxides<sup>[3]</sup>. Many efforts have been applied to synthesize and develop new materials as adsorbents. One of these is the use of mixed metal perovskite type oxides. Perovskites with general formula  $ABO_3$  are fascinating class of multifunctional materials. They exhibit a wide variety of physical properties such as optical, magnetic, electric and catalytic. Such properties can be controlled by variations in  $A$  and  $B$  cations<sup>[4]</sup>.

This paper presents the removal of Methyl Violet from aqueous solutions using Sr<sub>2</sub>ANbO<sub>5.5</sub> ( $A = Ca^{2+}$ ,  $Sr^{2+}$  and  $Ba^{2+}$ ). Methyl violet 10B (MV) is known in medicine as Gentian violet and is the active ingredient in a Gram stain, used to classify bacteria<sup>[5]</sup>. It is used as a pH indicator, with a range between 0 and 1.6. Compounds related to methyl violet are potential carcinogens. Methyl violet 10B inhibits the growth of many Gram positive bacteria, except streptococci. It is soluble in water, ethanol, diethylene glycol and dipropylene glycol. Methyl violet is a mutagen and mitotic poison, therefore concerns exist regarding the ecological impact of the release of methyl violet into the environment<sup>[5]</sup>. Methyl violet has been used in vast quantities for textile and paper dyeing, and 15% of such dyes produced worldwide are released to environment in wastewater.

In the Sr<sub>2</sub>ANbO<sub>5.5</sub> perovskite oxides, the high polarizing cations  $Ca^{2+}$ ,  $Sr^{2+}$  and  $Ba^{2+}$  fairly occupy the octahedral site obtaining a rocked salt ordering in the structure<sup>[6]</sup>. The ordered-cation distribution is attributed to the differences in both the ion size and the bonding character of the  $B$ -site cations<sup>[7, 8]</sup>. The partial substitution of  $Sr^{2+}$  was expected to influence the oxide structure leading to changes in the physical properties. These physical properties can be influenced by the differences in the ionic radii and the electron configurations of the doped cations. In such semiconductor nanoparticle oxides, particle size, shape and surface states are the predominant factors, which influence its properties such as adsorption<sup>[9]</sup>.

## II. EXPERIMENTAL

### Sample preparation

The preparation of samples involved Nb<sub>2</sub>O<sub>5</sub> (Merck, 99.99%), SrCO<sub>3</sub> and/or CaCO<sub>3</sub>, BaCO<sub>3</sub> (BDH, 99.98-99.99%). The appropriate stoichiometric amounts were mixed, using a mortar and pestle, and then heated in several steps with intermittent regrinding. Samples were initially heated at 850°C for 12 h followed by reheating at 1100°C for 48 h.

### Instrumentations

The crystallography of the samples was examined by a PANalytical X'Pert X-ray powder diffraction using Cu K $\alpha$  radiation (1.5400 Å) and a PIXcel solid-state detector. The operating voltage was 40kV and the current was 30 mA. The samples were measured in flat plate mode at room temperature with a scan range of 10° < 2 $\theta$  < 80° and a scan length of 10 mins were used. The structures were refined using the program RIETICA<sup>[10]</sup>.

The absorbance of solutions was determined using ultraviolet visible spectrophotometer (UV/Vis, model Spect-21D) and (190-900 Perkin- Elmer) at maximum wavelength of absorbance (590 nλ). The concentrations of solutions were estimated from the concentration dependence of absorbance fit. The pH measurements were carried out on a WTW720 pH meter model CT16 2AA (LTD Dover Kent, UK) and equipped with a combined glass electrode.

### Batch mode

Batch mode removal studies were carried out by varying several parameters such as contact time, pH, temperature and mass of prepared oxide (adsorbent). Essentially, a 50 ml of dye solution with concentration of 10 ppm was taken in a 250 ml conical flask in which the initial pH was adjusted using HCl/NaOH. Optimized amount of adsorbent was added to the solution and stirred using magnetic stirrer for specific time. The oxide samples were separated from solutions using centrifuge 3500 CPM for 5 minutes.

## III. RESULT AND DISCUSSIONS:

### 3.1. Characterization of oxides

X-ray diffraction patterns (Figure 1) demonstrated the three oxides to have a faced cubic structure with space group ( $Fm\bar{3}m$ ). The substitution of  $Sr^{2+}$  by either Ca or Ba has resulted in significant changes in cell volumes, density, crystallite and surface area. For instance, doping with  $Ba^{2+}$  significantly increases the cell volume from 577.230 to 604.520 Å<sup>3</sup> where doping with  $Ca^{+2}$  has decreased the cell volume to 559.490 Å<sup>3</sup>. This is likely driven by the large ionic size of the  $Ba^{2+}$  cation (12 coordinate ionic radius,

1.61 Å) and the small ionic size of the Ca<sup>2+</sup> cation (12 coordinate ionic radius, 1.34 Å). The ionic size of the Sr<sup>2+</sup> cation (12 coordinate ionic radius, 1.44 Å) is smaller than the Ba<sup>2+</sup> cation but is larger than the Ca<sup>2+</sup> cation. Table 1 displays the average Crystallite size, specific surface area, lattice strain, lattice parameter and Cell volume as estimated from X-ray diffraction data for the oxides. The increase in the cell volume, specific surface areas and densities of the oxides is consistent with the increase in the ionic radii of the doped divalent cations Ca, Sr and Ba. The crystallite size can be calculated using sheerer formula<sup>[11]</sup> (Equation. 1) where the specific surface area can be calculated using Sauter formula<sup>[12]</sup> (Equation.2) in which ρ is the density of the synthesised material.

$$D_p = (0.94\lambda) / (\beta_{1/2} \times \cos\Theta). \quad (1)$$

$$S = 6000 / (D_p \times \rho). \quad (2)$$

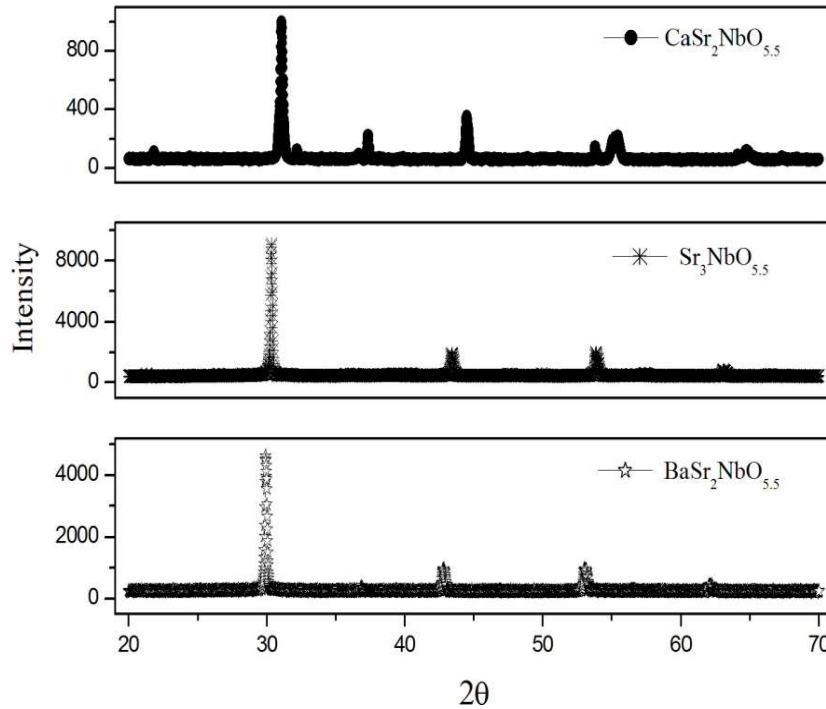


Figure-1 the XRD patterns of Sr<sub>2</sub>CaNbO<sub>5.5</sub>, Sr<sub>3</sub>NbO<sub>5.5</sub> and BaSr<sub>2</sub>NbO<sub>5.5</sub>.

Table-1; Average Crystallite size  $D_p$ , Specific surface area  $S$ , lattice strain  $\phi$ , Lattice parameter  $a$  and Cell volume  $V$ . estimated from X-ray diffraction data.

Formula	$D_p$ (nm)	$\rho$ (g/cm <sup>3</sup> )	$S$ (m <sup>2</sup> /g)	$\phi$	$a$ (Å)	$V$ (Å <sup>3</sup> )
Sr <sub>2</sub> CaNbO <sub>5.5</sub>	50.45	4.70	13.64	0.0015	8.2401(2)	559.490(1)
Sr <sub>3</sub> NbO <sub>5.5</sub>	81.91	5.104	14.35	0.0028	8.3263(3)	577.230(1)
BaSr <sub>2</sub> NbO <sub>5.5</sub>	50.45	5.419	22.03	0.0020	8.4554(2)	604.520(1)

BaSr<sub>2</sub>NbO<sub>5.5</sub> and Sr<sub>2</sub>CaNbO<sub>5.5</sub> displayed a similar crystallite size, possibly as a consequence of cation order effects. The materials can be formulated as (BaSr)SrNbO<sub>5.5</sub> and (SrSr)CaNbO<sub>5.5</sub> in order to emphasize the ordering at the B site between the Sr and/or Ca with Nb cations. In the double perovskite structure, it is anticipated that the two smallest cations will order in the octahedral sites, this ordering being a consequence of the differences in the size and/or charge between the two cations. The largest cation will then occupy the 12-coordinate (cuboctahedral) site. The corresponding ionic radii of Ba<sup>2+</sup> (12 coordinate ionic radius, 1.61 Å and 6 coordinate ionic radius. 1.35 Å<sup>[13]</sup>); Sr<sup>2+</sup> (1.44 and 1.18 Å<sup>[13]</sup>); Ca<sup>2+</sup> (1.34 and 1.00 Å<sup>[13]</sup>); and Nb<sup>5+</sup> (6 coordinate ionic radius. 0.64

Å<sup>[13]</sup>) cations suggest that the Nb<sup>5+</sup> and one Sr<sup>2+</sup> or Ca<sup>2+</sup> cation will occupy the 6-coordinate sites whereas Sr<sup>2+</sup> or a mixture of Sr<sup>2+</sup> and Ba<sup>2+</sup> will occupy the cuboctahedral sites<sup>[8]</sup>.

3.2. Batch mode

3.2.1 Effect of Time.

The removal percentage of dyes over the adsorbents can be calculated as:  $R\% = [(C_i - C_t) / C_i] \times 100$ , where R% is the removal percentage, C<sub>i</sub> = 10 ppm is initial concentration of dye solution, C<sub>t</sub> is the concentration of dye at contact time estimated from the concentration dependence of absorbance fit. Figure 2 shows the time dependence of MV removal at room temperature. There is no finite time was observed for the dye removal up to 150 min. The removals of the dye increase as the contact time increases. The removal of MV on the surface of Sr<sub>2</sub>CaNbO<sub>5.5</sub>, Sr<sub>3</sub>NbO<sub>5.5</sub> and BaSr<sub>2</sub>NbO<sub>5.5</sub> were found to be 79.80, 66.15 and 73.24 % respectively. The removals of MV using the doped oxides Sr<sub>2</sub>CaNbO<sub>5.5</sub> and BaSr<sub>2</sub>NbO<sub>5.5</sub> were larger than that of the undoped oxide Sr<sub>3</sub>NbO<sub>5.5</sub>. This result reflects the importance of the element composition and the element substitution in the enhancement of the adsorption properties of such oxides. Generally, the increase in the removal is consisted with the decrease in the crystallite size of the oxides. The inserted equations in Figure 2 describe the removal percentage (R%) as function of time (t) for each oxide. The initial removal rate (dR/dt) could be derived from the equations when t=0. The initial removal rates for MV dye were found to be 35.4, 27.7 and 27.2 using Sr<sub>2</sub>CaNbO<sub>5.5</sub>, Sr<sub>3</sub>NbO<sub>5.5</sub>, and BaSr<sub>2</sub>NbO<sub>5.5</sub> respectively. The wavelength dependence of absorbance for MV solution (Figure 2) illustrates the absorbance of MV solutions decreased as result of using the oxides as adsorbents.

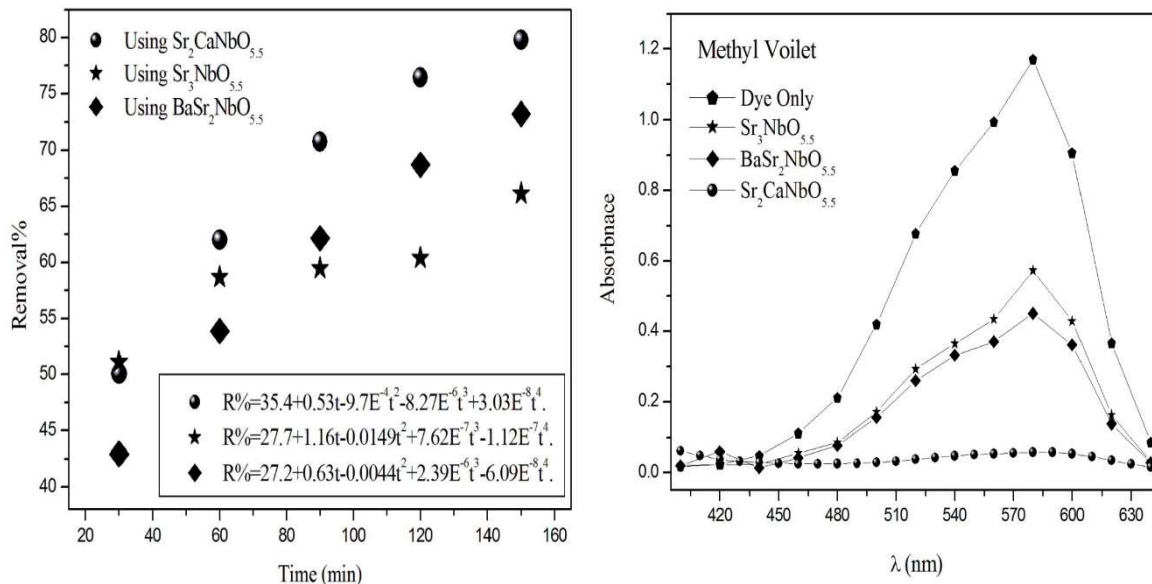


Figure 2. the time dependence of MV removal and The wavelength dependence of absorbance for MV solution at room temperature. The volume, concentration and pH of the dyes solution are 50ml, 10ppm and 5.1 respectively.

3.2.2: Effect of adsorbent mass

The amount of the dye adsorbed by one gram of the oxides (Q) was calculated as following:  $Q \text{ (mg/g)} = [(C_i - C_t) \times V] / W$ , where t= 150 min is the contact time, V= 50 ml is the volume of MV solution and W is the mass of oxides. As shown in Figure 3, Q decreases as the mass of adsorbents increased. The maximum capacity of adsorbent Q<sub>max</sub> can be estimated from the intercept of the liner fit of 1/Q<sub>t</sub> at Y axis. Sr<sub>2</sub>CaNbO<sub>5.5</sub> (50.45 nm, 13.64 m<sup>2</sup>/g) displayed the highest value of Q<sub>max</sub> (47.39(2) mg/g) whereas Sr<sub>3</sub>NbO<sub>5.5</sub> (81.91 nm, 14.35 m<sup>2</sup>/g) exhibited the lowest value of Q<sub>max</sub> (8.03(5) mg/g). Q<sub>max</sub> for BaSr<sub>2</sub>NbO<sub>5.5</sub> (50.45 nm, 22.03 m<sup>2</sup>/g) is 13.09(2) mg/g. This result reflects an enhancement in the adsorption properties has occurred as result of the substitution of Ca<sup>2+</sup> and Ba<sup>2+</sup> into Sr<sub>3</sub>NbO<sub>5.5</sub>.

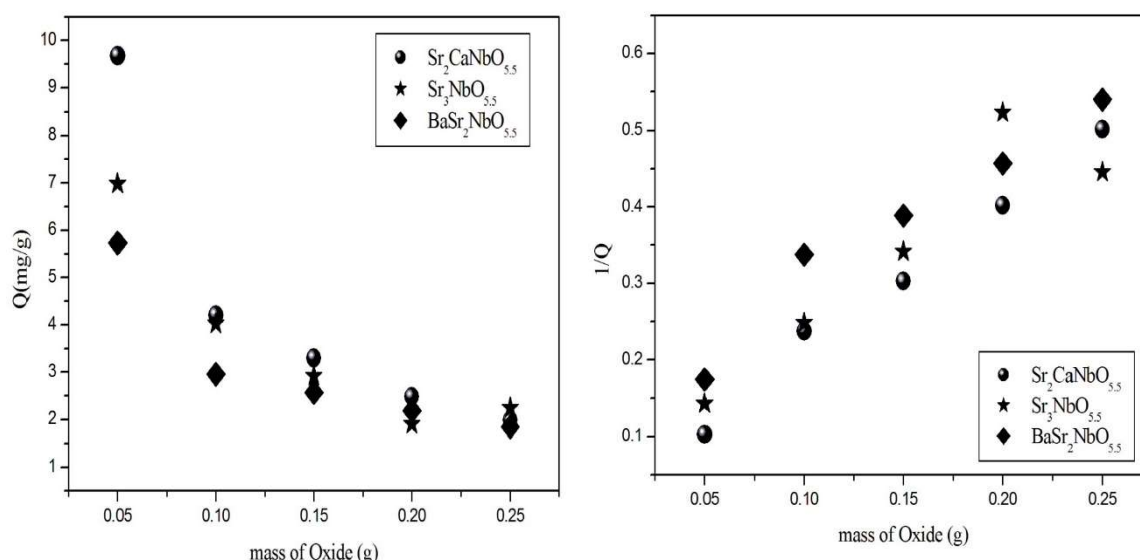


Figure 3. The effect of adsorbent mass on the removal. The time, volume, concentration and pH of dye solutions are 150min, 50ml, 10ppm and 5.1 respectively.

### 3.2.4: Effect of temperature

Temperature has an important impact on the adsorption process. An increase in temperature helps the reaction to compete more efficiently with  $e^-/H^+$  recombination. The removal of two dyes was investigated at 25, 40, 60 and 100°C. The obtained results are illustrated below in Figure 4. The removal of MV dye increased as temperature increased. For instance, the removal of MV increased from ~84% at 25°C to ~99% at 100°C when  $\text{Sr}_2\text{CaNbO}_{5.5}$  was used. This result is agreed with normal expectations, and is a consequence of the increase of adsorption strength and the concentration of active intermediates with temperature. The energy of activation ( $E_a$ ), was calculated from the Arrhenius plot of  $\ln R$  vs  $1000/T$ . Arrhenius plot shows that the activation energies of the removal are positive and equal to 1.77, 4.79 and 4.32 kJ/mole for  $\text{Sr}_2\text{CaNbO}_{5.5}$ ,  $\text{Sr}_3\text{NbO}_{5.5}$  and  $\text{BaSr}_2\text{NbO}_{5.5}$  respectively. This suggests that doping with Ca and Ba has resulted in lower activation energy for the process. The activation energy of the removal using  $\text{Sr}_2\text{CaNbO}_{5.5}$  is lower than that observed for  $\text{BaSr}_2\text{NbO}_{5.5}$ .

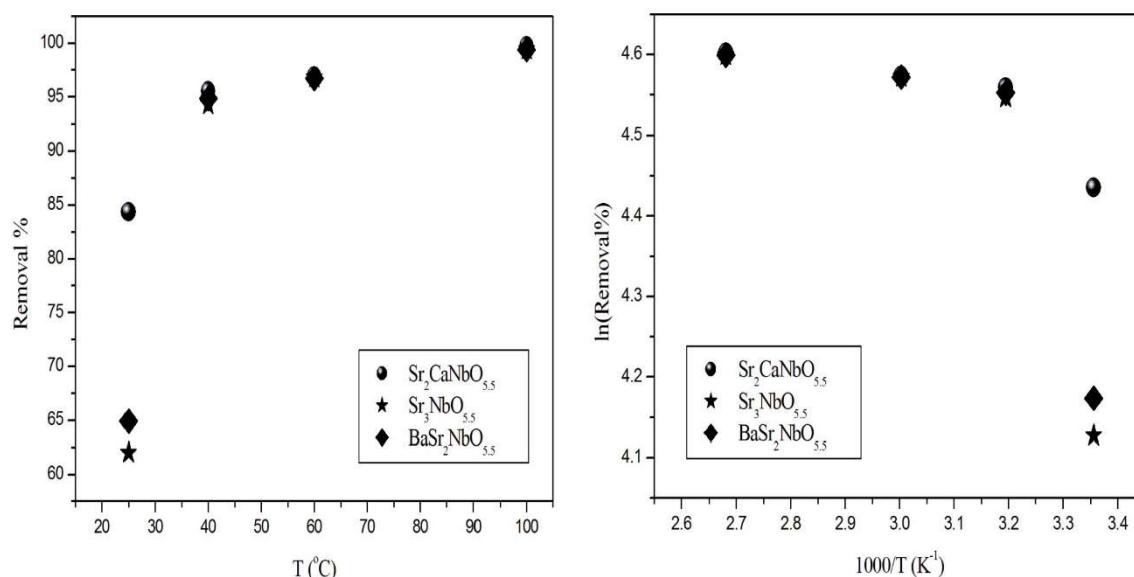


Figure 4. the effect of temperature on the MV removal. The time, volume, pH and concentration of dyes solutions are 150min, 50ml, 5.1 and 10ppm respectively

## 3.2.4: Effect of pH

The pH of solutions is a key parameter in dye adsorption. The magnitude of electrostatic charges which are impacted by the ionised dye molecules is controlled by the solution pH. As a result the rate of adsorption will vary with the pH of the medium used. In general, at low solution pH, the percentage of dye removal will decrease for cationic dye adsorption, while for anionic dyes the percentage of removal will increase. This is due to the increase in the positive charge on the solution interface and the adsorbent surface. In contrast, high solution pH is preferable for cationic dye adsorption but shows a lower efficiency for anionic dye adsorption. The positive charge at the solution interface will decrease while the adsorbent surface appears negatively charged.

To study the effect of pH, experiments were carried out at various pH values, ranging from 2 to 10 for constant dye concentration (10 ppm) and adsorbent mass (0.1g). Figure 5 presents the removal of dyes as a function of pH. It was observed that the removal of MV using Sr<sub>3</sub>NbO<sub>5.5</sub> has gradually increased from ~50% to ~75% as pH increased from 2 to 10. In contrast, the removal of MV using Sr<sub>2</sub>CaNbO<sub>5.5</sub> gradually decreases as pH increased from 4 to 10. The removal of MV using BaSr<sub>2</sub>NbO<sub>5.5</sub> steadily decreases as pH increased from 2 to 10. The highest removal of MV was recorded at pH= 2 (~90 %) using BaSr<sub>2</sub>NbO<sub>5.5</sub> whereas the lowest removal was recorded at pH=2 (~33%) when Sr<sub>2</sub>CaNbO<sub>5.5</sub> was used. The removal efficiency of the adsorbents is clearly increases as the acidity decreased.

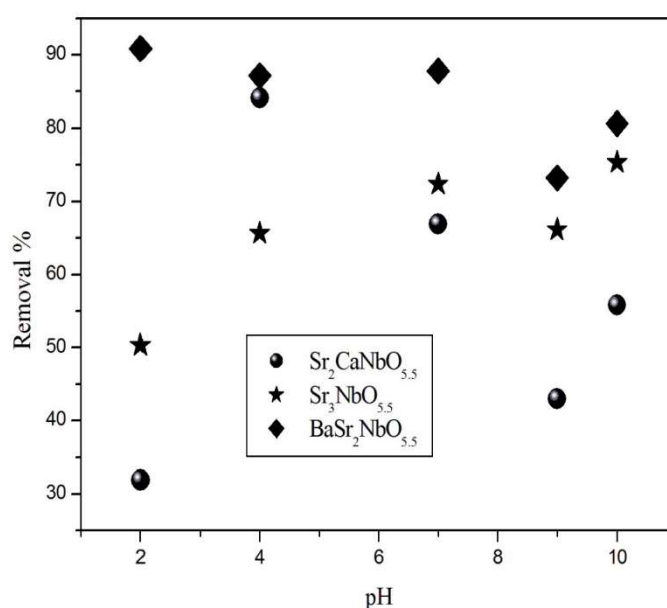


Figure 5. the effect of pH on the removal of MV. The time, volume and concentration of dyes solution are 150min, 50ml and 10ppm respectively.

## IV. CONCLUSION

The removal of Methyl Violet from aqueous solution using the A- site doped perovskites Sr<sub>2</sub>ANbO<sub>5.5</sub> (A= Ca, Sr or Ba) has been reported. The nano particle materials were made by solid state method and characterized by XRD. The results showed the substitutions of Ca<sup>2+</sup> and Ba<sup>2+</sup> have impacted both the structural and adsorption properties of the oxides. It was found that the removal of Methyl Violet increases as result of the divalent cation doping. The removal of MV increases as the physical parameters: time, temperature and adsorbent mass increased. The maximum capacities of adsorbent are 47.39, 13.09 and 8.03 mg/g for Sr<sub>2</sub>CaNbO<sub>5.5</sub>, BaSr<sub>2</sub>NbO<sub>5.5</sub> and Sr<sub>3</sub>NbO<sub>5.5</sub> respectively. The highest removal efficiency was recorded for MV dye using BaSr<sub>2</sub>NbO<sub>5.5</sub> at pH=2 where the lowest removal was observed at same pH for Sr<sub>2</sub>CaNbO<sub>5.5</sub>.

## REFERENCES

- [1] Agarwal S. K., Water Pollution, A.P.H. Publishing Corporation, 2005.
- [2] Cheremisinoff N. P., Handbook of Water and Wastewater Treatment Technologies, Butterworth-Heinemann, 2002.



- [3] Pawlowski L., *Physicochemical Methods for Water and Wastewater Treatment*, Elsevier Science, 1982.
- [4] Tejuca L. G. and Fierro, J. L. G., *Properties and Applications of Perovskite-Type Oxides*, Taylor & Francis, 1992.
- [5] Books H., *Articles on Triarylmethane Dyes, Including: Phenolphthalein, Methyl Violet, Bromothymol Blue, Coomassie Brilliant Blue, Bromophenol Blue, Malachite Gr*, Hephaestus Books, 2011.
- [6] Lecomte J., Loup, J. P., Hervieu, M. and Raveau, B., "Non-stoichiometry and electrical conductivity of strontium niobates with perovskite structure", *Physica Status Solidi*, 2, 65, 743-752, 1981.
- [7] Animitsa I., Neiman, A., Sharafutdinov, A. and Nochrin, S., "Strontium tantalates with perovskite-related structure", *Solid State Ionics*, 0, 136-137, 265-271, 2000.
- [8] King G. and Woodward, P. M., "Cation ordering in perovskites", *Journal of Materials Chemistry*, 28, 20, 5785-5796, 2010.
- [9] Fergus J. W., "Perovskite oxides for semiconductor-based gas sensors", *Sensors and Actuators B: Chemical*, 2, 123, 1169-1179, 2007.
- [10] Hunter B. A. and Howard, C. J., "RIETICA. A Computer Program for Rietveld Analysis of X-Ray and Neutron Powder Diffraction Patterns", *Rietica*, 1998.
- [11] Langford J. I. and Wilson, A. J. C., "Scherrer after sixty years: A survey and some new results in the determination of crystallite size", *Journal of Applied Crystallography*, 2, 11, 102-113, 1978.
- [12] Nogi K., Hosokawa, M., Naito, M. and Yokoyama, T., *Nanoparticle Technology Handbook*, Elsevier, 2012.
- [13] Shannon R. D., "Revised Effective Ionic-Radii and Systematic Studies of Interatomic Distances in Halides and Chalcogenides", *Acta Crystallographica Section A*, Sep1, 32, 751-767, 1976.

# *Large Hematoma Of Rectus Abdominis Muscle As A Rare Surgical Case In A COVID-19 Patient*

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**Abstract** – Presented article discusses the case of spontaneous large hematoma of rectus abdominis muscle, developed in a 63-year-old woman during standard in-hospital treatment of COVID-19.

Diagnosis has been confirmed on the basis of clinical, ultrasound and computed tomography findings. Patient underwent conservative treatment, but due to the increase in size of hematoma and patient's worsened general condition, emergency surgical hematoma evacuation and ligation of damaged lower epigastric artery was performed.

Postoperative period passed without complications. Patient discharged at home under ambulatory follow-up by surgeon.

According to this case could be concluded that conservative treatment of rectus abdominis muscle large hematoma is not always successful and careful monitoring and proper surgical treatment is needed to prevent complication and save the patient's life.

**Keywords** – Rectus Abdominis Muscle, Hematoma, Bleeding, Extravasation.

## **I. CLINICAL ASPECTS OF THE RECTUS ABDOMINIS MUSCLE HEMATOMA**

Hematoma of the rectus abdominis muscle may be interpreted as a tumour-like pelvic or abdominal mass, as well as an “acute abdomen”. It can be formed as a result of damage of upper and lower epigastric arteries or their branches. In most cases, hematoma of the rectus abdominis muscle arises postoperatively or after abdominal trauma. Spontaneous hematoma formation has been described during pregnancy, infectious diseases, collagenosis and anticoagulation treatment [1, 2].

Development of the rectus abdominis muscle hematoma is possible at any age [3]. First symptom of this disease is severe, sudden abdominal pain, which dynamically intensifies [4, 5, 6]. In most cases hematoma is localized in the lower abdomen. Physical examination findings are subfebrile temperature, paleness, tachycardia and painful abdominal palpation. Symptoms of shock can be seen during intensive bleeding [7].

Significant bleeding rarely occurs, if hematoma localizes in upper part of abdomen because blood vessel compresses by the fascia of rectus abdominis muscle. Opposite to this, hematoma of lower part spreads widely and can include few liters of blood [8].

## **II. DIAGNOSTICS AND TREATMENT**

Ultrasound examination has a significant role in the diagnosis of rectus abdominis muscle hematoma, but the “gold standard” of diagnosis is computed tomography (CT) scan with contrast media [6].

Treatment modalities might be both conservative and surgical. Conservative regimen with analgesia and bed rest is sufficient to treat Low volume well defined hematomas. At the same time, bleeding might be profuse and life-threatening, especially when it arises in the lower part of rectus abdominis muscle. In such cases only life-saving treatment is surgery, which includes bleeding vessel ligation and hematoma evacuation [5].

## **III. CASE PRESENTATION**

A 63-year-old female COVID-19 patient which had been hospitalized at the TSMU First University Clinic, department of internal medicine underwent the standard treatment including anticoagulation, antibiotics, hormones and other symptomatic therapy. On the 6th day of hospitalization, at 05:30 in the morning after movement in bed, patient felt severe pain in the left abdomen, dry mouth, shortness of breath, weakness, cold sweat, visible and palpable tumor-like mass in the left abdomen.

## **IV. OBJECTIVES**

Patient was contactable, adequate, confused, passive, pain exacerbation by the movement. Skin and visible mucous were pale.

Vital signs: T – 36.7°C, P – 97`, T/A - 130/75 mmHg, R – 23`, SpO2 – 96%.

Tongue – dry, abdomen – asymmetric, painful palpation on the left (where a tumor-like mass could be felt). Urination - free with normal urine. No pathology detected by the digital per rectum examination.

By the ultrasound examination free liquid in abdominal cavity was not detected. Lateral and below of left kidney the large size, prolonged, hypoechogenic area of varied consistency was seen that was oval, with high echogenic structure and narrowed line in center. Diagnosis of hematoma had been proposed.

At this time Hb was 11.3 g/dL, Ht - 34.5 %. For conservative treatment and monitoring, the patient was transferred to ICU department and ice was placed on the area of the tumor-like mass.

At 18:00, the patient’s general condition worsened: severe weakness, profuse sweating, collapse, dry mouth, asymmetric abdomen poorly involved in breathing.

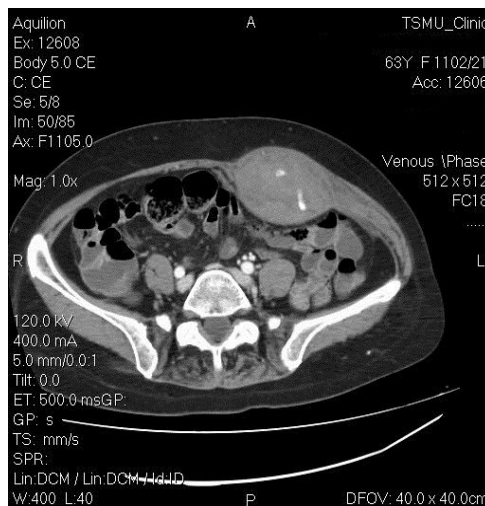
Vital signs: T/A - 90/50 mmHg, P-115` R - 24`, SpO2 - 90 %. Size of the tumor-like mass was increased by palpation. Increase of the left rectus abdominis muscle size, with blood-like mass of varied consistency and extravasation in area of bladder had been seen by the abdominal CT scan with contrast media (Pic. 1,2,3,4).



**Pic. 1.** Spread of hematoma between the left rectus abdominis muscle and fascia lata which covers the left half completely and extends preperitoneally. CT examination.



**Pic. 2** Sagittal section CT scan after contrast extravasation.



**Pic. 3** Hematoma in the left rectus abdominis muscle detected after extravasation of contrast medium during CT examination



**Pic. 4** Preperitoneal spread of hematoma

The same time, changes in hematologic indices (Hb - 9.6 g/dL, Ht - 26.6 %) were manifested. Spontaneous large hematoma of rectus abdominis muscle with active extravasation was diagnosed and patient underwent emergency surgical treatment under general anesthesia.

#### V. SURGICAL MANIPULATIONS AND PROCEDURES

Hematoma was localized between rectus abdominis muscle and fascia lata, spread preperitoneally until the anterior area of the bladder. About 1 liter of blood and blood clots was evacuated and a damaged lower epigastric artery was ligated. The wound was closed after complete hemostasis.

After surgery, patient was admitted to the ICU department, where anemia was corrected by transfusion of erythrocyte masses. Complete evacuation of hematoma was confirmed by the repeated CT scan with contrast media. Wound healing passed without complications. The patient was discharged under ambulatory follow-up by the surgeon.

#### VI. CONCLUSION

Conservative treatment of rectus abdominis muscle gigantic hematoma may not be always sufficient. If the patient's general condition worsens due to ineffective conservative treatment, proper assessment, decision making and immediate surgical treatment is needed for prevention of serious complication, which was seen in our case. Consequently, in patients with such problems, early surgical treatment should be considered.

#### REFERENCES:

- [1] Kumar HS, DiNella R, Janov J, Kaldas C, Smith H. Evaluation of risk factors for rectus sheath hematoma. *Sheth. Clin Appl Thromb Hemost.* 2016;22:292–296;
- [2] Dağ A, Ozcan T, Türkmenoğlu O, et al. Spontaneous rectus sheath hematoma in patients on anticoagulation therapy. *Ulus Travma Acil Cerrahi Derg.* 2011;17:210–214; [https://www.journalagent.com/travma/pdfs/UTD-84669-CLINICAL\\_ARTICLE-DAG.pdf](https://www.journalagent.com/travma/pdfs/UTD-84669-CLINICAL_ARTICLE-DAG.pdf).
- [3] Galyfos G, Karantzikos G, Palogos K, Sianou A, Filis K, Kavouras N. Spontaneous rectus sheath hematoma in the elderly: an unusual case and update on proper management. *Case Rep Emerg Med.* 2014;2014:675678.
- [4] A Balafa O, Koundouris S, Mitsis M, Siamopoulos KC. Unusual case of hemoperitoneum: spontaneous rectus sheath hematoma. *Perit Dial Int.* 2014;34:134–135.
- [5] Tseng GS, Liao GS, Shyu HY, Chu SJ, Ko FC, Wu KA. Expanding refractory rectus sheath hematoma: a therapeutic dilemma. *Diagn Interv Radiol.* 2012;18:139–141. [https://dirjournal.org/content/files/sayilar/39/buyuk/pdf\\_DIR\\_410.pdf](https://dirjournal.org/content/files/sayilar/39/buyuk/pdf_DIR_410.pdf).

- [6] Smithson A, Ruiz J, Perello R, Valverde M, Ramos J, Garzo L. Diagnostic and management of spontaneous rectus sheath hematoma. *Eur J Intern Med.* 2013;24:579–582.
- [7] Sandoval O, Kinkead T. Spontaneous rectus sheath hematoma: an unusual cause of gross hematuria. *Urology.* 2013;82:30–36.
- [8] O'Mara MS, Semins H, Hathaway D, Caushaj PF. Abdominal compartment syndrome as a consequence of rectus sheath hematoma. *Am Surg.* 2003;69:975–977. <https://search.proquest.com/docview/212843049?pq-origsite=gscholar&fromopenview=true>

## *Hemolytic Diseases of Infants*

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**Abstract** – With timely medical care, all processes in his small body will quickly return to normal and the risk of damage to the nervous system will be eliminated. To understand what the consequences of hemolytic disease will be, first you need to understand what this disease is and why it urgently needs to be treated. Let's look at the example of hemolytic disease of newborns with group incompatibility, since it is more common and proceeds somewhat easier than with Rh conflict. In this case, the mother has the first blood group 0 (I), and the fetus – another, more often the second A(II) or third B(III). At the heart of this disease is a massive breakdown of the red blood cells of the fetus due to the incompatibility of its blood and the blood of the mother.

**Keywords** – Blood Cells, Delivering Oxygen, Neurological Disorders, Hemolytic Disease.

The expectant mother having the first blood type does not have antigens. Let's denote the mother's body in the picture with a "minus" sign. And the future child, i.e. the fetus has a second blood group, i.e. there is an antigen in his blood. In the picture, we will mark the fruit with a "plus" sign. In the presence of an antigen in the fetus, the mother's immune system will begin to consider this antigen as a foreign enemy agent and will begin to produce protective antibodies (JgG) against this antigen. These antibodies can begin to be produced early - even during pregnancy, and can appear almost during childbirth. The shorter the gestation period at which the antibodies began to be produced, the more they accumulate and the more likely the more severe disease of the baby. These antibodies rush into the blood to the fetus through the placenta, settle on the red blood cells of the child and begin to destroy them. A lot of them are destroyed; a large amount of the pigment bilirubin is released from the destroyed red blood cells. This bilirubin is "bad", it is called indirect bilirubin and is very toxic. It should be neutralized in the liver. But since at birth the liver's enzyme system is immature (it matures postnatal), it will not be able to completely utilize all the bilirubin, it will be very much, and its feature is to accumulate in those tissues of the body that contain fat, then the ideal place for the accumulation of bilirubin will be subcutaneous fat and clinically we will see jaundice of the skin. In addition, you should know that red blood cells still perform the function of delivering oxygen to all organs.

And once they are destroyed, the function of oxygen supply is disrupted, and first of all, one of the most vulnerable and not yet too developed organs of newborns - the brain - will suffer, because it first needs oxygen supply.

Why is indirect bilirubin toxic? Because it damages the cells of the heart, liver and, to a greater extent, brain cells, bilirubin intoxication occurs, characterized by lethargy, regurgitation, vomiting, pathological yawning, and a decrease in muscle tone. And at high critical values above 340 mol in full-term children and at an indicator of 160 mmol/l in premature infants, "nuclear jaundice" occurs - this is bilirubin intoxication of the brain, when the nuclei of brain cells are stained with bilirubin: there is muscle hyper-tonus, rigidity of the occipital muscles, a sharp "brain" cry, the child reacts to all stimuli, a large fontanel bulges, muscles twitch, convulsions, strabismus, respiratory distress.

The brightness of the jaundice shade depends on the amount of this pigment in the newborn's body. Jaundice can occur early (perhaps even in the first day of a child's life) and persists for a long time. Characterized by an increase in the liver and spleen, the child's skin color is bright yellow, the sclera - the whites of the eyes-may be colored. If there is anemia, and it must be, because red blood cells die, then the baby will be pale and jaundice may not seem so bright.

Treatment for mild to moderate forms of the severity of this conflict is often carried out conservatively. Babies are treated with phototherapy, i.e. light treatment, because under the influence of light, indirect bilirubin is destroyed. Adsorbents are also prescribed to help the intestines fight off toxins. In severe conditions, a replacement blood transfusion operation is performed.

With late treatment, the consequences of hemolytic disease can be dangerous-from the death of the baby to severe neurological disorders with signs of cerebral palsy, delayed psychophysical development, deafness, and speech disorders.

Mild and moderate forms of pathology rarely (up to 10%) can leave a slight delay in motor development with a satisfactory state of mental abilities; behavior disorder; impaired movement functions, strabismus, hearing and speech disorders. Children with GBN do not tolerate vaccinations well, are prone to developing severe allergies and can often suffer from infectious diseases for a long time; teeth are often susceptible to enamel destruction and caries.

During the treatment period, the baby is excluded from breastfeeding, because through breast milk, antibodies (JgG) will enter the child and jaundice will increase. After 15-20 days, after the disappearance of the antibodies from the milk, the women can breastfeed. For the mother of a newborn, diet is very important. Proper nutrition of a woman will ensure the intake of vitamins and eliminate the effects of harmful chemical additives. The mandatory diet should contain vegetables and fruits, fish, and liver. The main thing is that the products are fresh and natural.

Children who have had HDI should be monitored by a neuropathology in a polyclinic and receive rehabilitation treatment.

And in conclusion, I want to say that even if you understand a little of what I have described above, any reasonable person, including those who are far from medicine by their profession, is able to understand the consequences of hemolytic disease.

Hemolytic disease of newborns (GBN) – occurs when the blood of the mother and fetus is incompatible with the Rh factor, its subtypes, and blood groups. More often, hemolytic disease occurs as a result of rhesus conflict. GBN develops in uterus. The Rh factor, inherited from the father and contained in the red blood cells of the fetus, enters the mother's blood. Antiserum antibodies are formed in the mother's blood. Some of these antibodies cause hemolytic of red blood cells. Group incompatibility of maternal and fetal blood also leads to the development of GBN. GBN manifests itself in three forms: edematous, jaundice and anemic. The edematous form is the most severe. Babies are often born prematurely, dead, or die in the first hours after birth. With an early immunological conflict, a miscarriage may occur. The jaundice form can be severe, moderate and mild. The prognosis for the jaundice form of hemolytic disease depends on the degree of damage to the central nervous system. In the case of severe intoxication and the occurrence of nuclear jaundice (if the child does not die on the 5th-7th day of life from paralysis of the respiratory center), there is a lag in mental and physical development. Anemic form is the mildest form. The prognosis in this case is favorable. The main method of treatment is blood transfusion.

To prevent the birth of children with hemolytic disease, all pregnant women in women's clinics conduct a blood test for the Rh factor and determine the blood group. Women who have Rh-negative blood are not recommended to have an abortion during their first pregnancy. For a Rh-negative woman, it is important that there are no cases of termination of pregnancy before the birth of the child, since each of them can increase the chance of antibody formation and, consequently, the birth of a sick child. If the abortion still took place, then to prevent the development of GBN, a Rh-negative woman after the first abortion (or miscarriage) is injected with a special drug — antiresus immunoglobulin. It will protect the unborn baby, which the mother will carry during the subsequent pregnancy, from antibodies, not allowing them to form. When the pregnancy of a Rh-negative woman ends in childbirth, the Rh-belonging of the baby will be determined. If the baby was born with a positive Rh factor, the woman is injected with immunoglobulin to prevent subsequent pregnancies (within the first 48 hours, but no later than 72 hours after delivery). If the newborn has a Rh factor-negative, the mother's immunoglobulin is not prescribed. Modern methods involve the introduction of immunoglobulin to a Rh-negative woman during pregnancy. If the father of the child is Rh-positive and no antibodies are found in the blood of the pregnant woman, then at the period of 28 and 34 weeks she can be injected with antiresus immunoglobulin for preventive purposes.



Signs of hemolytic disease of newborns directly depend on the form of the disease. For example, with an edematous form, a child has severe edema, the skin becomes waxy, muscle tone is sharply reduced, respiratory and cardiac function is depressed. The abdomen becomes swollen, barrel-shaped (due to an enlarged liver and spleen).

With anemic form, the skin and mucous membranes become pale, cyanotic. The abdomen is also enlarged.

With the jaundice form, the child's skin becomes bright yellow (sometimes even orange) in color. The mucous membranes and sclera of the eyes also turn yellow. The child becomes sluggish, sleepy, or on the contrary-sharply restless. With nuclear jaundice, the muscles come into a strong tone, the baby arches his back, throwing his head back, while often and shrilly screams and cries.

Sensibilization of the mother before pregnancy (that is, she already has an increased sensitivity to blood components – for example, when Rh-negative blood was transfused to her Rh-positive, miscarriages, abortions, childbirth). With each new pregnancy and birth, the risk of developing hemolytic disease of newborns only increases, especially if during childbirth there was a placental abruption or a caesarean section had to be performed.

The anemic form is considered the mildest form of hemolytic disease of newborns and has the most favorable prognosis. The child has pallor of the skin and mucous membranes, a decrease in muscle tone, an increase in the size of the liver and spleen, and anemia increases. At the same time, the condition and life of the child is not in danger, with timely treatment, the symptoms quickly pass.

### REFERENCES

- [1] Neonatology. National guide / ed. by N. N. Volodin. M.: GEOTAR-Media, 2007. 848 p.
- [2] Shabalov N. P. Neonatology : in 2 t. 5th ed., ispr. i dop. M.: MEDpress-inform, 2009. 1504 p.
- [3] Rooz R., Genzel-Borovicheshi O., Prokittle G. Neonatology: practical recommendations. Moscow: Med. lit. 2011. 568 p.
- [4] Kazakova, N. N. (2020). Dental status inpatients with inflammatory disease of the joints. In *Актуальные вызовы современной науки» XVIII Международная научная конференция. Переяслав* (pp. 57-58).
- [5] Kazakova, N. N. (2020). Prevention of caries of the chewing surface molars in children with rheumatism. *International Engineering Journal For Research & Development*, 5(ICIPPS), 3-3.
- [6] Daminova, S. B., & Kazakova, N. N. (2020). The state of the physicochemical properties of oral fluid in children with rheumatism. *ACADEMICIA: An International Multidisciplinary Research Journal*, 10(3), 133-137.
- [7] Kamalova, F. R., Rakhmatova, D. R., Turaeva, F. A., Aronov, E. K., & Kazakova, N. N. (2019). Changes in micro flora and Non-Specific factors protection of the oral cavity in children with inflammatory diseases maxillofacial area. *ACADEMICIA: An International Multidisciplinary Research Journal*, 9(4), 20-23.

# *Reflection In The Lexicographic Works Of The Phraseological Foundation Of The Russian And Uzbek Languages*

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**Abstract – Phraseological fund, vocabulary, semantics, phraseological unit, phraseological turnover, family values.**

**Keywords – This scientific article describes the national identity of each language, which is reflected in its phraseological fund and the reflection of the phraseological fund in lexicographical works.**

The most valuable source of information about the culture of the people's consciousness is the phraseological fund of the language and it contains the people's ideas about morality, customs, rituals, habits, and behavior. A special motive for the development of phraseology is given by the study of how the phraseological component of the language in its images reflects the world outlook of the people.

The vocabulary of the language contains a special shell of vocabulary, called the phraseological fund. Phraseological fund of any language has a vivid national and cultural specificity. All languages have their own specific features.

The national identity of each language is reflected in its phraseological fund. The Russian phraseological fund reflected many facts and events of Russian history.

For example, such as: Bread and salt - (respect) - the custom of the Eastern Slavs to bring guests a loaf and a salt shaker. Shouting at the entire Ivanovskaya - (shouting very loudly) - the announcement of the Tsar's decrees on Ivanovskaya Square in the Kremlin. Free Cossack - (free man) - this was the name of free people in the Moscow state of the 15-17 centuries. Kazan orphan - (a person pretending to be helpless) - in the 16th century, the Kazan princes complained to Ivan the Terrible to get rewards.

Russian phraseological units reflect the world outlook inherent in the Russian people: breaking spears; the cap is on the thief; slipshod; pull the strap; and does not lead an eyebrow; not a penny on a market day; a feast for the whole world; dance to someone else's tune; ring all the bells; wave fists after a fight; give birch porridge; through the stump deck; one like a finger.

Phraseologisms, being one of the genre of oral folk art with a short form, but deep content, were created on the basis of spiritual and cultural experience. It is interesting to analyze the images inherent in the creation of phraseological units, which, being part of the phraseological fund of the language, transmit the national and cultural experience of the people from generation to generation.

Revealing the proper national features of the semantics of phraseological units is possible only on the basis of comparing the stable phrases of different languages. Phraseological units, according to their social, ideological tasks, become the exponent of the worldviews of the broad masses of the people.

The role of phraseology in reflecting the national spirit is considered incomparable. Each expression or phrase used with a figurative meaning is considered a valid phraseological unit.

A special place in the phraseological fund of languages is occupied by phraseological units containing universal values, through which the characteristics of a person's character are described. The need to study the system of moral and ethical values inherent in the phraseological units of the Russian and Uzbek peoples is due to the desire to show the connection between modern principles underlying family values and what has been formulated over many centuries.

Family values are important for every person, therefore, in the Russian language there are a large number of phraseological units that speak about the role of the family: The porridge is thicker in the family; Family consent is the most precious thing; The whole family is together, and the soul is in place; There is no need for treasure, if the family is in good health; Family is the mainstay of happiness; A man without a family is like a tree without fruit. Together closely, but rosy sickening. Family together - the soul is in place; The family is in a heap, and the cloud is not scary.

Respect and love for each other, striving for unity in desires and actions are valued in them: Does not take a willing family and grief; You can't thread a thread between a husband and wife; There is no good in an unfriendly family; Where the needle goes, there is the thread; Without the owner, the yard cries, and without the mistress, the hut; Good children grow up in a good family.

Along with the study of the phraseological fund of the Russian language, already in the middle of the last century, research was undertaken on phraseology and other languages. Among them were many collections of articles on phraseology and phraseological dictionaries.

In Uzbek linguistics, significant work has been done to collect and systematize the phraseological wealth of the Uzbek language. This is undoubtedly evidenced by the publication of a one-volume Uzbek-Russian dictionary and a five-volume Russian-Uzbek dictionary, which included a large number of carefully selected and scientifically tested Russian and Uzbek phraseological phrases.

Much attention was paid to the creation of phraseological dictionaries and vocabularies, which included the richest phraseological composition of the Uzbek language. For example, the following works were created: Sh. Rakhmatullaev "Phraseological Dictionary of the Uzbek Language", M. Sadykov "Concise Russian-Uzbek Dictionary of Set Expressions" (1994), B. Yuldoshev, K. Bozorboev "Phraseological Dictionary of the Uzbek Language" and others.

The work of M. Khalikova examines the views and concepts of modern linguistics associated with such problems as language and thinking, the linguistic picture of the world, the influence of anthropomorphic means on the language. In this work, for the first time, using examples of phraseological units of the Russian and Uzbek languages, the problems of national semantics of phraseological units, the influence of extralinguistic means on the semantics of phraseological units were studied.

When comparing Russian phraseological units with Uzbek phraseological units, the originality of the expressions correlated with them in meaning is clearly visible. Here are some examples: A true friend does not betray; If you are a friend, then stand by your side; Amicably as a whole; The friend judges by the mind, and the foe by the dress; The water is turbid at the source.

These comparisons testify to the originality of the phraseology of each language. In the language, values and ideals of people are reflected and at the same time formed. In modern linguistics, phraseology is distinguished by many linguists as an independent linguistic series, rooted in antiquity and most clearly, vividly and figuratively reflecting culture, mentality, spiritual and moral values.

Phraseology clearly reflects the originality of the linguistic pictures of the world of ethnic languages. At the same time, the grammatical design of phraseological units fully reflects the typological characteristics of a given language and, above all, the features of its grammatical system.

Thus, a comprehensive study of lexicography can be useful in the study of the Russian and Uzbek languages, because knowledge of a language presupposes not only mastering its basic vocabulary fund and grammatical structure, but also a rich culture, a part of which is the culturological component laid down by the phraseological fund of any language.

Summing up all of the above, we can conclude that the phraseological fund of the two languages, in general, is unusually rich and diverse in its composition, has great stylistic possibilities due to its internal properties, which constitute the specifics of phraseological units.

**REFERENCES**

- [1] Ganieva F.F. Phraseological units as an object of research in the works of Russian researchers. 2015.
- [2] Konovalova E.K. Units of the international phraseological fund in the context of intercultural communication. 2012.
- [3] Kopzhasarova U.I. Phraseological fund of language as a means of expressing the mentality of the people. 2013.
- [4] Kovshova M.L. Cultural and national specificity of phraseological units. 2016.

# *Description Of Mystical Teachings And Methods In Navoi Philosophy*

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**Abstract – It is noteworthy that the method of mysticism is described in the works of Navoi in a simple, objective, without any extravagance, in an enlightening way, that is, in a scientific, theoretical and practical way. In particular, the theme is found in almost all of his works, and his work "Nasayim ul-muhabbat", dedicated to the activities of 770 Sufis and sheikhs, is an example of this. In particular, the characteristics of this category as follows are described as follows: "They are engaged in certain arts, knowing the content of the beloved slave". As an example of this, it is written that almost the great mashayiks ate an honest bite with their labor.**

**Keywords – Extreme Politeness, Consent, Patience, Sincerity, Piety, Mystical Sects, Feature Of Islam, The Philosophy Of Mysticism.**

In the annotated dictionary of Navoi's works, Sufism is interpreted as Sufism, the way of mysticism.

The term mystical method is interpreted as Sufism, the path of Sufism.

In the dictionary, the sect is interpreted as a way, a profession, a way of Sufism.

As Professor Kamilov.N points out, "although mysticism is rooted in Islam, nourished by the wisdom of the Qur'an and the hadiths, and often relied on the rules of the Shari'a, has expressed dissatisfaction with the working people". In our view, too, this is the contradictory aspect of the subject of mysticism. Most of the futuvists who sacrificed their lives and property for the sake of truth were formed under the influence of mystical teachings. In particular, it should be noted that the Sarbadars are also futuvvatists.

E.E. Bertels: "It is impossible to get an idea of the cultural life of a medieval Muslim East without studying mystical literature. This was true when he said that the East could understand itself without being aware of the literature".

As the basis for the beginning of the history of mysticism in "Nasayim ul-muhabbat", Navoi says in the article of Abdukhoshim Sufi: Kufiyul is original, he was a sheikh in Damascus, and Sufyan Savri q.s. it was modern. And Sufyan's words are, "If Abdukhoshim had not been a Sufi, I would not have understood the subtle meanings of riya". First, the khan built a building for the Sufis, and it was in the Ramlas of Damascus.

Here Navoi narrates the story of a building where the Sufi khanate was built by two Sufi dervishes, although they were completely strangers to each other.

Navoi, in his chapter "Description of the Valley of Enlightenment" in "Lison ut-tayr", describes the enlightenment aspects of mysticism philosophically and figuratively: "Of course, after the Valley of Love comes the Valley of Enlightenment." This is a valley that is crossed by hundreds of thousands of different roads, but one of them is very different from the other. There is no contradiction between the whole and the part. There is progress and decline. Then you are a hundred districts. you see the passenger in an unstable way, each taking a different path. Each of them is proud of the path he is taking, each of them turns the path in his own direction.

The prophet who led the way also said of this: "Whoever sets out on a journey to find the truth and wants to see that the road is innumerable, let him compare it to the *breath that the people take.*"

There is a lot of discrepancy in the analysis, most of which is rough and a little pure. Among the possessors of this pure nature are those who are subject to the rules of the Shari'ah of the Prophet.

As can be seen from the content of the text, not all the ways of the representatives of mystical sects and leeches are correct and flawless. However, not all leeches and sects were so popular because the ways of mysticism were all simple, inconsistent with humanistic practices, and the content was not so clear and understandable to the general public. They have been studied from a historical point of view, but have not become popular. As a prophet, when it comes to the breath of the people, it is clear that Navoi was trying to show that not only mysticism, but religion in general has a humane, populist basis.

We have already mentioned that the thinker put forward the profound idea in Hayrat al-Abrar that the purpose of the creation of the universe was to create man.

Here, too, it is said that there are contradictions, contradictions, contradictory views in the views between mystical analyzes. As we said at the beginning of this topic, just as there is a difference in mystical teachings, it is natural that there should be debate in its analysis and research.

"... Not all of these roads are clean, and not all of them are clean. It is necessary for there to be such a difference of opinion within the nation." It is said that any doctrine, especially religions, any sect, leech, or sect in religion, no matter how lofty they may be, will be worthless preaching if they do not serve the perfection of man. Unfortunately, while not all mystical pathways are pure, the process of "skydiving" them all continues in the process of research. We think that they should be simplified. Regarding the fact that Sufi philosophy, and especially poetry, is a complex socio-philosophical system, we think it is necessary to mention the following opinion of Imam al-Ghazali: "The same response from two people can be equal to a thousand. All of these answers are true in one sense. Because everyone rests from the state of his heart and mind".

From this view of Ghazali, it is clear that there are almost no two people in the world who marry in the same way. As we can see, even though almost all the requirements in the faith are the same, there has always been an attempt to change these patterns and requirements. It is better if it is viewed from a philosophical point of view. Because the diversity of philosophical views is interesting and it is through this that the debate becomes a factor of development. This is a characteristic feature of Islam and the philosophy of mysticism. But, as we have said in some places, ignorant approaches such as religion is not philosophy, philosophy is not religion, only lead to useless conflicts. Unfortunately, this kind of relationship continues today. Just as many Sufi thinkers, especially Navoi, have acknowledged that dialectics is an accelerating factor in the perfection of every field, it is in the mystical philosophy of dialectics that this concept is used as "accelerator".

Haqqulov I. the research concludes: "Russian scientist According to Petrushevsky I. M, the English orientalist Nicholson.R. seventy-eight interpretations of the concept of mysticism have been identified in written sources up to the 11th century. The concept of mysticism, which is not universally accepted in the same sense, is the work of Krinsky A.E. , while in the Western-Islamic world he represented only ordinary mysticism, in the East-Islamic world (Persian and Persian-Indian) he understood pantheistic theosophy close to Buddhism and Greek Neoplatonism.

The principle of "danger" in mysticism, that is, keeping between hope and fear, was developed by academician Muminov I. The fact that it is reflected in the rules of Amir Tumor is reflected in both divine and secular, socio-political relations.

Indeed, the interpretation of mysticism is expressed in different artistic and philosophical sources in different meanings and divine ways. We think that their objective scientific-theoretical interpretation and analysis should also be so controversial and should be so.

In mysticism, it can be concluded from the poetic and orifona interpretation that the style of the arifs (scholars, scientific method, language) may not be understood by everyone. However, poetic interpretation, masters of artistic expression, can articulate a large and complex problem or issue in a poetic or prose statement in an artistic style in a way that is understandable to all. After all, the big problem in philosophy is the problem of the art, the art of being able to convey one's views to society to one's followers. In Navoi one can see the genius that combines these two features. He expressed the deep philosophy of the universe, being, and man in both an orphan and a poetic way. The predominance in his style is an artistic-philosophical-poetic feature. However, as Navoi and I have been separated from our generation for almost six centuries, there are problems in understanding its linguistic features. Here, in Navoi's language, we can see that absolute ambiguity, in philosophical terms, has taken its toll from time to time. it would be fair to say that it is clear to the author.

At the same time, there are conflicting views on the issue of abandonment and abandonment. Perfect people are known to be old enough to leave when they reach a perfect age. This will be a time when the physical needs and wants of the young human body are weakened in the 50s and 60s. In particular, both sexual and sensual desires. At the same time, in the language of Navoi, it can be said that Khoja Ahmad Yassavi, the sheikh of Turkestan, went underground for life at the age of 63, at the invitation of the Prophet. Although not fully proven, it is said that this thinker lived to be 120 years old.

The theme of love is also highly artistic-figurative-philosophical in the description of the Valley of Love in Lison ut-tayr:

“Love is an inextinguishable torch. Don't call it a torch, not a light that burns the whole universe. Not everyone deserves love. Apart from straw, what creature can walk in the grass? It is necessary to be brave and strong in love, to be a strawman in the sea of light. Like a propeller burning in the light, the work of a lover is to burn. Don't say that wisdom is the work of reptiles, a butterfly can't be a butterfly.

... Know that the main job of a lover is to give up his life. Understand that burning for a friend is a trivial matter for you.

No matter how crippled and weak the body is, if the devotion is high, why worry about it?! Because this work is a work of love: he who is not in love is not considered a human being. The main thing in this case is love, and its implementation is beyond the reach of any amateur.

Sufis distinguish three types of love. The first is that true love, or love is divine, is man's love of God. The second is figurative love, or man's love for man. The third is that those who have pure love or high spiritual maturity can enjoy pure pleasure by looking at a pure beautiful body with a pure eye (unselfishly).

In this regard, the largest "Sheikh San'an's story" in "Lyson ut-tayr" describes how a person falls in love. But how true is the deification of this human love. Exactly this problem, as in all times, remains one of the social problems of our time. Can it be described as divine love that a boy or a girl will suffer so much that he or she will lose everything, even his or her parents, that he or she loves him or her? In this sense, we want to say that love should be "married".

The same information about Sheikh San'an is given in "Nasayim ul-Muhabbat".

Poets also take advantage of the convenience of literature for the expression of symbols to speak of three kinds of love in their works. The reader must be able to distinguish these for himself.

That is, no matter how perfect the path of mysticism, no matter how highly valued, evil, hypocrisy always finds its way among people in society.

In Nasayim al-Muhabbat, it is said, "... and as a mystic, they are relatively right to one of these categories."

Navoi believed that the founders of the most famous representatives of Sufism in Central Asia, the saints Ahmad Yassavi - Yassavia and Bahovuddin Naqshbandi - believed in the Naqshbandi sects and were their unseen piri. In particular, the founders of these two sects advocated an enlightened and effective way of life, not only from the dubious ways of religion and belief, but also from practical activities, which benefited the society. In particular, the famous "dil bayoru dast bakor" in Naqshbandi, that is, dealing with Allah, supported the belief that your hand should be at work (labor, profession, profession).

Nasayim ul-Muhabbat contains the following information about the etiquette of Hazrat Naqshbandi and his teachings:

“Someone asked me, 'Is Darwish an inheritance or a profession for you?' They said, "We have been blessed with the knowledge that one of the attributes of the Truth is equal to all the deeds of the jinn and human beings."

Get acquainted (gain, obtain) with present-day strangers. Such a beautiful habit is rare in the world.

In our opinion, the content of the text here can be understood in such a way that a person, regardless of his social origin, nationality, position, profession, must be free. Man should be proud not only of his dynasty, of the rank and achievements of his ancestors, but also of their prestige and gratitude. Unfortunately, this emotional defect is very widespread in our society. It is common to flag the glory of our ancestors who lived a thousand years ago. This is part of our national pride from a historical point of view, but it is not the right approach to lie entirely on this slogan.

In one of SN Ivanov's articles, the scientist notes that in the analysis of the gazelle it is necessary to be interested not only in what is said, but also in what is not said. In fact, it is this unspoken idea, the verse, the byte that ensures the uniqueness of the genre, that can lead to a lot of controversy.

The ways of mysticism, the history of ideological, philosophical differences and conflicts between them, the analysis of problems related to their existence in the scientific monograph of Professor Sh. Sirojiddinov are studied in a more objective, scientific and enlightening way and conclusions are given. "The theory of mysticism began to develop in two directions that were in serious opposition to each other. One is a mixture of philosophy and the other is theology. One was called "Vahdat ul-Wujud" and the other was called "Vahdat ul-Shuhud". The first preached the path of perfection and understanding through the discovery of the enlightenment of Allah through Ishq, and the second preached the observance of the Shari'ah, the path of knowing and knowing Allah without deviating from the rules of Islam under the strict supervision of the pir-ustaz. The Sufis of Vahdati Shushud, on the one hand, and the followers of Wahdat ul-Wujud, on the other, were in competition with each other. For example, Alouddawla as-Simnani (1261-1336) declared the teachings of Ibn al-Arabi to be misleading and extremely harmful to the people. According to him, the universe is not a manifestation of the Truth, but a reflection. Enlightenment can only be achieved if one acts in accordance with the Shari'ah. Man must understand the divine essence not as a result of study, but as a result of spiritual training, murakaba and mujahideen, through maturity, and as a result of ascension from the status of a priest. More importantly, theoretical differences have created ideological intolerance even among mystical sects.

Sects emerged that taught the ideas of "beings." Among the "witnesses" appeared sects that did not face each other. Their relationship to each other is full of manaqib literature reflected".

Attitudes towards "metaphorical science" and "mental science" have also been approached and interpreted differently in mystical sciences.

It should be noted that the plots of rivalry and opposition between Sufis and Shari'a, which are still reflected in many mystical and sectarian treatises on Sufism, are naturally misunderstood by many readers. The conflict between the Sufis and the people of the Shari'a, which is abstract in research and vague in our imagination, is specific to certain historical stages and stems from differences in theological views. For example, the science of kalam, which was later glorified by Shari'a scholars, was condemned by the Shari'a as heresy until the tenth century. The rise of so-called peripatetic Greek philosophy led to the arming of the Shari'ah with the word, and thus the word became one of the sciences of the Shari'a. In the eleventh and twelfth centuries, the development of peripatetic philosophy declined after the attacks of the great scholar of his time, Imam al-Ghazali. But the philosophy did not disappear. The mystical-metaphysical views, which were predominant in the philosophers' views, became ingrained in the mystical divine teaching of Ibn al-'Arabi (1165-1240) "Vahdat ul-Wujud" (One Being), which became increasingly popular among Sufis from the 13th century. This doctrine, which was deepening and influencing the broad masses, divided the world of the Sufis, which had hitherto operated on the basis of common views, actions and traditions, and divided them into two camps.

In an objective interpretation of the science of mysticism, it can be seen that in the Muslim East, especially in the Uzbek schools of science and philosophy, the essence of the issue has shifted to one side or the other. In particular, the priority of adaptation to the interests of the dominant ideology is clearly felt. For example, because the teachings of mysticism have a divine basis, in the Soviet era, it was not studied and propagated at all. The propagated part was interpreted as a revolutionary rebellion in social relations. Nowadays, however, it is even going to the level of fanaticism in a very divine way. However, we can see that there are strong differences between mystical leeches and sects on the divine and enlightenment interpretations of being, the universe, and man, and this is still the case.

As mystical works move away from us in terms of time, it becomes more and more difficult to understand their original content. For various reasons, the first hurdle is of course the language factor. Due to this, the socio-psychological, political and ideological



environment of the period when the works were created becomes more difficult to feel and imagine. However, this does not mean that the study of mystical teachings should be stopped altogether.

The debate over mystical views and conclusions is still ongoing.

***In our view, there are the following reasons for this situation:***

In conclusion, all the etiquette required in mysticism, sharia, sect, and leeches is very well described.

*First:* there is a variety of interpretations of the subject even in earlier sources, and there is no clear and unanimous conclusion. In fact, this is a simple case, indicating that in his time there was also a pluralistic approach to the subject of theology. This situation is also mentioned in Navoi's works;

*Second:* incomplete and in-depth study of the topic;

*Third:* the lack of logical consistency in the study of the secular and divine foundations of the problem;

*Fourth:* lack of tolerance and objectivity in the coverage of the topic;

*Fifth:* the bold unity in the divine interpretation of the subject from an ideological and moral point of view, the consequent lack of courage;

*Sixth:* the lack of a pluralistic approach even in the philosophical interpretation of the subject. In particular, the transition to the position of divine or secular interpretation in the interpretation of the issue so far;

*Seventh:* in the interpretation of the subject, the priority of the approach is often overly emotional, emotional, and overly exaggerated, and so on.

### REFERENCES

- [1] Haqqulov I. Formation and development of Uzbek mystical poetry. Abstract of the dissertation for the degree of Doctor of Philology. T - 1993. –p.12
- [2] Navoi. A. MAT: 20 volumes. 17 t. Nasayim ul-muhabbat. T .: “Fan”, 2001.
- [3] Navoi Alisher. Mahbub ul-qulub. 20-volume MAT. 14 vols. Pp.47-71.
- [4] Annotated dictionary of the language of Alisher Navoi's works. 4 volumes. 3 volumes Tashkent, “Fan” 1983. p. 194
- [5] Bekmirzaev. U. Navoi's dreams. T .: “Yangi asr avlodi”, 2011. pp. 78-80.
- [6] N. Komilov. Sufism. “ MOVAROUNAHR ”, “ UZBEKISTOT ” NMIU, 2009.
- [7] Bertels E.E. Sufism and Sufi literature. —M .: Nauka. 1995. P.54..
- [8] Navoi. A. MAT: 20 volumes. 17 t. Nasayim ul-muhabbat. T .: “Fan”, 2001. p28 .
- [9] Haqqulov I. Formation and development of Uzbek mystical poetry. Abstract of the dissertation for the degree of Doctor of Philology. T - 1993. –p-9. See also Imam al-Ghazali. Ihyou ulumid din. "Uzbekistan" 2019.p 512 .

# Modern Approaches to The Diagnosis And Evaluation Of Acute Kidney Injury In Obstetric Pathologies

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**Abstract** – Prerenal AKI is caused by renal hypo perfusion. With the timely restoration of normal renal perfusion, rapid normalization of renal function is observed. The causes of perennial AKI may be due to a decrease in effective arterial volume: myocardial, alular, pericardial, rhythm and conduction disorders; pulmonary hypertension, pulmonary thromboembolism, mechanical ventilation; systemic vasodilatation; sepsis, liver failure, anaphylaxis; renal vasoconstriction: nor epinephrine, ergotamine, liver diseases; under the influence of pharmacological drugs: angiotensin converting enzyme inhibitors (ACE inhibitors) or angiotensin II receptor blockers, no steroidal anti-inflammatory drugs (NSAIDs). The development of AKI can be observed with general hypervolemia, but with a decrease in arterial blood volume, which is observed in chronic heart failure, nephritic syndrome, cirrhosis of the liver and sepsis.

**Keywords** – Cardiac Surgery, Pregnant Women, Nephrotoxic Drugs, Therapeutic Technologies.

Renal damage to the kidneys includes glomerular, interstitial, and tubular damage. In addition, there are two additional variants of AKI — vascular renal damage and caused by intratubular obstruction. Acute tubular necrosis (OTN) is the most common cause of renal AKI, accounting for 70%. There is ischemic and toxic REL. The share of ischemic REL in the structure of causes is 50-60%, and in 20-45% of cases it is caused by sepsis [1]. Toxic tubulonecrosis accounts for 20% of AKI cases.

Ischemic tubular necrosis: Ischemic kidney injury and perennial AKI represent two stages of the pathological process. In severe hypo perfusion, the tubular cells are damaged, and renal dysfunction persists. Risk factors for the development of ischemic REL include the presence of previous kidney disease — CKD, atherosclerosis, diabetes mellitus; cardiac surgery. Ischemic OTN can develop in the absence of hypotension in cases of impaired renal auto regulation: in the elderly, with severe atherosclerosis, arterial hypertension and endovascular lesions, or in the presence of previous CKD.

Nephrotoxic OTN develops under the influence of endogenous toxins (hemo-and myoglobinuria in massive hemolytic causes prevail or rhabdomyolysis, respectively) or exogenous toxins. The spectrum of exogenous agents has changed significantly in recent years, with antimicrobial agents, radio contrast agents, and chemotherapeutic agents prevailing.

The main causes of the development of renal AKI: damage to large renal vessels: thrombosis, atheroembolism, thromboembolism, dissection, vacuities (Takayasu's disease); classic nodular polyarteritis; thrombosis, compression; glomerular apparatus damage: primary glomerulonephritis (GN), GN in systemic diseases and vacuities (systemic lupus erythematosus, Wegener's granule-matosis, microscopic polyangiitis, Charge-Strauss syndrome, hemorrhagic vasculitis—Schonlein — Henoch

purpura, cryo—globulinemic vacuities); GN in infectious endocarditic; malignant hypertension; gestosis of pregnant women; scleroderma kidney; hypercalcemia; drugs; radiocontrast substances; hematological: hemolytic-uremic syndrome (thrombotic thrombocytopenic purpura), disseminated intravascular coagulation, high viscosity syndrome.

Pathological conditions characterized by a predominant lesion of the tubules (often with the development of OTN): ischemia caused by renal hypo perfusion; exogenous toxins: antibiotics, antitumor drugs, radiocontrast agents, NSAIDs, diuretics, *α*-methyl dopa, allopurinol, azathioprine, etc.; endogenous toxins (myoglobin, hemoglobin, uric acid, light chain myeloma). Acute lesions of the interstitial apparatus: interstitial nephritis (antibiotics, NSAIDs, etc.); infections (viruses, bacteria, fungi); acute cellular reaction of kidney transplant rejection; infiltrative processes (lymphomas, leukemia, sarcoidosis).

Post renal AKI is the result of urinary system obstruction (MVD), which can occur at the level of the bladder or urethra (obstruction of the lower MVD) or at the level of the ureters and kidneys (obstruction of the upper MVD). In unilateral obstruction, AKI syndrome usually does not develop with preserved contra lateral kidney function.

The main reasons for the development of post renal AKI: obstruction of the upper parts of the MVS (bilateral obstruction or obstruction of a single kidney, papillary necrosis, blood clots, germinating kidney carcinoma, retroperitoneal tumor, retroperitoneal fibrosis, endometriosis); lower parts of the MVS (neurogenic bladder, bladder carcinoma, blood clots, concretions); prostate (prostate cancer, adenoma prostate gland); urethra (strictures, pharoses, concretions).

Post renal AKI can occur with both complete and partial obstruction. In the first case, anuria is observed, in the second — district phenomena (frequent urination, false urges, nocturnal, a feeling of incomplete emptying of the bladder). Partial obstruction may occur with or without oliguria.

The clinical picture of AKI is non-specific, depending on the etiology and the underlying disease that caused it. Often, latent development under the guise of the underlying disease, so early diagnosis is possible only if diuresis, creatinine and urea levels in the blood plasma are monitored.

The algorithm for diagnosing AKI is as follows:

1. Diagnosis of AKI based on the increase in blood creatinine level to 258.8mmol/l during the acceptable period for AKI (3 months) and a decrease in diuresis.
2. Elimination of CKD (normal kidney functions 3 months ago — blood creatinine level-75.5 mmol/L).
3. Clarification of the mechanism of AKI: renal damage (absence in the anamnesis and during the follow-up examination of the prerenal and postrenal causes of AKI, taking potentially nephrotoxic drugs-NSAIDs).
4. Identification of the cause of renal AKI (presumably NSAIDs).
5. Determination of severity (stage) AKI in accordance with the clinical recommendations for the diagnosis and treatment of AKI (2014) — the 3rd degree of severity (increased blood creatinine more than 3 times from the original).

Diagnosis: Acute renal failure (AKI), drug-induced (NSAID), 3rd degree of severity, uncomplicated.

In accordance with the recommendations of KDIGO (2012): "Patients with AKI should be monitored for 3 months to assess the degree of recovery of kidney function, a repeat episode of AKI, or deterioration of the course of previously existing CKD" [5]. At the same time, the level of creatinine and the volume of urine are monitored. Patients are recommended to be divided into groups according to the degree of risk of developing AKI. Patients should be examined to identify the reversible causes of AKI in order to eliminate them (for example, postrenal).

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The incidence of AKI in the general population is continuously increasing and reaches 0.25%, which is comparable to the incidence of acute myocardial infarction. AKI remains an important cause of both end-stage renal failure and the less severe stages of chronic kidney disease. In addition, AKI (in the near or long term) may be considered an important determinant of cardiovascular

risk. Despite the continuous improvement of therapeutic technologies, primarily methods of renal replacement therapy, there is no significant improvement in the results of treatment of AKI. The outcomes of severe variants of AKI remain unsatisfactory, and the mortality rate in them can reach 70% or more. At the same time, even a short - term, transient increase in Scr is associated with an increase in the duration of hospitalization, as well as with an increase in mortality over time. AKI therapy requires huge material costs, which place a heavy burden on all health care funding systems. All this makes us consider AKI as one of the most important medical and social problems.

As noted above, AKI is a relatively new concept, which has largely replaced the usual phrase AKI. To date, some doctors believe that such a replacement is purely terminological in nature. However, the reasons for the development of the concept of AKI are much deeper and are determined by the logic of the development of modern medicine. The main reason for the creation of this concept was the accumulation of information that even a slight transient increase in the concentration of creatinine in the blood serum (Run) is associated with a sharp increase in mortality. Such an increase in mortality is observed both in the early and long-term period. At the same time, the fatal outcome is not always determined by "renal" causes.

In nephrology, as in other areas of medicine, there are a lot of conditional terms that do not reflect the essence of the pathological processes that they characterize. In the vast majority of cases, these terms have historical roots and it is not possible to abandon them. However, when it comes to introducing new terms, especially those borrowed from foreign literature, to translate them into Russian, it is necessary not only to know the grammar of a foreign language, but also to understand the meaning of the term, since literal translation is in most cases impossible.

When using the RIFLE system, nephrologists encountered a number of problems. As mentioned above, even minimal changes in Scr (less than 44  $\mu\text{mol} / \text{L}$ ) have been shown to be associated with increased mortality among hospitalized patients. In addition, there were certain difficulties in assessing the severity of kidney damage at a particular time in a particular patient, for example, with an increase in the concentration of serum creatinine in a patient, the stages of AKI from R to F could be consistently detected. Finally, we emphasize a very important point from our point of view. As the developers noted," the criteria of the OPN [RIFLE-criteria, auth.] can be applied to all forms of AKI in patients in critical conditions, with the exception of primary kidney diseases, such as glomerulonephritis».

Moreover, it requires the doctor to pay attention to the patient's kidney function and, especially, to be wary of possible changes in their condition after any effects, including medical ones. Unfortunately, as many nephrologists know, some of our colleagues do not pay enough attention even to the size of the minute diuresis, and we sometimes get patients in extremely serious condition, although timely adoption of fairly simple measures could prevent such cases. Therefore, the KDIGO classification is also of great preventive value. Therefore, the concept of AKI and the stratification of its severity occupy a place in medicine close to the concept of CKD. Although it is unfortunate that many of the provisions of the KDIGO Recommendations on AKI do look unnecessarily formalized.

It also seems that the available methods of treating AKI, especially RRT, used for AKI, are approaching their limit and breakthroughs in this direction are not expected. Therefore, at present, early detection, primary and secondary prevention of AKI is becoming the main direction. This is possible only on the basis of common approaches to the definition and stratification of the severity of this condition.

Treatment of patients with AKI is very expensive and puts a heavy burden on society. It is important that AKI can cause CKD, and in patients who have had AKI, the cardiovascular risks increase dramatically.

### REFERENCES

- [1] Bikbov BT, Tomilina NA. The state of substitution therapy in patients with chronic renal failure in the Russian Federation in 1998-2009. *Nephrology and Dialysis* 2011; 13(3): 150-264
- [2] Mukhoedova TV, Lomivorotov VN, Kolesnikov SV. Predictors of the outcomes of acute renal failure in renal replacement therapy after cardiac surgery. *Anesthesiology and Resuscitation* 2005; (2): 53-58;
- [3] Podkorytova OL, Loss CE, Tkachenko NYA, etc. The structure of causes and effectiveness of treatment of acute renal failure according to the materials of the Department of Intensive Nephrology. *Anesthesiology and Resuscitation* 2005; (2): 50-52

- [4] Fedicheva EV, Gurevich KYA, Dats AV, Gorbacheva SM. Prognosis of hospital mortality in patients with acute renal failure using resuscitation scales. *Siberian Medical Journal (Irkutsk)* 2008; 77(2): 27-29
- [5] Bunova SS, Bilevich OA, Mikhailova LV, etc. Acute renal failure: causes, outcomes, methods of renal replacement therapy. *Omsk Scientific Bulletin* 2012; (114): 8-11
- [6] Kazakova, N. N. (2020). Prevention of caries of the chewing surface molars in children with rheumatism. *International Engineering Journal For Research & Development*, 5(ICIPPS), 3-3.
- [7] Daminova, S. B., & Kazakova, N. N. (2020). The state of the physicochemical properties of oral fluid in children with rheumatism. *ACADEMICIA: An International Multidisciplinary Research Journal*, 10(3), 133-137.
- [8] Kamalova, F. R., Rakhmatova, D. R., Turaeva, F. A., Aronov, E. K., & Kazakova, N. N. (2019). Changes in micro flora and Non-Specific factors protection of the oral cavity in children with inflammatory diseases maxillofacial area. *ACADEMICIA: An International Multidisciplinary Research Journal*, 9(4), 20-23.

# *Administrative-Legal Nature Of The Provision By The Internal Affairs Of Public Order And Security Of Citizens In The Conditions Of Conducting Mass Events*

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**Abstract – In the article on the study of the norms of national legislation, the opinions of scientists, the analysis of the administrative and legal nature of the provision of public order and security of citizens by the internal affairs bodies in the conditions of mass events is carried out.**

**On the basis of the conducted research, scientifically based proposals and recommendations aimed at improving the provision of public order and safety of citizens by the internal affairs bodies in the conditions of mass events are formulated.**

**Keywords – Public Order, Ensuring The Protection Of Public Order And Security, The Rights And Freedoms Of Citizens, Prevention And Prevention Of Mass Riots.**

## I. INTRODUCTION

In recent years, the Republic of Uzbekistan has become a venue for a large number of large mass events, including those of an international level. The most important condition for their preparation and implementation is to ensure the protection of public order and safety.

State protection and protection of public order acts as the main method of protection and protection of rights and freedoms, along with judicial and legal protection in which all other methods complement the current state system of protection and protection of human rights and freedoms.

## II. MEANS AND METHODS OF RESEARCH

In accordance with Article 33 of the Constitution of the Republic of Uzbekistan, citizens have the right to carry out their public activities in the form of rallies, meetings and demonstrations in accordance with the legislation of the Republic of Uzbekistan. Authorities have the power to suspend or prohibit these events only for justified security reasons. [1].

One of the main requirements for holding mass events is ensuring the safety of people, respecting their rights and legitimate interests, maintaining reliable public order in the places where they are held. The main subject responsible for organizing and maintaining public order during mass events, in accordance with the current legislation, is the internal affairs bodies.

In accordance with the Decree of the President of the Republic of Uzbekistan «On measures to radically improve the activities of the internal affairs bodies in the field of public order and public safety», one of the functions of the Main Directorate of the Patrol

Service and Protection of Public Order of the Ministry of Internal Affairs of the Republic of Uzbekistan is to ensure the activities of the internal affairs bodies on timely detection, prevention and suppression of actions directed against public order and public safety, as well as taking measures to detain persons who committed offenses during the preparation and conduct of mass events, in places of mass presence of people, as well as in case of emergencies [2].

Thus, in terms of their content, mass events are social phenomena that generate special conditions for the protection of public order in the territory in which they are held.

A prerequisite for ensuring public order and security during mass events is a clear legal regulation of the procedure for their organization and conduct, as well as the actions of state authorities and local self-government of citizens aimed at preventing, suppressing violations of this order, bringing to justice the perpetrators.

As noted by the foreign scientist I.I. Veremeenko, public order and public safety are different types of social relations, between which there is a close relationship: each of these groups of relations is a condition for the existence of the other. In addition, the content of public order and public safety coincides in the part in which the relevant public relations ensure respect for the honor and dignity of the individual, public and personal peace, which are among the vital interests of the individual and society.[3, 256 p.]

Public order and public safety are essential elements of the state security system. These groups of public relations are the most vulnerable in conditions of mass events that generate specific threats to these relations, which necessitates the use of special administrative and legal means of ensuring and protecting them. Despite the fact that different terms are traditionally used in the legislation: “protection” in relation to public order and “provision” in relation to public safety, the content of these types of law enforcement activities is basically the same. The content of the administrative-legal method of protecting public order and ensuring public safety is determined by the subject of administrative law and is the activity of certain subjects, regulated by the norms of administrative law, aimed at normative regulation of public relations by executive authorities; to identify conditions and factors that constitute a threat to public order and public safety, to eliminate them (including the prevention and suppression of illegal actions that infringe on public order and public safety); to exercise administrative jurisdiction in cases of offenses that infringe on public order and public safety.

The protection of public order and ensuring public safety in the context of holding mass events has quite significant features.

According to F.P. Vasiliev, the following main features of mass events are distinguished: 1) they initially involve the participation of significant communities (masses) of people (active participation or participation as spectators); 2) are organized mass actions that have specific, predetermined goals, and are carried out at the initiative of certain subjects; 3) are carried out in public places [4, 263 p.].

Thus, mass events, which are organized actions of significant groups (masses) of people, taking place in public places, are one of the most important forms of public activity of citizens. The number of public events held is growing from year to year. At the same time, when they are carried out, the threat of violations of public order, as well as the commission of terrorist acts and other encroachments on public safety, significantly increases, which requires the involvement of significant forces and means to ensure law and order.

So, under the administrative and legal protection of public order and ensuring public safety, one should understand the activity of certain subjects regulated by the norms of administrative law, aimed at: - on the normative regulation of public relations by the executive authorities; - to identify conditions and factors that constitute a threat to public order and public safety, to eliminate them (including the prevention and suppression of illegal actions that infringe on public order and public safety); - to exercise administrative jurisdiction in cases of offenses infringing on public order and public safety.

Mass events, which are organized actions of significant groups (masses) of people, taking place in public places, are one of the most important forms of public activity of citizens. The number of public events held in the country is growing from year to year. At the same time, when they are carried out, the threat of violation of public order, as well as the commission of terrorist acts and other encroachments on public safety, significantly increases, which requires the involvement of significant forces and funds to ensure law and order.

### **III. FINDINGS**

Thus, ensuring the protection of public order and security is an important task of the internal affairs bodies. It is the maintenance of public order that is the observance of the rule of law and the prevention of the outbreak of riots in the course of mass events.

The main tasks of the internal affairs bodies when holding mass events are:

- 1) Ensuring the strict observance of the established rules of conduct by the participants of mass events;
- 2) Ensuring a successful mass event;
- 3) Preventing the weakening of the protection of public order in the territory where the event is held;
- 4) Prevention and suppression of administrative violations of public order, etc.

In order to most effectively solve law enforcement tasks during mass events, it is necessary to coordinate action of all subjects of public order protection and public safety.

### **REFERENCES**

- [1]The Constitution of the Republic of Uzbekistan, T., 2019
- [2]Resolution of the President of the Republic of Uzbekistan "On measures to radically improve the activities of the internal affairs bodies in the field of public order and public safety" dated May 1, 2017, No. PP-2940
- [3]Veremeenko II The mechanism of administrative and legal regulation in the field of public order protection. Tutorial. M., 2009.S. 256
- [4]Vasiliev FP Organization of the protection of public order by city and regional internal affairs bodies / tutorial. Ulyanovsk, 2017. - 263 p.



# *Some Features Of The Connection Between The Interior And The Environment*

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**Abstract – Interior of industrial premises are the most forming and raised activity in difficult ecological conditions of a hot climate. A number of measures and offers on the architecturally-spatial organization for creation of comfortable and safe conditions of personnel ability to live are offered.**

**Keywords – Ecology, Wind Regime, Thermal Impact Modeling And Forecast, Evolution Of Urban Planning**

The active development of small business, along with others, makes it necessary to consider the connection of the interior of industrial buildings with the environment due to the fact that the human body needs cyclical, periodic stimulators, without which it experiences physiological pain [1,2]. Man is connected with nature, for him it is a source of health and strength. Separation from it causes a feeling of fear, leads to mental painful states (claustrophobia, etc.). That is why the connection of the interior with the environment, with nature, is an important psychological problem, for the solution of which it is necessary to provide: communication of a person with the environment, especially when it is designed in the form of a park and green spaces; information about weather conditions (whether it is raining, how much snow has fallen, etc.); information about the time of day (day, night, etc.); information about what awaits a person leaving the interior.[3]

This information is involuntary in an interior with natural light and an active building profile. It is more difficult when the ceiling is suspended, which hides the surface visible from the outside, and in buildings without natural light, where the connection between the interior and the exterior is completely interrupted. In such a case, you need to resort to one of the connecting links-the hall, the lobby, which, with good glazing and landscaping, belong largely to the exterior, at the same time reveal the interior. The vestibule also serves to adapt the eyes from high brightness (outside the building) to lower brightness (inside the building), when moving from the outside to the inside (so that there is no feeling of oppression) and from the inside to the outside (to avoid the blinding effect of light).

In general, as a result of psychological influence (the creation of a certain state of health, mood, calm), the connection with the environment has its effect on the health of workers, on productivity and quality of work.

The spatial connection of the interior with the environment is carried out through entrances and exits: one main entrance with a reception area, which is very important for the adaptation of incoming first-time visitors, and many secondary entrances and exits.

The main entrance-exit combines and distributes the following functional connections: the path of those working from the outside to the household premises, the path to the administration, etc.

## Some Features Of The Connection Between The Interior And The Environment

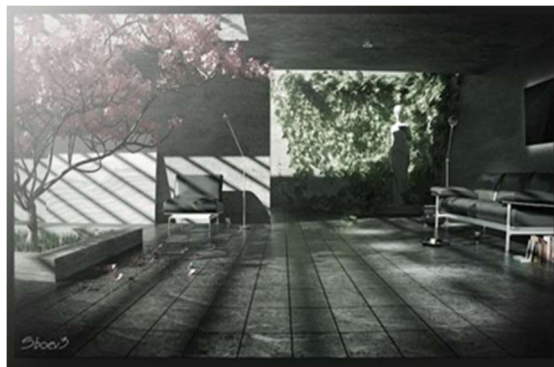
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The entrance node must have a sufficient area for communication paths, the location of information elements and visual propaganda, as well as an area for waiting, meetings, etc. It should be connected (or include in its space) with stairs, passageways, a cloakroom for visitors, a buffet, a recreation space, a sales hall, and exhibitions.

In the architectural solution of the entrance node (lobby), attention should be paid to the organization of the transition space between the external environment and the internal volume of the building. This transition can be solved in the form of a single space, when the building has natural light and an active profile, and in two zones: in the first, the entrance to the building is carried out without separation from the exterior, and in the second, the transition to the interior itself is organized. The second zone can be less lit, have a lower height and a different color finish using rich, warm colors. The lobby can be designed as a large space running through several floors. In this case, it is advisable to move part of the communication routes to the second level - to the transition bridges or galleries, which, along with improving the traffic schedule, add variety to the architectural solution.

In the decoration of the elements of the entrance group, it is advisable to use colder materials (marble, granite, etc.) to create a connection with the exterior, and warmer (for example, wood, fabric, leather, etc.) - for the decoration of waiting rooms, floors, walls, ceilings, furniture.

When determining the total area of the main entrance node, it is necessary to take into account its functions and the social significance of the enterprise. A simplified solution is unacceptable, but it is very common in existing enterprises.



The arrangement of secondary entrances and exits can be dictated by the technological features of the enterprise, the need to create communication links (for transport and pedestrians) and the requirements of fire protection. When organizing them, the following is taken into account:

They should be connected to small entrance lobbies;

Secondary entrances should preferably be located near the sanitary units, so that they can be used by persons working in the yard;

They should be located close to recreation areas and canteens (especially if the latter do not have an independent exit outside to the green areas);

Exits provided for by fire protection requirements can be combined with gates or special windows that open directly from the production premises (sometimes forcibly) in case of danger;

With a large building area, it is recommended to arrange exits to the courtyards, organized as a park environment. In large courtyards, there are good conditions for the concentration of such natural elements as shrubs, water areas, rock gardens, etc.; in small courtyards, landscaping in the form of lawns and flower beds is provided.

In cases where the space-planning solution of the building allows, open and closed terraces or canopies can be used for communication with the external space.

The organization of the spatial connection between the interior and the external environment requires the solution of thermal engineering issues in accordance with the climatic conditions.

The visual connection of the interior with the external space is carried out by directly viewing the environment through the glazed planes or by feeling it (for example, in the upper natural light). The larger the glazing surface, the better the connection to

the outside space. Factors limiting the area of glazing are: cooling in winter, overheating in summer, sealing requirements and visual discomfort ("silhouette effect", etc.). See Figure 2.

When solving the connection with the external environment, it is necessary to take into account the possibilities of viewing the panorama. In industrial areas, the area of landscaping is limited. Therefore, the view from the windows should be open to a pleasant perspective for the eyes, including the sky, the landscaping area (if the work involves visual strain), some attractions, if any, and limited to annoying objects, such as a noisy highway. It is necessary to pay special attention to the ratio of the external and internal scales, and the internal scale should be closer to the person.

In the absence of a good view from the room, it is advisable to have high windows for viewing the sky and a low location (even below the working plane) for communication with the adjacent land plot. The low position of the windows is also of practical importance: it improves aeration, illumination of the floor near the walls, etc.

It is desirable to strive for the device of windows with a smaller number of covers and a smaller total area of glazing, sufficiently insulating heat, and if necessary, absorbing heat. The presence of sun protection devices should not impair visibility. In the fences made of profile glass, the device of transparent strips at eye level and opening at the top for ventilation is provided.

The psychological connection between the interior and the external environment can be carried out by including elements of the exterior in the interior, organizing special openings for psychological communication with the external environment and using special view bay windows. [4, 5]

In the first case, a psychological connection is achieved:

Gardening, at least only near the windows, using the appropriate types of grass, ornamental shrubs that are associated with external gardening;

The use of facade elements that "penetrate" inside and are made of the same material, have the same texture and color (for example, figured masonry);

The use of identical lighting systems on the exterior canopies and in the interior, which emphasize this connection in the evening;



The inclusion of elements of the natural environment (for example, flowing water) in the interior, which creates a sense of coolness.

In the second case, the psychological connection with the external environment is achieved by creating special openings. There are the following types of "psychological" windows:

Vertical light openings (embrasures), which give a good idea of the time of day, as they cover the view from the sky to the surface of the earth;

horizontal light openings with height (0,75); 1,2 - 1,5 (1,8)m; the height of the window sill is taken depending on the working position: sitting or standing. They provide a wider view of the horizon, are more consistent with our visual analyzer, and are more convenient for observing in motion.

"Psychological" windows are located at the end of communication paths or along them. This is done so that everyone can see "what the weather is like outside", better navigate the interior and provide a link between it and the exterior.

See Figure 3.

And, finally, the psychological connection between the interior and the external environment is achieved through special view windows, which slightly affect the microclimate. They are connected to the communication network and the general space-planning solution of the building. The glazed surfaces of such bay windows can be positioned to avoid unwanted sun exposure or to increase the view. If they are successfully oriented (for example, to the north), the possibility of viewing increases.



The psychological connection with the environment can also be indirect, especially in the interiors of category I, where such a connection is made in relation to the glazed beautiful couloirs, galleries, etc.

"Psychological" windows and bay windows are particularly rational in buildings without natural light. Their area depends on the category of the interior and the constancy of the microclimate and can be from 1 to 6% of the surface of the facade wall for category I interiors, and even more for other categories.

The need to organize psychological lighting in a production building has a significant impact on its planning structure, which should provide for the placement of the main production premises directly at the external contour of the building. If it is impossible to arrange psychological lighting (visual review) directly in the shop, then it is advisable to create visual contacts with the external environment with the help of glazed partitions between the shops and the adjacent auxiliary rooms (red corners, buffets, rest rooms, etc.).

Means of decorative landscaping of premises: For the premises of group III, it is preferable to arrange planar green compositions of green showcases, which can be glazed in particularly dusty workshops. In order not to obstruct the passage of transport, the width of such storefronts should not exceed 0.60-0.65 m. For rooms of group I and II, it is recommended to use three-dimensional compositions, which can include small "water devices" that not only increase the decorative effect, but also contribute to humidifying the air in the rooms, which, as a rule, is necessary according to the conditions of the technological process. It should be borne in mind that the edges of the flower beds should raise above the floor level by 0.50-0.60 m, otherwise the plants are obscured by machines and are poorly visible (this simultaneously facilitates the constructive execution of flower baths).

The coloristic solution of green compositions must be linked to the peculiarities of the production process. When developing products of bright colors, you should give preference to decorative deciduous plants of calm green tones. When white or faded yarn or fabric is produced, intense colors, their contrasting combinations are desirable. This increases the visual acuity of the workers, as well as creates color accents in the room.

Green spaces: Green spaces should organically merge with the architectural ensemble of the enterprise, without suppressing it. As noted, for modern industrial buildings, a clear geometricity of forms is typical; often their architecture has an excessively flat character. In combination with the large length of the buildings, this often leads to featureless architectural compositions. By means

of landscaping, you can largely correct these shortcomings. This is facilitated by the decision of the layout of the adjacent territory of the factory plots in a landscape style, as well as a visual overview from the interior space.

Irregularly arranged tree and shrub plantings, asymmetric spots of floral decoration, curved outlines of walking paths soften the excessive dryness of the composition, make the architectural appearance of the enterprise more human. According to this principle, landscaping can be carried out, for example, at a worsted and cloth mill: vertical groups of trees, breaking up the monotonous and plastically featureless facade of the mill into a number of sections commensurate with a person, act as structural elements of the composition that form the space of the pre-factory zone.

In the process of reconstruction of enterprises, when greening their territory, it is often necessary to smooth out the style differences between new buildings and existing buildings. In the landscaping project of a weaving factory, for example, this is achieved by organizing thickened tree plantings on the western and eastern sides of the plot of the new building, shielding the old low-aesthetic buildings. Vertical landscaping is also used for this purpose. The central part of the plot in front of the building can be solved in the form of a lawn parterre with separate picturesque groups of trees, contrasting with the strictly geometric shapes of the surrounding buildings and saturated with equipment and communications production shops.

### REFERENCES

- [1] Architectural design of public buildings and structures: Textbook-Moscow, 2007.
- [2] Blokhin V. V. Architecture of the interior of industrial buildings. - Moscow: Stroyizdat, 1973.
- [3] Zokoley S. Architectural design, operation of objects, their connection with the environment. - Moscow, 1984.
- [4] Korepina T. N. Ergonomics of the architectural environment: Textbook-Yekaterinburg: Ural. GAKHA, 2002.
- [5] Mansurov Ya. M. Interior and equipment: Textbook-Tashkent: TASI, 2014.

# *Vulnérabilité Et Stratégies D'Adaptation Des Systèmes De Production En Milieu Agricole Et Agropastoral Sénégalais : Entre Mobilité, Innovations Et Diversification Des Sources De Revenus (Ferlo Nord Et Centre)*

## *[Vulnerability And Adaptation Strategies Of Production Systems In Senegalese Agricultural And Agropastoral Environment: Between Mobility, Innovations And Diversification Of Income Sources (Ferlo North And Center)]*

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Résumé – La zone sylvopastorale, à l'instar d'autres zones arides et semi-arides d'Afrique, est soumise aux effets néfastes du changement climatique. Les observations pour ces régions, sont entre autres, une diminution des rendements des cultures, des superficies cultivées et de la durée des saisons, accompagnées d'une baisse de la production agricole. Cette étude a pour objet d'analyser les stratégies paysannes, en particulier celles des agriculteurs et agroéleveurs de la zone sylvopastorale. Elle se déroule dans un contexte de forte variabilité pluviométrique, de vulnérabilité liée aux changements climatiques caractérisée par de grandes tendances de dégradation des conditions environnementales. Elle a porté sur l'exploitation des données d'enquête de terrain et d'entretiens grâce à la collecte des données au niveau 112 exploitations agricoles. Les résultats ont montré que le changement climatique, perçu par les communautés de la zone résulte, ont eu des impacts sur les modes d'existence des communautés à travers les faibles productions agricoles et d'élevage, des ressources naturelles, la réduction voire la disparition de certaines espèces forestières. Cette situation s'est traduite par la pauvreté et l'insécurité alimentaire au niveau des exploitations d'où le recours à un ensemble de stratégies pour faire face à la vulnérabilité des systèmes de productions largement tributaires de la pluviométrie. En effet, il est ressorti de l'analyse des données sur les perceptions recueillies au niveau des exploitations agricoles que la thésaurisation par l'élevage (84.7 %), diversification des types de cultures (69.3 %), l'utilisation des cultures à cycle courts (66.4 %), exode rural (49.6 %). Les stratégies d'adaptation extra-agricoles sont entre autres la mobilité qui est apparu comme l'un des déterminants majeurs des stratégies en milieu rural africain, l'exode rural qui est pratiqué autant par les agriculteurs que par les pasteurs, l'émigration qui a marqué les populations sahéliennes et la diversification des sources de revenu qui est une suite logique de la recherche de numéraires.

Mots-clés – vulnérabilité, stratégies d'adaptation, systèmes de production, agricole et agropastoral, mobilité, innovations, diversification, revenus, Ferlo

**Abstract**— The silvopastoral zone, like other arid and semi-arid areas of Africa, is subject to the adverse effects of climate change. Observations for these regions include, among others, a decrease in crop yields, cultivated areas and length of seasons, accompanied by a decline in agricultural production. The purpose of this study is to analyze peasant strategies, in particular those of farmers and agropastoralists in the silvopastoral zone. It takes place in a context of high rainfall variability and vulnerability linked to climate change characterized by major trends in the deterioration of environmental conditions. It focused on the use of field survey and interview data through data collection at 112 farm level. The results showed that climate change, perceived by the communities of the area, had impacts on the livelihoods of the communities through the low agricultural and livestock production, natural resources, the reduction or even the disappearance of certain forest species. This situation has resulted in poverty and food insecurity at the farm level, hence resorting to a set of strategies to deal with the vulnerability of production systems largely dependent on rainfall. Indeed, the analysis of the data on the perceptions collected at farm level showed that hoarding through livestock (84.7%), diversification of crop types (69.3%), the use of cycle crops course (66.4%), rural exodus (49.6%). Off-farm adaptation strategies are among others mobility which has emerged as one of the major determinants of strategies in rural Africa, the rural exodus which is practiced as much by farmers as by pastoralists, emigration which marked the Sahelian populations and the diversification of sources of income which is a logical consequence of the search for cash.

**Keywords**— *vulnerability, adaptation strategies, production systems, agricultural and agro-pastoral, mobility, innovations, diversification, income, Ferlo*

## I. INTRODUCTION

La zone d'étude appartient à la ZSP située entre les latitudes 15° et 16° 30 Nord et les longitudes 13° 30 et 16° ouest, le Ferlo s'étend de la vallée du fleuve Sénégal jusqu'aux franges du Bassin arachidier sur plus de 60 000 km<sup>2</sup> (Wane et al., 2006). Toutefois, notre d'étude est circonscrite entre le Ferlo Nord et le Ferlo Centre entre les latitudes 16°28'53.84"N et 15°13'42.48"N Nord et les longitudes 15°55'36.93"W et 14°45'0.50"W Ouest (Dieye, 2018; Dieye, 2020). Une partie de cette zone est contiguë à la dépression occupée par le Lac de Guiers et incluse dans le bassin versant du Ferlo. Elle s'étend sur les régions administratives de Louga, et Saint-Louis et couvre une superficie totale de 6278,34 km<sup>2</sup>. Sur le plan administratif, le Ferlo couvre une partie des régions de Saint-Louis et de Louga et toute la région de Matam (Figure 1). Le Ferlo appartient à la zone bioclimatique sahélienne (Faye et al., 2011) et correspond à la zone silvopastorale du Sénégal (Sy, 2009). Dans cette zone, l'élevage, de type extensif, exploite les pâturages naturels (Akpo et al., 1995; Ba, 2007). De cette vocation pastorale, les ressources ligneuses jouent un rôle important dans l'alimentation du cheptel et la satisfaction des besoins des populations (Diop, 1989). Cependant, ces ressources connaissent depuis plus de quatre décennies, un processus de dégradation significative à la suite de la grande sécheresse des années 1970. Cette dégradation se traduit par une régression de certaines espèces ligneuses corrélée à l'expansion d'autres (Akpo et Grouzis, 1996). Parallèlement, la densité moyenne des ligneux dans la zone a nettement diminué au cours de ces dernières décennies (Piot et Diaite, 1983 cités par Diop, 1989) avec comme conséquences l'appauvrissement des terres, l'érosion des sols, etc. de même, les ressources en eau de surface, constituées essentiellement et des mares saisonnières, sont fortement touchées par la dégradation des conditions climatiques. Ces mares, ayant joué un rôle fondamental dans la l'occupation de cette région (Diop et al. 2004) voient ainsi leur potentiel se réduit progressivement sous l'effet de la sécheresse. Tandis que les moyens d'exhaure utilisés varient d'une localité à l'autre (Puit, forage),

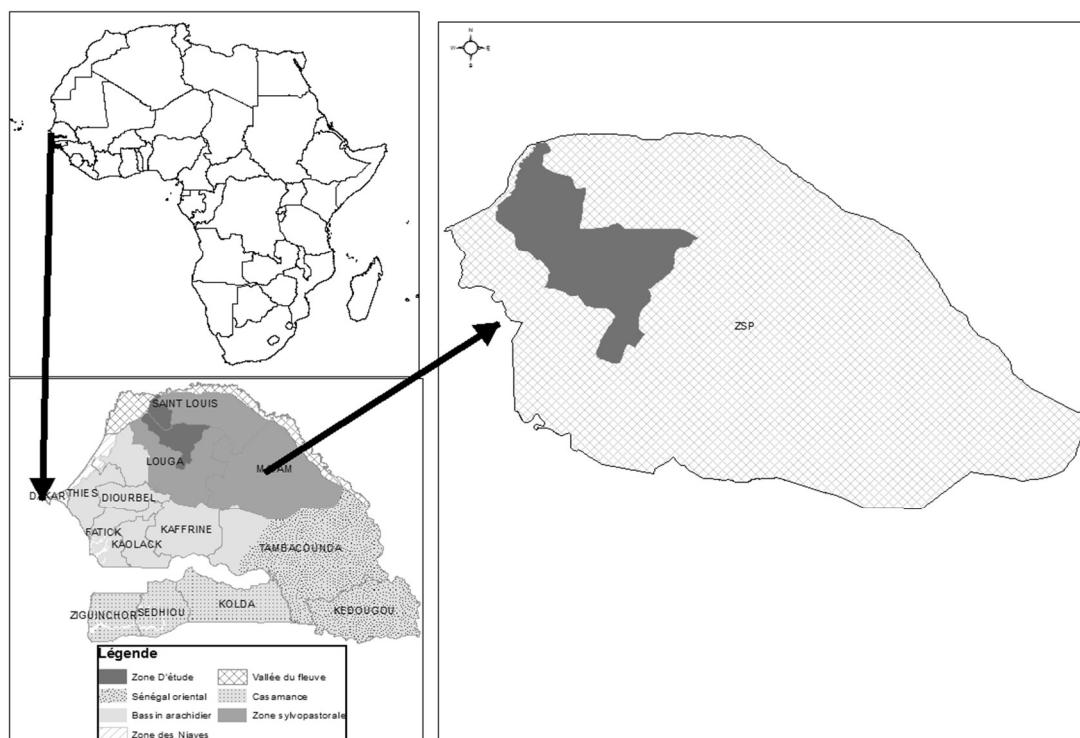


Figure 1: Carte de situation de la zone d'étude

Sur le plan climatique, le Ferlo appartient au domaine sahélien caractérisé par l'alternance de deux saisons: une saison sèche qui dure neuf (09) mois (Octobre à Juin) et une saison pluvieuse de trois (03) mois. La pluviométrie reste faible et très instable avec une moyenne de 422,6 mm par an pour un coefficient de variation de 0,3 sur la période 1951-2004 (Faye *et al.*, 2011). La température moyenne oscille autour de 27,73 °C et fluctue entre une moyenne maximale de 30,19 °C au mois d'Octobre et minimale de 24,4 8 °C au mois de Janvier (Niang, 2009). La moyenne annuelle de l'humidité relative est de 47% et elle est marquée par une évolution unimodale, avec un maximum intervenant au mois d'août (73%) et un minimum au mois de février (29 %) (Diop *et al.* 2004). Sur le plan morphopédologique, la zone d'étude appartient au Ferlo sableux caractérisé par une succession de dunes et de bas-fonds peu accidentés avec un type de sol différent selon que l'on se trouve sur un sommet de dune ou en bas de pente (Diouf, 2003). En ce qui concerne l'hydrologie, on distingue les nappes profondes, appelées aquifères du Maestrichtien et de l'Éocène d'une part et celles dites superficielles ou nappes du Continental terminal et du Quaternaire d'autre part (Michel, 1973). Par ailleurs, cette région est caractérisée, du point de vue géomorphologique, par un modelé formé d'une surface plate et monotone qui s'abaisse progressivement vers l'Ouest et le Nord-ouest mais entaillée par des réseaux de vallées mortes dont les ramifications découpent les plateaux en une série de lanières de superficies très variables et aux contours festonnés (Michel P., 1977). Globalement, on note une subdivision zonale dont l'une (à l'Est) est dominée par un substrat sableux, et l'autre (à l'Ouest) est dominée par un substrat ferrugineux (Valenza *et al.*, 1972). Quant au couvert végétal, il est composé d'un tapis herbacé à dominante d'espèces annuelles (*Cenchrusbiflorus*, *Schoenefeldiagracilis*, *Zornia glochidiata*, etc.), couvrant de façon incomplète le sol, et d'une strate arbustive peu dense dominée par *Balanites aegyptiaca*, *Bosciasenegalensis*, *Acacia senegal*, etc., dans la partie sablonneuse, et de *Pterocarpus lucens* dans la partie ferrugineuse (Valenza *et al.*, 1972).

Du point de vue socio-économique, il s'agit d'une région essentiellement agricole et pastorale qui abrite un cheptel composé de bovins, de petits ruminants, d'équins et d'asins. Les bovins de la zone sont dans une large majorité de race zébu Gobra. La population, composée majoritairement de Peuls (ethnie dominante) et partage l'espace avec des Ouolofs, des Maures et Sérères. L'élevage, qui représente le système de production dominant dans la zone, est associé selon les sous-zones à des activités agricoles comme la culture de mil (*Pennisetum typhoides*), d'arachide (*Arachis hypogaea*), de niébé (*Vigna sinensis*), de sorgho (*Sorghum bicolor*) béréf (*Citrulus lanatum*) et le bissap (*Hibiscus sabdariffa*), à des activités forestières comme l'exploitation de bois, de l'apiculture, de la gomme arabique, de fruits de *Balanites aegyptiaca* et de *Zizyphus mauritiana* ou à des produits



demaraîchage. Selon l'importance de ces activités, on peut distinguer cinq sous-systèmes: sylvopastoral, agrosylvopastoral, agropastoral, basse vallée du Ferlo et périurbain (Anonyme, 1998). En outre, la pratique de l'élevage de bovins et de petits ruminants sous forme d'embouche constitue une source de revenus pour les ménages à cause de sa participation à la diversification des sources de revenus non-agricole dans un contexte de dépendance l'activité agricole à une la pluviométrie aléatoire et aux saisons capricieuses.

En outre, la pratique de l'élevage de bovins et de petits ruminants sous forme d'embouche constitue une source des ménages à cause de sa participation à la diversification des sources de revenus non-agricole dans un contexte de dépendance l'activité agricole à une la pluviométrie aléatoire et aux saisons capricieuses. S'est donc posé de réelles difficultés de liee à la baisse du revenu réel des paysans dont la cause principal découle principalement de la faible productivité (alors que les contingences de l'économie mènent à une baisse continue du pouvoir d'achats producteurs.

## II. MATÉRIEL ET MÉTHODES

L'étude des stratégies des agriculteurs de la zone sylvopastorale a nécessité donc un diagnostic de l'environnement social, économique et institutionnel qui nous a permis d'approfondir les formes d'agrégation des systèmes agricoles pour maintenir l'unité d'exploitation. Ainsi, l'étude des stratégies d'adaptation, dans le cas des agriculteurs de la zone sylvopastorale, s'appuie sur des variables liées aux spécificités des différents ménages. Il s'agit de variables qui tiennent compte de la dimension des unités de production (nombre de foyer), à l'ancrage des ménages dans les valeurs de la société, à la diversification des sources de revenu, à la mobilité, à la diversification des types de cultures..., car c'est « la perception d'un risque qui pouvait expliquer le comportement de la majorité des paysans », (Brossier.J, 1989) . Il s'y ajoute que « la couverture des besoins alimentaires familiaux est l'objectif de base de tout agriculteur de la zone sahélienne (...) : il s'agit de produire suffisamment de céréales pour au moins couvrir les besoins de la famille et « l'attitude adoptée vis-à-vis du risque, les décisions qui sont prises, résultent de cette perception et en retour l'éclairent. On notera d'ailleurs que les pratiques des acteurs, qui concernent des domaines et des niveaux variés d'intervention, peuvent être envisagées soit comme réponses au risque, soit comme facteurs l'aggravant, soit encore comme sources éventuelles de nouveaux risques ». Selon Eldin et al, (1989) « *Le paysan en cherchant donc à couvrir les besoins de sa famille s'intéresse à la quantité de céréales par personne. Cette quantité dépend de la production de céréales (Pr) et de la population totale (PT). La production de céréales est fonction des superficies cultivées (S) et des rendements (R). Ainsi, les critères d'analyse des stratégies d'adaptation et de prise de décision par les agriculteurs ne s'établissent pas de façon intrinsèque mais principalement par référence aux objectifs de production qu'ils se sont eux-mêmes fixés et qui de surcroît varient généralement dans le temps et dans l'espace, en fonction du contexte social, environnemental...* ». C'est pourquoi il est abordé successivement, et de manière plus ou moins tranchée, les réponses stratégiques et tactiques, les pratiques préventives et curatives, les comportements d'évitement et de contournement tout en prêtant une attention particulière aux effets du changement technique ainsi que l'impact des interventions extérieures. Ce sont ces différentes situations qui serviront les bases illustratives du bien-fondé de l'analyse des stratégies d'adaptation des systèmes de production en milieu agricole et agropastoral sénégalais notamment à travers la mobilité, la modification du calendrier cultural, les innovations et diversification des sources de revenus, etc.

La recherche menée dans cadre cet article s'est basée sur un ciblage des localités où se développent une intense activité agricole (Mbane, Diagle, Ouarkhoh, Saré Lama, Mbeuleukhé, Syer, etc) avec un total de 112 ménages ou exploitants agricoles au niveau de sept 07 communes (Tessékéré, de Mboula, Mbeuleukhe de Yang Yang, de Ouarkhokh, de Syer, et de Mbane). Ces communauté rurales sont devenue des communes avec l'avènement de l'ActIII de de la décentralisation intervenu en 2014 qui consacré la communalisation intégrale au cours de laquelle les anciennes communautés rurales sont toutes devenues des communes. Les communautés rurales de Mbane et de Syer sont mitoyennes au lc de Guiers et possèdent une façade littorale qui donne des opportunités d'accès à l'énorme réservoir d'eau que constitue le lac de Guiers. S'agissant des communautés rurales de Mbeuleukhe, Mboula, Yang-Yang et Ouarkhokh, bien qu'elles se situent au cœur de la zone sylvopastorale, elles sont caractérisées par l'existence d'une population d'agriculteurs qui participent grandement à l'expansion des zones de cultures. En fin, la communauté rurale de Tessékéré, presque exclusivement habitée par des éleveurs se situe dans la zone classée dite « des six forages ».

**Tableau 1:** Tableau des donnees demographique de la zone d'étude

Communes	Population	Sexe		Nombre de ménages	Nombre d'exploitant enquêté
		Nbr Femmes	Nbr Hommes		

<b>Mbane</b>	30975	15332	15643	3958	40
<b>Mboula</b>	8545	4249	4296	1117	12
<b>Tessekre Forage</b>	9780	5007	4773	1326	15
<b>Ouarkhokh</b>	17988	9060	8928	2010	20
<b>Yang-Yang</b>	5312	2649	2663	679	10
<b>Syer</b>	7721	3797	3924	<b>1051</b>	10
<b>Mbeuleukhe</b>	1641	852	789	159	5
<b>Totaux</b>	81962.00	40946	41016	10300	112

Sources: ANSD, Source : Projections démographiques RGHAÉ 2013

La méthode du choix aléatoire a été effectuée sur le terrain en se basant sur un questionnaire administré aux différentes exploitations. La collecte des données a porté sur des caractéristiques socio-économiques et l'appréciation de l'impact, la réaction face à la crise, les formes d'adaptation en période de soudure, la mobilité et les activités des différents membres des ménages, les modalités de gestion du risque en période de crise climatiques, les formes d'anticipation, etc. Pour aboutir aux résultats présentés, nous avons conduits des entretiens avec les chefs de ménage, mais lorsque celui-ci était absent, quelques-uns ont été menés avec les femmes, les fils ou les frères. En fin l'analyse des perceptions et des stratégies d'adaptation a été effectuée grâce à l'utilisation des logiciels XLSTATS et Sphinx Plus<sup>2V</sup>.

### III. RÉSULTATS ET DISCUSSIONS

#### III.1. Les stratégies intra-systèmes

Les stratégies intra-systèmes sont abordées ici sous l'angle des innovations apportées aux méthodes de production; innovations qui se justifient par le rapport entretenu avec le contexte climatique. Ces stratégies sont liées à des formes d'adaptation des moyens de production, avec l'introduction de variétés plus exotiques, à des modifications du calendrier agricole ou à des mutations vers d'autres types de cultures... En effet, pour Raynaud et al. (1997): « pour rendre compte de la diversité qui caractérise aujourd'hui les relations société/nature au Sahel, on ne peut donc se contenter d'inventorier les déterminants objectifs de cette différenciation. Il faut aussi s'efforcer de comprendre comment les sociétés sahéliennes ont pu être les sujets de leur propre évolution : comment leurs principes internes d'organisation et leurs dynamiques propres de changement ont pu infléchir les rapports qu'elles entretiennent avec la nature, interpréter en fonction de leurs propres orientations les contraintes pesant sur leur méthode de gestion des ressources productives : rapport à la terre, contrôle de la force de travail, maîtrise des outils techniques ». Ainsi, l'étude des stratégies d'adaptation des agriculteurs de la zone sylvopastorale s'appuiera sur les changements apportés aux techniques productions, mais aussi et surtout, aux pratiques sociales.

#### III.1.1. Les innovations techniques et le développement de l'agriculture irriguée

Au cours de nos enquêtes, la plupart des personnes interrogées ont mentionné la diminution et l'irrégularité croissante des précipitations durant les cinq dernières décennies, un dérèglement de la saison pluvieuse, une augmentation de la fréquence des poches de sécheresse à l'intérieur de l'hivernage, etc. En réponse à ces changements, les paysans ont adopté des stratégies d'adaptation dont les plus courantes sont liées à diversification des types de culture, à la pratique de techniques de gestion des terres ou de modification du calendrier cultural, etc. Ces différentes stratégies sont liées à la diversité des perceptions des changements, d'exposition aux aléas et de contraintes matérielles, financières et techniques, mais aussi et surtout d'accès à l'information.

#### III.2.1. La diversification agricole

L'étude des stratégies d'adaptation révèle une tendance assez forte vers la diversification des types de cultures de la part les agriculteurs. En effet, la majorité des agriculteurs interrogés nous ont d'abord indiqué la prouesse de la la SODEPS qui leurs a permis d'accéder à des équipements agricoles (houe occidentale, houe sine, semoir). Ces équipements en matériel agricole ont permis aux populations d'emblaver d'importantes superficies consacrées à la culture du mil et de l'arachide. Cependant, avec la rareté de la pluviométrie, les agriculteurs ont su introduire, à partir du milieu des années 1990, la culture de la pastèque. Ainsi, avec la baisse de la pluviométrie et l'accès difficile à des semences adaptées au nouveau contexte climatique, les agriculteurs cultivent de moins en moins certaines spéculations en privilégiant des variétés moins exigeantes en eau telles que les pastèques. La stratégie consiste donc à substituer aux cultures à forte exigence d'eau, des variétés à cycle court et certaines variétés comme le « béréf »

(Photo 1) sont largement concurrencé par la pastèque. Cette lourde tendance de substitution du « béref » par la pastèque est d'autant plus importante qu'elle offre une valeur monétaire conséquente accessible quelque fois à bors champ (Photo 2) et cela quelque leur vulnérable aux insectes ou la demande en temps nécessaire à son traitement. Toutefois, l'arachide n'a pas disparu totalement à cause notamment de son intégration à la consommation quotidienne. Elle est ainsi auto-consommée, en partie ou mis sur le marché pour ensuite servir à l'achat de céréales destinées à la consommation domestique. Certains de nos interlocuteurs nous ont même confié qu'ils vendaient leur production sans frais de transport ni déplacement. Ce sont plutôt des bana bana qui viennent des villes acheté la production sur place et s'occuper de l'avaccuation de la marchandise en ville.



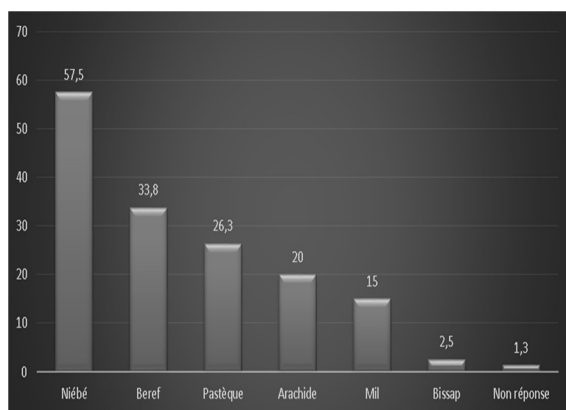
**Photo 1 :** Association dans un champ du mil et d'un béref



**Photo 2 :** Champs de pastèque à Mbeuleukhé

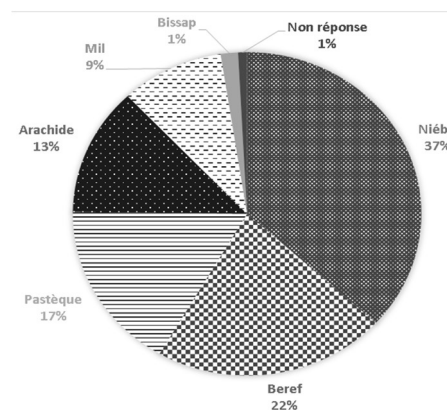
**Source :** Sidy Dieye

La culture du mil quant à elle (*Pennisetum typhoides*) occupe de faibles proportions (15%), bien qu'elle se prête de manière préférentielle aux sols sableux du Jeeri (Figure 1). Cela illustre les objectifs des agriculteurs en termes de production vivrière et de recherche de numéraires qui relèvent de stratégies d'intensification et de limitation des risques à travers, notamment, la baisse des superficies consacrées à des céréales comme le mil (Figure 2). Ce raisonnement sur les moyennes s'appuie sur les remarques consacrées aux rendements moyens, avec de fortes variations inter-annuelles des rendements et relativement localisés. En effet, la distribution des précipitations étant hétérogène au sein même de la zone sylvopastorale, elle a pu avantager ou désavantager certains agriculteurs au profit d'autres agriculteurs.



**Figure 2:** Fréquence générale des types de cultures

**Source :** Sidy Dieye



**Figure 3:**Appréciation des cultures les plus adaptées

A l'évidence, cette situation justifie les opportunités offertes à certains de s'extraire de situations particulièrement défavorables et à consacrer une partie de leur production à la consommation à l'occasion d'années moins favorables. Cependant, les ménages les plus performants et les moins productifs constituent l'essentiel des exploitants, et la différenciation des résultats renseigne de l'hétérogénéité de situations au sein des ménages.

### **III.1.3. Le développement des cultures irriguées et du maraîchage sur les rives du lac et la sédentarisation progressive**

La zone qui est principalement concernée par les cultures irriguées et le maraîchage correspond à la région traditionnelle du Galodjina. Cette région, située sur les rives du lac de Guiers, est située dans la zone sahélienne avec un climat très aride aux précipitations faibles et irréguliers. Le problème du déficit pluviométrique est « un facteur géographique spécifique » et la sécheresse qui s'y est installée depuis des décennies est révélatrice d'une précarité très accrue des conditions de vie. Ce contexte particulier explique le rôle fondamental des eaux de surface (Fleuve Sénégal et lac de Guiers) dans la vie sociale et économique. C'est pourquoi le complexe lac de Guiers-Taouey-Bounoum constituait une pièce maîtresse des activités productives de la région avant que ne soit construit le barrage de Keur Momar Sarr en 1956. Les agriculteurs sédentaires ont ainsi contribué à façonner les paysages et ont plus ou moins vécu en complémentarité avec les activités pastorales. Ainsi cette région a été exploitée par de multiples acteurs (agriculteurs, éleveurs, pêcheurs...) à cause des facilités d'aménagement. C'est pourquoi elle a suscité un intérêt stratégique pendant la période coloniale et cet intérêt s'est accentué au lendemain des indépendances, car le projet colonial sera poursuivi avec d'importants moyens techniques et financiers dont l'objectif était d'atteindre les ambitions d'autosuffisance alimentaire.

En effet, à la fin des années 1960, le déficit hydrique a occasionné une baisse des productions agricoles qui s'est traduite par une insécurité alimentaire généralisée sur l'ensemble du monde rural. En conséquence, le système de production qui reposait essentiellement sur l'agriculture de type traditionnelle, caractérisée par un outillage rudimentaire et en équilibre avec les besoins locaux, ne pouvait plus couvrir les besoins alimentaires des populations à partir des années de sécheresse. C'est dans ce contexte que s'est posée l'équation de la transformation des productions par une augmentation de la production agricole à travers notamment l'exploitation et la mise en valeur de la vallée du fleuve Sénégal et de ses marges. Cette vocation sera à l'origine de profonds bouleversements des pratiques agro-pastorales qui étaient en cours sur les rives du lac de Guiers.



**Photo 3** : Périmètre de manioc à Foss Ndiakhaye



**Photo 4** : Sacs d'arachides issus de l'agriculture irriguée à Saneite

**Source** : Sidy Dieye

A partir de cette période, les systèmes de production vont connaître des mutations profondes qui vont concerner autant les agriculteurs que les éleveurs établis sur les rives de ce complexe fluvio-lacustre. En effet, dans un souci d'accroissement de la production agricole, l'Etat du Sénégal, par l'entremise de la SAED va orienter, dès le début des années soixantes, les pratiques agricoles du Delta vers les cultures irriguées et maraîchères qui viennent s'ajouter aux cultures de décrues déjà largement développées. Ces mutations ont d'abord commencé avec la culture du riz, mais elle s'est diversifiée avec l'introduction de la culture de l'oignon, des aubergines, du manioc, de l'arachide, de la patate douce (Photo 3 & 4) ... alors que la Compagnie Sucrière

Sénégalaise à Richard-Toll s'oriente sous le format d'une entreprise d'agro-business à capitaux privés au moyen d'investissement souvent très lourd. Cette dynamique de développement des cultures maraîchères et de l'irrigation accentue la valeur marchande des terres et va susciter de réelles vocations d'accès au foncier sur l'ensemble de la région. Au plan démographique, en dehors du phénomène d'accroissement des superficies consacrées aux cultures irriguées et au maraîchage, le flux migratoire s'opère en faveur des villages situés sur les rives du Lac Guiers. Ainsi, les mutations spatiales qui s'y opèrent dans le milieu s'organisent par le passage d'une stratégie de dédoublement spatial à la sédentarisation définitive, même si dans le Jeeri, on remarque plutôt l'expérimentation du micro-jardinage de la part surtout des femmes appuyées par des projets et ONG à travers les G.I.E et GPF des localités concernées. Pour le reste, il s'agit d'initiatives personnelles largement en deçà des grandes emblavures aux abords du Lac. Selon Daouda Samba Diop, agriculteur à Ouarkhokhe, depuis son retour au village après plusieurs séjours dans la vallée, il pratique le maraîchage sur de faibles superficies. Avec son expérience acquise à Richard-toll où il travaillait comme ouvrier, il est retourné au village à la suite de la mort de son père où il fait usage de son expérience pour s'adonner à l'irrigation.

Cette tendance expansive des cultures irriguées fait dire à Guilмото (1996) qu'« *au cours des vingt dernières années, la sécheresse installée sur l'ensemble de l'Afrique sahélienne est venue sonner le glas de l'agriculture pluviale et des systèmes pastoraux traditionnels* » (Encadré 12). C'est ainsi que l'agriculture irriguée a définitivement pris pied sur l'ensemble de la région, et, l'envergure du pompage à grande échelle s'est largement diffusée dans la région sous l'appui et l'encadrement de projets et d'institutions nationales à l'image de la SAED, d'où le déploiement des sociétés de production des produits phytosanitaires comme la SPIA (Photo 5).



**Photo 5 :** Magasin de produits phytosanitaires à Mbane



**Photo 6 :** Matériel agricole destinée aux gros travaux des aménagements hydro-agricoles

**Source :** Sidy Dieye

Cette « évolution agricole », peu commune dans une région où les maux semblaient irréversibles depuis le tassement brutal de la pluviométrie, a fait couler beaucoup d'encre et, quoique son bilan soit encore mitigé, elle a incontestablement revitalisé les terroirs concernés par les aménagements hydro-agricoles.

Le développement de la culture irriguée a ainsi révélé l'énorme potentiel qui existe dans cette région, et c'est l'exploitation de ce potentiel qui constitue le tournant majeur de l'histoire agraire de la région. En effet, les cultures d'irrigation, de maraîchage et fruitières se sont progressivement substituées au système de culture, jadis dominé par les cultures vivrières à dominante arachide/mil. Ainsi, devant l'ampleur des transformations environnementales depuis plusieurs décennies, l'éleveur autant que l'agriculteur procède à la refonte totale ou partielle et de manière quasi-permanente de leurs systèmes de production avec un recours de plus en plus fréquent à des équipements agricoles très lourds (Photo 6). Car la région doit désormais faire face à de nouvelles mutations socio-économiques et environnementales, et les nouveaux rapports à la terre, introduits par les nouvelles pratiques agricoles sont aujourd'hui vecteur de tensions qui n'incitent guère à une stabilité de la région.

#### **III.1.4. La modification du calendrier cultural et innovation dans le recrutement de saisonniers**

Parmi les nombreuses innovations apportées aux pratiques culturales par les agriculteurs, on peut aussi noter les modifications du calendrier cultural. En effet, dans un contexte fortement caractérisé par la persistance du stress hydrique et l'irrégularité des précipitations, les agriculteurs ont apporté des changements majeurs dans les stratégies de recrutement des saisonniers. Au cours de nos enquêtes, un certain nombre de stratégies, qu'on peut qualifier d'innovantes, ont été notées parmi lesquelles la renégociation des contrats de navétanat. Ainsi, en lieu et place des anciens types de contrats qui permettaient aux saisonniers de disposer d'un champ en même temps que leurs employeurs et de s'exposer aux caprices des hivernages, les saisonniers font fréquemment aujourd'hui recours à des contrats de type censitaires. Ce type de contrats constitue un gage contre le risque et les caprices d'un mauvais hivernage. Ainsi, pour avoir plus de sécurité et se prémunir du risque de se retrouver à la fin de la saison sans ressources, les « navétanes » signent des contrats de type censitaires en présence d'une autorité, généralement le chef de village, qui se portera comme garant, quelque soit l'issue de la saison (Témoignage de Amadou Peinda Top, Habitant de Ouarkhokh).

S'agissant de la modification du calendrier cultural, elle fait parti des innovations majeures apportées au système de production des agriculteurs. En effet, qu'il s'agit de modifications apportées à la date des semis dans la zone Jeeri ou de l'adaptation des cultures irriguées à la météorologie, un ensemble de pratiques est aujourd'hui mis en œuvre afin de s'accommoder aux réalités du climat. A l'intérieur du Jerri, domaine par excellence de la pratique des cultures sous pluie, les populations interrogées affirment avoir adapté le calendrier à la nouvelle situation climatique en abandonnant les semis précoces du mil jadis très connu dans le système de culture paysan sénégalais au profit des semis après réception de quantités de pluies suffisantes. C'est d'ailleurs cette situation qui à l'origine du choix de variétés culturales à cycle court, mais aussi de la modification du calendrier de semis et de récolte des produits maraîchers (Témoignage de hamadou Wade (57ans) à Mbane, recueilli en novembre 2011).

#### **III.2. Les stratégies extra-agricoles**

Pour aborder les mutations induites par les stratégies extra-agricoles, il nous revient de les aborder à l'aune des bouleversements intervenus dans les systèmes de production. Il convient à cet effet d'étudier, en dehors de l'objectif d'autoconsommation, les conséquences de la dégradation de l'environnement sur le revenu des ménages. En effet, les mutations des exploitations agricoles sont liées, en partie, au besoin de répondre à la demande en produits vivriers qu'entretien une situation de déficit presque structurel en produits agricoles. Cela constitue un véritable défi pour le monde paysan, en particulier dans la zone sylvopastorale où elle entraîne une augmentation des besoins des agriculteurs en liquidité et participe à leur intégration au circuit international de distribution des biens de consommation. Ces stratégies apparaissent comme des réponses plus ou moins élaborées, qui cherchent à substituer au déficit de productions agricoles, des produits importées et un alignement du paysannat au model de consommation urbain. Dans ce contexte de déficit et d'ancrage au marché mondial de consommation, les familles envoient une partie de leur force vive à la migration temporaire ou définitive. Celle-ci aboutit, entre autre, à la dislocation des grandes concessions au profit de petites unités familiales. Cette situation dénote des nombreux indices qui indiquent que la naissance d'une exploitation intervient souvent après que son chef ait acquis une autonomie et une réelle capacité de travail au sein de l'unité mère. Cela passe généralement par la capitalisation des revenus sur un cheptel d'embouche ou de trait avant l'émancipation. L'élevage constitue à cet égard une forme de capitalisation qui permet, entre autre, d'assurer une plus grande autonomie financière. C'est pourquoi l'essentiel des ménages dispose de petits ruminants, alors que les inégalités d'accès aux facteurs de production, qui constituent un facteur discriminant, sont à l'origine de certains comportements d'agriculteurs et manque de performance de certains ménages. Ils sont ainsi obligés de s'adonner à des transactions foncières. Certains agriculteurs ne disposant pas de moyen pour mettre en valeur leurs terres mettent en location leur terre à d'autres paysans mieux lotis. Cette situation entretient une forme de spéculation des terres au niveau de la zone.

Ainsi, la capacité de satisfaction des besoins du ménage mais aussi de disposer de revenus tirés des productions agricoles dépend d'abord de l'accès au capital foncier et des moyens de les exploiter. C'est pourquoi les situations les plus alarmantes sont révélatrices d'une extrême vulnérabilité. Celle-ci véhicule des difficultés de fonctionnement de certains ménages dépourvus de noyau conjugal, surtout lorsque le chef de ménage est une femme dépourvue du minimum d'équipement ou de main-d'œuvre disposée à l'épauler dans l'exécution des travaux.

Nous avons été frappé lors de notre passage à Bokki neddo (Syer) et à Ngaraf par deux situations typiques de ce genre. Par exemple où la dame S. Sarr qui venait de perdre son mari au moment de notre passage s'est retrouvée chef de ménage. Par manque de ressource, elle est obligée d'envoyer son fils aîné à Mala, localité située au bord du lac, pour travailler comme qu'ouvrier agricole. Le deuxième cas qui se trouve à Ngaraf, c'est également l'exemple d'une concession où le chef de ménage venait de décéder laissant

derrière lui deux épouses et un Vieillard de 90 ans.

### **III.2.1. La mobilité comme stratégie d'adaptation.**

La mobilité en milieu rural est une thématique qui a été largement évoquée par plusieurs auteurs (Diop, 1960 : Diop, 1965, Guilмото<sup>1996</sup>, etc). Cependant, depuis le début des années de sécheresses, qui ont grandement affectées paysanat africain, le phénomène de mobilité est apparu comme l'un des déterminants majeurs des stratégies en milieu rural africain. Ainsi, point n'est besoin de nous appesantir davantage sur ses causes dans le cas notre étude. Mais nous constatons que l'essentiel des études consacrées à ce phénomène a conclu à une absence de satisfaction des besoins des ménages pour en trouver les causes.

En conséquence, il est presque unanimement fait état d'une situation de dégradation des conditions d'existence ou d'absence de perspective pour les populations affectées. C'est dans ces conditions que les populations font recours à la migration définitive ou partielle et/ou à la l'exode rural pour répondre aux besoins des ménages (Photo 7 & 8). Ainsi pour Roquet (2008) « *parmi les stratégies mises en œuvre par les paysans sénégalais pour assurer la gestion du risque vivrier et, au-delà, assurer la durabilité de leurs sociétés dans un contexte de désengagement de l'État, figure un certain nombre d'innovations techniques et le recours à la migration* ».

La sortie du cercle des activités productives agricoles emprunte également le biais des migrations, de la pluriactivité par la diversification sources de revenus. Ainsi, « *loin d'être enfermées dans les limites de leur agriculture, la plupart des économies paysannes s'ouvrent aux revenus migratoires, soit pour faire face à des accidents, soit de façon structurelle. Elles inscrivent la mobilité dans leurs stratégies quotidiennes* » (Blanc-Pamard. et Boutrais, 1997). Cependant, elle revêt des formes et des ampleurs variées selon le contexte climatique, démographique, les conditions de la mise en valeur et la spécificité des ménages. Il s'est donc posé de réelles difficultés liées à la baisse du revenu réel des paysans dont la cause principal découle principalement de la faible productivité (alors que les contingences de l'économie mènent à une baisse continue du pouvoir d'achats producteurs. En effet, le Sahel est connu pour une série de sécheresse généralisée ayant des impacts extrêmes sur la sécurité alimentaire dans la région et des crises humanitaires, pouvant entraîner des déplacements et des migrations (USAID, 2013). En effet, avec le changement climatique actuel, les migrations induites directement (provoquées) ou indirectement (accélérés) par le climat ont été analysées au début comme un échec de l'adaptation des populations (migrations forcées ou encore réfugiés climatiques) (la vision maximale) Désormais, elles sont de plus en plus analysées comme une réponse d'adaptation efficace des populations (Diallo, 2018). *Car Toute déstabilisation des moyens de survie d'une population est une atteinte aux forces vives d'un Etat, et donc à ses capacités de résistance. Ainsi, un tiers de la superficie des terres émergées du globe est menacé par la désertification, et plus de 250 millions de personnes sont directement affectées par ce problème avec 24 milliards de tonnes de sols fertiles qui disparaissent chaque année. Cette raréfaction de la production agricole est particulièrement déstabilisante dans des zones déjà économiquement et politiquement fragiles (Sahel).*



**Photo 7 :** les restes d'une mosquée abandonnée à Mouye



**Photo 8 :** les restes d'une maison abandonnée à Mouye

**Source :** Sidy Dieye

### III.2.1.1. L'exode rural

L'exode rural est pratiqué autant par les agriculteurs que par les pasteurs. Ces derniers, parce qu'ils consacrent plus de temps aux activités pastorales, sont davantage retenus au sein de leurs terroirs. En effet, le développement de l'économie de marché crée, chez les paysans, une propension à approvisionner le marché en produits locaux (huile, arachide, béréf, etc) et à y acquérir des produits manufacturés ou de consommation. Les paysans entrent ainsi dans une sorte d'engrenage où ils sont partagés entre une « offre » et une « demande ». Ils sont obligés, malgré la précarité des conditions de production et l'environnement économique défavorable (détérioration des termes de l'échange) aux productions agricoles, de produire davantage pour manger et de vendre pour produire. Selon Suret-Canale, (1962), « *la mise en place de l'appareil économique capitaliste colonial qui s'est traduite par l'ouverture du Sahel et de ses régions au commerce international, s'est accompagnée de l'introduction au Sahel de produits de consommation tels que le sucre, l'arachide, et le riz. Ces produits, à défaut de supplanter les céréales et autres produits locaux (mil, sorgho, maïs etc.), devinrent incontournables dans les habitudes alimentaires des sahéliens. A force de se voir proposer les articles manufacturés, les sahéliens finirent également par y prendre goût, et se créèrent de nouveaux besoins : articles d'équipement domestique (lits, tissus etc.), articles d'équipement agricole (semoirs, sarcleuses, bineuse, etc.)* ».

D'importants changements socio-économiques sont apparus ainsi avec la colonisation : changement d'habitude alimentaire, de mode vestimentaire, de techniques de production etc. Ces changements socio-économiques ont mis l'économie des collectivités sahéliennes dans une situation de dépendance au commerce international. Dans ce contexte, la monétarisation a joué un rôle fondamental et a atteint le monde paysan qui ne peut plus l'occulter. Verdier et Rochegude (1986) résument bien la situation en ces termes: « on attend d'eux qu'ils abandonnent leurs objectifs traditionnels d'autoconsommation et qu'ils acquièrent une mentalité d'entrepreneur ». Ainsi, malgré les efforts déployés pour entrer dans la « modernité », les paysans ne reçoivent ou ne bénéficient quasiment pas de crédits et autres appuis techniques sérieux leur permettant de se lancer efficacement dans une bataille de concurrence avec les produits extérieurs.

A défaut d'investir ou d'innover dans les techniques de production pour adapter les produits sahéliens aux nouvelles conditions climatique et maintenir les productions à un niveau acceptable, la boîte de pandore de la dépendance vis-à-vis de l'extérieur était largement ouverte, exposant du coup le paysannat à une dépendance alimentaire que les plus entreprenants cherchent à résoudre par la mobilité. Cette mobilité est qualifiée d'exode rural et, selon Raison (1992) « *le départ à la ville a rarement été, en Afrique tropicale, arrachement définitif des racines, mais il l'est sans doute moins que jamais, les liens avec la terre étant essentiels à la survie.* » Ainsi, « *les sociétés africaines digèrent et réinterprètent les événements qui les affectent en fonction de leurs dynamiques internes, et les paysans n'adoptent jamais de perspectives modernistes* » (Verdier et Rochegude, 1986). Toutefois, ces deux chercheurs reconnaissent implicitement que même si les paysans ambitionnent d'accroître leurs revenus, la logique de multiplication des valeurs de l'échange ne constitue jamais leur projet essentiel. Les objectifs restent la satisfaction des besoins jugés fondamentaux (la survie, la reproduction de la force du travail).



**Photo 9** : Jeune charretier d'un dimanche au marché de Dahra



**Photo 10** : Charretier quittant le village Mewel wolof avec une charrette chargée d'herbe en direction de Dahra





**Photo 11:** Le village de Mouye est pratiquement vide, il ne reste que l'abri du conducteur du Forage



**Photo 12 :** Sur un véhicule de transport, les commerçants rentrent après une journée remplie d'échange au marché de Diaglè

Source : Sidy Dieye

En définitive, l'intégration à l'économie de marché imposé au paysannat s'est traduite par le basculement vers la dépendance alimentaire, et inévitablement, tout cela débouche sur un désenchantement général et un manque de confiance entre partenaires au développement (paysans, intermédiaires et structures étatiques d'encadrement...) où les paysans, sans rester passifs, ont répondu par la mobilité, particulièrement par l'exode rural pour survivre. Cependant, l'exode rural n'est pas le seul phénomène migratoire connu des agriculteurs de la zone sylvopastorale. Le phénomène d'émigration bien connu par la majorité des populations même s'ils ne sont pas tous tentés ou concernés.

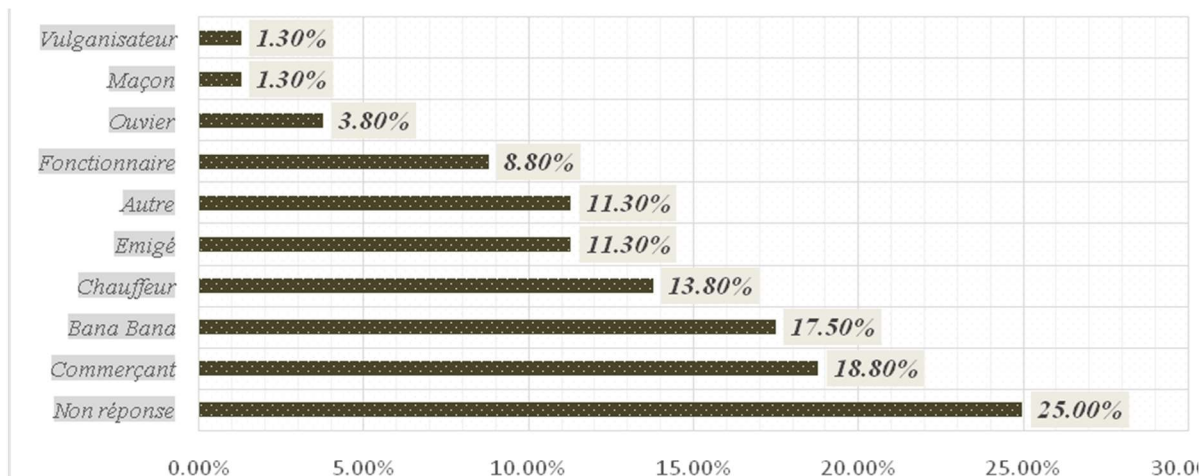
### III.2.1.2. L'émigration

Depuis des décennies, le phénomène de l'émigration a marqué les populations sahéliennes. Depuis des décennies, le phénomène de l'émigration a marqué les populations sahéliennes et les Etats africains n'ont pas réussi à enrayer les phénomènes de l'émigration après les indépendances. Au contraire, le phénomène s'est amplifié avec l'avènement des sécheresses qui ont lourdement affecté le paysannat africain. Cette situation a conduit les populations à la grande mobilité à l'intérieur comme à l'extérieur du continent. Elle s'est davantage accrue dans le contexte d'intégration politico-territorial de la sous-région. Ainsi à l'image des autres populations rurales, la migration touche également les agriculteurs de la zone sylvopastorale avec des flux migratoires généralement orientés vers la Mauritanie. Ces mouvements migratoires sont liés à des raisons de travail, mais surtout à cause du rôle de carrefour de certains grands axes d'émigration vers l'Europe que joue ce pays. Selon le rapport du GRDR (2012) : « à partir de 2004, la médiatisation des cas de noyades de migrants subsahariens tentant de rejoindre les côtes européennes amène les autorités mauritaniennes à prendre conscience d'un nouvel état de fait : la Mauritanie est aussi devenue, un pays de transit, puisque c'est à partir de ses côtes et de la frontière terrestre avec le Maroc nouvellement ouverte que les candidats subsahariens à la migration irrégulière partent vers l'Europe. Les pays du Maghreb ont fermé leurs frontières aux migrants subsahariens, laissant à la Mauritanie la charge d'expulser ces « indésirables » en Europe, prenant ainsi le risque de créer des tensions avec les pays d'origine des migrants. » Cependant, les mouvements migratoires entre les deux pays sont anciennes et remontent à plusieurs siècles.

En définitive, nous retenons simplement que la migration intervient surtout lorsque les productions ne permettent pas de couvrir les besoins des ménages et que les ressorts sociaux sont épuisés. Selon Tapinos, « le modèle de décision économique retient une hypothèse de comportement simple: les individus, toutes choses égales par ailleurs, n'envisagent une émigration, temporaire ou permanente, que dans la perspective d'améliorer leur bien-être et celui de leur groupe d'appartenance la famille ou toute autre unité élargie, dans un horizon de temps déterminé, une période de quelques années, leur durée de vie, peut-être même celle de leur descendants. »

Nos enquêtes réalisées sur les migrations dans la zone d'étude révèlent que la Mauritanie constitue la principale destination internationale des populations des migrants de cette zone et cette permanence des flux transfrontaliers entre la zone sylvopastorale

et la Mauritanie s'explique un ancrage ou un renouvellement des anciens réseaux de commerce qui se sont hérités de part et d'autre du fleuve Sénégal. Ces échanges bénéficiant, entre autre, du développement inégal des politiques agricoles, monétaires et douanières, car la dégradation des conditions de vie engendre la vitalité des flux commerciaux non contrôlés qui approvisionnent à moindre coût les marchés. Ainsi, les espaces frontaliers et périphériques prennent une position importante dans le dispositif anticrise des populations (Weiss, 1995; 1997). Il s'y ajoute que le nombre d'emplois non-salariés participe à la démultiplication du nombre de prétendants à l'exercice du petit commerce et au développement du secteur l'informel en particulier. C'est ainsi que les régions frontalières sont devenues des pôles de transit et de consommation des produits d'importation peu coûteux (Labazée, 1993). Toutefois, il existe d'autres destinations comme la Gambie, le Gabon et d'autres pays d'Afrique centrale (Figure 4).



**Figure 4:** Activité des autres membres de la famille

Les mouvements migratoires sont ainsi entretenus par le contexte d'échange transfrontalier qui existe entre les deux pays, mais le taux de migration est assez hétérogène d'une localité à l'autre. Cela pousse Fielding (1993) à affirmer que: « *la migration est peut-être un autre « concept chaotique », qu'il faut « décrypter » de façon que chaque élément puisse en être envisagé dans son propre contexte historique et social et que la signification puisse en être comprise séparément dans chaque contexte* ». En effet, si le taux de migration est faible dans la zone pro-lacustre, il est en revanche assez important dans les villages du Jeeri et surtout dirigée vers l'Europe. Ainsi pour Castles (2000), « *dans les régions extrêmement pauvres, il arrive que l'émigration soit rare parce que les habitants ne possèdent ni les ressources financières nécessaires pour le voyage, ni les ressources culturelles qui leur permettraient de savoir qu'il existe des possibilités ailleurs, ni sociales, c'est-à-dire les réseaux d'entraide indispensables pour réussir à trouver du travail et s'adapter à un environnement nouveau.* » Toutefois, lorsqu'il se produit une catastrophe (comme une guerre ou une dégradation de l'environnement) qui réduit à néant les moyens de subsistance, les plus pauvres eux-mêmes sont parfois obligés de s'expatrier, en général dans de très mauvaises conditions. Les recherches montrent que c'est dans les groupes à revenus moyen que la probabilité de départ est la plus grande et l'intégration des autres membres de la famille pour la satisfaction des besoins des ménages indique un taux d'émigration de 11,3% dans notre échantillon (Figure 4). Ce taux est donc plus important chez les agriculteurs et dans une proportion dix fois plus importante que celui des éleveurs.

### III.3. La diversification des sources de revenu

La diversification des sources de revenu est une suite logique de la recherche de numéraires. Elle repose généralement sur les mouvements migratoires des ruraux et est intimement liée au contexte de déficit de production. Cette quête de ressources, à la base de la diversification des activités, revêt plusieurs facettes liées à la situation économique du ménage. D'ailleurs pour **Lesourd (1997)**, « *les principales motivations de la pluriactivité chez des acteurs ruraux sont de plusieurs ordres.* » Ainsi, la pluri-activité vise la recherche du plein emploi car, face au faible coût d'opportunité du travail agricole, conduire plusieurs activités de production pouvant générer des ressources surtout financières permet de compenser les situations de déficit de trésorerie lié au caractère aléatoire rendement de la production agricole. C'est ainsi que les classes particulièrement mobiles vont à la recherche d'une promotion ou d'une ascension sociale à travers l'exercice de plusieurs métiers. Dans ce contexte, l'agriculture est de plus en plus

considérée comme une activité peu rentable et très accaparante, car elle ne permet plus de couvrir les besoins vitaux, d'où l'émergence, à côté de l'agriculture, d'activités comme le commerce ou le manouvrier, etc. Moussa Niang (45 ans) dit avoir fait la maçonnerie, la ferronnerie, et exercé le métier d'ouvrier à l'usine AMO à Dakar. Maintenant je suis revenu à Mbeuleukhé dans mon village natal où j'effectue le métier de collecteur au niveau de l'ASUFOR. Je m'occupe, pendant la saison sèche, de la collecte des recettes, car les troupeaux des transhumants passent très souvent ici pour se désaltérer à l'occasion de la période de transhumance.

Cependant cette pluri-activité s'accompagne de dynamiques socio-économiques à l'intérieur même de la société. Et, selon Diouf (2008), « le processus qui s'est déclenché au XX<sup>ème</sup> siècle avec la monétarisation de l'économie s'est amplifié et que l'organisation des rapports sociaux en classes d'âge a été remarquablement bouleversée ». En effet, « avec la grande valeur acquise par la monnaie à la suite de l'introduction du capitalisme colonial, les personnes âgées ont eu souvent tendance à détourner, à leur profit personnel, les biens lignagers qu'ils étaient chargés de gérer » (Raynaud, 1997). Par ailleurs, « le poids de l'impôt a amené aussi les aînés à laisser leurs jeunes frères ou fils mariés se prendre en charge dans le courant du XX<sup>ème</sup> siècle. Ce que les jeunes, soit de plus d'autonomie, ont ainsi progressivement saisi pour se soustraire de l'autorité de leurs aînés perçus parfois comme autoritaires ou corrompus » (Raynaud, 1997). Cela provoque en définitive une désintégration de la famille et c'est « l'individu même qui s'est progressivement soustrait des règles imposées par les structures sociales traditionnelles afin de contrôler lui-même sa vie sociale, et économique. C'est ainsi qu'il a pris lui-même ses décisions pratiques agricoles, pastorales, etc » (Raynaud, 1997). Se pose ainsi la question de la survie qui devient cruciale et prime sur toute autre considération de nature économique ou sociale. Dès lors, le paysan ne s'interroge plus sur la productivité de son travail, pourvu qu'il satisfasse par tous les moyens les besoins alimentaires de sa famille. C'est par là que les agriculteurs ont pu trouver, grâce à la pluri-activité, une alternative, et de considérer l'élevage comme un secteur pouvant assurer le rôle de refuge. Les opportunités pour les agriculteurs d'accroître les revenus tirés de l'élevage sont réelles dans ce contexte de précarité des ressources tirées de l'agriculture et de dégradation de l'environnement.



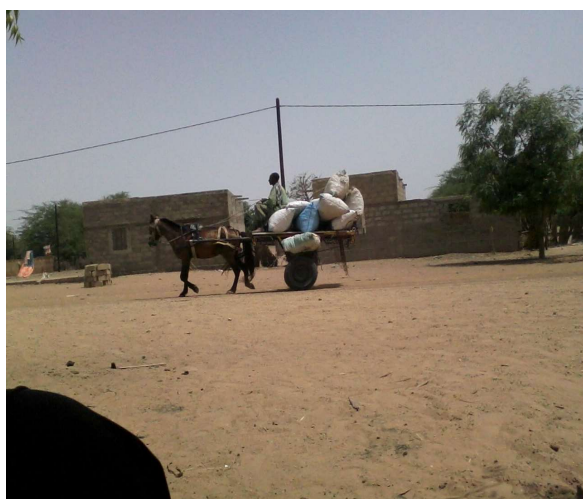
**Photo 13 :** Sous l'ombre d'un *Prosopis juliflora*: Embouche d'une race améliorée à Saneith Tack



**Photo 14 :** Un troupeau de race bovine améliorée au bord de la Taouwey entre Mbane et Lewa.

Les stratégies de quête de numéraires s'expriment aussi par l'entretien d'un cheptel grâce à l'embouche ovine et surtout bovine qui offre l'occasion de produire du lait et de saisir les opportunités offertes par la demande urbaine en produit laitier et carnés. Dans ce sens l'élevage a connu une mutation avec des expériences plus ou moins réussies de croisement de type génétique. Il existe à cet effet des expériences de croisement qui sont à l'état d'expérimentation de races étrangères (Jersiaise, Montbéliarde, etc.). Il se développe ainsi dans les localités pro-lacustres (Mbane, Saneith, Ndiakhaye, Foss, etc.) des expériences de stabulation bovine avec la mise place d'étables mixtes permettant la production de viande et de lait. Ces niches d'intensification et d'exploitation de la disponibilité de l'eau et où des surplus de devises tirées de l'agriculture irriguée qui autorisent des aventures dans ce domaine (Photos 13 et 14). Un de nos interlocuteurs à Mbane affirme avoir tenté l'exemple car, avec les recettes tirées de l'irrigation, il s'est lancé dans l'élevage en commençant les bovins, puis les moutons et les chèvres. Cependant il ne nous notifie que la stabulation présente des risques car la technique n'est pas totalement maîtrisée par les agents techniques d'élevage. D'ailleurs nous confie-t-il, il a fait l'expérience et a dans son enclos environs quatre vaches qui peuvent plus mettre bas.

En outre, l'investissement pour l'acquisition de chevaux et de matériel de transport (charrette) constitue également une stratégie des producteurs pour les travaux agricoles mais aussi pour la pratique d'activité génératrices revenus non agricoles à travers le transport hippomobile saisonnier dans des villes comme Dahara, Touba, Dagana, Richard-Toll, etc (Photo 15 et 16). En effet, « *le bétail, chez les paysans wolofs, toucouleurs ou soninkés, remplit un triple rôle. Son accumulation constitue une stratégie de sécurisation dans un milieu à hauts risques. C'est d'abord un palliatif des aléas des cultures. Les ventes d'animaux destinées à acheter du mil permettent de compenser les mauvaises récoltes et d'assurer la soudure entre cultures de décrue et cultures pluviales. Il participe également à l'alimentation, par le lait plus que par la viande et permet en même temps de faire face aux dépenses exceptionnelles (naissance, décès, mariage, dot...), d'honorer des visiteurs et, par conséquent, de maintenir le rang du propriétaire dans la société. La fonction économique du cheptel est surtout indirecte et ne vaut que par rapport à l'agriculture car, les ventes modulées de bétail servent à obtenir le mil qui manque, alors que la commercialisation du surplus céréalier lors de bonnes récoltes permet d'accroître ou de reconstituer le cheptel* » (Santoir, 1996).



**Photo 15 :** Un charretier transportant des récoltes quittant Foss Ndiakhaye pour Richard-Toll



**Photo 16 :** Daral des équins à Darha Jolof

Dans le Jerri, la cueillette de la gomme arabique est de plus en plus pratiquée, et les agriculteurs, surtout Wolofs sont entrés en scène dans son exploitation à l'occasion des saisons de récolte des plantations de la société ASYLA-GUM.

Enfin, la redistribution du risque peut également avoir lieu au sein du ménage entre les individus. C'est ainsi que diversification des sources de revenus en provenance des membres de la famille et travaillant pour apporter leur contribution au revenu global du ménage est encore vivace. Car, « *l'implication de l'épouse dans la collecte de revenus pour le ménage est d'autant plus sollicitée que son investissement est orienté vers des activités différentes de son conjoint par une réallocation interindividuelle du risque au sein du ménage. L'impact des chocs économiques mais également démographiques est alors réduit* » (Buisson, 2012). Cette implication de plus en plus importante des autres membres de la famille, notamment les femmes, est aujourd'hui à la base de la forte dynamique organisationnelle notée au sein de la société.

#### IV. CONCLUSION

La démarche adoptée dans le cadre de cette étude se fonde sur une approche méthodologique prenant en compte deux échelles d'observation : le ménage (entité élémentaire du système de production) et son environnement (milieu de production). Ces deux éléments ont constitué le binôme du modèle d'observation de nos hypothèses d'analyse. Il s'est agi d'explorer la relation homme-milieu en décortiquant l'armature du système de production pris dans l'authenticité de leur environnement. En procédant de la sorte, on s'inscrit ainsi dans la démarche de Chauveau (1994) qui note que « *le concept de « stratégies » appliqué aux comportements des agriculteurs africains est né de l'hypothèse centrale que ces comportements relèvent de choix cohérents et délibérés dont l'intelligibilité requiert la prise en compte des conditions réelles dans lesquelles s'effectuent les activités agricoles..., où le recours à l'histoire institutionnelle permet de situer l'émergence et l'usage du concept de stratégie des agriculteurs dans le contexte*

*politique, social et économique du développement rural ; concept qui s'est inscrit dans la longue tradition agrarienne de histoire institutionnelle caractérisée par des interventions en milieu rural depuis la colonisation. Les productions restent largement dominées par certaines variétés constituent la base d'une production oscillant au gré de la pluviométrie. »* A cet effet, l'arachide demeure, de loin, la principale culture qui fournit des revenus monétaires, lors-même que les productions maraîchères participent, de manière substantielle, à accroître les devises en zone pro-lacustr grâce au développement continu de l'irrigation consécutivement à l'extension des emblavures dans les localités attenantes au lac de Guiers.

Nous avons examiné, dans cet article, des concepts phares de l'analyse des structures familiales la mise en œuvre des stratégies d'adaptation. Des généralités des structures familiales à l'analyse concrète des spécificités des ménages différentes, les résultats obtenus ont permis de mettre en exergue la valeur des différentes formes d'adaptation des agriculteurs. Celles-ci vont de la diversification des formes de revenus aux décisions les plus tranchées. Par ailleurs, elle a révélé l'existence d'un système hétérogène de formulation qui s'est forgé à la suite d'une longue histoire de lutte contre un environnement particulièrement hostile. Le rôle de l'État dans la définition des stratégies d'adaptation de l'agriculture, ainsi que les diverses réponses de différents groupes n'offre pas de garantie pour échapper aux impacts de la dégradation des conditions de vie. Toutefois, une attention particulière est accordée à la diversification des sources de revenus et à contribuer à amplifier la mobilité des acteurs. Nombre d'entre-eux se sont investis, en particulier pour les cultures maraîchères, alors que les femmes se massivement dans les stratégies de gestion des richesses des ménages. Cette situation a engendré la part importante et croissante des revenus monétaires et leur participation accrue dans le marché du travail. En outre, les activités de productions se sont développées au rythme et à la cadence d'occupation et d'installation des hommes, de leurs modes de productions et de leur manière de mettre en valeur des terroirs. Dans le cas particulier des agriculteurs de la zone sylvopastorale, on peut retenir l'analyse des caractéristiques des exploitations montre que les populations se sont appropriées d'un espace quasiment inhabitable avant l'installation du forage.

Les résultats mettent en exergue les conséquences négatives des conditions plus sèches sur la productivité des pâturages et présentent la disparition des plantes vivaces comme cause probable de l'empiètement des arbustes, la dégradation des sols, la perte de la biodiversité et de la baisse de la résilience. Cela pousse à la réduction très sensible de l'utilisation de stratégies multiples qui amplifient la mobilité, en particulier, l'exode rural et l'émigration qui, bien que participant à accroître les transferts des revenus entraîne par ailleurs la modification des modes de consommation. En effet, le Sahel est connu pour une série de sécheresses généralisées ayant des impacts extrêmes sur la sécurité alimentaire dans la région et des crises humanitaires, pouvant entraîner des déplacements et des migrations (USAID, 2014). En effet, avec le changement climatique actuel, les migrations induites directement (provoquées) ou indirectement (accélérées) par le climat ont été analysées au début comme un échec de l'adaptation des populations (migrations forcées ou encore réfugiés climatiques) (la vision maximale). Désormais, elles sont de plus en plus analysées comme une réponse d'adaptation efficace des populations (Diallo, 2018). *Car toute déstabilisation des moyens de survie d'une population est une atteinte aux forces vives d'un Etat, et donc à ses capacités de résistance. Ainsi, un tiers de la superficie des terres émergées du globe est menacé par la désertification, et plus de 250 millions de personnes sont directement affectées par ce problème avec 24 milliards de tonnes de sols fertiles qui disparaissent chaque année. Cette raréfaction de la production agricole est particulièrement déstabilisante dans des zones déjà économiquement et politiquement fragiles (Sahel).* Par ailleurs, les revenus transférés tirés de ces mobilités transitent dans les institutions de microfinance participant au renchérissement d'un coût de vie fortement affecté par la volatilité de consommation et l'instabilité des prix des productions agricoles induites sous l'effet d'une pluviométrie instable.

## REFERENCES

- [1] Akpo, L.E. et M. Grouzis, 1996, Influence du couvert sur la régénération de quelques espèces ligneuses sahéliennes (Nord Sénégal, Afrique occidentale), *Webbia*, 50(2), pp 247-263.
- [2] Akpo, L.E. et M. Grouzis, 1996, Influence du couvert sur la régénération de quelques espèces ligneuses sahéliennes (Nord Sénégal, Afrique occidentale), *Webbia*, 50(2), pp 247-263.
- [3] Fielding, A., 1983 - Fielding, A. J. (1993). Mass migration and economic restructuring. In R. L. King (Ed.), *Mass migration in Europe: The legacy and the future* (pp. 7-18). London, England: Belhaven.
- [4] Ba, A., 2007, Evaluation des revenus des agropasteurs, leurs demandes de formation et d'éducation, et leurs capacités contributives : cas de l'unité pastorale de Bélél Bogal dans le département de Podor au Sénégal, Mémoire de fin d'étude ENEA, Dakar.

- [5] Diop A.B.1960 : Enquête sur la migration toucouleur à Dakar, Bulletin de l'IFAN, XXIII, serie B, 3-4, juillet-octobre, 393-418.
- [6] Diop A.B, 1965 : Société toucouleur et migration (enquête sur la migration toucouleur à Dakar), Initiations et études n- XVIII~Dakar, IFAN.
- [7] Blanc-Pamard.C Boutrais.J, 1997 - Ouverture.In Dynamique des systèmes agraires, pp 7-22.
- [8] Brossier, J. , 1989 : Risque et incertitude dans la gestion de l'exploitation agricole : Quelques principes méthodologiques In : Le risque en agriculture [en ligne]. Marseille : IRD Éditions, 1989. Disponible sur Internet : <<http://books.openedition.org/irdeditions/16086>>. ISBN : 9782709925020. DOI : <https://doi.org/10.4000/books.irdeditions.16086>.
- [9] Buisson.C-B, 2012 - Trois essais sur la vulnérabilité des ménages ruraux dans les pays en développement: risques, stratégies et impacts, 173p.
- [10] Castles S., 2000 : Migration internationales au début du XXI<sup>ème</sup> siècle : tendances et problèmes mondiaux ; In Revue internationale des sciences sociales, n° 165, pp, 313-327.
- [11] Chauveau, J.P, 1994. Participation paysanne et populisme bureaucratique. Essai d'histoire et de sociologie de la culture du développement w, in: *Jacob J.-P. et Lavigne Delville P. (6ds.): 25-60.*
- [12] Diallo, A.2018. Changement climatique et migrations humaines au Sénégal : une approche en termes de vulnérabilité du système socio-écologique. Economies et finances. Université Cheikh Anta Diop de Dakar, 2018. Français. ffNNT : 2018 - GREAE004ff. Fftel-02006424, 378p.
- [13] Diop.T 1989. les ressources ligneuses de la zône sylvo-pastorale du Senegal: Evolution, gestion et perspectives de developpement, communication présentée a l'atelier tenu 3 l'université C.A. Diop de dakar sur forêt, environnement et developpement du 22 ari 26 mai 1989, REF. No 38/AGf ZOSTC: JUILLET 1989.
- [14] Diop.A.T., Diaw O.T., Diémé.I;I.Touré.I; Sy O., Diémé G 2004. Les maresde laZonesylvopastorale duSénégal:tendancesévolutiveset rôledanslesstratégiesdeproduction des populations pastorales. In: *Revu d'Elevage et de médecine vétérinaire des pays tropicaux*, 57(1-2):77-85.
- [15] Diouf, M 2003. Caractéristiques fondamentales de la feuillaison d'une espèce ligneuse sahélienne: *Acaciatorilis*(Forsk) (Ayne) variations selon les microsites topographiques au Ferlo(Nord-Sénégal),104p..
- [16] Diouf. A, 2008. Interactions société, nature et climat au Sahel: La rupture socio-économique et écologique au Centre-Est agro-sylvopastoral sénégalais au XX<sup>e</sup> siècle, 352p.
- [17] Eldin, M., Milleville, P., 1989. Le risque en agriculture. Nouvelle édition [en ligne]. Marseille : IRD Éditions, 1989. Disponible sur Internet : <<http://books.openedition.org/irdeditions/16044>>. ISBN : 9782709925020. DOI : <https://doi.org/10.4000/books.irdeditions.16044>.
- [18] Faye, G., P.L. Frison, S. Wade, J.A. Ndione, A.C. Beye et J.P. Rudant, 2011. Étude de la saisonnalité des mesures des diffusionmètres scat: apport au suivi de la végétation au sahel, cas du Ferlo au Sénégal. *Rev Télédétection*, vol. 10, n° 1, pp. 23-31..
- [19] GRDR, Université de Nouakchott, 2012. Migrations en Mauritanie. Répertoire des textes, des acteurs et des publications, 36 p.
- [20] Guilmoto.C.Z,1997. Migrations et institutions au sénégal : effets d'échelle et déterminants, les dossiers du ceped no 46 paris, juin 1997.
- [21] Labazée.P et Grégoire E, 1993. Grands commerçants d'Afrique de l'Ouest, Paris, Karthala-ORSTOM.
- [22] - Lesourd M., 1997 - Questions de géographiecrises et mutations des agriculteurs et des espacesruraux. Editions du temps, 159 p.

- [23] Michel, 1973. Les bassins des fleuves Sénégal et Gambie: étude géomorphologique, 383 +571p.+1vol.decartes(Mémoires ORSTOM; 63).
- [24] Niang, K., 2009. L'arbre dans les parcours communautaires du Ferlo-Nord (Sénégal), Mémoire de DEA FST/UCAD, 67p
- [25] Raison J-P ,1992. Les formes spatiales de l'incertitude en Afrique contemporaine; *séminaire du GEMDEV du 6 novembre 1992*, Professeur de Géographie Université de Paris X. 17p.
- [26] Raynaut.C, 1997. Sahel, diversité et dynamiques des relations sociétés-nature, 340p.
- [27] Roquet D., 2008. Partir pour mieux durer : la migration comme réponse à la sécheresse au Sénégal ? », *Espace populations sociétés* [En ligne], 2008/1 | 2008, mis en ligne le 01 juin 2010, consulté le 14 octobre 2012. URL: /index2374.html <http://www.eps.revues.org> ; <http://www.revues.org>.
- [28] Santoire.C 1996. Vallée du fleuve Sénégal: la reconstitution du cheptel paysan. In *Agriculture et développement* n°10-Juin 1996, Revu trimestriel ISSN 1249-9951.15p.
- [29] Suret-Canale.J, 1962. Afrique noire, Géographie, Civilisations, Paris, Éditions sociales,395 p..
- [30] Sy, O., 2009: Rôle de la mare dans la gestion des systèmes pastoraux sahéliens du Ferlo (Sénégal) », *Cybergeo: European Journal of Geography, Environnement, Nature, Paysage. Document 440*, [En ligne] URL :<http://www.cybergeo.eu/index22057.html.yh>.
- [31] Tapinos G. P ; 2000. Mondialisation, intégration régionale, migrations internationalesIn. : *Revue internationale des sciences sociales*, vol. 165, 165, 2000/09. - p. 343-352.
- [32] USAID.2014. Adaptation de l'Agriculture au Changement climatique dans le Sahel. Profils des pratiques de gestion agricole. Projet Résilience Africaine et Latino-Américaine au Changement Climatique (ARCC), août 2014, 64p..
- [33] Verdier.R et Rochegude.A ,1986. Systèmes fonciers à la ville et au village. Afrique noire francophone, Paris, L'Harmattan, 296 p.
- [34] Wane, A., V. Ancey et B. Grosdidier, 2006. Les unités pastorales du Sahel sénégalais, outils de gestion de l'élevage et des espaces pastoraux. Projet durable ou projet de développement durable?. Développement durable et territoires, Dossier 8 : Méthodologies et pratiques territoriales de l'évaluation en matière de développement durable [En ligne] URL : <http://developpementdurable.revues.org/3292>
- [35] Weiss.T, 1995. Contribution à une réflexion sur la crise de l'État en Afrique et sa gestion par les populations des espaces périphériques, 10p.
- [36] 1997 Weiss, Th, 1997. Contribution à une réflexion sur la crise de l'État en Afrique et sa gestion par les populations des espaces périphériques », colloque Le Territoire, lien ou frontière, Orstom-Institut de géographie de Paris-IV,2-4 octobre 1995, CD-rom IRD.

# *On Issues Of Digitization Of Documents Used In International Transport In Uzbekistan*

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**Abstract** – This article is devoted to the issues of electronic translation of the TIR Carnet, waybill (invoices) and CMR documents used in international road transport of goods. The foreign experience of translating these documents into electronic form is also widely covered. The article presents a systematic approach to the identified problems and formulated conclusions and suggestions for their solution.

**Keywords** – International Road Transportation of Goods, export, import, surplus, TIR CARNET, CMR, e-TIR CARNET, e-CMR, e-waybill (invoices), Republic of Turkey, Republic of Iran, Republic of Uzbekistan, national carrier, national interest, international image.

## I. INTRODUCTION

One of the main conditions for ensuring the competitiveness of the commodity markets of Uzbekistan in the world market is the improvement of cheap, fast and safe transport logistics.

At the same time, it was noted in the appeals of the head of State to the Supreme Assembly of the Republic of Uzbekistan, which he made in the last three years.

In particular, on December 22, 2017, practical instructions were given on the creation of the "National Logistics Portal" in order to support national carriers, create additional conditions for entrepreneurs. [1]

Also, in the application made in 2018 year, such tasks as the restoration of customs duties that meet modern requirements and operate on the basis of the principle of "single window" were defined.

In the next appeal of the head of State, which was made on 24 January of this year, practical measures were taken to expand cooperation with the CIS countries in trade and economic spheres, as well as to develop the program "digital Uzbekistan-2030". It is also possible to know that Uzbekistan does not have a high place in the international ranking of the following countries, which was established among 190 countries of the World [2].

Table 1. Top-5 countries and the role of Uzbekistan in the rating of the annual report "Doing Business" of the World Bank

	<b>Countries (place / points)</b>	2020y.	2019y.	2018y.	2017y.	2016y.	2015y.
1.	<b>New Zealand</b>	1/8 6,80	1/8 6,59	1/8 6,55	1/8 7,01	1/87, 34	1/88, 27



2.	<b>Singapore</b>	2/8 6,2	2/8 5,24	2/8 4,57	2/8 5,05	2/86, 79	2/86, 91
3.	<b>Denmark</b>	4/8 4,30	3/8 4,64	3/8 4,06	3/8 4,87	3/84, 40	4/84, 20
4.	<b>Hong Kong</b>	3/8 5,30	4/8 4,22	5/8 3,44	4/8 4,21	5/83, 67	3/84, 97
5.	<b>Republic Of Korea</b>	5/8 4,00	5/8 4,14	4/8 3,92	5/8 4,07	4/83, 88	5/83, 40
6.	<b>Uzbekistan</b>	69/ 69,90	76/ 67,40	74/ 66,33	87/ 63,03	87/62 ,60	141/5 4,26

## II. RESEARCH METHODOLOGY

In order to organize and manage the transportation of goods and vehicles in the Republic of Uzbekistan, to study the importance of logistics infrastructure, dynamic range of induction and deduction, economic-statistical analysis and synthesis, statistical grouping, experimental observation, systematic analysis, comparison and other methods were used during the research.

## III. ANALYSIS AND RESULTS

As we all know, one of the main factors affecting the transition of the country to the digital economy can be seen when the foreign trade turnover of Uzbekistan (tsa) is increasing in significant share over the Year [3]. In particular, according to the report of the state statistics agency, the above opinion can be expressed in the following figures (billion. In US dollars):

Table 2. Foreign trade turnover of the Republic of Uzbekistan

	2014 y.	2015 y.	2016 y.	2017 y.	2018 y.	2019 y.	2020 y.
<b>FTT</b>	27,53	24,92	24,23	26,56	33,43	42,2	36,3
<b>Export</b>	13,54	12,50	12,09	12,55	13,99	17,9	15,12
<b>Import</b>	13,98	12,41	12,13	14,01	19,43	24,3	21,17
<b>Trade balance</b>	-0,44	0,091	-0,043	-1,46	-5,45	-6,4	-6,04

At the same time, today, it is possible to know that the number of TIR CARNET and cargo delivery control manuals (YUEBNK in subsequent places), which are formalized for cargo Auto mounts moving through the borders of the Republic customs, increases year by year [4]. In particular, the dynamics of 2014-2019 years is as follows:

Table 3. Number of Official Tire CARNET and YUEBNK in Uzbekistan

	2014 y.	2015 y.	2016 y.	2017 y.	2018 y.	2019 y.	2020 y.
<b>Export</b>	48278	51840	76349	93007	114540	155452	170160
<b>Import</b>	93236	83159	88214	110791	221723	305896	242427
<b>Transit</b>	34240	27334	24913	30631	36465	46219	45262
<b>Total:</b>	175754	162333	189476	234429	372728	507567	457849

The increase in the volume of foreign trade burdens and the introduction of digital information technologies in this direction in the implementation of effective customs control over them remains a prerequisite for the period.

In this regard, it is worth noting that the decree of the president of the Republic of Uzbekistan "on additional measures to improve customs administration and increase the efficiency of the activities of the bodies of the state customs service of the Republic of Uzbekistan" dated November 24, 2018 on the introduction of the Eat in international cargo transportation" PD-5582 - the army of In this document, in total 3430 vehicles were loaded into vases for one day at the border customs posts of the Republic.

Also in these terminals, if foreign trade cargo is not formalized remotely, then 50 km from the state border.dan-1500 km.it leads to excessive financial costs and time spent on business entities operating at a distance of up to and including the cost of capital.

In this regard, the need for electronic transfer of transport and commercial documents, which are currently used in international shipping, is increasing. At present, it is necessary to consider the issue of electronization of TIR CARNET(hereinafter referred to as TIR), CMR and invoice(invoices) documents, which are mainly used in international transportation of cargo vehicles.

On the introduction of electronic tire Carnet:

The TIR booklet, which is being used today in international transportation, is one of the important documents in World foreign trade. While the trends in the use of this TIR booklet are being focused on, although the dynamics of the decline of the booklets distributed around the world is currently observed, Uzbekistan is leading among the countries of Central Asia with the increase in the amount used by the national carriers by the Year [5]. The above idea can be substantiated by the following table:

Table 4. Number of tire Carnets distributed by IRU to the states

State	2012 y.	2013 y.	2014 y.	2015 y.	2016 y.	2017 y.	2018 y.	2019 y.
<b>Uzbekistan</b>	17500	7500	9000	9000	27000	14000	32400	43000
<b>Kazakhstan</b>	19000	25000	24200	18500	23500	21300	14700	15000
<b>Turkmenistan</b>	6000	7500	11000	13000	13000	1000	6000	14000
<b>Kyrgyzstan</b>	17100	22200	20900	9300	4800	4100	2000	2000
<b>Tajikistan</b>	2950	3500	4000	2500	2350	3100	3400	2300

In particular, the opinion of experts on technical and conceptual aspects of the digitization of the tire booklet was widely discussed in the 151-th chapter of the economic and Social Council of the United Nations on 5-8 February 2019. It was also the first in the world to receive international cargo between the Islamic Republic of Iran and Turkey using e-Tir as a test in March 2016 [6]. In this test practice, the following advantages came from a test project between the countries of Iran and Turkey.

**Facilities for customs bodies**

- Accelerate the implementation of customs control, as well as reduce the volume of work with documents in simplification;
- Reliable web services are provided by the International Automobile Transport Association (IRU) and the European Economic Commission of the United Nations to the customs authorities, in which there is an opportunity to check in Real time All information on international transport, as well as electronic guarantees of authenticity;
- The possibility of Customs employees to obtain a wide range of information on the information in the TIR CARNET booklet, in which information on all intermediate customs offices, electronic declarations of international cargo, sender and receiver customs offices, comparative means (fillings). Also in the introduction of this system, there are advantages such as the fact that there is no chance of violations of the law related to international shipments.

**Convenience for the owner of the booklet and international cargo carriers**

- Savings In The Time Of Going To Buy A Booklet In The Form Of Paper. Receipt Of A Booklet In Real Time, As Well As The Absence Of The Need To Purchase A Booklet For A Reserve;
- The Online Implementation Of The Payment Policy Will Save The Time Of Arrival Of The Owner Of The Booklet To The National Associations, As Well As The Absence Of Daily Expenses;
- Carriers Reduce The Likelihood Of Speed And Error In The Formation Of Information In The Booklet As A Result Of The Automatic Formation Of Data Before The Publication Of Electronic Booklets;
- Also One Of The Main Achievements Of E-Tir Is That There Will Be No Problems Even If This Booklet Is Lost. The Owner Of The Booklet Will Have The Right To Re-Print It Through The Computer At The Desired Time And Submit It To The Customs Authorities For Formalization. (For Information: In Case Of Loss Of The Previous Tir Carnet Booklet, All Facilities And Facilities Associated With This Booklet(Such As The Guarantee Amounts Of The Guarantee Organizations, Simplified Procedure Checks Of The Customs Authorities) Will Lose Their Power);

**Facilities for national associations**

- Convenience and reliability in issuing guarantees for international road transport in Real time;
- Absence Of The Need To Remove The Booklet As A Reserve, The Possibility Of Monitoring The Booklet Online For Its Use In International Transport;
- In Case Of Detection Of Any Interruptions With The Carrier, Immediate Help Of The Owner (Carrier) Of The Booklet Will Be Provided;
- Convenience In Carrying Out Tasks Related To The Performance Of Customs Incoming Requests (Reports Of Different Views, Data, Etc.), As Well As Being Considered As An Effective Tool In Risk Management.

Currently, the price of one tire CARNET booklet is distributed by the International Association of automobile carriers (IRU) to national associations at a price of 6 sheets from 35 to 165 US dollars, and 14 sheets from 69 to 197 US dollars. In particular, 6 sheets of paper are sold to national carriers of Uzbekistan from 38, 14 sheets from 77 US dollars [7].

**On the introduction of electronic CMR**

At present, one of the main transport documents in international transport is an Additional Protocol on the transfer of CMR to electronic form (e-CMR) signed in Geneva on February 20, 2008 and entered into force on June 5, 2011.

To date, an additional protocol has been introduced in 6 years (2011 - 2017 y.) 17 states have ratified this treaty. In practice, according to this document, the first marotaba 2017 year in Yanvar, international shipments between France and Spain were tested through e-CMR and gave its positive results. In this transport, by the national carrier of Spain Primafrío, apelsin tavarini is 1300 km from Uelva(Spain)to the city of Perpignan(France).the league was transported at a distance. Starting from December 1, 2017, Belgium, the Netherlands and Luxembourg launched a three-year experiment on the introduction of e-CMR practice. And since March 1, 2018, all logistics and transport companies in the Benelux countries are practically supporting this hujjatni in case of electronization.

Based on the data of the International Automobile transport Union (iru), it gives the following advantages of e-CMR in practice:

**1. Regarding the reduction in spending:**

- 3-4 Times Reduction In The Time Of Processing Of Documents;
- Acceleration Of Administrative Formalities (Reduction Of Data Entry In Documents, Lack Of Archive And Paper Work, Elimination Of Cases Such As Faks, Copywriting, Typesetting;
- Accuracy In Calculations And Elimination Of Cases Of Discrepancies Between Them During Unloading And Loading Of Goods.

**2. On the increase in transparency of international shipping:**

- Accuracy Of Information Contained In Documents (E-CMR Is Confirmed By An Electronic Digital Signature, It Is Not Possible To Change The Information Contained In It);
- Availability Of Tracking And Control After Shipment;
- Includes Capabilities Such As Real-Time Knowledge On Receiving Information About The Delivery Of The Cargo.

In this regard, official data of the transport and Logistics Association of the Netherlands, the amount of 180 million Manats per year. It became known that in the formalization of funds in the amount of euro, as well as each electronic SMR document, up to 4,5 euro will be spent. In place of the information, about 40 million pieces of transport cargo letters per year are drawn up in the Netherlands. At the same time, according to the opinion of the permanent representative of Iru in Eurasia, today, if the formalization of one paper-form CMR document will cost 6,23 euros, then the cost of 1,50 euros in electronic Form[8].

Proceeding from this, only in 2019, by transferring the CMR document into electronic form, the participants of foreign economic activity received 2.5 million rubles. savings close to the euro can be saved. In particular, these figures are shown in detail by the table below in the section of years.

Table 5. Expenses to be spent on the number of Tir CARNET and YUEBNK official in Uzbekistan

CMR form and number	2015 y.	2016 y	2017 y	2018 y	2019 y
<b>Total number</b>	162333	189476	234429	372728	507567
<b>Paper (6.23 euro)</b>	1011334	1180435	1460492	2322095	3162142
<b>Electron(1.5 euro)</b>	243999	284214	351643	559092	761350
<b>Difference (profit)</b>	767335	896221	1108849	1763003	2400792

Taking into account the above, this information can be drawn from the comments in the analytical material and draw the following conclusion:

**First** of all, there is a need to transfer documents used in the transportation of foreign trade cargo (mainly TIR CARNET, CMR, invoice to electronic form;

**Secondly**, the increase in the scale of international cargo transportation in the countries of high-level trade partners with Uzbekistan(Russia, China, Turkey, Iran, Kazakhstan) is increasing the demand for the electronization of documents used in this process;

**Third**, as a result of the non-application of these documents in electronic form, Uzbekistan has a negative impact on its export and transit potential, which requires excessive time and cost in the formalization of these documents;

**Four**, when formalizing foreign trade cargoes, they are holding them for a long time at state border posts, as a result of which the state has been negatively impacted by improving its position in prestigious international ratings (such as LPI, Doing Business, Transparency International;

**Fifth**, the transition of the Republic to the digital economy and the digitization of the international transport process, which is a component of the country's electronic government, the transfer of the documents used in it to the electronic form remains one of the most urgent tasks.

Therefore, in order to eliminate the problems and shortcomings in this regard, the following proposals are put forward.

1. On the application of electronic TIR Carnet in international transport, the army is conducted under the auspices of international organizations as a test in practice with countries. Bunda is desirable to carry out with Kazakhstan, which is advanced in IT technology in Central Asia.

2. on e – CMR signed in Geneva on February 20, 2008, creating a working group at the government level on the ratification of the Additional Protocol, which entered into force on June 5, 2011. Also, bunda is also launching a testing process in partnership with IRU.

3. Currently, the introduction of electronic invoices (e-invoice) in the form of a test, even in international shipments, taking into account the fact that they are practically introduced in the state bodies. Bunda see supporting the testing process at border duty posts with low volume of work.

## REFERENCES

- [1] President Shavkat Mirziyoyev’s Address to the Oliy Majlis / <http://uza.uz/oz/documents/zbekiston-respublikasi-prezidenti-shavkat-mirziyeevning-oliy-22-12-2017/28-12-2018/25-01-2020>.
- [2] The World Bank: World Development Indicators. 2015, 2016, 2017, 2018, 2019, 2019 year editions. <http://data.worldbank.org/indicator>.
- [3] Foreign trade turnover of the Republic of Uzbekistan / <https://stat.uz/uploads/docs/2020+.pdf>.
- [4] Based on the data of the State Customs Committee of the Republic of Uzbekistan.
- [5] Total amount of TIR Carnets issued by IRU to National Associations 2001–2019 / <http://www.unece.org/fileadmin/DAM/tir/figures/TIRCarnets2001-2019.pdf>.

- [6] UNECE-IRU eTIR Pilot between Turkey and the Islamic Republic of Iran / [https://www.unece.org/fileadmin/DAM/trans/doc/themes/UNDAC2C/presentations/Grosejean\\_6\\_2015.pdf](https://www.unece.org/fileadmin/DAM/trans/doc/themes/UNDAC2C/presentations/Grosejean_6_2015.pdf).
- [7] TIR CARNET prices in 2001 -2019 years / [https://www.unece.org/fileadmin/DAM/tir/Carnet\\_Prices/TIR\\_Carnet\\_Prices\\_2019e.pdf](https://www.unece.org/fileadmin/DAM/tir/Carnet_Prices/TIR_Carnet_Prices_2019e.pdf).
- [8] First ever border crossing to use e-CMR electronic consignment note / <https://www.iru.org/resources/newsroom/first-ever-border-crossing-use-e-cmr-electronic-consignment-note>.
- [9] Based on the data of the State Customs Committee of the Republic of Uzbekistan.

# *Species Composition And Diversity Of Plant Along The Rach Tra River In Ho Chi Minh City*

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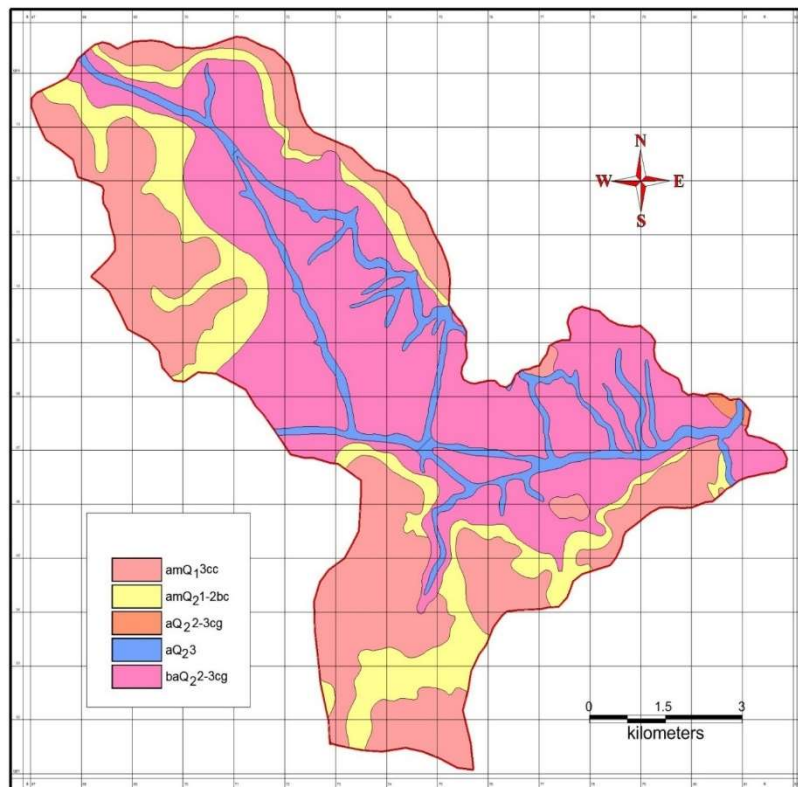
**Abstract** – This research provides data on species composition and plant diversity along the Rach Tra river that has not been published in any prior literature. The survey method was applied according to the linear system and typical standard plots in field trips combined with a morphological method in the laboratory. The results of studying vegetation along the Rach Tra river recorded 132 species, 113 genera, 59 families belonging to two phyla of vascular plants: Polypodiophyta and Magnoliophyta.

The value of plant resources in the investigation area was identified with six major use groups as follows: medicine (89 species), food (21 species), household goods (8 species), ornamental (12 species), firewood (2 species) and organic fertilizer (5 species). Besides, two invasive plant species were found including *Mimosa pigra* and *Eichhornia crassipes*. The life forms of plants along the Rach Tra river were classified into shrub (18 species), herb (62 species), lianas (28 species) and timber (24 species).

**Keywords** – Biological diversity, ecosystem, Rach Tra, vegetation along rivers.

## I. INTRODUCTION

The Rach Tra river is a large tributary of the Saigon river, about 44 km in length, the Rach Tra basin is part of the area of Cu Chi and Hoc Mon districts in Ho Chi Minh City, Vietnam [1]. In recent times, the interaction between human activities and the interior areas of the Rach Tra basin has been progressing quite complicatedly, landslides on both sides of the river were mainly due to over-exploitation of riverside land (housing, farming, raising fish, etc.) and waterway traffic. These changes were resulting in a great impact on the biodiversity of the vegetation along the Saigon River. However, Rach Tra has not been paid attention to a more sustainable approach to development [2], [3].



**Figure 1.** Geological map of Rach Tra

In this study, we will survey and evaluate the current state of the vegetation along Rach Tra. It aims at providing data on the species composition and diversity of the flora along Rach Tra, as well as the value of plant resources for humans. Another aim is to contribute a scientific basis to management agencies in planning, conserving, utilizing, and developing this natural resource sustainably.

## II. MATERIALS AND METHODS

### 2.1. Science field trips

The method we employed to collect the data is conducting the survey according to the linear system and typical standard plots [3]. In addition, it was combined with the research methods of Nguyen Nghia Thin [4], based on the map of current status and characteristics accompanying with topographic location so as to establish sampling lines. In this way, the route must pass through the habitats of the study area (the lines cross the representative areas of the study area) [5].

From the above sampling lines, we selected the key points, which could show the most typical characteristics, to place the standard plots. After locating the plots, colored nylon ropes were used to fix the plots. In each standard plot 50m x 50m (0.25 ha) in size, all vascular plant species within the plot area were investigated [6]. The collected plant samples were photographed, preliminarily treated with 70 - 80% alcohol solution, and attached with labels [7].

### 2.2. Laboratory

Determination of scientific names of plant species was based on a morphological method, a comparison of plant-specific morphology with plant images captured from the field trips. Additionally, the actual recorded characteristics of each individual plant would be compared with Pham Hoang Ho's Cayco Vietnam [8], and the standard samples stored at the Botanical Museum of the Institute of Tropical Biology, 85 Tran Quoc Toan, District 3, HCM City.

Division of plant life forms and value of plant resources based on field results combined with the documents: Dictionary of medicinal plants in Vietnam by Vo Van Chi [9], Vietnam useful plants of Vo Van Chi and Tran Hop [10], Vietnam medicinal plants and herbs by Do Tat Loi [11], 1,900 useful plant species of Vietnam by Tran Dinh Ly [12].

The list of plant species composition was created following categories from lower to higher plants. The families of the phyla, along with the genera and species of the families were arranged alphabetically (by scientific name) [13], [14].

### III. RESULTS AND DISCUSSION

#### 3.1. Diversity of plant species composition

According to the results of field investigation and laboratory analysis, it can be described that the composition of plant species along Rach Tra had 132 species, belonging to 113 genera, 59 families of 2 phyla of vascular plants including Polypodiophyta and Magnoliophyta (Table 1). From the total species, genera, families recorded, respectively, Polypodiophyta had 8 species (6.1%), 5 genera (4.4%), and 5 families (8.5%) consisting of Blechnaceae, Marsileaceae, Parkeriaceae, Pteridaceae and Schizeaceae. In comparison with Polypodiophyta, Magnoliophyta possessed 124 species, 108 genera, 54 families. Thus, it can be confirmed that Magnoliophyta dominated with the total number of species, genera, and families in the study area.

**Table 1.** The plant families with a large number of species

Families	Number of species	Rate (%)
Fabaceae	12	9,1
Asteraceae	11	8,3
Poaceae	11	8,3
Convolvulaceae	8	6,1
Euphorbiaceae	7	5,3
Schizeaceae	4	3,1



**Figure 2.** The vegetation along the Rach Tra river



Further analysis of Magnoliophyta shows that the Dicotyledon class (Magnoliopsida) dominated with 92 species (74.2%), 80 genera (74.1%), 41 families (75.9%); The monocotyledon class (Monocotyledoneae) owned a lower proportion with 32 species (25.8%), 28 genera (25.9%), 13 families (24.1%). Dicotyledon was dominant in Magnoliophyta and even in the entire flora of the study area.

Some families had many species in the flora of the study area. Specifically, in Magnoliophyta, the Fabaceae family possessed the highest number of species with 12 species accounting for 9.1 % of the total species. Asteraceae and Poaceae families had the same number of species with 11 species (8.3%); Convolvulaceae family had 8 species (6.1%); and Euphorbiaceae family had 7 species (5.3%). For Polypodiophyta, Schizeaceae family obtained the highest number of species with 4 species (3.1%).

### 3.2. Diversity in value of plant resources

It has been verified that in the study area there were 132 plant species, in which 103 species are valuable for use on a regular basis, such as medicinal plants with 89 species (67.4%) [15], [16], [17], plants for food with 21 species (15.9%), ornamental plants with 12 species (9.1%), plants for household products with 8 species (6.1%), plants for firewood with 2 species (1.5%), plants for organic fertilizer with 5 species (3.8%) [18]. Variation in plant resource value is shown in the **Figure 3**.

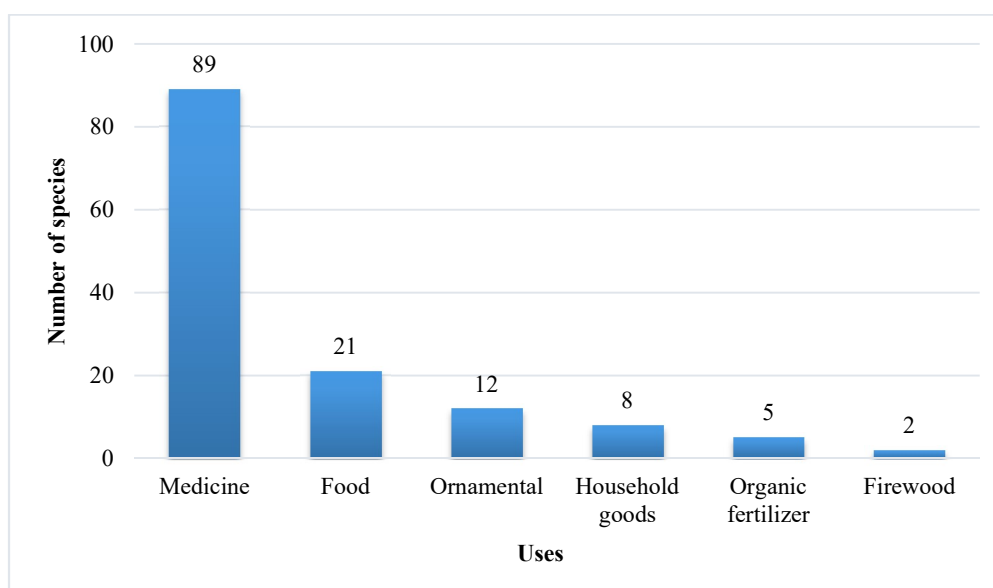


Figure 3. Diversity in value of plant resources

The species were popularly exploited by people residing along Rach Tra for ornamental purposes such as *Barringtonia macrostachya*, *Gardenia jasminoides*, *Ixora finlaysoniana*, *Typha angustifolia* [19], [20].

Plants were used as food and medicine [21], [22], [23] such as *Stenochlaena palustris*, *Enhydra fluctuans*, *Sphenoclea zeylanica*, *Crateva religiosa*, *Momordica charantia* [24], [25].

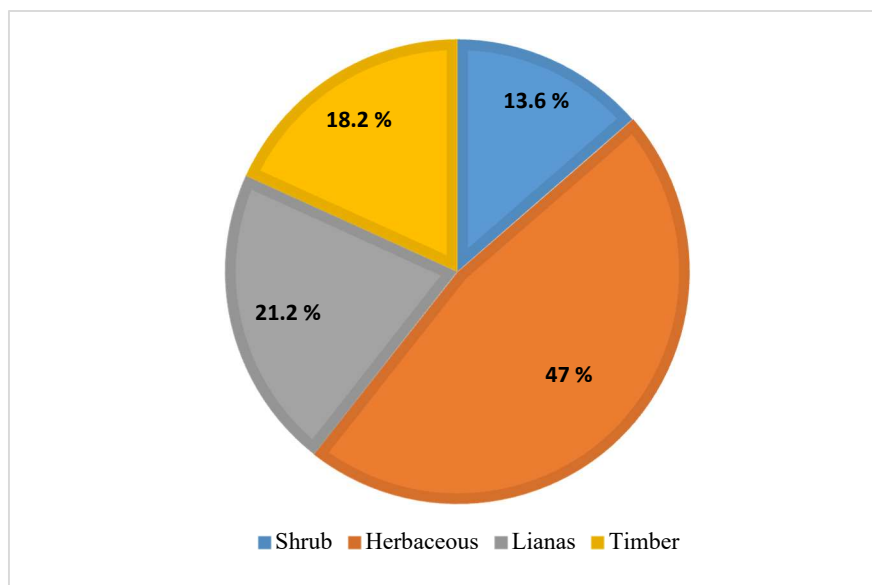
Plants were for manufacturing construction materials, household appliances, boats, fibers, handicrafts, or firewood such as *Calophyllum inophyllum*, *Melaleuca cajuputi*, *Hibiscus tiliaceus*, *Eichhornia crassipes* [26], [27].

In addition to the above use values, many plant species also have value for environmental cleaning, contributing significantly to the regulation and balance of the water environment [28], [29] such as *Lemna minor*, *Phragmites karka*, *Ludwigia adscendens*, *Polygonum tomentosum*, *Eichhornia crassipes*, etc [30], [31].

According to The World Conservation Union (IUCN), the 132 plants species recorded in the study area along Rach Tra existed *Dolichandrone spathacea* (L.f.) Seem. on the list of plant species needing conservation, as a least-concern species (LR - Lower Risk) [32].

### 3.3. Diversity in the plant life forms

The flora in the study area was divided into four main groups of life forms: shrub, herbaceous plant, lianas and timber plant [33], [34], [35, 36]. Details are described in the **Figure 4**.



**Figure 4.** Diversity in the plant life forms

- The shrubs group had 18 species (13.6%), this group was usually found in many areas along the coasts of the dry or wet soils, focusing mainly on families such as Arecaceae, Fabaceae, Melastomataceae, etc.
- The herbaceous plants’ group had 62 species (47.0%), this group included plants living along the alluvial, lowland riverside or wetlands, mainly concentrated into families such as Poaceae, Cyperaceae, Asteraceae, etc.
- The lianas group had 28 species (21.2%), the most common families were Schizeaceae, Convolvulaceae, Fabaceae, Menispermaceae, etc.
- The timber plants’ group had 24 species (18.2%), this group consisted of plants living along the river such as Annonaceae, Apocynaceae, Myrtaceae, Lecythidaceae, etc.

Thus, the herbaceous plants’ group had the highest number of species (47.0%) among the existing life forms in the study area. They not only contribute to increasing diversity of riparian plant ecosystems but also bring the use-value to the locals, as well as participating in environmental protection and preventing erosion.

#### IV. CONCLUSIONS

Through investigation and survey, there were 132 species, 113 genera, 59 families of 2 phyla of vascular plants including Polypodiophyta and Magnoliophyta. Fabaceae, Asteraceae and Poaceae were the three most abundant families, this is may be due to environmental factors directly affecting to the richness of plant species [37].

There were 132 species of plants in the study area with 103 species for the use value, including medicinal plants with 89 species, plants for food with 21 species, 12 species of ornamental plants, plants for household appliances with 8 species, plants for firewood with 2 species, plants for organic fertilizer with 5 species.

According to The World Conservation Union, one plant specie were on the list of plant species in the need of conservation. That was *Dolichandrone spathacea* (Lf) Seem.

The flora in the study are was classified into four main groups of life forms comprising of the shrubs group with 18 species, the herbaceous plants’ group with 62 species, the lianas group with 28 species and the timber plants’ group with 24 species.

In the study area along Rach Tra, there were two invasive plant species consisting of *Mimosa pigra* [38], [39] and *Eichhornia crassipes* [40], [41]. The development of *Mimosa pigra* and *Eichhornia crassipes* tends to increase [42], [43], [44], hindering the movement of people and affecting the habitat of the flora and fauna.

The wetlands along Rach Tra had a habitat of a natural flora corridor with a small area [45], [46] distributed along the riverbank with a width of 5 - 50m.

### REFERENCES

- [1] T. T. Nguyen et al., "Nutrient dynamics and eutrophication assessment in the tropical river system of Saigon–Dongnai (southern Vietnam)," *Science of the Total Environment*, vol. 653, pp. 370-383, 2019.
- [2] E. Strady et al., "Baseline seasonal investigation of nutrients and trace metals in surface waters and sediments along the Saigon River basin impacted by the megacity of Ho Chi Minh (Vietnam)," *Environmental Science and Pollution Research*, vol. 24, no. 4, pp. 3226-3243, 2017.
- [3] Q. Tang, G. Liang, X. Lu, and S. J. C. G. S. Ding, "Effects of corridor networks on plant species composition and diversity in an intensive agriculture landscape," *Chinese Geographical Science*, vol. 24, no. 1, pp. 93-103, 2014.
- [4] N. N. Thin, *Plant research methods*. Publisher of Hanoi National University, 2007.
- [5] C. J. T. A. N. Rahbek, "The relationship among area, elevation, and regional species richness in neotropical birds," *The American Naturalist*, vol. 149, no. 5, pp. 875-902, 1997.
- [6] Lomolino, M. V. J. G. Ecology, and biogeography, "Elevation gradients of species-density: historical and prospective views," *Global Ecology and Biogeography*, vol. 10, no. 1, pp. 3-13, 2001.
- [7] P. J. P. o. H. Loc, *Applying UNESCO's Vegetation Classification Framework to Vegetation Cover in Vietnam*. Publisher of Hanoi, 1985.
- [8] P. H. Ho, *Vietnamese plants [Cay co Viet Nam]*, (Vol. 1, 2, 3). Ho Chi Minh City: Youth Publisher, 1999-2003.
- [9] V. V. Chi, *Dictionary of medicinal plants in Vietnam (Vol. 1, 2)*. Hanoi: Medical Publishers, 2012.
- [10] V. V. Chi and T. Hop, *Vietnam useful plants (Vol. 1, 2, 3)*. Hanoi: Education Publisher, 2000.
- [11] D. T. Loi, *Vietnam medicinal plants and herbs*. Hanoi: Medical Publishers, 2009.
- [12] T. D. Ly, *1,900 useful plant species of Vietnam*. Hanoi: World Publisher, 1995.
- [13] R. K. Brummitt, *Vascular plant families and genera*. Royal Botanic Gardens, Kew, 1992.
- [14] P. Brummitt and C. E. Powell, *Authors of plant names*. Royal Botanic Gardens, Kew, 1992.
- [15] Bhattacharjee and S. Kumar, *Handbook of medicinal plants*. Aavishkar Publishers, 2000.
- [16] Van Wyk, Ben-Erik, Wink, and Michael, *Medicinal plants of the world*. CABI, 2018.
- [17] Farnsworth et al., "Medicinal plants in therapy," *Bulletin of the world health organization*, vol. 63, no. 6, p. 965, 1985.
- [18] Nygaard Sorensen, Jorn, Thorup-Kristensen, K. J. J. o. P. Nutrition, and S. Science, "Plant-based fertilizers for organic
- [19] Di Martino et al., "Use of native plants for ornamental purposes to conserve plant biodiversity: Case of study of Majella National Park," *Journal for Nature Conservation*, vol. 56, p. 125839, 2020.
- [20] Okole, BN, Odhav, Bharti, Bornman, and C. J. S. A. J. o. Botany, "Commercialisation of plants in Africa," *South African Journal of Botany*, vol. 70, no. 1, pp. 109-115, 2004.
- [21] Farnsworth, N. R, Soejarto, and D. D. J. T. c. o. m. plants, "Global importance of medicinal plants," *The conservation of medicinal plants*, vol. 26, pp. 25-51, 1991.
- [22] Densmore and Frances, *How Indians use wild plants for food, medicine & crafts*. Courier Corporation, 2012.

- [23] Arnason, Thor, Hebda, R. J, Johns, and T. J. C. J. o. Botany, "Use of plants for food and medicine by Native Peoples of eastern Canada," Canadian Journal of Botany, vol. 59, no. 11, pp. 2189-2325, 1981.
- [24] Pieroni and A. J. J. o. Ethnopharmacology, "Medicinal plants and food medicines in the folk traditions of the upper Lucca Province, Italy," Journal of Ethnopharmacology, vol. 70, no. 3, pp. 235-273, 2000.
- [25] Shuping, D. t. tempspacetempsspaceS, Eloff, C. J tempspacetempsspaceN %J African Journal of Traditional, and A. Medicines, "The use of plants to protect plants and food against fungal pathogens: A review," African Journal of Traditional, Complementary Alternative Medicines, vol. 14, no. 4, pp. 120-127, 2017.
- [26] Dirr and M. A, Manual of woody landscape plants: their identification, ornamental characteristics, culture, propagation and uses (no. Ed. 4). Stipes Publishing Co, 1990.
- [27] de Medeiros et al., "A variation of checklist interview technique in the study of firewood plants," Funct. Ecosyst. Communities, vol. 2, pp. 45-50, 2008.
- [28] Bassam and N. EL, Energy plant species: their use and impact on environment and development. Routledge, 2013.
- [29] MEMON et al., "Heavy metal accumulation and detoxification mechanisms in plants," Turkish Journal of Botany, vol. 25, no. 3, pp. 111-121, 2001.
- [30] Pimentel et al., "Economic and environmental benefits of biodiversity," BioScience, vol. 47, no. 11, pp. 747-757, 1997.
- [31] Salt et al., "Phytoremediation: a novel strategy for the removal of toxic metals from the environment using plants," Bio/technology, vol. 13, no. 5, pp. 468-474, 1995.
- [32] IUCN, IUCN Red List of Threatened Species. International Union for Conservation of Nature, 2014.
- [33] Du Rietz and G. Einar, Life-forms of terrestrial flowering plants. Sv. växtgeografiska sällsk., 1931.
- [34] R. J. T. B. R. Adamson, "The classification of life-forms of plants," The Botanical Review, vol. 5, no. 10, pp. 546-561, 1939.
- [35] Raunkiaer, C. J. T. l. f. o. plants, s. p. geography, and b. t. c. p. o. C. Raunkiaer., "The life forms of plants and statistical plant geography; being the collected papers of C. Raunkiaer," The life forms of plants and statistical plant geography; being the collected papers of C. Raunkiaer, 1934.
- [36] Smirnova, OV, Palenova, MM, Komarov, and A. J. R. J. o. D. Biology, "Ontogeny of different life forms of plants and specific features of age and spatial structure of their populations," Russian Journal of Developmental Biology, vol. 33, no. 1, pp. 1-10, 2002.
- [37] Tsyganov, Andrey N, Milbau, Ann, Beyens, and Louis, "Environmental factors influencing soil testate amoebae in herbaceous and shrubby vegetation along an altitudinal gradient in subarctic tundra (Abisko, Sweden)," European Journal Of Protistology, vol. 49, no. 2, pp. 238-248, 2013.
- [38] Mansor, Asyraf, Crawley, and M. J. J. T. l. s. research, "Current status of *Mimosa pigra* l. infestation in Peninsular Malaysia," Tropical life sciences research, vol. 22, no. 1, p. 37, 2011.
- [39] Pramual, Pairot, Khumkratok, Suttira, Wongpakam, and K. J. P. J. Bot, "Population genetics of invasive weed *Mimosa Pigra* L.(Mimosoideae) in Thailand," Pak. J. Bot, vol. 43, no. 6, pp. 2721-2726, 2011.
- [40] Albano Pérez et al., "Seed germination and risks of using the invasive plant *Eichhornia crassipes* (Mart.) Solms-Laub.(water hyacinth) for composting, ovine feeding and biogas production," Acta Botanica Gallica, vol. 162, no. 3, pp. 203-214, 2015.
- [41] Mengistu, B. Bekele, Unbushe, Dikaso, Abebe, and E. J. O. J. o. Ecology, "Invasion of Water Hyacinth (*Eichhornia crassipes*) Is Associated with Decline in Macrophyte Biodiversity in an Ethiopian Rift-Valley Lake—Abaya," Open Journal of Ecology, vol. 7, no. 13, pp. 667-681, 2017.
- [42] Lonsdale and W. J. J. o. Ecology, "Rates of spread of an invading species--*Mimosa pigra* in northern Australia," Journal of Ecology, pp. 513-521, 1993.

- [43] Ren, M. X, Zhang, and Q. G. J. A. Botany, "Clonal diversity and structure of the invasive aquatic plant *Eichhornia crassipes* in China," *Aquatic Botany*, vol. 87, no. 3, pp. 242-246, 2007.
- [44] ZHANG, YUAN-YE, ZHANG, DA-YONG, Barrett, and S. C. J. M. ecology, "Genetic uniformity characterizes the invasive spread of water hyacinth (*Eichhornia crassipes*), a clonal aquatic plant," *Molecular ecology*, vol. 19, no. 9, pp. 1774-1786, 2010.
- [45] Naiman, R. J, Decamps, Henri, Pollock, and M. J. E. applications, "The role of riparian corridors in maintaining regional biodiversity," *Ecological applications*, vol. 3, no. 2, pp. 209-212, 1993.
- [46] Nilsson, Christer, Jansson, R. J. R. R. Research, and Management, "Floristic differences between riparian corridors of regulated and free-flowing boreal rivers," *Regulated Rivers: Research Management*, vol. 11, no. 1, pp. 55-66, 1995.

# *Code-Mixing Causes Confusion In Young Bilingual Speakers, Or Does It?!*

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**Abstract** – This study provides empirical, comparative and statistical analysis of 2 different categories of people: the first category was 250 students academically involved in educational establishments; their monolingual and bilingual language experience and their attitudes to people who mix 2 languages at their speech. A long with the survey which was carried out at the metro station of Beruniy, we did the second experiment, namely, we took interviews from 67 mothers of 1-14 year-old children, residing in Tashkent, in order to gain reliable information about children being brought up in a monolingual/bilingual or even multilingual atmosphere; those children's language development and difficulties, parents' plans for their children's language skills, support and motivation. Especially, we intended to observe if bilingual environment is causing any language confusion to a child and the role of parent's code-mixing in the family. The obtained results of the first experiment were different from what we had expected. The participants expressed neutral (44%) and positive (35%) attitude to code-mixing among bilingual people. The second experiment opened the doors to the world of young children and their language experience retold by their mothers. At the final stage of our analysis we realized that code-mixing as a common language phenomenon is rather natural and not seen as a linguistic error among majority participants of the experiments. Concerning the children and their language development which was under empirical and statistical studies, majority of them who are experiencing sequential bilingualism in particular, from early ages did not display any language confusion; though simultaneous bilingual children of young age had some confusion with vocabulary comprehension.

**Keywords** – Monolinguals, Language Systems, Language Mode, Language Development.

## I. INTRODUCTION

A lot of children all around the globe are practicing bilingualism since their infancy. Although bilingual children are believed to have more flexible intellect and developed cognition and show better academic results according to some scientists, yet, there are some costs of bilingualism parents and educators ought to be aware of. One of those phenomena that is not welcomed by many scientists and language users in whole is code-mixing. In this article, we study the causes and effects of code-mixing on children and based on our scientific findings we study language environment in the capital of Uzbekistan and find out people's language status and their attitude to code-mixing in bilingual people, including children.

## II. BACKGROUND OF THE STUDY

Code-mixing is an incredibly complex, but at the same time, effortless language phenomenon which occurs in bilinguals' language performance frequently. To be more specific, code-mixing is the process when a bilingual of any age combines language units of both languages within a sentence/utterance.

For many language scholars code-mixing is a normal and acceptable outcome in language performance as code-mixing in bilingual children occur naturally: they observe this process in adults' language output and follow their league [1, 2]. As they say, parents are the first teachers for children and, hence, parents guide their offspring in their early communication journey. Young language learners who are thirsty to discover the world where they have just come, will do everything the way their parents do, including language learning. In this consideration, we are likely to assume that parents who do not mix languages in oral communication in their daily lives bring up children who, also, try not to mix languages in their speech.

According to some linguists mentioned in the works of Krista Byers-Heinlein and Casey Lew-Williams, community where bilingual children reside makes impact on children language development as well [1,2; 2]. Obviously, the environment which the language users are surrounded by plays a tremendous role in shaping one's language skills as they communicate with each other, spend more time together and are in many cases emotionally bound to one another. Friends who the children play football with, schoolmates who they study together from the morning until late afternoon, neighbors who call them out to go for a walk in the evenings will certainly add their fair share to their language boosting process.

When we observe that code-mixing is natural and common everywhere, we wonder, what causes code-mixing. How does it occur?

According to Grosjean's views on language interactions in bilinguals, which was brought up in the works by P. Brook & V. Kempe, bilinguals' languages are in constant competition to be active and thus, for the user of two languages, it takes everyday choices to use either of the languages at a time to "digest" data in the form of a language piece. In the time the opted language is being implemented, the other language is forced to rest [3, 13]. Bilinguals with two language systems are bound to opt for one of the languages to comprehend the data around, by deactivating the second language for a while. It is such a process which creates flexibility in the mind of a bilingual to choose the most effective means to gain the needed data.

Another empirical situation might occur when a bilingual receives data, his/her mind may measure the data in both language systems, and then choose it to stay in his mind in one of the language systems, which is closer to his/her personal mentality. The information stored in a bilinguals' mind is likely to be in the language which has shaped the biggest part of his mentality or even culture.

Here, I assume, culture plays a great role, in perceiving the information in a certain language mode. Given that, even though semantically a language piece is clear by the bilingual in both languages, still there should be the closer translated/perceived version of that very language piece in one of his/her language systems. The perception of that language piece in the preferred language shapes a concept as clearly as possible; therefore, every time the user implements that language piece, and the picture/sensation comes to his/her mind immediately.

### III. MATERIALS AND METHODS

During the research we studied various literature, including articles and books on bilingualism in children. In the field of bilingualism, the phenomenon of code-mixing was learned thoroughly and we searched for reasons/causes to/of code-mixing among young children. We tried to link the impact of the surrounding people including parents and friends to the child's code-mixing and language performance on the whole. We based our research on 3 main sources. The primary one is Krista Byers-Heinlein and Casey Lew-Williams' work [1] in collaboration named "Bilingualism in the early years: What the science says" which was published in 2018. It discusses about young children who are exposed to bilingualism from early age and the advantages and disadvantages of bilingualism in their journey into bilingual language development.

The second piece of scientific work which we found crucial to study [2] was by Comeau, Genesee and Lapaquette with their "The modeling hypothesis and child bilingual code-mixing" published earlier in 2003. This linguistic contribution discussed issues of the environment that shapes the child as a language user. Finally, another linguistic work [3] by Francois Grosjean and Krista Byers-Heinlein written in collaboration was absolutely revolutionary and captivating: "Speech Perception and Comprehension" and it was published in 2018. In the article, the authors discussed many issues including language modes in bilingual minds and constant competition of the two languages to be activated in different situations.

In the research we approached to empirical, comparative and statistical methods. In other words, we started the research from observation. During the experiments (the survey with students of 15-27 years old and interviews with mothers of 1-14 year-olds) we observed their answers, reactions to the questions. After the experiments were done, we compared them all, as our target was to

find out what percent of the participants are bilingual (multilingual) or monolingual and how they react to code-mixing. At the end we put all the results to the tables working out the statistics in percentages.

#### **IV. RESULTS AND DISCUSSIONS**

Now when we have collected some data about how the language mixing occurs and how the data in the bilingual mind is stored, we prefer to delve into finding out more about the society we live in and their attitude to bilingualism and code-mixing. For this reason, we have carried out two experiments in the form of a survey and interviews in Tashkent among two different groups:

**EXPERIMENT 1.** The first group of people was teenagers and adults between the ages of 15-27. Given that people of this age were available the most, near to the National University of Uzbekistan. They were all students of lyceums and universities located around Beruniy Metro station. As we considered this spot of the city to be the fullest with the students of the target age, we opted for certainly this location to have our survey. The aim of the survey was to find out what proportion of the students studying in Tashkent's biggest academic area is bilingual, so the number of questions asked in the survey was few enough, five. We would just come up a passerby and ask them:

- 1) How old are you?
- 2) Where do you study?
- 3) How many languages do you speak?
- 4) What are those languages?
- 5) (Then, we would explain them what code-mixing is and when they recognize/recall such situation from their observations, we would ask the final question). What's your attitude to people who code-mix in their speech?

The total number of participants in the survey was 250. The data was gained within a week during the daytime between 2-5pm on weekdays.

When we gathered the data it took us another week to analyze and see the results.

When finally all the data was analyzed we discovered that in the students' town:

1. First of all, during the analyses after having collected all the data for this experiment, all 250 participants were categorized into three groups according to age difference. The first group consisted of teenagers between the ages of 15-19. The second group was of young adults between the ages of 20-23. Finally, people who are 24-27 years old made up the third group.

Out of 250 interviewees whose answers were thoroughly analyzed (since there were some other interviewees who were 27+, whose answers were not included to the 250 as target object of the experiment was to find out data about younger adults until the age of 27).

Out of total number of 250, there were 127 young adults at the ages between 20-23 which made the biggest proportion of participants in the experiment and that equaled to 50.8%, followed by the category of older students between the ages of 24-27 with the 29.9%. 49 teenagers between the ages of 15-19 made the smallest percentage (which is 19.6%) of the total number of participants taken part in the experiments.

Table 1

<b>№</b>	<b>Age</b>	<b>Number</b>	<b>Percent</b>
<b>1</b>	15-19	49	19.6%



2	20-23	127	50.8%
3	24-27	74	29.6%
	Total	250	100%

2. To the second question which was about the place where they all studied answered more than 250 people but only those people’s answers, who were students, were included in the experiment. Given that, those who worked and academically were not involved anyhow were not the target of this experiment.

Our aim was to observe the level and range of monolingualism/bilingualism/multilingualism among the young generation and predict the hypothetical future of the language usage by the future holders of the country in the capital city.

Amongst the 250 participants in three categories of ages the results were in such fashion:

Table 2

№	Age	Lyceum	University
1	15-19	26	4
2	20-23	1	126
3	24-27	-	93
	Total	27	223

Namely, 26 teenagers studied at lyceum and 4 of them have already managed to become students of universities. Among the young adults who fell into the second category only 1 person was at lyceum and the whole other majority of 126 people were at universities. Among the third category of 24-27 agers there were none who attended lyceum and 93 of them all were enrolled in university courses. In total, out of 250, 27 were lyceum students and 223 people went to university.

When participants were asked the third question, which was “How many languages do you speak?”, the results looked this way:

Table 3

№	The number of languages spoken by participants	The number of speakers	Percent
1	1 language	161	65%
2	2 languages	68	27%
3	More than 2 languages	21	8%

Total	250	100%
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3. To conclude, among the 250 interviewees, 161 of them were monolinguals who comprised 65% of the whole student population taken part in the experiment. The percentage of the bilinguals was equal to 27% with 68 people, followed by merely 8% of multilingual language users who spoke more than two languages and they made up 21 people among the army of 250 students.

Table 4

№		15-19		20-23		24-27		Total
1	1 language	76	47%	44	27%	41	26%	161
2	2 languages	15	22%	26	38%	27	40%	68
3	More than 2 languages	2	10%	9	43%	10	47%	21

If we look closely to the table above, the number of mono-, bi- and multilingual speakers is thoroughly categorized in three age groups with percentage relative to the total number.

The biggest number of monolinguals is in the category of teenagers (76 people), while in the other two categories that number is almost half of teenager’s (44 and 41 people). However, the number of bilinguals almost equally dominates among the second and third age categories with 26 and 27 speakers, leaving behind the category of teenagers with solely 15 bilingual speakers. Finally, the same trend is observed with multilingualism, whereas the number of multilingual students among the two older-aged categories exceed with 43% and 47%, whereas multilingual teenagers were only 2 making up the rest 2%.

5. As to what languages are widely spoken among the participants, we drew our conclusion in the form of a table below:

Table 5

№	Different Languages	The number of speakers	Percent
1	Uzbek	229	92%
2	Russian	48	19%
3	English	29	12%
4	Other languages (Korean, German, French, Tadjik, Kazakh)	11	4%

Among the 250, Uzbek, the state language was dominating with the army of 229 speakers (92%), followed by the two other languages which were relatively close in popularity: Russian with 19% and English with 12% of speakers. Finally, there were 11 speakers of other languages too and they made up the tiny 4% of all the participants.

5. In the end, it was the time for us to settle to the target question which was the core of this experiment – to get to know participants attitudes to bilinguals/multilinguals who code-mix in their language performance. After having analyzed the data about this issue, we have come to realize that the people’s attitudes were not as negative as we had expected to.

Table 6

№	The participants’ attitude to code-mixing	Number of participants	Percent
1	Positive	88	35%
2	Negative	52	21%
3	Do not care/ does not matter	110	44%
	Total	250	100%

The biggest part of the group (44%) would have neutral attitude to code-mixing phenomenon is speech, along with the second biggest part (35%) expressed positive attitude to code-mixing too. Only with 21% 52 participants expressed negative attitude to such phenomenon in language users.

Table 7

№	Attitude	15-19 y.o		20-23 y.o		24-27 y.o		Total
1	Positive	18	37%	46	36%	24	32%	88
2	Negative	10	20%	24	19%	18	24%	52
3	Do not care/does not matter	21	43%	57	45%	32	44%	110

In the table above we can see the detailed number and percent of people and their attitudes to code-mixing.

**EXPERIMENT 2.** The second group of people was mothers of 1-14 year-old children. The experiment two was in the form of an interview. The aim of the interview was to know what proportion of youngsters is being raised to be bilingual, what languages are being preferred to practice from young age and the probable future of those young language users.

The questions asked during the interviews were different depending on the mothers’ time and willingness to converse (5-7 questions in total):

1. Are you a bilingual (or maybe multilingual)? If yes, how long have you been bilingual (or multilingual)?
2. What languages do you speak?
3. What do you think is the right age for exposing a child to the second language?
4. Do your children speak one or more languages? What are those languages?
5. Have you ever noticed language confusion in your children? If yes, what do you think caused that?
6. Which foreign language(s) do you think are important for your children’s bright future?
7. How are you supporting/helping your children to develop their language skills?

The data collection was done by 15-40min interview talks at random places where we predicted the data would be attainable, such as cafes, supermarkets, buses, bus stops, entrances of kindergartens and primary schools. All in all, we managed to talk to 67 female parents, which took us three months.

1. Initially, before gaining information about their children, we had intention to know the mothers better, as we were aware that for a child’s success in language learning the environment that parents have created around their children was of paramount importance. That is to say, if parents themselves were active language users, then it is, in many cases, a matter of time for children to become fluent users of those languages. Hence, first two questions were to explore the mothers’ language abilities.

Out of 67 mothers 31 were monolinguals and they were the 46% of all the interviewees. Bilingual mothers were slightly fewer – 28 females with 42%. Last but not least, there were multilingual mothers as well with only 8 people making up the smallest proportion of 12%.

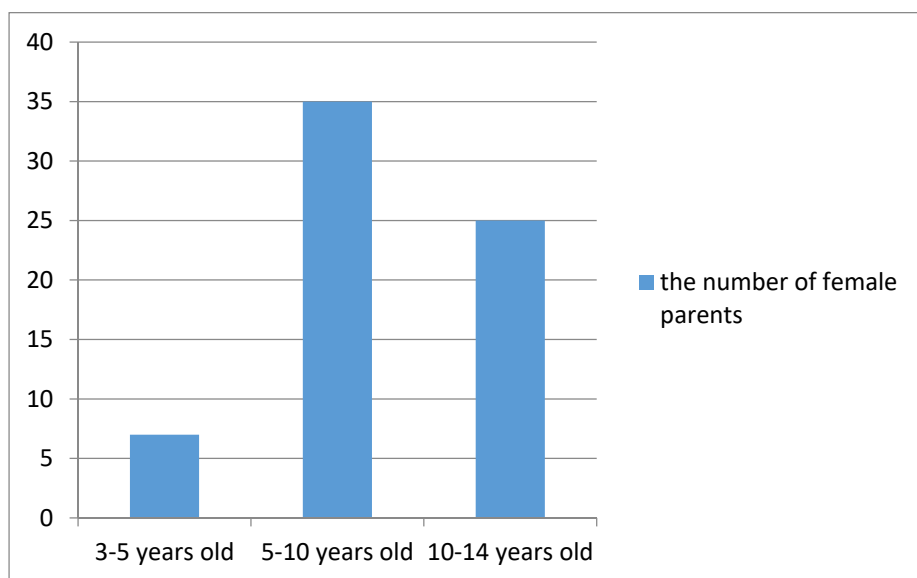
Table 8

N <sup>o</sup>	The number of languages spoken by participants	The number of speakers	Percent
1	1 language	31	46%
2	2 languages	28	42%
3	More than 2 languages	8	12%
	Total	67	100%

Looking at the results of the interviews we can note that 54% of the female parents were either bilingual or multilingual. Thus, we found it relevant to ask them a following question about the duration of them becoming and/or being bilingual/multilingual. The vast majority answered that the time when they considered in such way was since their childhood and school time.

2. Amongst the mothers languages such as Uzbek, Russian, Kazakh, Tajik, Kirgiz, English and Arabic were spoken.
3. Now, it was the turn for exploring their children. To the question about the right age to introduce a child to the second language, opinions varied this way:

**Diagram 1. The right age to expose a child to the second language according to female parents' opinions**



All in all, many mothers were of the view that it is best to introduce the second language after the age 5.

4. In the city of Tashkent we could guess that among children there are two widely spoken languages – Uzbek and Russian. Answers to this question met our expectations. Children of our mothers spoke Russian and Uzbek, however, the number of monolingual children slightly exceeded.
5. Question №5 was absolutely special to highlight as it was about language confusion in bilingual children. We intended to know if their bilingual children have a tendency to confuse languages or have trouble in comprehension of the two languages. There was a follow-up question asking for the causes of such dilemma.

Out of 67 females, majority were positive and proud to realize that bilingualism had no negative impact on their children. Though, just under 3% of them (2 mothers) recalled that they had observed language confusion in their children. As we were listening to the mothers it seemed as the mothers themselves had trouble to understand and explain the reasons for confusion. We tried to brainstorm all the causes to assist them understand and recall for more specific data. As a result, they said that in a bilingual family at the early age (2-4 years old) a child listening to his father and mother who communicate in two languages often have some confusion in vocabulary comprehension and thus confusion. Obviously, these ladies were talking about simultaneous bilingualism in children.

6. The 6<sup>th</sup> question of the interview was about foreign languages the mothers find important for their children's future. Through collecting information about those languages, our aim was to make distinct prediction of the languages spoken by the future holders.

Majority mothers opted for English, Russian as of great importance for academic success and better job prospects. However, there were females who would rather found Korean and Arabic as one of the most important and future-promising languages for their children.

7. The final question of the interview was about parents' role in children's language development. We asked how they are helping/supporting their children in language learning. Their answers were not very surprising. Many of the parents were of the view that courses in language centers are of great help in learning a foreign language. However, this was monolingual mothers' views in many cases. Bilingual/multilingual parents were sure that it starts at home, in the atmosphere where a parent communicates with a child in the target language. Some mothers highlighted reading books in the target language together is an effective way of activating the target language along with encouraging a child to read more.

## V. CONCLUSION

On the whole, on the grounds of the results of the first experiment, we realized that in the capital of Uzbekistan among the ages of 15-27 year-old young generation attitude to code-mixing was rather neutral. Many among the participants considered code-mixing as a natural phenomenon in language performance. According to the data gained from the interviews with mothers of 1-14year-olds, the results justified the situations when exposing a child to simultaneous bilingualism is likely to challenge the young language learner and lead to confusion. However, this is not the case with sequential bilingualism. Furthermore the role of bilingual parents is not taken for granted: the more active the parent is as a bilingual or multilingual, the smarter is the child is growing around that parent.

## REFERENCES:

- [1] Krista Byers-Heinlein and Casey Lew-Williams "Bilingualism in the early years: What the science says", 2018
- [2] Comeau, Genesee, Lapaquette "The modeling hypothesis and child bilingual codemixing". 2003
- [3] Francois Grosjean and Krista Byers-Heinlein "Speech Perception and Comprehension" 2018

# *Validity And Practicity Of Flipped Guided Inquiry Based Learning (FGIL) Model In Chemical Kinetics For Year 1 Students*

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**Abstract** – This research was motivated by the Covid-19 virus pandemic that has hit globally, including Indonesia. The pandemic that occurred caused the learning system to be shifted to an online system. The challenge faced by teachers in online learning systems was the teachers have to think about an appropriate learning to be done with an online system. This study aims to develop and reveal the level of validity and practicality of the Flipped-Guided Inquiry Based Learning (FGIL) model which developed for learning in tertiary institutions. The type of research undertaken was Educational Design Research (EDR) with the Plomp development model. The subjects of this study were chemistry lecturers at Padang State University (UNP) and chemistry students who are studying general chemistry. The instruments used were the validation sheet to test the validity, and the practicality sheet to test the practicality. The validation was carried out by 4 chemistry lecturers and one to one by 3 students. The practicality test was carried out on 40 1st year students taking general chemistry courses. Analysis of the validity and practicality data, the value for the validity test was 0.85 with the valid category, and the practicality test was obtained for 0.82 with the very high practicality category. The results show that the FGIL model is valid, practical and effective and can be applied by lecturers in lectures.

**Keywords** – *Guided Inquiry, Flipped Classroom, FGIL, Chemical Kinetics.*

## I. INTRODUCTION

The Covid-19 pandemic has hit almost all over the world, including Indonesia. The impact of the Covid-19 pandemic has caused changes to the learning system. This is a decision from the Indonesian Ministry of Education which states that the learning process during the Covid-19 pandemic is carried out from home or what is called as distance learning (online) (1,2). In online learning, the challenge faced by teachers is that they have to think of appropriate learning to stimulate students to take online lectures (3).

Learning that can be used in online learning systems is *blended learning*. Learning with system *blended learning* has two learning setting, they are synchronous and asynchronous (4). One part of *blended learning* is *flipped classroom* (5). Learning with the flipped classroom system is learning by reversing what usually happens in the classroom and outside the classroom.

In the learning process, students are required to be active in learning. One learning model that can increase student activity is guided inquiry learning model. Learning with the guided inquiry model familiarizes students with solving problems, thinking critically and achieving understanding independently, so that students can be actively involved in the learning process (6).

Based on the background above, this study conducted a research on the development of the Flipped Guided Inquiry Based Learning (FGIL) model on chemical kinetics material for year 1 students. This model is expected to be effective for learning with online systems during the pandemic and other special conditions as well as support for learning in era 4.0. In the designed learning model, the learning process uses supporting facilities in the form of the *Learning Management System* (LMS), namely Edmodo and *Zoom Meeting*.

### II. METHODE

Type of research carried out was *Educational Design Research* (EDR) with the Plomp development model, the stages are; *preliminary research*, *development or prototyping phase* and *assessment phase* (7). This paper is only limited to the stages validity and practicality of the FGIL model on chemical kinetics material for year 1 students.

In *preliminary research* stage, needs and context analysis were carried out, literature studies and conceptual framework development. Context analysis is carried out by looking at the description of conditions in the field related to the learning process in the General Chemistry course. The needs analysis is done by analyzing the General Chemistry semester learning plan (RPS). Literature studies are carried out to find and understand sources related to the development that will be carried out, and find solutions to problems through scientific journals. Furthermore, based on the problems that have been identified and linked to some existing theories, a framework of thinking is developed.

In the *development or prototyping phase*, a micro research cycle is carried out namely analysis, designing, evaluation and revision. At this stage, after designing prototype 1, a formative evaluation is then carried out. The formative evaluation was carried out in the form of a *self-evaluation* whose revision results resulted in a prototype 2. Furthermore, *expert review* and *one to one evaluation*, which aimed to determine the validity of the model developed. Validation was carried out by 4 chemistry lecturers, and one to one evaluation was by conducting interviews with 3 chemistry students. After being revised, it will produce a prototype 3. Then carried out with *small group evaluation* is on prototype 3, namely by conducting trials on 6 students and the results of the revisions will produce prototype 4.

In the *assessment stage*, a field test is carried out, namely a field trial of the resulting prototype 4. Field trials were conducted on 40 students who were taking general chemistry courses. At this stage, the practicality test of the developed model is carried out.

### III. RESULTS AND DISCUSSION

#### Results

In preliminary research stage can be seen that general chemistry lectures are conducted online, due to the current pandemic condition. In general chemistry courses, one of the materials studied online is chemical kinetics. After conducting a literature study, it can be seen that for emergency learning during the Covid pandemic, it can be done by implementing *flipped classroom* learning, and guided inquiry learning can be transferred to the online system. Thus a learning model was developed that combines guided inquiry learning with the flipped classroom system, which is called the *Flipped GuidedBased Learning Inquiry*(FGIL) model. The following are the stages of learning the FGIL model.



Figure 1. The FGIL Learning Cycle

In the *development or prototyping phase*, what is done is making a prototype. The things done first to make prototype 1 are 1) design learning using guided inquiry, 2) determine a model that is in accordance with the learning objectives (models can be in the form of images, graphics, data tables, videos, etc.), 3) make questions keys that are tailored to the expected concepts and are based on the model, 4) create questions and exercises, and 5) concentrate to the part of the guided inquiry syntax in Edmodo.

The learning model developed is guided inquiry learning which presented in *flipped classroom*. Learning contains two learning settings, namely asynchronous and synchronous. Asynchronous learning is carried out at the stages of preparation, orientation, and exploration and concept formation. Meanwhile, synchronous learning is carried out at the application and closing stages. The orientation stage as well as exploration and concept formation were carried out using Edmodo LMS, while the closing stage was carried out using a *zoom meeting*.

The resulting prototype 1 was then *self-evaluated*. From the *self-evaluation* it can be seen that there is still 1 component that is not in the prototype 1. Furthermore, the prototype 1 revision is carried out. The results of the revision of prototype 1 are called prototype 2. The resulting prototype 2 is then carried out to *one to one evaluation* which is carried out on three students. From the results of the *one to one evaluation*, it can be seen that the voice on the orientation video, the language used and the key questions given are clear and can be understood by students. From the results of the interview, the suggestions given by students were that the model (image) needed to be added some more information that made it easier for students to explore images. In prototype 2, validation was also carried out by an *expert review*. From the validity test, it is known that the value obtained is 0.85 in the valid category. This indicates that in terms of content feasibility, construction, language and graphics the FGIL model developed has a valid category. The revised results from *one to one evaluation* and assessment by *expert review* resulted in a prototype 3.



Table 1. Validity Results According to *Expert Review*

No	Aspects Assessed	Values	Category
1	Content Feasibility	0.86	Valid
2	Construction Feasibility	0.87	Valid
3	Linguistic	0.85	Valid
4	Graphics	0.81	Valid
<b>Average</b>		<b>0.85</b>	<b>Valid</b>

The resulting prototype 3 was then subjected to a *small group evaluation*. This *small group evaluation* was conducted on 6 students, the aim of which was to see the practicality of the resulting FGIL model. From the test, it can be seen that the practicality value obtained is 81 with the very high practicality category. Based on the opinions given by students during *small groups*, it is known that learning carried out using the FGIL model can motivate and help students in learning. The results of the revision of the prototype 3 resulted in a prototype 4.

Table 2. Practice Results of Small Group Evaluation

No	Aspects Assessed	Percent Value (P)	Practicality Criteria
1	Ease of use	79	High
2	Time efficiency	82	Very High
3	Benefits	81	Very High
<b>Average</b>		<b>81</b>	<b>Very High</b>

In the Assessment Phase, a field test was carried out on prototype 4. This stage is also called a field test which aims to obtain a final opinion regarding the practicality of the model being developed. The test was conducted on 40 chemistry students and 2 general chemistry lecturers. From the test, it was found that the student practicality was 82 with the very high practicality category. While the practicality of the lecturers is 85 with a very high practicality category.

Table 3. Results of Practicality Field Test Student

No	Aspects Assessed	Percent Value (P)	Practicality Criteria
1	Ease of use	82	Very High
2	Time efficiency	80	Very High
3	Benefits	84	Very High
<b>Average</b>		<b>82</b>	<b>Very High</b>

### Discussion

The learning model is a general pattern of learning behavior to achieve the expected learning outcomes (8). The learning model is also a plan or pattern (which can be used long-term) to guide learning process in the classroom. The learning model has several components, which are 1) there are steps (Syntax), 2) a social system, namely there are activities carried out by teachers and students, 3) the principle of reaction, there is interaction between teachers and students and it can also be seen from the teacher's response to participants students, 4) support systems, which are the conditions required by a model (technical capabilities and facilities), and 5) instructional impacts and accompaniment impacts (9,10). The FGIL model developed can be said to be a learning model because it fulfills the five components of the model.

From table 1 it can be seen that the results of the validity of the FGIL model on the chemical kinetics material for year 1 students by experts, obtained a value of  $V = 0.85$  in the valid category. This indicates that the model developed is valid in terms of content feasibility, construction feasibility, language and graphic.

In terms of content feasibility, the FGIL Model has an average  $V$  of 0.86 in the valid category. That means, the orientation that is conveyed through the video is in accordance with the material being taught, the model (pictures, tables, etc.) used to answer key questions is in accordance with the material being taught, scientifically correct, and can be explored to answer key questions. The key questions contained in the exploration stage (in Edmodo) can lead to explore the models, the combination of models with key questions can guide the students for finding the concepts, and the exercises and questions contained in Edmodo can strengthen and solidify the concepts.

In terms of construction feasibility, the FGIL model has an average  $V$  of 0.87 in the valid category. This means that the learning design is based on the guided inquiry learning cycle, the Edmodo application that has been socialized before makes it easier for students to access learning; Orientation videos have image quality and clear sound; the presentation of questions accompanied by models (pictures, tables, etc.) make the students easier at the exploration stage; the key questions given have started from simple to complex; presenting the application stage on Edmodo's small group feature allows students to have discussions between group members; and the closing stage which is carried out directly using the application *zoom meeting* allows students to confirm the concepts obtained with the lecturer directly.

In terms of language, the FGIL model has an average  $V$  value of 0.85 in the valid category. This means that the language used in the orientation video is valid, and the language used in the key questions is a good and correct language according to Indonesian spelling rules.

From a graphic point of view, the FGIL model obtained a  $V$  value of 0.81 in the valid category. This suggests that the models (pictures, tables, etc.) that are presented in Edmodo can be observed clearly.

The FGIL model in the chemical kinetics material developed has a very high category of practicality in terms of student and lecturer assessments. The practicality of the students' responses shows that the average  $P$  value obtained is 82 which is in the very high category. As for the practical results of the lecturers' responses, the average  $P$  value obtained was 85 in the very high category. From the results obtained, it can be seen that the FGIL model in chemical kinetics material developed is easy to use by students and lecturers, it also can make the learning process more efficient because students can learn at their own learning pace, and can be useful in terms of understanding the concept of material and increasing student activity.

In terms of ease of use, it was obtained an average  $P$  value of 82 with a very high practicality category. This indicates that the learning steps based on the FGIL model are easy to understand. In addition, the models (pictures, tables, etc.) and key questions provided on Edmodo are easy to understand. So this also indicates that the language used in Edmodo is easy to understand.

In terms of learning time efficiency, the FGIL model has a very high level of practicality with an average  $P$  value of 80. This shows that by using the FGIL model, students can learn at their own pace. thus causing learning time to be more efficient.

In terms of benefits, the FGIL model has a very high level of practicality with an average  $P$  value of 84. This indicates that the use of the FGIL model makes it easy for students to understand the concept of chemical kinetics. The models (pictures, tables, etc.) used in Edmodo can help students answer key questions, so that they can help the students understand concepts. In Edmodo, there are exercises and questions that can strengthen the students in understanding the concept of chemical kinetics, and using the FGIL model can increase student interest and activity in learning.

#### IV. CLOSING

Based on the research that has been done, it can be concluded that:

1. The *Flipped Guided Inquiry based Learning* (FGIL) model on chemical criteria material for year 1 students can be developed.
2. The *Flipped Guided Inquiry based Learning* (FGIL) model on chemical kineries material for year 1 students developed has a validity value of 0.85 with valid criteria, and a practicality value of 82 with a very high practicality category,

#### REFERENCES

- [1] Health M, Minister of AND, Negeri D, Year P, and A, Academic T. stipulate Joint Decree Law Number. 2020; 2019.
- [2] Reynders G, Ruder SM. Moving a Large-Lecture Organic POGIL Classroom to an Online Setting. *J Chem Educ.* 2020;
- [3] Nerantzi C. The Use of Peer Instruction and Flipped Learning to Support Flexible Blended Learning During and After the COVID-19 Pandemic. *Int J Manag Appl Res.* 2020; 7 (2): 184–95.
- [4] Chaeruman UA. Designing a Blended Learning Model Designing a Blended Learning Model. *J Technodic.* 2013; 17 (4): 053.
- [5] Powell A, Watson J, Staley P, Patrick S, Horn M, Fetzer L, et al. Blending Learning: The Evolution of Online and Face-to-Face Education from 2008 - 2015 *Blending Learning: The Evolution of Online and Face-to-Face.* 2015; (July).
- [6] Kardena H, Mawardi M. Development of Guided Inquiry Based Student Worksheet for First College Student. *Int J Sci Res Publ.* 2020; 10 (10): 375–9.
- [7] Akker J van den, Bannan B, Kelly AE, Nieveen N, Plomp T. Educational Design Research Educational Design Research. Nieveen TP & N, editor. *Educational Design Research.* 2013. 1–206 p.
- [8] Wijanarko Y. Make A Match Learning Model for Fun Science Learning. *J Taman Cendikia.* 2017; 1 (1).
- [9] Joyce B, Weil M. *Models of Teaching* Fifth Edition. 2003. 1–479 p.
- [10] Sunyono. *Representation Multiple Learning Model.* Bandar Lampung: Media Academy; 2015.

# *Administrative And Legal Methods Of Ensuring Road Safety In The Republic Of Uzbekistan*

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**Abstract** – The article analyzes the issues of ensuring safe road traffic in the Republic of Uzbekistan on the basis of studying the norms of national legislation, opinions of domestic and foreign scientists. It is noted that road safety today is one of the strategic tasks of the republic. Further development and improvement of road safety in the country, regulation of relations in this area, suggest the need to improve legal and organizational measures to ensure road safety. On the basis of the study, scientifically grounded proposals and recommendations were formulated aimed at improving this area.

**Keywords** – Road Safety, Emergency Situations, Road Users, Road Traffic Accidents.

In the Republic of Uzbekistan, a purposeful policy is being pursued to reform the state-legal nature in the field of organizing and ensuring road safety, which are aimed at preventing and suppressing accidents on the roads, as well as making them really safe for all participants.

As the head of state noted, «... In the Canadian city of Calgary, which has more than 1 million vehicles, 10 people died in road accidents in 10 months of this year. For comparison, in our country, where in total there are more than 2.5 million units of road transport, over 1,600 people died on the roads during the same period. Isn't this a tragedy, a huge loss? »[1].

So, according to the Main Directorate of Traffic Safety of the Ministry of Internal Affairs, 2,388 accidents were recorded in the first half of 2020, which is 176 or 6.9% less than in the same period last year. The number of fatal accidents has also decreased - 642 (in the first half of 2019 - 777). However, the statistics remain disappointing so far, 3-4 people die on the roads every day[2].

One of the main regulatory legal acts regulating road safety is the Constitution of the Republic of Uzbekistan, the Law of the Republic of Uzbekistan «On Road Safety»[3], the Law of the Republic of Uzbekistan «On Internal Affairs Bodies»[4], Resolution of the President of the Republic of Uzbekistan «On Measures to Further Improve the Safety System road traffic» , the Resolution of the Cabinet of Ministers of the Republic of Uzbekistan «On measures to further improve the road safety system in the Republic of Uzbekistan»[5], as well as the Code of the Republic of Uzbekistan on administrative responsibility, regulating measures of administrative responsibility and other measures of administrative and legal coercion that could be applied for traffic violation.

In accordance with article 4 of the Law of the Republic of Uzbekistan Law of the Republic of Uzbekistan «On road safety», the main principles of ensuring road safety are: the priority of protecting the life and health of citizens, protecting their rights and

legitimate interests, as well as the environment; priority of measures to ensure road safety; consistency of activities to ensure road safety.

It should be noted that state administration in the field of road safety is carried out by the Cabinet of Ministers of the Republic of Uzbekistan, local government bodies and specially authorized state bodies, specially authorized state bodies in the field of road safety include: Uzbek Agency for Automobile and River Transport; State Traffic Safety Service of the Ministry of Internal Affairs of the Republic of Uzbekistan.

The Main Traffic Safety Directorate of the Ministry of Internal Affairs of the Republic of Uzbekistan is a structural subdivision of the central office of the Ministry of Internal Affairs of the Republic of Uzbekistan, which ensures the organization of work on the prevention and prevention of offenses on the roads, ensuring road safety.

The main tasks of the Main Directorate are: a comprehensive and systematic analysis of information on ensuring road safety, taking into account the state of the road transport infrastructure, the dynamics of road accidents, violations of traffic rules, road congestion, the technical condition of vehicles, as well as eliminating the causes and conditions of occurrence problems and shortcomings in this area; organization and coordination of the activities of traffic safety units of the internal affairs bodies to combat road accidents and violations of traffic rules; organization of road safety, including prevention and suppression of traffic violations, prevention of road accidents and road congestion, identification and identification of persons involved in the commission of offenses; organizing interaction with other departments of the internal affairs bodies, government bodies, civil society institutions, as well as establishing an open dialogue with the population on road safety issues; development of proposals for further improvement of legislation, law enforcement practice, as well as forms and methods of ensuring road safety, etc. [6].

At the same time, as a foreign scientist noted, the problem of preventing road accidents is complex, requiring joint efforts of ministries, departments, other state bodies, many enterprises and organizations for its solution. Meanwhile, the road safety system is currently far from being optimal. This explains that even with a more or less effective work of individual entities included in the system, in general, activities aimed at preventing road accidents, reducing the severity of their consequences, in the country cannot be recognized as satisfactory [7, 91 P].

The organization of road traffic in its administrative and legal terms should be a complex of measures aimed at the implementation of the norms governing the procedure for the emergence, development and protection of social relations that form it in the field of road traffic.

The main goal of reforming the system of legal regulation of road transport relations in the Republic of Uzbekistan is to increase the degree of protection of road users, prevent road accidents and minimize their harmful consequences, as well as introduce legal responsibility for road accidents into effective legal recovery mechanisms in these relations. In this area, it is necessary to create adequate management and interaction mechanisms.

Ensuring road safety today rightfully belongs to the top priority tasks of the state, which are of national importance. The current situation with road safety, despite the measures taken in the state, continues to show negative dynamics.

According to the Main Directorate of Road Traffic Safety of the Ministry of Internal Affairs of the Republic of Uzbekistan, in 2020, the number of fatal accidents in road accidents amounted to 169 people, which is 12.9% less than in 1940 cases the year before last. 1962 people died in them, or 6.3% less than in 2019 [8].

The issues of the concept of road safety, its content and features have always been under the close attention of representatives of domestic legal science, however, despite this, the definition of road safety remains controversial. At the same time, at present, in administrative legal science, relatively stable ideas have developed about the main approaches to the definition of road safety, the aspects of which should be formulated as 1) a scientific and legal category, 2) a legal category, 3) a socio-legal category. Considering road safety in the first meaning, based on the analysis of the study of road safety, we came to the conclusion that it is necessary to formulate a definition of road safety, reflecting its socio-economic and technical nature. In this regard, it is believed that the study of this concept should be based on the analysis of two basic concepts «road traffic» and «safety».

In accordance with the Law of the Republic of Uzbekistan «On Road Traffic Safety», road traffic is understood as a set of relations arising in the process of moving people and goods with or without vehicles within roads, and ensuring road safety is understood as activities aimed at preventing the causes of road accidents, reducing the severity of their consequences.

Analyzing the above, road traffic should be understood as an activity to satisfy personal and social needs in the spatial movement of people, means and products of their labor, based on the use of the technical complex «vehicles – roads», consisting in controlling the movement of vehicles, moving on vehicles without control of them or natural pedestrian movement on roads, proceeding under the conditions of a constant risk of uncontrolled movement of motor vehicles and subsequent negative consequences in the form of death, injury of people, damage to material objects.

Continuing the study of the concept of «road safety», it is necessary to analyze the following aspects: 1) the interests of road users, 2) resistance to threat, 3) freedom of road users, in addition, there are several signs of road safety: the first is the state and the nature of the protection of public relations from the threat associated with the danger of road accidents that can lead to the death of people or cause them bodily harm of various severity, damage vehicles, roads, structures, cargo or cause other material damage. The second sign of road safety is the place of origin of social relations - the economic sphere of human activity.

Summing up the analysis of the concept of road safety as a scientific and legal category, the conclusion was determined for the concept of «road safety», which has an independent legal meaning, has specific features that indicate an independent legal nature and allow it to be distinguished as a separate legal category, which is necessary both for theory and for legal practice.

### REFERENCES

- [1] «A comprehensively developed generation is the basis of a great future, the creative work of the people is the basis of a prosperous life, friendship and cooperation are a guarantee of prosperity». \ Report of President Shavkat Mirziyoyev at the solemn meeting dedicated to the 26th anniversary of the adoption of the Constitution of the Republic of Uzbekistan on December 7, 2018
- [2] Statistical data of the Main Directorate of Traffic Safety of the Ministry of Internal Affairs for 2020
- [3] Law of the Republic of Uzbekistan «On road safety» dated April 10, 2013, No. 3PY-348
- [4] Law of the Republic of Uzbekistan «On Internal Affairs Bodies» dated September 16, 2016
- [5] Resolution of the Cabinet of Ministers of the Republic of Uzbekistan «On measures to further improve the system of ensuring road safety in the Republic of Uzbekistan»
- [6] Resolution of the President of the Republic of Uzbekistan «On measures to further improve the road safety system» dated July 11, 2017, No. PP-3127
- [7] Potapenko I.V. Measures to ensure the proceedings in cases of administrative offenses in the field of road traffic. \ Actual problems of the administrative activities of the police. Materials of the All-Russian Scientific and Practical Conference. Krasnodar, 2016 P.91
- [8] Statistical data of the Main Directorate of Traffic Safety of the Ministry of Internal Affairs for 2020

# *Formation And Variability Of Modern Orphoepic Norms Of The Literary Language*

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**Abstract – The article examines the main reasons for the violation of the orthoepic norms of the modern Russian literary language in oral speech; matters of the normative variance of a word in the Russian language, which are considered in the proper linguistic aspect, the interaction of spelling and spelling norms.**

**Keywords – Orthoepy, Variability, Literary Norm, Double Pronunciation, Variation.**

In the modern world, we often face problems with the pronunciation of certain words and not only words, but also parts of a word. Along with the formation of the modern Russian language, the formation of orthoepic norms of the modern Russian language and the variability of these norms are also observed.

At first glance, it may seem that the norm of the literary language allows only one way of expression. The Russian literary norm is flexible, stylistically diverse, and exists in many variations. The mobility of the linguistic norm often leads to the fact that for the same linguistic phenomenon there is not one way of expression, but several. The evolution of language inevitably presupposes the stage of coexistence of two or even more modes of expression. The existence and functioning of the doublet elements of the language system at the phonetic, lexical and grammatical levels is called variance. Variants of norms are also reflected in the dictionaries of the modern literary language.

The existence of variant forms raises questions such as: how is it right - творог или творог, индустрия или индустрия, маркетинг или маркетинг, сосредоточиваться или сосредотачиваться, договор или договор. Since stress changes rapidly, it is easy to trace the paths of stylistic differentiation of linguistic means on words reflecting fluctuations in stress.

There are variants that differ in pronunciation: дож[д 'и] — до[ж'ж']и, дое/~ж'ж']ать - дое[жж]ать \ variants of words at the place of stress are called accent variants: творог — творог, звонит — звонит \ grammatical fluctuations create grammatical variants.

There is an opinion that the presence of such options is an imperfection of the language, but this judgment is deeply mistaken. Traditional Russian culture of oral speech allows variations, the pronunciation of words varies depending on the nature and purpose of the utterance.

In addition to the fact that the options seem to support the acceptance of speech skills, they also have a special functional load - they act as an important stylistic tool (в отпуске - в отпуску). In those cases, when the variants do not give anything semantic or

stylistically, they usually speak of doublets. The literary language seeks to get rid of simple doublets that do not carry a useful functional load. For example, in the 18th century, the foreign language word coffee was found in more than ten forms: кофей, кафе, кохвий, кофь, кава, etc. Over time, these redundant options are eliminated from speech use.

However, the fluctuation of the forms of this word is different today in the modern Russian language. Along with its literary use in the masculine gender (черный кофе), in spoken language speech, its use in the neuter gender is often found. Some researchers believe that this very agreement (горячее кофе) will become the grammatical norm in the future. Thus, the number of redundant options decreases, and in this one cannot fail to see the processes of improving the language.

The emergence of many orthoepic variants is associated with the development of the literary language. The pronunciation is gradually changing. So at the beginning of the 20th century, they said а[н']гел, це[р']ковь, ве[р']х], пе[р']вый. And at the present time, such pronunciation can often be found in the speech of older people. Unfortunately, the solid pronunciation of the consonant [с] in the particle -ся (сь) is very quickly leaving the literary language (смеял[с]а, встелили[с]). At the beginning of the 20th century, this was the norm of the literary language, as well as solid sounds [г, к, х] in adjectives in -кий, -гий, -хий and in verbs in -кивать, -гивать, -хивать. The words высокий, строгий, ветхий, вскакивать, подпрыгивать, стряхивать were pronounced as if it had been written строгой, ветхой, вскаковать, подпрыговать. Subsequently, the norm began to admit both options - старый и новый: и смеял[с]а и смеял[с']я, и стро[г]ий и стро[г']ий. As a result of changes in literary pronunciation, variants appear, some of which characterize the speech of the older generation, others - of the younger.

The orthoepy of the modern Russian literary language is a historically developed system that, along with new features, largely retains the old, traditional features reflecting the historical path passed by the literary language. The historical basis of Russian literary pronunciation is the most important features of the spoken language of the city of Moscow, which developed back in the first half of the 17th century. By the indicated time, the Moscow pronunciation had lost its narrow dialectal features, combined the peculiarities of pronunciation of both the northern and southern dialects of the Russian language. Acquiring a generalized character, the Moscow pronunciation was an expression of the national one.

Moscow pronunciation norms were transferred to other economic and cultural centers as a model and there they were assimilated on the basis of local dialectal characteristics. This is how the pronunciation peculiarities, unusual for the Moscow orthoepic norm, developed. The most pronounced were the peculiarities of pronunciation in St. Petersburg, the cultural center and capital of Russia in the 18th-19th centuries. At the same time, there was no complete unity in the Moscow pronunciation: there were pronunciation options that had different stylistic colors.

So, we are talking about the older (old Moscow) and St. Petersburg norms. Petersburg, which has become a cultural center, reflected the desire of native speakers, oriented towards writing, to bring spelling and orthoepy closer together.

Literary pronunciation is often referred to as stage pronunciation. This name indicates the importance of realistic theater in the development of pronunciation. When describing pronunciation norms, it is quite legitimate to refer to the pronunciation of the scene.

In the formation of literary pronunciation, an exceptional role belongs to radio broadcasting, television and sound films, which serve as a powerful means of spreading literary pronunciation and maintaining its unity.

The pronunciation system of the modern literary language in its basic and defining features does not differ from the pronunciation system of the pre-October era. The differences between the first and the second are of a particular nature. The changes and fluctuations that have arisen in modern literary pronunciation concern mainly the pronunciation of individual words and their groups, as well as individual grammatical forms. So, for example, the pronunciation of a soft sound [с] в аффиксе -сь — -ся (мою[с'], мыл[с'ь]) при старой норме (мою[с'] — мыл[с'ь]) does not make any changes to the system of consonant phonemes of the modern Russian language. Strengthening the new pronunciation variant of the affix -сь — -ся (бою[с']) as a modern orthoepic norm brings pronunciation closer to writing, which was not the case with the old pronunciation variant (бою[с]), and therefore it is quite expedient.

The selection in the literary language of styles in the field of vocabulary and grammar is also manifested in the field of pronunciation. There are two types of pronunciation style: spoken language style and public (book) speech style. Conversational style is common speech that dominates everyday communication, stylistically weakly colored, neutral. The absence in this style of setting for perfect pronunciation leads to the appearance of pronunciation variants, for example: [прос'ут] и [прос'ът], [высок'ий] и [высок'ий]. The book style finds expression in various forms of public speech: in radio broadcasting and sound films, in reports



and lectures, etc. This style requires impeccable language design, strict preservation of historically formed norms, and the elimination of pronunciation variants.

In cases where the differences in pronunciation are due solely to the field of phonetics, two styles are distinguished: full and colloquial (incomplete). The full style is characterized by clear pronunciation of sounds, which is achieved by a slow speech rate. The conversational (incomplete) style is characterized by a faster tempo and, naturally, less careful articulation of sounds.

Thus, the number of redundant options decreases, and in this one cannot fail to see the processes of improving the language. And in turn, the change in norms is preceded by the appearance of their variants, which actually exist in the language at a certain stage of its development.

### REFERENCES

- [1] Valgina N.S. Active processes in modern Russian.
- [2] Volvak N.P. Active processes in the field of modern stress.
- [3] Gorbachevich K.S. Variation of the word and language norm. L., 1978
- [4] Zarva M.V. Accentology.
- [5] Kolesov V.V. History of Russian stress.
- [6] Kulikova E. The norm of stress and shift of accents in the Russian language.
- [7] Ozhegov S.I. and Shvedova N.Yu. Explanatory dictionary of the Russian language. - M.: Azbukovnik, editions, 2005
- [8] Russian spelling dictionary / Russian Academy of Sciences. V.V.
- [9] Lopatin (editor-in-chief), - 2nd ed., Rev. and add. - Moscow, 2004.

## *The Use Of Complex Sentences In Oral Public Speech*

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**Abstract** – This article discusses the problems of using complex sentences in oral public speech. It is necessary to identify the most essential characteristics of intellectualized oral speech, its connections and relationships in the sphere of varieties of the modern Russian literary language, as well as its characteristic differences due to the technical way of presentation.

**Keywords** – Oral Public Speech, Pronunciation, Variation, Difficult Sentence, Subordinative Compound Sentence, Non-Union Complex Sentence, Polypredicative Compound Sentence, Composed Complex Sentence.

Usually, much attention is paid to the theory and description of a complex sentence in linguistics. According to the fair remark of I.P. Raspopov, "The whole syntax" revolves "around the sentence." And despite the abundance of literature related to the problem of a complex sentence, the syntactic unit again became the object of attention in our work. What is the reason for this? The answer to this question presupposes, first of all, an appeal to the peculiarities of the type of speech, which is investigated in the work. What is interesting about oral public speech as a sphere of functioning of a complex sentence?

The oral type of speech (namely, its subtype - colloquial speech) begins to be studied in Russian studies since the mid-60s. And a complex sentence immediately becomes the object of attention of linguists. However, studies are directed only to individual elements of its system: certain types of composed, complex, subordinative, non-union sentences (CCS, SCS, NCS). In this case, as a rule, bipredicative constructions are considered. Multicomponent CCS and SCS, as well as polypredicative complex sentences (PCS) of oral speech, formed on the basis of two or three types of communication, do not fall into the field of view of linguists at all, since it is believed that in the conditions of the oral-speech flow there is a large volume and presence weak syntactic links at the main level of articulation do not provide the polypredicative construction with the necessary fastening potential, allowing it to function as an integral syntactic unit (when verbally realized, the PCS breaks down into separate phrases).

In the works of E.N. Shiryayev presents a systematic description of a non-union complex sentence that functions in both written and oral literary speech. On the basis of extensive linguistic material, the author showed that book-written asyndetic structures and oral-spoken structures have significant differences due to the form of speech implementation. The next step in the analysis should be the study and integration of the general principles of constructing a complex sentence in the oral-speech stream, which is characterized by segmentation. Since it is she who generates various properties of the relations between segments, which are often common to union and non-union sentences. Therefore, the need to study the system of a complex sentence as a whole was clearly revealed, taking into account the peculiarities of the oral form of implementation.

To solve this problem, it is necessary to determine the specific type of oral speech .. Modern publicly addressed oral speech from the point of view of the way of presentation appears in two main forms: radio and television. Here we can also name Internet

speech, which, while not being oral in the proper sense of the term, reveals in some of its genres the features of the oral-speech organization.

The lack of direct contact with the audience predominantly determines the monologic nature of radio speech in comparison, for example, with television. The monologue factor is relevant for the analysis of an oral complex sentence, since segmentation, as the main way of organizing the oral-speech flow, is most fully manifested in a monologue. Dialogue speech consists of short, situationally fixed replicas. In them, as a rule, firstly, the boundaries of the proposal are clearly presented, and secondly, a clearer intra-structural organization. And the shorter the sentence, the less opportunities for manifestation of destructive tendencies, the more strict are the formal features of the models. Conversational dialogue contains syntactic constructions that differ in a certain stable, reproducible form.

An oral monologue is a different matter. The principle of segmentation, implemented in a monologue, allows the speaker to connect segments of a wide variety of devices within one structure. This creates a wide field for syntactic transformations: a sentence can coincide with the codified model, it can have oral and speech specificity with a general adherence to the structural-semantic scheme of a codified sentence, it can have no analogues both with formal observance of the structural-semantic scheme of a sentence, and inconsistency with her. Thus, a monologue speech allows you to fully realize the syntactic potential of a complex sentence.

For the analysis of an oral sentence, in addition to monologic organization, the factor of spontaneous speech production is relevant. Spontaneity, as an immanent conditionality of speech, as a property that is formed at the time of a message, distinguishes radio speech, for example, from Internet speech, where (with formally spontaneous production) it always remains possible to return to the text created on the screen and correct it if necessary. In television speech, due to the pictorial support of meaning, as well as the wide representation of the reproduced speech, not all types of transformations may appear.

In addition to spontaneity and monologue, for the analysis of a complex sentence realized orally, such a factor as the intellectualized nature of speech is important. The richness of speech provides a variety of semantic-syntactic relations expressed in the sentence. The more serious and complex a thought, the more complex and varied the type of syntactic constructions expressing it. As TV critics note, modern television is increasingly turning into a means of entertainment rather than information. And television analytical programs tend to use a reproducible way of presenting speech. In this case, the linguistic material does not possess properties relevant to the organization of a complex sentence realized orally.

Thus, we turn to radio speech, which is positioned as an information radio, where analytical, cultural and enlightening, educational programs are broadcasted live.

Radio speech, possessing the necessary properties that are significant for the organization of an oral complex sentence, and the characterological features of oral publicly addressed speech, is able to adequately represent its features. In the future, the abbreviation OPAS will mean it.

In Russian linguistics, there is still no systematic description of the Russian complex sentence functioning in the oral type of communication. Very many fundamental questions have been little studied or not studied. You can name the following: what are the obligatory signs of an oral compound sentence; what are the main tendencies of development in the complex supply system of the OPAS; how does the system of a complex sentence OPAS correlate with similar systems of other speech varieties of the modern Russian literary language; what are the principles of differentiating paratactic, hypotactic and asyndetic structures; what is the specificity of multicomponent and polypredicative oral constructs; what are the restrictions imposed by the spontaneous nature of the speech process that are relevant to the syntax of a complex sentence; what are the word-order and linear-structural features of the organization of an oral complex sentence; what determines the multifunctionality of communication indicators in an oral sentence; which components in the complex sentence system evolve in the first place, and which of its links are more stable. The description of the system of a complex sentence of the UPR, the study of the features of its structuring allows you to take a certain position on these issues

To describe a wide range of poorly studied oral-speech phenomena, the position of the researcher is also important on a number of general theoretical problems: the hierarchy of syntactic units; structure and semantics of linguistic units; complex sentence typology; variability in speech; oral public speech as a type of oral type of the modern Russian literary language.

These problems inevitably arise when analyzing our material. They determine the relevance of the topic of dissertation research.

In modern linguistics, the fact is noted that the emergence and development of global and regional computer networks in recent decades has led to the emergence of the communication sphere, which has qualitatively new properties. The term "Internet speech" has already been introduced into scientific use. The study of this type of speech is just beginning, but its uniqueness is already being noted, which is manifested in the combination and peculiar refraction of the signs of written and oral types of speech.

A fairly large part of the Internet information is the intellectualized type of speech. Today, any oral conversation on a socially significant topic, given on a live radio or television broadcast, can then be read on the Internet. Ways of transforming an oral text into a written one are interesting. Specifically oral moments associated with the organization of the utterance are eliminated. For example, the grammatical forms of the sentence members are brought into clear correspondence, the lacunae are filled in with the verbal material, functionally unloaded repetitions are eliminated, etc. All this makes the text comfortable and familiar to visual perception.

However, it is not possible to completely get rid of the specifics of oral-speech construction, since when transforming an oral text into a written one, there is a danger of eliminating coherently significant components. So, on the Internet, constructions built on the principle of interrupting the syntactic perspective of an utterance (interruption is transmitted by ellipsis) and constructions with a violation of the syntactic perspective are usually preserved. Such structures contain some component, which is then developed in subsequent sentences, so it is impossible to eliminate them without prejudice to understanding the meaning. However, the presence of such constructions in a written text causes the effect of visual rejection, visual discomfort. The Internet user sees a construction that is different from the usual sentence scheme that he encounters every day in any other type of written text.

All this prompts to turn again to the complex of theoretical problems that the practice of linguistic research of oral speech has already encountered. It is necessary to identify the most essential characteristics of intellectualized oral speech, its connections and relationships in the sphere of varieties of the modern Russian literary language, as well as its characteristic differences due to the technical way of presentation. This, in turn, leads to problems of the form of implementation of intellectualized speech, types of speech, its genre originality and linguistic means used in it.

Thus, consideration of the above problems allows us to clarify the structure of the literary language and its varieties, to clarify the relationship of the corpus of syntactic means in oral public speech to the corpus of general literary, book-written and oral-literary syntactic means. The study of the theoretical problems of the oral sentence allows, on the one hand, to explain the appearance in the literary-written speech of constructions that become productive and are activated in modern linguistic reality as a result of the influence of the oral type of speech on the literary-written, as a result of the "democratization of codified syntax". On the other hand, it will make it possible to establish patterns of syntactic organization of speech in new areas of communication, in particular, Internet speech (computerized speech, according to V.M. Leichik), the mechanisms of the device and syntax of which will definitely become the subject of comprehensive study in the near future. Our research (within the framework of the designated topic) is designed to contribute to this. It should highlight theoretical approaches to the new material.

### REFERENCES

- [1] Akimova O.B. On the question of the term "quasi-complex sentences" // Problems of modern syntax: theory and practice. Interuniversity. Sat. scientific. tr. M: MANPO, 2002.
- [2] Andramonova H.A. Hypotaxis in the service of modus: system and functioning // Complex sentence: traditional questions of theory and description and new aspects of its study. Issue 1. Materials of the scientific conference. Moscow: Russian Training Center, 2000.
- [3] Andreeva S.B. Typology of constructive-syntactic units in Russian speech // Questions of linguistics. 2004. No. 5.
- [4] Borisova I.N., Russian conversational dialogue: the problem of integrativity. Diss. ... Dr. philologist, sciences. Yekaterinburg, 2001.
- [5] Gavrilova G.F. Sentence-utterance and cognitive models of knowledge // Actual problems of philology and teaching methods. Interuniversity. Sat. 4.1. Rostov-on / D. : RGPU, 2001.
- [6] Ereshchenko M.V. Constructions with the service word "I" and their varieties in modern Russian. Abstract of thesis. diss. ... Cand. philologist, sciences. Rostov-on / D., 2001.

# *The Phenomenon Of The Folk - Applied Art Of Uzbekistan In The Creative Development Of Students*

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**Abstract – The article analyzes the creative potential of applied art as a purposeful, organized and controlled pedagogical process of forming a personal aesthetic attitude to reality and aesthetic activity.**

**Keywords – Phenomenon, Creative Potential, Aesthetic Education, Folk - Applied Art, Didactic Conditions, Motivation, Professiogram.**

Modern pedagogical science considers aesthetic education as a complex philosophical and social - pedagogical system, which is an integral part of the general spiritual culture of a person. It has been established that the aesthetic attitude of a person to reality, including the natural and objective environment, art, as well as literature, has its own objective laws that are available for comprehension, study and use in aesthetic, moral and, ultimately, spiritual development and education of the individual. Aesthetic laws are manifested in the life of nature and society, aesthetic consciousness and activity.

Another important position is that aesthetic education as a philosophical and pedagogical category can be evaluated as a purposeful, organized and controlled pedagogical process of the formation of a person's aesthetic attitude to reality and aesthetic activity.

The importance of aesthetic education, the role of the development of the creative potential of teachers - mentors by means of art and literature have been repeatedly emphasized by many great thinkers of the past centuries: Al Farobiy, Abdurahmon Zhomi, Alisher Navoiy, Abdulla Avloniy and others, outstanding educators such as N. Chernyshevsky, L. Tolstoy, V. Belinsky ... This problem was devoted to the scientific works of many prominent scientists - teachers of the last century: V. Sukhomlinsky, A.S. Makarenko, A. Bakushinskiy, L. Vygotskiy and others.

Art, especially folk art, with its enormous aesthetic potential and possibilities, as the most "concentrated and developed" form of aesthetic consciousness, occupies a special place both in the general problems of aesthetics in both science and in the "professiogram" developed by pedagogical science. And here it is very important to develop and create pedagogical conditions for the development of creative potential among students - future teachers of the subjects of the aesthetic cycle at school, in particular teachers of fine arts.

Based on the analysis of the tasks of aesthetic education arising from the works of leading scientists of the Republic in the field of theory and methods of developing the creative potential of youth students by means of folk, decorative and applied arts of

Uzbekistan R. Khasanov, B. Boymetov, S. Bulatov, K. Kasymov and others, and also the latest scientific research of aesthetics, art history, psychology and pedagogy, it can be concluded that the level of aesthetic education directly depends on the level of aesthetic education of future teachers.

And in the conditions of Uzbekistan, where art, especially national decorative and applied art: miniature, artistic embroidery, gold embroidery, ceramics, artistic carving and painting on wood and ganch, etc. have centuries-old aesthetic ideals, aesthetic education is a determining factor in the development of students' creative potential. The President of the Republic of Uzbekistan Sh. M. Mirziyoyev emphasized "... the importance of training in the field of higher and secondary - special vocational education, modern and independent thinking, possessing high spiritual and moral qualities, educated and highly qualified personnel" [1.].

A necessary component of the pedagogical conditions for the development of students' creative potential by means of folk art are motivational - target conditions. Motivational - target conditions should be aimed at achieving didactic, educational and creative goals. The didactic goals, in turn, should be aimed at acquiring by students - future teachers of the fine arts a complex of knowledge, skills and abilities in the field of folk arts and crafts, especially its primordial, traditional types.

For example, when studying traditional embroidery of Uzbekistan, a student should know its main local centers of the Republic, the genesis of the Bukhara center of artistic textiles, embroidery schools of Nurata, Shakhrisabz, Samarkand center of artistic embroidery, Surkhandarya, Karshi, Tashkent, Fergana centers, know the historical stages, the dynamics of development of this type of artistic craft, to be able to highlight the common features and local features of these schools.

In the process of studying, students master the technique and methods of work, the composition of suzane and other products, the constructive construction of patterns and ornaments, color, comprehending their charm and beauty.

Achievement of didactic goals, thus, is aimed at the formation of students' aesthetic education, which ensures in the future the teacher's focus on the aesthetic education of schoolchildren, college students and lyceums.

And most importantly, such creative goals as the development of students' abilities for artistic perception, forms creative thinking, contributes to the understanding of the importance of aesthetic education by means of folk art are realized.

It is very important when creating motivational - target conditions for the development of the richest artistic heritage of our ancestors, providing meaningful conditions - the development of programs, electives, special courses, special workshops in accordance with the "Subjects of choice" block of the standard curriculum. Such a special course on in-depth study of the folk art of the native land in the amount of 54 hours was developed at the Faculty of Pedagogy of Bukhara State University.

The special workshop is largely provided with scientific and methodological material, video and photo materials, creative works, educational and methodological complexes. Here the task is to continuously replenish the content of education using modern information and pedagogical technologies.

In addition to traditional forms and methods of teaching students the primordial types of artistic crafts - lectures, conversations, practical work in educational workshops, the program of the special workshop includes excursions to the museum of folk decorative and applied arts, visits to creative workshops of famous artists - artisans, their invitations to meetings and exhibitions creative works. A. Bakushinsky believes that "a very great educational value is ... aesthetic perception of nature, of course, mainly in the form of artistic excursions. This perception should represent a peculiar form of artistic creation ..." [2, p. 126].

The ultimate goal of organizing pedagogical conditions should be the formation of students' conscious, sustainable interest in national folk applied art, education on this basis of aesthetic taste and aesthetic sensitivity.

Thus, the effectiveness of the development of students' creative potential by means of folk arts and crafts directly depends on the optimal organization of pedagogical conditions, which in turn affects the level of aesthetic training and aesthetic education of the future specialist. B. Nemensky writes: "Art as a culture of attitudes towards all phenomena of life is a group of tasks that actually absorbs the content of art, expressed through it the moral - aesthetic, emotional - value criteria of society" [3, p.82].

"The world of art is a constant source of aesthetic educational affairs," emphasizes another author I.P. Podlasiy [4, p.170].

The development of students' creative potential by means of folk art is a process of purposeful formation of the interest and abilities of a person to cognize and full-fledged perception of the beautiful, develop a system of ideas about the history of the artistic culture of the Uzbek people, form the needs to express themselves in applied art, and introduce elements of beauty into school life.

Thus, traditional folk art culture in the process of purposeful study, perception, classes within the framework of special courses carries a number of aesthetic educational functions. The role of folk arts and crafts as an effective factor in aesthetic education and aesthetic education of future teachers - mentors in modern conditions becomes extremely important, is an urgent necessity of life and contributes to the formation of high moral and aesthetic qualities of the individual.

**REFERENCES**

- [1] Decree of the President of the Republic of Uzbekistan "On Measures to Reform Management in the Sphere of Higher and Secondary Specialized Education" dated July 11, 2019. "Pravda Vostoka", No. 140 dated July 12, 2019
- [2] Bakushinsky A.V. Research and articles. Selected works of art history. - Moscow, S. Artist, 1981.-350 p.
- [3] Nemensky B. The wisdom of beauty. On the problems of aesthetic education. Book. for the teacher. - Moscow:, education, 1987.-255 p.
- [4] Podlasiy I.P. Pedagogy. New course: Textbook for student pedagogical universities: In 2 kn. - Moscow: Gumanti Publishing Center VLADOS, 1999. - Book 2: The process of education. - 256 p.: ill.
- [5] Абдуллаев С.С., Рафиева Н.А. Искусства древней руси и средней азии в духовном диалоге (исторический экскурс) // Вестник науки и образования. 99:21-2 (2020), С. 97-100.
- [6] Тошев И.И., Абдуллаев С.С. Торговые купола Бухары // Интернаука. 48:14-1 (2018), С. 31-33.
- [7] Olimov, Shirinboy Sharofovich. "THE INNOVATION PROCESS IS A PRIORITY IN THE DEVELOPMENT OF PEDAGOGICAL SCIENCES." (2021).
- [8] Khodjayeva N. S., Mamurova D. I., Nafisa A. IMPORTANCE IN PEDAGOGICAL TECHNIQUES AND EDUCATIONAL ACTIVITY //International Engineering Journal For Research & Development. – 2020. – Т. 5. – №. CONGRESS. – С. 5-5.
- [9] Muzafarovna A. N., Jurayevich J. Q. The role of islam in folk decorative art of Bukhara //Asian Journal of Multidimensional Research (AJMR). – 2020. – Т. 9. – №. 5. – С. 347-350.
- [10] Bafaevich, Azimov Barot, and Azimova Mukhaye Baratovna. "The Importance of Teaching Methods of Fine and Applied Arts." *Middle European Scientific Bulletin* 9 (2021).
- [11] Jurayevich, Jumayev Koryogdi, and Abdullayev Sukhrob Sayfullayevich. "THE UNIQUE OF BUKHARA JEWS IN THE DYE INDUSTRY AND WEAVING CRAFT." *Euro-Asia Conferences*. Vol. 1. No. 1. 2021.

# *Identification of Problems and Learning Media Needed by Biology Students in Learning Implementation in Microbiology Subjects*

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**Abstract** – This research is a step to improve the lecture system through identification of problems experienced by students and the learning media needed in the Microbiology course. The initial stage carried out was identifying the constraints and learning media needed by students in the Microbiology course. The research subjects were lecturers of Microbiology and Biology Department students at Padang State University (N = 25). Collecting data using the observation method by distributing questionnaires covering the difficulties experienced in the learning process and identifying the needs of learning media. Based on the data from the questionnaire, it was found that the learning process was still constrained by students' understanding of the concept of microbiology which was fairly abstract and needed better supporting media such as animated videos to be able to describe the learning material more clearly.

**Keywords** – Identificaton, Problems, Media, Micobiology

## I. INTRODUCTION

Teaching and learning is a complex process that is influenced by various factors, including the use of media or teaching aids, which produces the active involvement of the students and make teaching becomes more interactive. The importance of interactive learning or academic engagement is reflected in instructional activities learners should be arranged so that learners have the right opportunity to get involved in the case belajar meaningful not just rote learning. Academic involvement it will prove of how students do chores, focusing on the important topic of learning and the awareness of his own trying to learn. Students need to be seriously involved in learning to achieve a deep understanding. Academic involvement will be closely related to the commitment and motivation of students and interactions in the social system of the classroom ( Killen, 2003: 19).

The use of the latest teaching sources and teaching media that are actual and relevant to technological developments should be applied to various subjects, especially in abstract biology courses. One of the abstract biology courses is Microbiology. Microbiology is a branch of biology that studies microorganisms. The object of microbiological study is all micro- scopic living things, namely living things that need to be seen with a microscope, including bacteria, fungi, microscopic algae, and archaea and viruses which, although in fact, cannot be fully considered as living things. Bacteria, viruses and archaea belong to the prokaryotic group while fungi, protozoa, and microscopic algae belong to the eukaryotic group. Based on the object of microbiology study , it can be seen that the microbiology course is an interesting subject to study.

Based on the Academic Guidelines Book of the State University of Padang (2015), basic microbiology is designated as one of the compulsory subjects in the scientific and skills subject group (MKK). Basic microbiology courses are a requirement for taking



advanced courses such as biotechnology, and other applied microbiology courses, such as soil microbiology, medical microbiology, food microbiology, and industrial microbiology. Students' understanding of basic microbiology courses will be the basis for student understanding in developing microbiology concepts in other courses and making student final assignments when conducting research related to microbiology. Therefore, students must have a good and correct understanding of the concept in this subject. Although the microbiology material in the examples of the application of the knowledge can be directly observed and can be easily found in everyday life, the "biology" process that occurs to produce a product will be difficult for students to understand if it is taught using only pictures or schemes. Therefore, appropriate learning sources and media are needed to be able to concretize the object of study in this microbiology course so that it is easier for students to understand.

The use of the latest and valid learning resources allows lecturers to present the latest information and knowledge according to the development of science in their field. Law Number 12 of 2012 concerning Higher Education Article 41 paragraph 1, mandates that learning resources in the higher education environment must be provided, facilitated, or owned by universities in accordance with the study program being developed. Based on this law, it is clear that higher education institutions are required to develop learning resources according to the needs of students. Even though universities implement an adult learning system (andragogy) where students are required to proactively explore information and knowledge from anywhere related to learning materials, the more complete and actual learning resources developed by lecturers in their field of study make it easier for students to learn and encourage the achievement of learning goals. .

Learning resources are something that can support relatively permanent changes in a person's knowledge, behavior and or attitudes. This can be in the form of data, people, and objects that are used separately or combined in learning and learning to facilitate learning and learning activities whose procurement is developed by design or by utilization (Rahmadi et al, 2018). Ellington and Harris (1986: 95) say, teaching resources are any resources that include people, teaching materials, instructional tools, and others that can be used by learners to realize and facilitate learning. Meanwhile, according to the Association for Educational Communication and Technology (AECT), learning resources are all sources including data, people, and objects that can be used for learning, separately or in combination, in order to achieve learning objectives (AECT, 1986: 9). This is in line with Majid's (2008: 170) statement that learning resources are information that is presented and stored in various forms of media that can help students learn as a form of curriculum. The form is not limited whether in the form of print, video, software, or a combination of these forms that can be used by students and educators.

Based on the opinions of the experts above, it can be concluded that learning resources are anything that can be used to facilitate learning and improve learner performance in learning and learning which consists of messages, people, materials, tools, techniques, and backgrounds that can be used simultaneously. separate or combined, where the utilization can be specifically designed or simply utilized from everything that is available.

The teaching module is one of the teaching resources which is the most important learning reference besides the curriculum in learning. A teacher can use the media more effectively if he understands the underlying concepts of the teaching and learning process (Naz, 2008). In order for the learning experience to be more concrete, teachers must use and prepare special teaching materials. Teaching materials help teach abstract concepts in meaningful ways. A lot teaching aids certainly will strengthen the presentation of faculty into a more profound understanding. The use of media teaching has managed to turn most classrooms of pen gajaran traditional, in which teachers do most of the talking and the learners are passive listeners, into participatory learning centers that facilitate productive learning. (Thomas, 2008: 106)

One of the teaching resources for the Microbiology course used by biology students at the State University of Padang (UNP) is the teaching module prepared by the lecturer who teaches the Microbiology course of UNP, Mrs. Dr. Dwi Hilda Putri, et al (Putri, 2019). Based on the results of the analysis of the microbiology e-module textbook (Putri, 2019), it is known that in an effort to improve concept understanding, this e-module is equipped with video sites, journals and articles. The journal or article presented is a journal / scientific article whose discussion can make it easier for students to understand the material presented. The youtube video link presented in the e-module is a youtube video link containing material related to learning topics. The learning media in the form of a youtube video link presented by the microbiology e-module is known to be mostly in English, while after being traced, the Indonesian language microbiology learning videos are still few and difficult to find on YouTube.

In addition to teaching resources, students also need actual learning media that can make it easier for students to be able to reflect clearly on abstract concepts in the Microbiology teaching module. Gagne and Briggs in Arsyad (2007) implicitly say that

learning media includes tools that are physically used to convey the contents of learning material, including books, tape recorders, cassettes, video cameras, video recorders, films, slides (picture frames), photos, pictures, graphics, television, and computers. Most educational experts distinguish between media and teaching aids, but the two terms are also used interchangeably. The difference in the use of these terms lies in the function, not in the substance. Learning sources are said to be teaching aids if they function only as a tool. It is said the media if it is part of learning resources integrating throughout of the entire ke activeities learning (Asnawir, 2002).

According to Gunawan (2019) multimedia is a media that can support communication between educators and students during the learning process through text, audio, images, animation, video and graphics. Multimedia has the ability to explain complex and dynamic concepts more clearly, makes it easier to remember content easily and improves understanding of topic content through the perspective of students and ultimately makes students more interested in learning ( Chachil et al, 2014; Khan & Masood, 2015; Hwang et al, 2012 in Gunawan, 2019).

Multimedia can interpret a concept that can help participants explore, analyze, try, and explore the concepts and principles contained in the material, so that they are able to more quickly build the structure of students' understanding. Multimedia can also optimize the role of the senses in receiving information into the memory system because it integrates elements such as sound, text, animation, images or graphics that are presented interactively (Afriani, 2014). This statement is also in line with Mayer (2002) that learners can achieve a deeper understanding when explanations are presented in an audiovisual form rather than just words. And learning with multimedia allows learners to build mental representations of the display of words and images or audio visuals that have been presented. According to Liana (2020) the advantages of multimedia is maha students can access materials from home without having to meet directly with the lecturer as a source of multimedia teaching can be downloaded using a smartphone or computer, so students can read the material whenever they have free time both online and offline. The use of multimedia can also be applied effectively in higher education because almost all students already have smartphones or computers. Animated video is an example of multimedia that can provide visualization of abstract material based on computers or androids.

Based on this explanation, the purpose of this study was to identify the problems experienced by biology students in learning Microbiology courses and the learning media needed to improve students' understanding of learning materials.

### II. MATERIALS AND METHOD

This research is a qualitative descriptive study that focuses on identifying problems and learning media needed by students in Microbiology courses in 2020. The subjects in this study were lecturers in the Microbiology course and students of the Biology Department at the Faculty of Mathematics and Natural Sciences, Padang State University (UNP) semester 3 of the 2019/2020 academic year who took the Microbiology course (N = 25). Data collection was carried out by observation, open questionnaires, and interviews. .

The techniques used in collecting this data consist of:

1. Interview

An interview list will be prepared to ask a number of questions to a lecturer who teaches the Microbiology subject at Padang State University

2. Questionnaire

The types of questionnaires distributed were closed and open questionnaires distributed to biology students at Padang State University for semester 3 of 2020.

Data analysis using qualitative descriptive analysis. Analysis of the results of the student questionnaire is also presented using a table that shows the percentage of the student's assessment. The results of this analysis will also describe the problems faced by students in the application of Microbiology in Human Life in the Microbiology course.

### III. RESULTS AND DISCUSSION

Based on the results of observations and interviews from questionnaires that the author has distributed to lecturers and students. From the results of interviews with lecturers, the following observations were obtained;

- a) In microbiology lectures, lecturers endeavor to provide cooperative and dynamic learning with discussion and presentation methods.
- b) In lectures, students have begun to adapt quickly to understand microbiology learning material.
- c) With the cooperative learning method, students are required to seek information related to the material and be active in discussions.
- d) There are many learning resources used by students in microbiology lectures and are quite easy to understand. One of the teaching resources used is textbooks in the form of e-modules compiled by lecturers. This textbook / e-module is designed to overcome the deficiencies found in textbooks. The material on e-module is generally sourced from text books which are presented with a sentence that is easily understood and adapted to the needs of students studying in the syllabus of lectures . In this e-module, there is also a link for learning videos from YouTube related to the material being studied. The teaching module is one of the teaching resources which is the most important learning reference besides the curriculum in learning.
- e) According to the lecturer, in the implementation of Microbiology lectures, especially the application material of microbiology in human life, students are still constrained in understanding the concept so that several related materials must be repeated frequently .
- f) The learning media used, namely power point slides (PPT), were still inadequate in supporting students' understanding of the material. Even though the material in microbiology in the examples of scientific applications can be observed directly and easily found in everyday life, the "biology" process that occurs to produce a product will be difficult for students to understand if taught only using pictures or schemes. According to the lecturer, better supporting media such as videos are needed to be able to describe microbiology learning material. In this case, the use of multimedia video animation is considered very well used to describe and explain the process of "biology" that occurs realistically using video, sound, text, animation and graphics.
- g) Based on this, the lecturer who teaches the subject agrees to create supporting teaching media that is in accordance with the Microbiology course syllabus and student needs.

Furthermore, observations were made to identify problems experienced by students in lectures obtained by using a closed questionnaire. This questionnaire identifies problems from 7 aspects, namely:

- 1) Interest and understanding in microbiology courses
- 2) Learning media used in microbiology lectures
- 3) Implementation of microbiology lectures
- 4) Use of microbiology e-module textbooks
- 5) Constraints in understanding microbiology textbooks
- 6) Video lessons needed

Table 1. Student Opinion Questionnaire About Lectures

No.	Statement	Score Answer Percentage (%)			
		Yes	Not	Yes	Not
<b>1.</b>	<b>Aspects of Interest and Understanding of Microbiology Subjects</b>				
	a. Microbiology is an interesting subject	25	-	100	-
	b. Microbiology is a difficult subject to understand because it is too abstract	15	10	60	40
<b>2.</b>	<b>Implementation of Microbiology Lectures</b>				
	a. Lecturers use learning media based on information and communication technology in microbiology learning	23	2	92	8
	b. Is there a need for media in the microbiology learning process that is equipped with audio visuals?				0

		25	0	100	
<b>3.</b>	<b>Implementation of Microbiology Lectures</b>				
	a. Microbiology lectures use the discussion method and students make group presentations	25	0	100	0
	b. When presenting using learning videos related to the material	17	8	68	32
<b>4.</b>	<b>The use of e-module microbiology textbooks</b>				
	a. Using a microbiology e-module textbook prepared by a lecturer as a teaching resource for microbiology courses	16	9	64	36
	b. Opening the learning video link in the e-module as additional teaching materia	20	4	83	17
<b>5.</b>	<b>Constraints in understanding microbiology e-module textbooks</b>				
	a. Microbiology e-module textbooks improve understanding of the material	19	6	76	24
	b. Constrained by the learning video link provided by the e-module, generally in English	20	5	80	20
<b>6.</b>	<b>Required Learning Videos</b>				
	a. The learning videos needed are videos in Indonesian with simple and easy to understand sentences	25	0	100	0
	b. To better understand the concept of abstract microbiology material during a group presentation, I needed a teaching resource in the form of an animated video	20	5	80	20
	c. The instructional video needed is an animated video	12	12	50	50
	d. The learning videos needed are real videos	12	12	50	50

The data obtained from a closed questionnaire can be described as follows:

- 1) Overall students view that Microbiology is an interesting subject, but as many as 60% think Microbiology is a subject that is difficult to understand because, even though the microbiology material in the examples of science applications can be directly observed and easily found in everyday life, the process of "biology "What happens to produce a product is classified as abstract because it cannot be observed with the naked eye.
- 2) In the learning process, almost all students perceive that lecturers are already using media-based learning information and communication technology in learning microbiologist i but all the students said it was still in perluka n media audio-visual learning process microbiology in order to further enhance student understanding.
- 3) Overall, the Microbiology lecture method takes place with the discussion method where students learn cooperatively and make group presentations in turn. During group presentations, 68% of students used learning videos from YouTube to explain the material being discussed.
- 4) In this Microbiology learning process, as many as 64% of students use e-modules prepared by teaching lecturers and 83% open learning video links embedded in e-modules as additional teaching materials.
- 5) In using the e-module of Microbiology prepared by lecturers and colleagues, 76% of students stated that the e-module of microbiology improved their understanding of the material, but 80% of students experienced problems with the learning video link provided by e-modules which generally speak English so it is difficult understood. In addition, the obstacles experienced

are that some video links cannot be opened and the referenced learning videos are not in accordance with the main material being studied by students.

- 6) Overall, based on the results of observations through questionnaires, students admit that they need Microbiology learning videos in Indonesian that are in accordance with the topic being studied using simple and easy to understand language to support student understanding in microbiology learning, especially on the topic of Microbiology Applications in Human Life.

#### IV. CONCLUSION

Based on the results of observation and discussion, it can be concluded that students have difficulty understanding the concept of microbiology which is fairly abstract because the object of study is microorganisms that cannot be observed with the naked eye. The team of lecturers for the microbiology course at Padang State University (UNP) has provided teaching materials in the form of e-modules designed to overcome deficiencies in textbooks. The material on e-module is generally sourced from text books which are presented with a sentence that is easily understood and adapted to the needs of students studying in the syllabus of lectures. In this e-module, there is also a link for learning videos from YouTube related to the material being studied. The learning video link that is linked to the e-module aims to improve student understanding of the material. Even so, students still have problems understanding the learning videos provided by this e-module because generally the learning videos from YouTube are in English so they are difficult to understand. In addition, the obstacles experienced are that some video links cannot be opened and the referenced learning videos are not in accordance with the syllabus and main material being studied by students. Overall, based on the results of observations through questionnaires, students admit that they need audio visual media such as Microbiology learning videos in Indonesian that are in accordance with the topic being studied using simple and easy to understand language to support student understanding in microbiology learning, especially on the topic of Microbiology Applications in Human Life. Through the acquisition of data from this preliminary research, it is hoped that it can provide an overview for the lecturers in improving the implementation of the learning carried out. Furthermore, researchers can continue this research with research that leads to the realization of learning media in the form of animated videos, especially related to the topic of Microbiology Applications in Human Life in Indonesian which is in accordance with the Microbiology learning syllabus of Padang State University (UNP) which is rich in content, interesting and easy to understand by students as its user.

#### REFERENCES

- [1] Azhar, A. (2007). *Media pembelajaran*, Jakarta: PT. Raja Grafindo Persada, 15-85.
- [2] Afriani, D. T., & Hasruddin, H. (2018). Efektivitas Pembelajaran Berbasis Masalah Secara Berkelompok Menggunakan Multimedia Untuk Meningkatkan Kemampuan Memecahkan Masalah Pada Perkuliahan Mikrobiologi. *Warta Dharmawangsa*, (56).
- [3] Asnawir, B. U., & Usman, M. B. (2002). *Media pembelajaran*. Jakarta: Ciputat Pers.
- [4] Association for Educational Communication and Technology. (1986). *Defenisi Teknologi Pendidikan Terjemahan*. Jakarta: PAU-UT& Rajagrafindo Persada.
- [5] Chachil, K., Engkamat, A., Sarkawi, A., & Shuib, A. R. A. (2015). Interactive multimediaBased Mobile Application for Learning Iban Language (I-MMAPS for Learning Iban Language). *Procedia-Social and Behavioral Sciences*, 267-273.
- [6] Ellington, H., Harris, D., & Harris, N. D. C. (1986). *Dictionary of instructional technology*. Nichols Pub Co.
- [7] Hwang, I., Tam, M., Lam, S. L., & Lam, P. (2012). Review of Use of Animation as a Supplementary Learning Material of Physiology Content in Four Academic Years. *Electronic Journal of e-Learning*, 368-377.
- [8] Khan, F. M. A., & Masood, M. (2015). The Effectiveness of an Interactive Multimedia Courseware with Cooperative Mastery Approach in Enhancing Higher Order Thinking Skills in Learning Cellular Respiration. *Procedia-Social and Behavioral Sciences*, 977-984.
- [9] Killen, Roy (2003). *Effective Teaching Strategies: Lessons from Research & Practice*. Melbourne: Australia. Thomson, Social Science Press South. Another reference

- [10] Liana, Y. R., & Nursuhud, P. I. (2020). Problem-Based Learning Approach with Supported Interactive Multimedia in Physics Learning: Its Effects on Critical Thinking Ability. *JIPF (Jurnal Ilmu Pendidikan Fisika)*, 5(2), 88-97.
- [11] Majid, Abdul. (2008). *Pengembangan Pendidikan Berbasis Keunggulan Lokal*. Jakarta: Prestasi Pustaka.
- [12] Mayer, R. E. (2002). Multimedia learning. In *Psychology of learning and motivation* (Vol. 41, pp. 85-139). Academic Press.
- [13] Naz, A. A., & Akbar, R. A. (2008). Use of media for effective instruction its importance: some consideration. *Journal of elementary education*, 18(1-2), 35-40.
- [14] Putri, D.H dkk. (2019). *Bahan Ajar Mikrobiologi Berbasis Sains Teknologi Masyarakat*. Padang: Universitas Negeri Padang.
- [15] Rektorat UNP. 2015. *Buku Pedoman Akademik Universitas Negeri Padang*. Padang: UNP Press.
- [16] Rahmadi, I. F., Khaerudin, K., & Kustandi, C. (2018). Kebutuhan Sumber Belajar Dosen yang Mendukung Pembelajaran Berbasis Teknologi Informasi dan Komunikasi di Perguruan Tinggi. *Edcomtech Jurnal Kajian Teknologi Pendidikan*, 3(2), 63-74.
- [17] Thomas, M. (2008). *Effective Teaching: a Measure of Excellence*. New Delhi: S.Chand & Company.

# *Linguistic Analysis Of Identical Motives In European And Central Asian Epics*

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**Abstract –** This article depicts the identical motives in European and Central Asian epics, which were investigated comparatively. The motif of the presence of creatures, the presence of true friends to epic heroes and the motive of realizing the main essence of life, when their journey is over is considered as common motives in epics. In this article, one can observe several identical motives, that are comparatively studied.

**Keywords –** Motive, epic hero, the Song of Roland, extraordinary birth, ethno-genetic forms.

As we have known, that the matters such as an extraordinary birth of an epic hero, his companion, or his own fighting armament can be realized in an identical way in both European and Central Asian epics. X.G.Ko`ro`gli points out that these identical motives will appear in the consequence of various literary-cultural relations and their influence.

They can come out in ethno-genetic, socio-political, ideological and historical forms. If we analyze some European and Central Asian epics such as “Beowulf” of the ancient Anglo-Saxons’ epic, “Odyssey” by Homer, “Shokhnoma” by Firdavsi, “Gilgamesh” of an ancient Akkadians, the French epic “The Song of Roland” and Uzbek epic “Alpomish” from the linguistic point of view, we will be able to see the following identical motives:

1. The main characters such as Beowulf in the epic “Beowulf”, Rustam in the epic “Shohnoma” (story about kings), Alpamish in Uzbek epic “Alpamish”, Odyssey in the epic “Odyssey” and Roland is a single child of their parents. All of these heroes began to be renowned as a gallant and bold fellow from their early age.
2. The motif of the presence of creatures as a companion to the epic hero during their journey. For example, Alpamish had a horse, called Baychibar; Raxsh is Rustam’s favourite horse; as well as, Velyantif was highly appreciated by Roland.
3. Alpomish, Odyssey and Rustamkhon are married to clever, loyal and devoted women. Barchin, Penelopa and Takhmina are the images, who are embodied as patient, faithful and dedicated. Barchin, Penelope and Taxmina have come to represent marital fidelity.
4. Then the next motive is the presence of true friends to epic heroes. For example,  
Oliver is the devoted friend of Roland.  
Qorajon is a true friend of Alpomish;

Enkidu is a faithful companion to Gilgamesh;

Viglaf is a loyal companion of Beowulf.

5. The motif of epic hero's armament. The motive of acquiring a certain magic armament can be noticed in the existence of legendary swords, archer and clums of these heroes. For instance, Beowulf had a magic sword, called Hrunting; very large array of Alpomish; Odyssey was very skillful at archery; Roland's legendary sword, called Durandal and a large clum of Rustam.
6. The motif related to make trick by pretending not to be recognized in order to save his life or his companions. Particularly, Odyssey and Rustam's craft, cunning can be crucial example to this type of motive. We can come across the following similar situation in "Shohnoma", when Sukhrab was about to fight with with Rustam, this young brave and clever warrior asked him whether he is Rustami Dastan and his descendants. Because Sukhrab was Rustam's son. Unfortunately, being unaware of that young warrior is his son, Rustam didn't tell the truth about himself and didn't let him know about his background. We can the following extract, which was appealed by Sukhrab toward his father:

Why do you keep secret your name?

'Caus today you are in fight with me.

Aren't you grandson of glorious Som?

Aren't you that gallant Rustam?

Please tell me the name of your descendants,

Whether they are well-known heroes.

Rustam said: O, fellow, chased glory

Don't tell me this flimsy story.

At the same time, Odyssey replied to Poliphem, who is one-eyed monster in a similar way:

Cyclops, you asked me about my famous name,

I will tell you. Then you offer me a gift,

As your guest. My name is nobody.

My father and mother, all my friends —

They call me Nobody.

7. The motive that the hero goes to an Underworld that ordinary humans are barred. In the epic "Odyssey", the superhuman Odyssey visits to Teresa, who lives in Underworld in order to know the way to returning his home after twenty years. This similar motive about the journey to Underworld can be observed in the ancient Akkadian epic "The Epic of Gilgamesh", in which Gilgamesh meets with Uthnapishtim, who lives in supernatural world and at the same time, being considered the only human being, who survived after Noux storm, and as a result, Gilgamesh obtained magic and everlasting life flower from Uthnapishtim.
8. The motif of fighting with ogre, beast or monsters en route their journey by epic heroes. This type of motif is very peculiar to both European and Central Asian motives. For example, Alpomish kills White ogre, Beowulf fought and killed the monster, which is called Grendel. In the Akkadian epic, Gilgamesh defeated heavenly bull, called Humbaba.
9. In turn, the motif of betraying to his own tribe and his companions plays an important role in linguistic analysis of the epics. The betrayal of Antinoy and Evrimax to Odyssey by intending to obtain his estate, while Odyssey is far away from



his hometown Ithaca; the traitor Ultantaz, who gained possessions, belonged to Alpomish, and Roland's stepfather Ganelon betrayed to his king and companions by taking revenge from his stepson Roland.

10. The motif of inheriting something valuable and precious to his future-born child by these quester-fathers. For example, Odyssey handed his dagger to his new-born son Telemach, before he was setting out to Trojan War. At the same time, the epic hero Rustam also left a dagger to his son Suhrab before he was setting out a journey to Mozandaron. In turn, Alpomish had appointed to give the name Yodgor to his expecting child.
11. The ancient Akkadian epic "The Epic of Gilgamesh" and Anglo-Saxons' epic "Beowulf" can be a vivid example to the similar motive of realizing the main essence of life, when their journey is over. In turn, this similarity can convey the meaning that no person on the Earth is able to leave eternally and they can face to different assays because of fate. We can give the following example from the epic "Beowulf".

For this gold, these jewels, I thank.

Our father in Heaven, Ruler of the Earth-

For all of this, that His grace has given me,

Still came to my lips, I sold my life

For this treasure, and I sold it well

As well as, in the epic of "Gilgamesh" it is stated that the great ruler Gilgamesh confessed that any person even will not be able to move any stone unless the God wants. For example, this poem is devoted to Gilgamesh.

The king has laid himself down and will not rise again,

The Lord of Kullab will not rise again.

He overcame evil, he will not come again,

Though he was strong of arm, he will not rise again.

He had wisdom and a comely face, he will not come again,

He is gone into the mountain, he will not come again.

On the bed of fate he lies, he will not rise again

From the couch of many colors, he will not come again.

12. The motif of crying, mourning by remembering their dead friends. According to P.A.Grinser, the theme of mourning is characteristic feature of epics. For example, Gilgamesh mourns for the death of his friend Enkidu, similarly, Axill cries out for Petrokl; Priam for Hector; Odyssey for his companions and Oliver for his true friend Roland.

In conclusion, we can state that linguistic analysis of similar motives in European and Central Asian epics play an immense role on investigating them in order to define the peculiar characters and similar subject matters as a triggering factor, existed in these epics. We hope that the above-mentioned motives will keep their importance by reflecting ethno-genetic, socio-political, ideological and historical forms of world nations.

#### **REFERENCE**

- [1] Firdavsi, "Shohnoma". Publication of Literature and Art named after Gafur Gulom. Tashkent. 1975.

- [2] Ruzmetov H.Q. "Linguistic study of French and Turkic epics at higher education". "Science of the Academy of Science of the Republic of Uzbekistan." Fan Publication. 2009
- [3] Odyssey. Translated by Ian Johnston.
- [4] Beowulf. Translated by Burton Rafeel.
- [5] N.K.Sanders. The epic of Gilgamesh.

# *Historical And Philosophical Foundations Of Family Business And Family Values*

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**Abstract – This article discusses aspects related to family business and the historical and philosophical foundations of family values. Also, within the framework of the topic, the specifics and features of family entrepreneurship and family values were analyzed. In particular, it is scientifically proved that the family doctrines of the great Eastern scientists, on the one hand, provide for important aspects of education, spirituality, and on the other hand, today it is these harmonious aspects, complementing each other, that guarantee sustainable development in the country.**

**Keywords – Humane And Democratic Society, Family Business And Family Values, Well-Being And Prosperous Life, Education And Upbringing, Family**

In building and managing a humane and democratic society in our country, the role of family business in ensuring sustainable development, well-being and prosperity is great. This necessitates the comprehensive formation and development of a family business. President of our country Shavkat Mirziyoyev noted: “As you know, the education of the younger generation has always been of great and urgent importance. But in the twenty-first century, in which we live, this question really becomes a question of real life.” The more perfect the upbringing, the happier people live,” say the sages[1]. And in order for education to be perfect, it is absolutely unacceptable that there is a gap in this issue” says that in our country special attention is paid to the education of young people, especially the social protection of the family, motherhood and childhood.

Therefore, approaching the problem from the point of view of historicism, it is important to note, on the one hand, the relationship between family business and family values, and on the other-that the theoretical views on family business and family values, formed in the social sciences of the West and the East and passed down from generation to generation on the basis of continuity, determined the content and essence of national crafts, home work. The idea that man is the greatest of all beings, that all things are created for him, is at the heart of Islamic spirituality, while encouraging people to be mutually exclusive, intelligent, and to form noble qualities in them is at the heart of Islamic pedagogy and psychology.

Islam is deeply rooted in the public life of the people, in particular, in family relations, culture and national traditions, but it does not follow that without Islam, the ancient, unique culture of the Uzbek people, including family values, could not exist. The sources of Islamic spirituality contain a system of views on the family, family relations and family education, which includes all aspects aimed at the formation, development and strengthening of the family. Although these views were put forward from the point of view of theology, they were also consistent with reason and everyday life, as they proceeded from the requirements of human activity, lifestyle, social needs and finally, family relations. In Islam, the peculiarities of family education are indicated. These features are derived from the requirements of Islam, are associated with general ideas about the moral education of the child, which are of universal importance, as they call the child to humanity and goodness. Today, parents must instill in their children this universal content of Islamic spirituality.

The fact that religious values serve as an important factor of spiritual and moral education in the family in the new historical conditions is explained by the fact that the reason for the penetration of religious ideas and images into the way of life of the nation, into the life of the people is the result of the powerful influence of religious consciousness on the human psyche. At present, it is the responsibility of parents to distinguish between religious heresy and religious values in the process of family education and to prevent poisoning the child's consciousness with religious superstitions.

It is known that in the heritage of Eastern thinkers, the issues of education and, in particular, family education are given a wide place. They considered the upbringing of children the main criterion that determines the fate of society, the future of the nation. Their pedagogical views are based on the idea of the perfect person as a social ideal. They focus on the relationship between the social and biological aspects of education, put forward such issues as the unity of the influence of heredity and environment in education, the unity of the health of the body and soul. Their ideas about the unity of mental, labor, moral, aesthetic and physical education, about the ways of their implementation and about raising children in the family cover many aspects of these problems and form a system of views on a specific area of education. These views have advanced far in their development, enriched the thinking of our ancestors for several centuries, and do not lose their value today as a spiritual value. The problem of the unity of social and family education was tried to solve positively, which is fully recognized by both modern pedagogy and psychology[2].

Family home-based business, a craft that is relevant not only today, but also since ancient times widely spread on the territory of our country, in the countries of the East as a whole. For example, great scientists also engaged in useful work in their spare time. One of the famous representatives of the Khojagantariqat (doctrine trend), Sayyid Amir Kalon as-suhari, lived as a potter. Therefore, the emir became popularly known as the Potter. The Emir of Kalol [3], Muhammad Baboyi, taught Bahauddin Naqshbandi knowledge based on Samosiy. Bahauddin Naqshbandi, considered one of the founders of the Sufi tariqat, was a fabric carver. The man lived all his life engaged in agriculture and crafts. Because he had no ambition in richness in the world, he had nothing at home but a grate, a pustak (wool), a jug, a ceramic bowl. Baha'uddin Naqshband is a wise man who has lived a life of sweat, honest work, and caring for the soul of Allah.

Pahlavan Mahmud-pustinduz (loom coat), poet Jawhari-sovungar, poet Mawlono Khawafi-tailor, poet mir Argun Hamaduz-chatyrduz, mawlono (Great) Kabuli Ghazalfurush-kalawachi (spinning wheel), mawlono Kamarduz-tasmaduz, Bisotiy Samarqandiburaduz (wood work). Because they worked honestly in their profession, led their way of life, and through science, tariqat, and contemplation, they took a step towards eternity. In the Avesta, one of the oldest monuments of the Eastern peoples, it is said: "In order to do best and good, a person must work, create material goods with his own hands." In particular, both in the Holy Qur'an of Islam and in the Hadiths of the Sharifs (Honest one), created to promote the essence of the ayats and surahs of Islam among the people, there is a preference for honest work, mastering professions. In particular, the great muhaddis (hadith scholar) Khoja Ismail, in Imam al-Bukhari's book of commerce, Al-Jom'u al-Sahih (a convincing collection), says: "Aisha razi'ilahuankho narrates: The Messenger of Allaah (peace and blessings of Allaah be upon him): 'My companions earn their living by their profession.'

In the Uzbek family since ancient times, special attention was paid to the upbringing of children, the education of their literacy, faith, the study of sciences and crafts. Judging by the information given in our ancient ancestors took special care to ensure that the child was born perfectly and from the very infancy was engaged not only in physical education, but also in its mental maturation, knowledge of wisdom, and the acquisition of moral qualities. The study of the methods by which our ancestors at that time carried out measures to educate their generation as mature, devoted to society, the Motherland, hardworking people, has not lost its relevance today.

According to the ancient Turkic custom, in the upbringing of a child, grandparents occupied a more important place than parents. Such family morality and upbringing are even more clearly manifested in the lives of great personalities and scientists. In particular, the education of the Timurid princes was mainly entrusted to their descendants. Saraymulkhonim was engaged in the upbringing of Shorukh Mirzo, the beloved grandsons of Muhammadsultan Mirzo, Khalilsultan Mirzo and Ulugbek Mirzo. The family is a separate, but at the same time an integral part of society. Therefore, changes in it are precisely a reflection of changes in society. The interests of the family consist of the interests of the country, the people, the nation, striving for good. "In short, it should be clear to all of us that as long as the family is healthy, the society is strong and the country is stable." [4] In this respect, the strength and health of the family are also determined by the successful implementation of a well-built economy in the family and, consequently, business and entrepreneurship.

It is known that the family, i.e. a small social group based on marital union, family ties, relations between the general economic husband and wife, parents and children, brothers and sisters, grandparents and other relatives, is the basis of society, the source of state power. Family life is characterized by material (biological, economic) and spiritual (moral, legal, psychological) processes. The collective world of the family is a multi-faceted phenomenon, covering not only the territorial and social position of the family in society, the peculiarities of its historical development, but also economic opportunities, demographic and ethnographic, ethno pedagogical and ethno psychological traditions.

It should be noted that all human qualities, such as honesty, truthfulness, honesty, kindness, hard work, which are the basis of education, are formed primarily in the family. Family is a historical category. Its forms and functions depend on the nature of existing social relations, as well as on the level of cultural development of the society. At the same time, the family has a strong influence on the life of society, performing a number of functions (carrying a child, working on the farm, managing the household, meeting the physical needs of its members, influencing the spiritual, moral and aesthetic perfection of the upbringing of the younger generation).

As A.Fitrat said : “The most difficult task in a family is to raise a child after birth. Parenting actually consists of two words. That's why it seems like a very small problem in your eyes. But wise people know that the basis of the political, religious, and social revolutions of the bath is connected with the combination of these two words — “raising a child”. This is due to the fact that the people must act, be a statesman, be happy, deserve respect, be ignorant, be weak and humiliated, wear the jam of poverty, bear the burden of misery and be forgotten, obey others, be a slave and a prisoner, be brought up from childhood from their parents. As one judge put it: “If the whole human being had left me how to bring them up my children, I would have completely changed the situation of people according my own wish.” If you think about the situation of the peoples of the world today, your words will be confirmed.

Currently, 40 million Britons are ruled by 400 million Indians and Africans. The Chinese government has become a cunning and insidious toy for 40 million Japanese people with 400 million inhabitants. 60 million Germans take on their side two weak states (Austria and Turkey)and wage war with seven states, whose population is equal to 750 million.

These events, which seem strange and strange in the eyes of a person, are influenced by education, because the education of children is the education and improvement of the child physically, morally and morally. This means sending them to the desert of attempts and skirmishes, which is, to the field of life or death, armed with a strong body, common sense and good morals. As you know, the British are much more perfect than the Indians and Egyptians, the Japanese-the people of China physically, morally and morally. These achievements are the result of their upbringing.”[5]

Consequently, it should be noted that the role of the family in society is invaluable and can not be overestimated. Its description is also complex, and the content is incredibly deep, the picture is diverse and unlike any other. And the cup of life is in harmony. But, it is worth remembering that harmony does not arise by itself.

When the family is strong, peaceful and honest, the society will also be strong and prosperous. The spiritual and moral image of the family has been built and improved over the centuries on the basis of the knowledge and experience, cultural values of our ancestors, as well as on the basis of the achievements and achievements of our contemporaries[6].

In our wise people there is a proverb:“A country with strong families, a prosperous country-will be strong and prosperous.” Uzbek families have special qualities that characterize their childhood, the sincerity of relations between parents and children, the strength of mutual respect, respect for young people and respect for the elderly. In the East, when the father is the head, provider, and guardian of the family, the mother is its fear, mediocrity, and pleasure. According to the ancestors mind the children are considered to be the most holy in the family.

In our country, there are all opportunities for raising children in the family, introducing them to universal, spiritual values and traditions, and improving the level of knowledge. As a child grows up in a family environment, his whole behavior also forms an attitude to the environment and family, ideas about how he will build his family, raise children in the future.

Family is something that fully reveals the inner potential of each of us. Both spirituality and great experiences of a person are actually solved in the family and become socially significant. Spirituality is inextricably linked to enlightenment, which is achieved only through consistent reading, learning, and experience. Spirituality reflects the identity of a person, his spiritual world. It also plays an important role in distinguishing good from evil, justice from evil, wisdom from ignorance.

As one of the outstanding philosophers of the East, the poet Mirzo Abulkodir Bedil, noted “First laying a brick obliquely, the architect tilts the wall, even if it reaches the star”. After all, even the spiritual appearance of a person can be compared to a huge building. If a person is not brought up correctly from a young age, then, becoming an adult, he will not have the opportunity to establish it. Therefore, along with ensuring socio-economic development in our country, special attention is paid to the upbringing of a harmoniously developed generation with high spirituality.

In order for the family to be strong and contribute to the development of society, first of all, if parents take a responsible approach to raising children and ensure that young people who are building a new family find their equals, and the parents themselves are role models in this matter, the society that we dream of will be built.

Researchers believe that in the ancient era, chaotic sexual relations prevailed, and the family at that time did not yet exist, these relationships were replaced by group marriage, a large family appeared.

With the establishment of monogamy (same-sex family), women were displaced by men. The woman gradually began to turn into a slave, the slave of her husband-master. The acquisition of wealth and its transfer to legitimate heirs remained the main goal of the family. In ancient Zoroastrianism, widespread in Central Asia, the issue of family and marriage was given great importance. Since the family and marriage met the creator's requirement, it was forbidden to violate it. If the husband or wife committed immorality in the family, that is, immorality, then such people were punished with sticks. Thus, they fought for the strength of the family. In the East, the family has long been considered a sacred homeland. It was they who did not allow its strength to crack.

Also in “Avesta” special attention is paid to the purity, purity of the breed. The presence of a relative—a seed, a brother—and sister will not marry their children and it is condemned. With the independence of the Republic of Uzbekistan, attention to the family has increased even more. The family is the most important unit, particle, link of civil society and the state. The family includes three aspects: marriage, which is its direct manifestation, family property and care for them, and the upbringing of children. In the conditions of marriage under the law, the most important thing is the mutual consent of the persons entering into marriage and their reaching the age of marriage. The family should be built on purity and purity, on double love, loyalty and fidelity, stability in society comes only when the family is strong, peaceful, prosperous and healthy.

The strength of the family is considered to be calm, peace in the family, a sincere attitude to each other. It also depends on the moral education of the family members. It is known that mannerisms are a reflection of the spiritual appearance of a person. The family is the main criterion for the formation of moral values, and it is desirable that the family function smoothly and smoothly within the framework of the activities of schools, mahallas, and public organizations. Due to the democratic principles and independence in the life of the state and society, there is a need to strengthen and improve moral values and, consequently, to educate a harmoniously developed generation. In this regard, the leading role of the state in the spiritual reform of the life of society increases. In the spiritual reformation, the main task is to educate a healthy generation.

The family is a factor that ensures the continuity of humanity and the transfer of values, traditions and customs, as well as the cultural and spiritual heritage of the entire nation from one generation to another. It is in the family that the spiritual and moral values inherent in people are a manifestation of a sense of mutual respect, honor, trust, favor, love, cooperation, empathy in a specific form. The most important thing in a family is the harmony of actions, which ensures that both parties understand and support each other, empathize with each other in a difficult and joyful moment. The sacred duty and responsibility of the family is not only the birth of a child, but also the upbringing of children with high spirituality and enlightenment, creating conditions and helping them to find their place in an independent life in society. If the spiritual atmosphere in the family is properly adjusted to the upbringing of children, the parental example and responsibility for it are more important than ever. Since family relations occur between parents and children, the father is the main one in the family, he is the head of the family and solves all problems, guided by the opinion and wise advice of the father. A hard-working, self-sacrificing, patient and, in a sense, tough-handed and thrifty father plays a crucial role in raising and nurturing children. The way a parent brings up their child is determined not only by the present day of society, but also by its perspective on the continuity of generations.

Today, the President of the Republic of Uzbekistan signed a decree “On additional measures to improve the procedure for lending to projects implemented within the framework of state programs for the development of family entrepreneurship”.

It should be particularly noted that the implementation during 2018-2019 of program measures for broad involvement of the population in business activities, creating conditions for the formation of additional and sustainable sources of income by providing

employment in handicrafts, home-based work and other areas of business activity to a certain extent contributed to improving the economic situation of the population, especially socially vulnerable families in remote regions.

At the same time, it is necessary to establish full-fledged partnerships with broad segments of the population, small businesses and family businesses by improving the effectiveness of the system of financial support for programs for the development of small businesses, family entrepreneurship, employment, initiatives of women and the younger generation, as well as radically improving the working methods of commercial banks with state participation and increasing the popularity of banking services.

In order to consistently implement the tasks set out in the Decree of the President of the Republic of Uzbekistan dated August 13, 2019 No. PO-5780 "On additional measures to radically improve the system of organizing work to protect private property and strengthen guarantees of the rights of owners, support business initiatives, as well as expand access of business entities to financial resources and production infrastructure", as well as the development of small businesses, family businesses, programs to support the initiatives of women and the younger generation are planned to implement a number of measures to rationalize the use of public resources, ensure their expediency and increase efficiency.

In accordance with it, the decrees of the President of the Republic of Uzbekistan of November 17, 2017 No. UP-5242 "On measures for the further development of crafts and comprehensive support of artisans" of February 2, 2018 No. PO-5325 "On measures for the radical improvement of activities in the field of support for women and strengthening the institution of the family" and of June 27, 2018 No. UP-5325 "On measures for the-Decrees of the President of the Republic of Uzbekistan of April 26, 2018 No. PP-3680" On additional measures to improve the activities of farmers, dehqan farms and owners of household plots", of June 7, 2018. No. PP-3777 " On the implementation of the program "Every family is an entrepreneur", from July 14, 2018 No. PP-3777 "On measures to improve and increase the efficiency of work to ensure employment", No. PP-3777 "On measures to improve and increase the efficiency of work to ensure employment", No. PP-3680 "On measures to 3856 and dated March 7, 2019 "On additional measures to attract the population to entrepreneurship and the development of family entrepreneurship in the regions" - in connection with the implementation in the republic of state programs aimed at the development of small business, family entrepreneurship, self-employment, women's empowerment and support for the younger generation, on the one hand, create new jobs, and on the other hand, thanks to a number of measures aimed at ensuring sustainable development and well-being of the population, in the context of the pandemic, full support of the population is an important factor.

In conclusion, it should be noted that family business and family crafts have been given importance since time immemorial and even in the Middle Ages this process developed. In particular, it is important to note that Eastern scientists were engaged not only in science, but also in a certain profession, and in general paid serious attention to moral education through useful work in family life, as well as parental responsibility.

### REFERENCES

- [1]Speech by the President of Uzbekistan Shavkat Mirziyoyev at the IV Congress of the Kamolot Youth Social Movement July 1, 2017, 14:02 Politics
- [2]Bahridin Umarov - Doctor of Psychology, Professor. The family is the center of spiritual and moral upbringing, Published: 20-12-2020. [muzaffar.uz/saboqlar/3530-oilaviy-qadriyatlar-jamiyat-mustavligi-asosi.html](http://muzaffar.uz/saboqlar/3530-oilaviy-qadriyatlar-jamiyat-mustavligi-asosi.html)
- [3]Shahobiddin ibn bintu Amir Hamza. Authority Miri Kulol. 1436 y. Bukhara Regional Museum. Inv. -№ 1158. -p.2.
- [4]Karimov I.A. High spirituality is an invincible force.- T .: "Spirituality", 2008, -p 58
- [5]A.Fitrat "Selected". 21, IV. T .: - Spirituality 2006.
- [6]"The order of family or family management". 216 p. Shakirova Shoxida Yusupovna PhD, Doctor of Philosophy, Head of the Department of Editorial Publishing and Information Technology Development of the Research Institute "Mahalla and Family" under the Ministry of Mahalla and Family Support. <http://muzaffar.uz/saboqlar/3530-oilaviy-qadriyatlar-jamiyat-mustavligi-asosi.html>

# *The Effect of Perceived Organizational Support on Employee Readiness to Change in Correctional Office at Sibolga City*

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**Abstract**—The Correctional Office at Sibolga City is making changes of work system and service. The changes include building an integrity zone in the form of corruption prevention, bureaucratic reform, improving public services, and changing work systems by utilizing information technology. Implementing this change requires high level of employee readiness. Increasing employee readiness to change may be influenced by perceived organizational support. The purpose of this study was to determine the effect of perceived organizational support on employee readiness to change in the face of change. This study involved 95 employees at the Correctional Office at Sibolga City. The measuring instrument used in this study is a scale of employee readiness to change and a scale of perceived organizational support. Based on the results of the regression analysis, it shows that perceived organizational support have a positive and significant effect on employee readiness to change. The implication in this research is that Correctional Office at Sibolga City can increase readiness to change by increasing positive perceptions of organizational support.

**Keyword**—Correctional, employee readiness to change, perceived organizational support

## I. INTRODUCTION

Correctional is one of the activities of guiding inmates which is the final part of the criminal justice system. The process of implementing the correctional is carried out by the Correctional Office . In Sibolga City there are two Correctional Office. As an institute that provides services to the public, the Correctional Office is required to make improvements by changing the system and services.

One of the changes conducted is accordance with Permenkumham RI Number 29 in 2019 which explains that offices in the Ministry of Law and Human Rights including the Correctional Office in Sibolga City are required to build an integrity zone in the form of corruption prevention, bureaucratic reform, and improvement of public services [1].

Then, other changes that are being carried out are related to work systems that utilize information technology such as services that take advantage of information technology as described in Permenkumham RI Number 39 in 2016 concerning Sistem *Database* Pemasarakatan (SDP). SDP is an information system that includes collecting, filtering, managing, presenting, and communicating correctional information [2].

Hopefully, the employees being able to carry out the changes as described above has not been fully implemented by employees. There are still employees whose service is not good. Then, the application of information technology in work also creates a problem because there are employees who do not understand information technology. Based on the LAKIP Bapas Kelas II Sibolga (accountability report from one of the Correctional Office at Sibolga City) in 2019, it was explained that some employees didn't



understand about information technology such as the use of computers and the internet, while the Ministry of Law and Human Rights including the Correctional Office in Sibolga City had made changes to the work system by utilizing the system information [3].

Efforts to face changes in the the Correctional Office in Sibolga City have implemented a corporate university. It is intended that employees create learning to be culture so that problems can be resolved. However, the effort to implement this learning culture has not yet fully implemented. This also causes employees at the Correctional Office in Sibolga City to be less ready to face change and less able to adapt to existing changes.

The readiness of employees to face change is basically important so that changes in the organization successfully [4]. Readiness to change also considered important because it is the thing that most contributes to employee commitment to implementing change within the organization [5]. Readiness to change is the belief, attitude, and intention of employees that changes in the organization are really needed [6].

Unreadiness of employees to face change as previously described is possible due negative perceived organizational support. One that contributed greatly in building employee readiness to change is perceived organizational support [7]. Perceived organizational support have a positive relationship with employee readiness to change, where the low readiness of employees to change is influenced by the low perceived organizational support [8].

Perceived organizational support is an employee's belief in the organization which then show the employee's perception that the organization rewards contributions and pays attention to employee well-being [9]. Perceived organizational support can make employees more confident in their ability to carry out changes [10]. Employees who perceive organizational support will also reduce resistance to changes in the organization [11].

Berdasarkan uraian diatas, persepsi dukungan organisasi merupakan salah satu faktor yang mempengaruhi kesiapan berubah pegawai. Faktor ini akan diuji untuk melihat pengaruhnya terhadap kesiapan berubah pegawai di UPT Pemasarakatan Kota Sibolga.

Based on the description above, perceived organizational support is one of the factors that influence employee readiness to change. This factor will be tested to see its effect on the employees readiness to change at the Correctional Office in Sibolga City.

## **II. STATEMENT OF PROBLEM**

Is there effect of perceived organizational support to employee readiness to change in correctional office at Sibolga City?

## **III. LITERATURE REVIEW**

### **3.1 Employee Readiness to Change**

Employee readiness to change is individual's beliefs, attitudes and intentions that assess the extent to which the organization needs change and how the organization's capacity to make or undergo change successfully. This belief is individual's assessment that organizational change is really needed, so that he is ready to face changes in the organization. The belief also related to the individual feeling that they have the ability to succeed in making changes so that the existing changes have a positive impact [12]. The employees readiness to change can also implement changes in the organization [13]. Therefore, Holt, Armenakins, Feild, & Harris said that the employees readiness to change is very important to be improved [14].

Novel defines readiness to change as an individual's self-awareness to change due to environmental demands [15]. Then, Dharmawan & Nurtjahjanti said, employees readiness to change is self-evaluation by themselves and environment in an affective and cognitive which aims to participate in making changes in the organization [10].

In addition to the above explanation, Holt, Armenakins, Feild, & Harris explain the individuals readiness to change as a comprehensive attitude that is simultaneously influenced by what changes (content), how change is processed (process), the environment in which change occurs (context), and individual characteristics that are requested to make changes (individual attributes) [16].

Holt, Armenakis, Feild, & Harris explained that readiness to change has dimensions consisting of [16]:

1. Appropriateness

Appropriateness is an individual belief related to whether the changes that will be made are right for the organization and the organization will benefit from these changes. Individuals also feel that the organization has logical reasons for making changes. Then, individuals must focus on the benefits of change in the organization, how much change efficiency is obtained, and the suitability of organizational goals with change goals.

2. Management Support

Management support is related to individual beliefs or perceptions with the support or commitment of the management or leadership with the changes that will be made. Management that provides support for change creates employee confidence that management within the organization is committed and supports the implementation of planned changes. As a result, employees will behave in accordance with the organization's plans for change.

3. Change Efficacy

Change efficacy describes an individual's belief that they have the ability and skills and are capable of implementing tasks related to change. Employees who feel they have the ability, skills, and ability to carry out their duties, they will behave in accordance with what the organization wants, including the desire to implement change. The level of individual self-confidence can basically succeed the planned changes.

4. Personal Valence

Personal valence explains the benefits that individuals feel and what will be obtained if the planned changes can be implemented. This dimension is also related to employees feeling that the organization makes changes not only provides benefits to the organization but also provides benefits to employees. In other words, employees feel that the changes made will benefit them.

5. Perceived Organizational Support

Professor Eisenberger defines perceived organizational support as the belief of employees that their organizations appreciate their performance and how the organization cares for their welfare and socio-emotional needs [17]. In 1986, Eisenberger, Huntington, Hutchison & Sowa explained that the perceived of organizational support is the perception of employees to the organization how the organization views, respects, appreciates, and cares for their well-being [18].

Rhoades and Eisenberger said that perceived organizational support are the feelings or perceptions of employees to what extent the organization values their contributions and cares for their well-being in several things such as approval, respect, salary, promotion, access to information, performance, difficult situations, and personal life [19]. Rhoades and Eisenberger explain that there are three dimensions of perceived organizational support, namely [19]:

1. Fairness

The fairness in question is related to how to determine the distribution of resources among employees. Fairness regarding the distribution of these resources where the organization shows a concern for the welfare of employees will have a strong effect on perceived organizational support. The fairness described above is divided into two aspects, namely structural aspects and social aspects.

2. Supervisory Support

Supervisor is agents of the organization who have the responsibility to direct and evaluate the performance of their subordinates, thus employees will view their superiors as an indication of organizational support. Employees will also develop a general view of how superiors will value and value contributions made and care for their well-being. This is similar to how employees form general perceptions about the organization's appreciation of them.

3. Organizational Reward and Job Conditions

Human resource practices such as rewards and job conditions have contributed to perceived organizational support. As for these practices, among others:

a. Recognition, pay, and promotions

Opportunities for obtaining rewards in the form of recognition, salary, and promotion have contributed to the perceived organizational support where employees have a positive assessment of the organization.

b. Job Security

Job security shows the certainty that an organization wants to maintain in the future of employee membership. Job security can provide a strong indication of perceived organizational support.

c. Autonomy

Autonomy is related to the perceived control of employees on how they carry out their work, including scheduling, work procedures, and task variations. With the trust given by the organization to employees in carrying out their work, it can increase the perception of organizational support.

d. Role Stressor

Stressors are related to three aspects in the employee's role in the organization, namely: excessive workload, ambiguous roles or the absence of clear information about employee job responsibilities, and the existence of conflicting roles or conflicting responsibilities.

e. Training

Job training is considered an investment in employees that can lead to increased perceived organizational support.

### 3.2 Perceived Organizational Support to Employee Readiness to Change

One of the factors that influence employee readiness to change is perceived organizational support. Thakur & Srivastava concluded in their research that there is a positive and significant relationship between perceived organizational support and employee readiness to change [7].

Farahana, Ghaffari, Nazri, & Kasuma in their research also support the above findings where the perception of supervisor support can increase employee readiness to change. They also found that the perception of supervisor support was the best predictor of increasing employee readiness to change in the face of organizational change. This happens because the organization represented by the supervisor can provide support, understanding, and assistance to employees during the change process so that it can increase the level of readiness to change in facing the challenges of change [20]. Kirrane, Lennon, O'Connor, & Fu added, organizational support can be shown by management or supervisor support [21].

### 3.3 Research Hypothesis

Based on the theoretical description stated above, the researcher proposes the research hypothesis as follows : perceived organizational support has a significant effect on employee readiness to change in Correctional Office at Sibolga City.

## **IV. MATERIAL AND METHOD**

### 4.1 Participants

This research is population research or the sample in this study were all populations. This was done in consideration of the relatively small population of 95 people. The total of employees in Correctional Office at Sibolga City is 95 people.

### 4.2 Research Instrument

Data were collected using a scale of employee readiness to change and perceived organizational support as follows:

a. Employee Readiness to Change

In this study, employee readiness to change is measured using dimensions: appropriateness, management support, change efficacy, and personal valence. The results of the reliability test of the employee readiness to change variable used Cronbach's alpha = 0,918.

b. Perceived Organizational Support

Perceived organizational support is measured using dimensions: fairness, supervisory support, and organizational reward and job conditions .The results of the reliability test used Cronbach's alpha = 0,924.

V. RESULT

The normality assumption test aims to see whether the research data on each variable is normally distributed. In this study, the normality assumption test will use the Kolmogorov-Smirnov Test statistical method. Normally distributed data has p value > 0.05. The following are the results of the normality assumption test in this study:

Table 1. Normality Test Result

One Sample Kolmogorov Smirnov Test		
	Employee Readiness to Change	Perceived Organizational Support
Kol. Smirnov Z	1,149	1,281
Sig.	0,143	0,075

Based on table 1, it is explained that employee readiness to change variable has a significance of 0.143 ( $p > 0.5$ ). Then, the variable perceived organizational support has a significance value of 0.075 ( $p > 0.05$ ). Based on this, it can be concluded that the research data on the two variables above are normally distributed.

Furthermore, the linearity assumption test aims to see whether the two variables have a linear relationship. This assumption test is carried out using the test for linearity where two variables are said to be linear if the p value is  $< 0.05$ . The results of the linearity test statistical calculations can be seen in the table below:

Table 2. Linerarity Test Result

Variable	F	P
Perceived Organizational Support * Employee Readiness to Change	97,403	0,000

Based on table 2, between the variable perceived of organizational support and employee readiness to change, it was found that the F value was 97.403 with a linearity significance value of 0.000 ( $p < 0.05$ ). Based on this, it shows that the linearity assumption is met, which means that there is linearity between the independent variable and the dependent variable.

Simple Regression test is done to analyzing data with these results :

Table 3. Simple Regression Test Result

ANOVA						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7164.570	1	7164.570	85.163	.000 <sup>a</sup>
	Residual	7823.851	93	84.127		
	Total	14988.421	94			

a. Predictors: (Constant), Perceived Organizational Support

b. Dependent Variable: Employee Readiness to Change

Based on table 3, it can be seen that the value of  $F_{\text{statistic}} = 85.163$  with a significance value of  $p = 0.000$  ( $p < 0.05$ ). While the  $F_{\text{table}}$  value for  $N = 95$  and a significance value of  $p = 0.05$ , the  $F_{\text{table}}$  value = 3.94. Thus the value of  $F_{\text{statistic}} > F_{\text{table}}$  ( $85.163 > 3.94$ ),

it can be concluded that the perceived organizational support has a significant effect on employees readiness to change in Correctional Office at Sibolga City.

Table 4. Perceived Organizational Support with Employee Readiness to Change

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0,691	0,478	0,472	9,172

Based on table 4, it can be seen that the R value is 0.691 and has a positive value. This shows that the more positive the perceived organizational support, the higher the employee's readiness to change to face change. The determinant coefficient value (R Square) is 0.478 or 47.8%. This explains that the variable perceived organizational support contributes to employee readiness to change by 47.8%. So it can be concluded that the hypothesis is accepted.

The following is the calculation result of the empirical score and the hypothetical score of the variables perceived organizational support and employee readiness to change.

Table 5. Description of Empirical and Hypothetical

V	Hypothetical Score				Empirical Score			
	Mean	Max	Min	SD	Mean	Max	Min	SD
Y	66	110	22	14,67	87,74	110	52	12,627
X	45	75	15	10	55,27	75	31	10,203

V= Variable  
 Y = Employee Readiness to Change  
 X = Perceived Organizational Support

Table 5 shows the hypothetical data and empirical data that will be used to find the categorization of each variable. Based on the table, it can be seen that the employee readiness to change variable has an empirical mean of 87.74 with a standard deviation of 12.627. Meanwhile, the hypothetical mean of employee readiness to change variable is 66 with a standard deviation of 14.67. Then, the perceived organizational support variable has an empirical mean of 55.27 with a standard deviation of 10.203. Meanwhile, the hypothetical mean of the perceived organizational support variable is 45 with a standard deviation of 10.

The research data obtained can be grouped based on categorization criteria. Classification refers to the hypothetical mean data and standard deviation [22]. Based on the mean and standard deviation of the hypothetical scores obtained, the categorization of customer satisfaction, service quality and trust can be determined as follows:

Table 6. The Categorizations of Perceived Organizational Support with Employee Readiness to Change

Employee Readiness to Change			
Raw Score	Categorization	Total of Respondent	Percentage (%)
$X < 51,33$	Low	0	0 %
$51,33 \leq X \leq 80,67$	Medium	17	17,89%
$80,67 < X$	High	78	82,11%
Total		95	100%
Perceived Organizational Support			
Raw Score	Categorization	Total of Respondent	Percentage (%)
$X < 35$	Negative	3	3,16 %

$35 \leq X \leq 55$	Normal	36	37,89%
$55 < X$	Positive	56	58,95%
Total		95	100%

Based on the table 6, the following information can be obtained:

1. Employees in Correctional Office at Sibolga City have readiness to change with moderate categorization of 17 people or 17.89%. Then, employees have the readiness to change with a high categorization of 78 people or 78%. Based on the table, it can be seen that in general employees in Correctional Office at Sibolga City have a high readiness to change.
2. Employees in Correctional Office at Sibolga City who have a negative perceived organizational support are 3 people or 3.16%. Then, employees who have a positive (moderate) perceived organizational support are 36 people or 37.89%. Furthermore, employees who have a positive perceived organizational support are 56 people or 58.95%. Based on the table, it can be seen that in general employees in Correctional Office at Sibolga City have a positive perceived organizational support.

## VI. DISCUSSION

The hypothesis in this study is perceived organizational support has an influence on employee readiness to change. Based on statistical analysis using simple regression method, the value of  $F_{\text{statistic}}$  was obtained = 85.163 with significance value  $p = 0.000$  ( $p < 0.05$ ). While the  $F_{\text{table}}$  value for  $N = 95$  and significance value of  $p = 0.05$ , the  $F_{\text{table}}$  was obtained = 3.94. Thus the value of  $F_{\text{statistic}} > F_{\text{table}}$  ( $85.163 > 3.94$ ). Then, the R value is 0.691 and has a positive value. The determinant coefficient (R Square) is 0.478 or 47.8%.

Based on the explanation above, the results obtained from this study indicate that the perceived organizational support has a positive and significant effect on employee readiness to change. This means that employees who have a positive perception of organizational support will increase employee readiness to change. Then if the perception of organizational support is negative, employee readiness to change will be low.

The results of this study have supported previous research which explains that perceived organizational support have an influence on employee readiness to change. Aini, Umaroh, Sari, & Sulistyani found in their research that there was a significant effect of perceived organizational support on employee readiness to change, where positive perceptions of organizational support tended to increase employee readiness to change. In other words, high employee readiness to change is influenced by positive perceptions of organizational support [23].

Apart from the explanation above, the influence of perceived organizational support on employee readiness to change was also found by other researchers. Dharmawan & Nurtjahjanti, said in their research that there was a positive relationship between perceived organizational support and employee readiness to change. The more positive perceived organizational support will increase the employee readiness to change. So that organizations that want to foster a sense of employee readiness to change are important for organizations to pay attention to the welfare felt by employees [10].

Based on categorization, perceived organizational support tend to be positive. This can be seen in 56 people or 58.95% of correctional employees in Sibolga City who perceive positive support from the organization. Then, the level of employee readiness to change in the Sibolga City penitentiary is also in the high category where 82.11% of employees with a total of 78 people have a ready attitude to change towards change. Based on this explanation, it is evident that the perceived organizational support can lead to employee readiness to change in the face of change.

There are several reasons that can explain the influence of perceived organizational support on employee readiness to change.

1. Employees who perceive organizational support in a positive way will reduce resistance to planned changes to be carried out by the organization [11].
2. Supervisors who are representatives of the organization in providing support can provide understanding, support, and assistance during the change process implemented by the organization.

3. Employees who view their supervisor as supportive of change will have a more positive sense of their abilities so that they can overcome upcoming challenges and they will readiness to change [8].
4. Kwahk and Lee said that employees who perceive organizational support positively make these employees have optimism and hope for their organization, which can have a role in increasing employee readiness to change [24].

## VII. CONCLUSION

1. Perceived organizational support have a positive and significant effect on employee readiness to change in the Correctional Office at Sibolga City. This means that the more positive perceived organizational support will increase the employee readiness to change. Conversely, the more negative the perceived organizational support will reduce employee readiness to change.
2. Perceived organizational support has an effective contribution of 47.8% to the employee readiness to change in the Correctional Office at Sibolga City.
3. The level of readiness to change and perceived organizational support in the Correctional Office at Sibolga City are generally in the high category.

## REFERENCES

- [1] Tapanulipost. (2020, 02 25). *Bapas Sibolga Deklarasi Janji Kinerja Menuju WBK dan WBBM*. Retrieved 06 16, 2020, from Tapanuli Post Pelita Tapanuli: [HYPERLINK "https://www.tapanulipost.com/hukum/8913/bapas-sibolga-deklarasi-janji-kinerja-menuju-wbk-dan-wbbm/"](https://www.tapanulipost.com/hukum/8913/bapas-sibolga-deklarasi-janji-kinerja-menuju-wbk-dan-wbbm/) <https://www.tapanulipost.com/hukum/8913/bapas-sibolga-deklarasi-janji-kinerja-menuju-wbk-dan-wbbm/>
- [2] Laoly, Y. H. (2016). *Peraturan Menteri Hukum dan Hak Asasi Manusia Republik Indonesia Nomor 39 Tahun 2016 Tentang Sistem Database Pemasarakaran*. Jakarta: Kemenkumham.
- [3] Sukarja, S. (2019). *Laporan Akuntabilitas Instansi Pemerintahan Balai Pemasarakatan Kelas II Sibolga 2019*. Sibolga: Bapas Sibolga
- [4] George, J. M., & Jones, G. R. (2001). Towards a Process Model of Individual Change in Organizations. *Human Relations* , 419-444.
- [5] Mangundjaya, W. H., & Gandakusuma, I. (2013). The Role Of Leadership & Readiness For Change to Commitment to Change. *Romanian Economic and Business Review* , 192-197.
- [6] Armenakis, A. A., Harris, S. G., & Mossholder, K. W. (1993). Creating readiness for organizational change. *Human Relations*, 681-703.
- [7] Thakur, R. R., & Srivastava, S. (2017). From Resistance to Readiness: The Role of Mediating Variables. *Journal of Organizational Change Management* , 230-247.
- [8] Anggraini, N. P., & Fajrianti. (2019). Peran Psychological Capital dalam Hubungan Persepsi Dukungan Manajemen dan Kesiapan untuk Berubah. *Jurnal Psikologi Teori dan Terapan* , 85-94.
- [9] Eisenberger, R., Malone, G. P., & Presson, W. D. (2016). Optimizing Perceived Organizational Support to Enhance Employee Engagement. *SHRM-SIOP Science of HR Series* , 1-22.
- [10] Dharmawan, D. C., & Nurtjahjanti, H. (2017). Hubungan Antara Perceived Organizational Support dan Kesiapan Untuk Berubah Pada Karyawan PT. KAI Commuter Jabodetabek. *Jurnal Empati* , 115-119.
- [11] Ming-chu, Y., & Meng-hsiu, L. (2015). Unlocking the black box: Exploring the link between perceive organizational support and resistance to change. *Asia Pacific Management Review*, 20(3), 177–183.
- [12] Armenakis, A. A., Harris, S. G., & Mossholder, K. W. (1993). Creating readiness for organizational change. *Human Relations*, 681-703.
- [13] Tsalits, A. H., & Kismono, G. (2019). Organizational culture types and individual readiness for change: evidence from Indonesia. *Diponegoro International Journal of Business* , 86-95.

- [14]Mardhatillah, A., & Rahman, S. A. (2020). Kesiapan Karyawan untuk Berubah: Apakah ada Perbedaan Demografis dari Prediktor Psikososial? *Jurnal Psikologi Sosial* , 1-11.
- [15]Novel, N. J. (2019). Kesiapan Perubahan Para Karyawan dalam Rangka Perubahan Kepemimpinan di ISS Indonesia. *Responsive* , 108-116.
- [16]Holt, D. T., Armenakis, A. A., Feild, H. S., & Harris, S. G. (2007). Readiness for Organizational Change: The Systematic Development of a Scale. *The Journal of Applied Behavioral Science* , 232-255.
- [17]Dai, K., & Qin, X. (2016). Perceived Organizational Support and Employee Engagement: Based on the Research of Organizational Identification and Organizational Justice. *Open Journal of Social Sciences* , 46-57.
- [18]Eisenberger, R., Malone, G. P., & Presson, W. D. (2016). Optimizing Perceived Organizational Support to Enhance Employee Engagement. *SHRM-SIOP Science of HR Series* , 1-22.
- [19]Rhoades, L., & Eisenberger, R. (2002). Perceived Organizational Support: A Review of the Literature. *Journal of Applied Psychology* , 698-714.
- [20]Farahana, W., Ghaffari, S., Nazri, M., & Kasuma, J. (2017). The Effect of Internal Context Factors on Individual Readiness to Change among the Non-academic Staff at the University of Malaya. *Australian Journal of Basic and Applied Sciences* , 58-68.
- [21]Kirrane, M., Lennon, M., O'Connor, C., & Fu, N. (2016). Linking perceived management support with employees' readiness for change: the mediating role of psychological capital. *Journal of Change Management* , 1-20.
- [22]Azwar, S. (2012). *Penyusunan Skala Psikologi*. Yogyakarta: Pustaka Pelajar.
- [23]Aini, H., Umaroh, S. K., Sari, M. T., & Sulistyani, N. W. (2020). Pengaruh Persepsi Dukungan Organisasi Terhadap Kesiapan Untuk Berubah Pada Karyawan PT. Anugerah Bara Kaltim Kabupaten Kutai Kartanegara. *Jurnal Fakultas Psikologi Universitas 17 Agustus Samarinda* , 1-11.
- [24]Munawaroh, L., & Meiyanto, I. S. (2017). Peranan Psychological Capital terhadap Kesiapan Individu untuk Berubah yang Dimoderatori oleh Persepsi Dukungan Organisasi. *Jurnal Psikologi* , 198-210.



# *Educational Ideas Of Reformers In Turkestan In The Late 19th - Early 20th Centuries*

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**Abstract** – This article reflects the main features of the development of enlightenment in Turkestan. The advanced views of such enlighteners as Ahmad Donish (1827-1897), Sattarkhan Abdulgafarov (1843-1902), Furkat (1858-1909), Berdakh (1827-1900) are reflected. the course of enlightenment, which acquired a certain political connotation at the beginning of the twentieth century, demanded educational reforms, the opening of new-method schools, the creation of theater troupes. study secular sciences, languages of other peoples, etc. The role of such enlighteners as Mahmudhoja Behbudi, Minovar-Kori Abdurashidkhanov, who played a huge role in their educational activities in the development of enlightenment of the Turkestan region, including Uzbekistan, is especially indicated.

**Keywords** – Jadidism, enlighteners, enlightenment, Young Bukharians, reform, Muslim society, new method schools, market relations, ideology, ideological movement, capitalist relations, cognition, emirate, political system, transformation, early period, secular knowledge, feudal system, property, education ...

## I. INTRODUCTION

In the enlightenment of Turkestan at the end of the 19th - beginning of the 20th centuries, both general features inherent in enlightenment, both in the ideological movement of the period of formation of capitalist relations, and specific ones, due to the historical and national characteristics of the region, were reflected. [1-45]

Educational ideology in Turkestan emerged in the 80s of the 19th century. Its formation and development was due to the influence of European culture, the very fact of the contrast between feudal Central Asia and capitalist Russia.

Enlighteners of the early period Ahmad Donish (1827-1897), Sattarkhan Abdulgafarov (1843-1902), Furkat (1858-1909), Berdakh (1827-1900), analyzing the feudal and cultural backwardness, criticized the feudal-khan system and advocated knowledge ... [2-46] They pinned their hopes on an enlightened monarch who could lead the country out of backwardness, promoting the spread of science and education.

Ahmad Donish believed that the way to get rid of poverty and ignorance was through reforming the state system of the emirate, spreading secular knowledge.

The enlighteners argued that happiness is acquired not in a passive expectation of it in the next world, but in the knowledge of the surrounding world and the subordination of this knowledge to society and people.

A. Donish said that a person exists for creation, therefore he must have knowledge and work, because food products do not fall from the sky, but are obtained by labor. He summoned his compatriots to study science to master various crafts.

Furkat's creativity is also permeated with the desire for progress, knowledge and enlightenment. Familiarity with the achievements of European culture, in particular Russian, played an important role in improving his educational ideas.

Furkat comes to the firm conviction that only through the study of European culture and science, through enlightenment, can one get out of the backwardness in which she found herself. According to Furkat, ignorance is a living hell, in which you cannot see a ray of light, and suggested the young generation to study secular sciences. He said that science should serve the people, scientists should be respected and respected, regardless of their nationality and religious beliefs.

Admiring the achievements of science that entered life, Furkat pays tribute and gratitude to the scientists of Russia. In Turkestan at the end of the XIX - beginning of the XX centuries. the idea of an "enlightened and wise ruler" gave way to the idea of denying monarchical power. This tendency manifested itself in the views of Mukimi, Zavka, Hamza, and others Mukimi in his works reflected a deep hatred for the world of oppression and violence, described the plight of the peasants, oppression and arbitrariness in colonial Turkestan .. "Where the poor should look for the truth, if money is a dagger that cuts everything," Mukimi wrote angrily. Mukimi's ideas were continued by Zavki, Hamza and others.

## **II. THE EMERGENCE OF THE CURRENT JADIDISM.**

The Jadid movement was of particular importance for the enlightenment of that period. [3-88-90] Jadidism took shape as a special stream of enlightenment and acquired a certain political coloring at the beginning of the twentieth century. They demanded educational reform, were in favor of new-method schools, and created theater companies. The Jadids disclosed the problems associated with the reform of the management of the region, market relations. They dealt with such issues as the right of a Muslim to deal with banking capital, trade, study secular sciences, languages of other peoples, etc. They saw the advantage of capitalist economic relations over feudal ones, contributed to their development in Turkestan; discovered new methods of economic management based on the expedient use of the advantages provided by the railway, the banking system, the use of technology, etc. They said that without knowledge, science and technology, without having trained specialists, they would win the competition with the capital of the metropolis, and they stood up for secular education, for training specialists, for carrying out reforms in the administration of the region, which would not limit the economic and political freedom of the local bourgeoisie.

The Jadids collaborated with the leaders of the national liberation movement of Tatarstan, Transcaucasia, Turkey. Newspapers and magazines from Turkey, Kazan, Orenburg, Ufa were distributed in Turkestan.

Behbudi. The essence and essence of the Jadid movement was most vividly expressed by one of its largest leaders and theorists Mahmud Khoja Behbudi (1879-1919). [4-17]

Behbudi came from a wealthy family. After graduating from the madrasah, he held the position of mufti (interpreter of Sharia) at the Kazi courts of Samarkand, was engaged in commercial activities. Since 1906, Behbudi has appeared in the Jadid periodicals with the idea of national liberation of the region through educational reform and the system of government in Turkestan. His views are characterized by an anti-feudal orientation and especially opposition to the colonial system of government in Turkestan. Behbudi in his activities paid much attention to the promotion of secular knowledge and culture. In 1913 he published the Samarkand newspaper, and from August 1913 the Oina magazine, which existed until June 1915. In addition to numerous articles devoted to the problems of promoting scientific knowledge, socio-political life and everyday life of the peoples of Turkestan, Behbudi wrote textbooks on geography, a primer for elementary schools, translated and edited a number of works. He also wrote the play "Padarkush" ("Father-killer"), which was staged by amateur theater companies in many cities of Uzbekistan.

"Our rich people," he wrote, "are ruined as a result of their illiteracy, because they do not know how to trade, conduct financial transactions." Behbudi warned that if we do not want to lose to other nations in the field of culture and economy, we must train educated statesmen, engineers, and businessmen. They will become the protectors of our interests and our religion. "Without this," he says, "our days are numbered."

In his political demands, Behbudi proceeded from the program of the Muslim Union party, which arose in August 1905. Its representatives turned to Behbudi with a request to express their views on Turkestan, with which they invited in 1914 to St. Petersburg to a meeting of the Muslim faction of the State Duma. [5-58]

Behbudi, Minovar-Kori and other leaders of the Jadids began to actively create their own organizations. In March 1917, the Shura Islamia organization was established. Already at its first congress in April 1917, a political credo was formulated, namely,

the idea of creating a national-religious autonomy, convening a Constituent Assembly, which would establish a special form of government in Turkestan within the framework of the Russian Federal Republic. The Jadids believed that the Constituent Assembly would give Turkestan self-determination. They were active participants in the creation of the "Kokand autonomy". Participated in the congress where the "Kokand autonomy" was proclaimed.

Behbudi in 1919 was killed by agents of the Bukhara emir for his educational and public activities directed against the existing system and in support of the Young Bukhara movement. Minovar-Kori Abdurashidkhanov was repressed in 1929 and died. [6-141]

### **III. FINDINGS**

So, the activities of the enlighteners of Central Asia are one of the brightest pages in the history of social thought. Their dignity lies in the fact that in the dark period of feudal backwardness, they promoted the ideas of progress and social justice, formed the consciousness of national independence.

#### **REFERENCES :**

- [1] "History of philosophy in a summary." - M.: Mysl, 2001, p.-45
- [2] Gafarov N.U. Jadidism in Central Asia at the end of the 19th century. - the beginning of the XX century. Dissertation, 2014, p-46.
- [3] Kazimova G.Kh. The enlightening ideas of Sadridinna Aini (1895-1910). Dissertation, 1997, pp. 88-90
- [4] Rasulov K. Jadidikho kistand? (Who are the Jadids?) // Rudaki, - 2007.- № 16, -C.17
- [5] Khotamov H. Bukhara Jadids and the main stages of their activity, - Dushanbe, 2000, p. 58.
- [6] Fundamentals of Philosophy: Textbook. Section 2. - T.: Uzbekiston, 2010, p-141.

# *The Analysis Practicality Of Problem-Based Learning Model Accompanied By Metacognition Instructions To Improve Statistical Reasoning Skill Students*

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**Abstract** – This research is focused on the prototype development stage to see the practicality of learning devices in developing a Problem-Based Learning model accompanied by Metacognition Instructions. This type of research is qualitative research with a descriptive approach. The informants in this study were students of Mathematics Education at IAIN Kerinci and lecturers of Mathematics at IAIN Kerinci. This study uses instruments 1) In-depth interview sheets for students and lecturers of Mathematics at IAIN Kerinci; 2) Participant Observation; and 3) Documentation. The results of the data analysis, the practicality of learning devices has an average with an excellent category for all aspects. It means learning devices developed based on the Problem-Based Learning model accompanied by Metacognition Instructions to improve statistical reasoning skill students is practical.

**Keywords** – Practicality Analysis, Problem Based Learning, Metacognition Instruction, Statistical Reasoning Skill.

## I. INTRODUCTION

One of the objectives of learning educational statistics is to form and develop students' statistical reasoning skills. In Garfield (2003) statistical reasoning abilities will introduce a person to the concepts and logic of statistical thinking. Statistical reasoning provides an introduction to the level of practical ability to select, generate and interpret methods of both descriptive statistics and statistical inferencing appropriately. Meanwhile, Chance (2002) states that statistical reasoning involves understanding the entire investigative process starting from the questions asked for data collection, selecting the analysis to be used for testing assumptions, understand how a model can be used to simulate random phenomena, understand how data is generated to estimate probability, recognizing how, when, why investigation tools might be used, and able to understand and utilize the context of a problem to plan and evaluate investigations and to draw conclusions.

The development of students' statistical reasoning abilities is very important and urgent to be pursued by lecturers, especially lecturers in the education statistics subject. One way to develop statistical reasoning skills is to consistently invite students to solve daily problems by applying statistics. The hope is that students' statistical reasoning abilities will continue to develop properly so that it will indirectly improve the quality of students' thinking and knowledge.

Ironically, statistical reasoning skills among educators are also problematic. The results of Martadiputra (2010) study on statistical literacy, statistical reasoning, and statistical thinking of junior high school and high school mathematics teachers in

Bandung, illustrate that: 1) the average statistical literacy ability has reached 88.38% so that it got a good category; 2) the average statistical reasoning has only reached 46.45% so that it is in the moderate category; 3) the average statistical thinking ability reaches 32.15%, with a low category. Based on the study, it was found that the statistical literacy skills of SMP/SMA mathematics teachers were already good so that teachers tended to teach statistics by emphasizing statistical literacy skills. Meanwhile, the statistical reasoning abilities and statistical thinking abilities of junior high school mathematics teachers can be categorized as medium and low respectively. This condition is thought to cause students' reasoning abilities and statistical thinking abilities to still have problems. Therefore, this issue must be of concern to policymakers in the field of education and higher education institutions, both public and private, that produce teachers.

Currently, statistical learning has not touched students' statistical reasoning abilities. Students still have difficulty applying statistics in their daily lives and solving educational problems. Learning is still a technical calculation that is not meaningful. This condition is in line with the conditions of statistical learning internationally. As stated in the *Australian Education Council (1994)*; *National Council of Teachers of Mathematics (1989, 2000)*; *The School Curriculum and Assessment Authority & Curriculum and Assessment Authority for Wales (1996)* states that there is a need for international statistical education reform at all levels of education (Jones *et al*, 2000; Wulansari *et al*, 2019). Furthermore, Jones *et al*, (2000) suggest using a broader approach in studying statistics, including describing, organizing, representing, analyzing, and interpreting data. To broaden this perspective, further research on learning and teaching statistics is needed (Shaughnessy *et al*, 1996; Rusliah, 2016). Ben-Zvi and Friedlander (2010) stated that when given real problems, conventional statistics learning activities tend to be unreal and relatively shallow. This indicates that conventional statistics learning is less meaningful for students. And in conventional statistics learning, educators emphasize more on statistical literacy skills, not on statistical reasoning abilities.

The existing learning model has not paid special attention to statistical reasoning abilities. The learning model that is thought to improve statistical reasoning skills is the Problem Based Learning Model with Metacognition Instruction (PBM-IM). This model tries to combine aspects of problem-solving as well as aspects of metacognition to complement each other. This is because PBM, which is currently widely used by educators, has not paid special attention to metacognition aspects. In fact, in several studies, it was found that the problem-solving aspects of metacognition were in harmony. As stated by O'Neil and Brown (1997; Rusliah *et al*, 2020) that to build problem-solving strategies, metacognition plays an important role as a process by which a person thinks about his thoughts to build the strategy. From this explanation, it can be said that there is a need for a learning model that modifies the problem solving and metacognition aspects. It is hoped that the PBM-IM learning model can accommodate these two aspects. With the PMB-IM model, every proposed statistical problem will be seen how the student starts planning, processes information, arrives at the final result as well as the correct interpretation of the results. Each stage of problem-solving will be accompanied by metacognition instructions.

The PBM-IM learning model is not directly used but must be tested. The aspect that needs to be tested is the practical aspect of the model. Practicality is a very important element in the PBM-IM research process to improve statistical reasoning skills. Practicality relates to the ease of use of the products produced. According to Suharsimi Arikunto (2006: 62), a teaching material has high practicality if the teaching material is practical, which is easy to implement, and is equipped with clear instructions. In line with that, Sukardi (2008) states that practicality can be assessed from the following aspects: 1) Use, including ease of management, storage, and can be used at any time; 2) Its use only requires a short time, fast and precise; 3) Fostering the attractiveness and interest of students in using the device; 4) Easy to understand or use by the teacher; and 5) Has the same equivalence.

## II. METHODS

This research is a research development or *Research and Development (R & D)*. Development research is a research method used to produce certain products. The model used is a model development Plomp which consists of three phases, namely the phase of preliminary investigations (*preliminary research*), phase of development or manufacture of prototypes (*development or prototyping phase*), and the phases of assessment (*assessment phase*). At the initial stage, we analyzed the context and needs in the learning of student education statistics. At the prototype stage, products produced from preliminary studies were developed, namely in the form of model books, student books, and PBM-IM-based lecturers' books. Prototype production includes designing, developing, and formative evaluation. The evaluation stage is the stage of assessing the resulting prototype using practicality and effectiveness tests. At this stage, semi-summative is also applied. Formative evaluation includes *self-evaluation*, *expert review*, *one-to-one*, *small group*, and *field test*. A summary of the stages is provided in Fig 1 below.

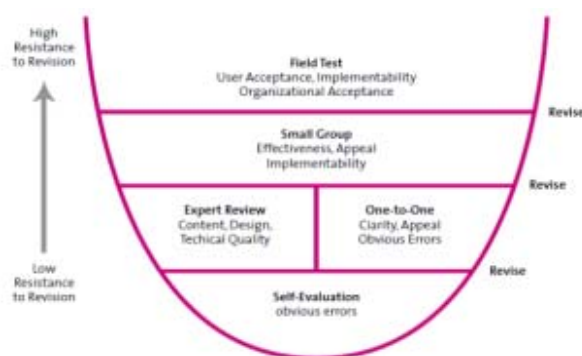


Fig 1. Formative Evaluation (Source: Tessmer, 1993; Plomp, 2013)

This research will discuss the practicality of model books, student books, and lecturer books based on PBM-IM. Practicality is carried out in two activities, namely *one to one* and *small groups*. One to one involves three students, namely students with high, medium, and low abilities. *Small groups* are carried out by applying the PBM-IM model book to 6 students, namely 2 high-ability students, 2 medium-ability students, and 2 low-ability students. In the implementation of the small group, the researchers directly applied the mathematics learning tools and the teacher as an observer. After the implementation of the small group, the researchers gave a practical assessment questionnaire to the teachers and students involved in the small group: the practicality of the product was obtained from the practicality checklist data sheet on a Likert 1-5 scale. Furthermore, the data analysis of validity and practicality was carried out using the steps adopted from Riduwan (2005), namely determining the percentage using the formula:

$$\text{Prosentase Valid atau Praktis} = \frac{\text{jumlah skor jawaban masing - masing item}}{\text{jumlah skor ideal masing - masing item}} \times 100\%$$

Note: Formula in Indonesian language

The valid and practical criteria are shown in Table 1 below.

Table 1. Validity and Practicality Criteria

No	Percentage of Achievement	Validity	Category Practicality Category
1	≥ 81%	Very Valid	Very Practical
2	61% - 80.99%	Valid	Practical
3	41% - 60.99%	Enough Valid	Quite Practical
4	21% - 40.99%	Less Valid	Less Practical
5	≤ 20.99%	Invalid	Not Practical

Source: Ridwan (2005) modified

### III. RESULTS

#### A. Practicality Analysis in Phase One to one

In Table 2 it can be seen that every aspect has reached the desired criteria, namely instructions with a value of 100%, learning outcomes 81.6%, material 100%, worksheets 86.6%, validity 91.2%, graphics 91.2% and benefits 93.4%. The practicality of the learning device assessed by the student response questionnaire has an average of 92% with the very practical category.

Table 2. Results of the questionnaire practicalities of one to one

Aspect	Value	Criteria
Instructions	100	SP
Learning Accomplishment	81.6	SP
Materials	100	SP
Worksheet	86.6	SP
Linguistic	91.2	SP

Kegrafikaan	91.2	SP
Benefits	93.4	SP

Note: SP = Very Practical

### B. Small group analysis

In the stage *small group*, researchers teach in small groups of 6 students. The researcher taught 5 meetings to try out the PBM-IM-based student books. The students chosen by the researchers represented all the student ability criteria and were different from students in phase *one two*. The researcher asked the lecturer for help to select 6 mathematics majors who would be included in the activity *Small group*. Then the students were divided into two groups, each group consisting of 1 high-ability student, 1 medium-ability student, and 1 low-ability student. The researcher asked the mathematics lecturer to be an observer during the testing of the device in the phase *small group*. The researcher gave the observation sheet to the lecturer as a reference for the assessment as an observer. Lecturers assess the implementation of PBM-IM-based books. Lecturers during the learning process carried out by researchers by filling out observation sheets. The results of observations of the practicality of learning devices carried out by the lecturer on the learning process carried out by researchers in the phase *small group* can be seen in Table 3 below.

Table 3. The results of the lecturer observation sheet on the implementation of the small group

Aspects assessed	I	II	III	IV	V	Score
Syntax	83.72	89.3	88.84	88.37	86.51	87.35
Reaction Principle	72.73	81.82	85.45	83.64	87.27	82.18
Social System	75.56	77.78	80	77.78	73.33	76.89
Average	78.22	85.56	87.15	86	86.89	84.77
Criteria for	P	SP	SP	SP	SP	SP

Notes: P = practical, SP = Very Practical

In the Table, it can be seen that there is 1 meeting with the practical category, namely the first meeting with a value of 78.22%. Meanwhile, 4 meetings were categorized as very practical, namely at meetings II, III, IV, and V with the respective values of 85.56%, 87.15%, 86%, and 86.89%. The practicality of the learning device as assessed from the observation sheet filled in by the lecturer has an average of 84.77% with a very practical category. The table also shows that the results of observations for each meeting do not always increase. However, the decline in assessment from the previous meeting was not a problem because the results were still within practical criteria. The small group also assessed practicality by using the student response armature. Student response questionnaires are given after the fifth meeting is over, then students are given a questionnaire to find out its practicality from the student's point of view after using the device. The results obtained can be seen in Table 4 below.

Table 4. Practicality questionnaire results small group

Aspect	Practicality Score Small Group	Criteria
Guidelines	86.6	SP
Learning Outcomes	90.8	SP
Material	91.6	SP
Worksheet	92.2	SP
Languages	86.6	SP
Graphic	91.2	SP
Benefit	100	SP

In Table 4 it can be seen that every aspect has reached the desired criteria, namely instructions with a value of 86.6%, learning outcomes 90.8%, material 91.6%, worksheets 92.2%, validity 86.6%, graphics 91.2%, and 100% benefit. The practicality of the learning device assessed by the student response questionnaire has an average of 91.28% with the very practical category. The practicality of model books, student books, and lecturer books based on PBM-IM was tested through the one-to-one phase and a small group had practical criteria. Practicality is assessed from several aspects, namely instructions, learning outcomes, materials, worksheets, validity, graphics, and benefits. The practicality of the learning tools assessed by the student response questionnaire in

the one-to-one phase had an average of 92% in the very practical category, in the small group phase it had an average of 91.28% with the very practical category.

The practicality value of one-to-one compared to the small group decreased from 92% to 91.28%, namely 0.72%. However, the decline that occurred from the one-to-one phase to the small group phase did not affect the practicality of the device, because the device was still in the very practical category. Based on the analysis carried out, the decline that occurred did not significantly affect practicality.

The decrease in practicality value occurred because the small group phase involved more students than the one-to-one phase. The one-to-one phase-only involved three students, while the small group phase involved 6 students. So that the one-to-one process is easier to implement compared to the small group, all students also get good guidance in the one-to-one phase compared to the small group phase.

Practicality is also assessed from the learning process carried out in the small group phase. The assessment is carried out by observing the learning process carried out by the researcher. The observer in this study was a lecturer who taught educational statistics. Observations were made to see the practicality of the assessment of lecturers who teach educational statistics when the device is applied directly in learning. The results of the observations show that the device has met the practical criteria.

#### IV. CONCLUSION

Based on the result of the study, it was concluded that the Practicality of the Problem-Based Learning Model Accompanied by PBM-IM to Improve Statistical Reasoning Skill Students were very practical based on observation, students and lecturer response questionnaire.

#### REFERENCES

- [1] Ben-Zvi, D., & Friedlander, A. (1997). Statistical thinking in a technological environment. *Research on the role of technology in teaching and learning statistics*, 45-55.
- [2] Chance, B. L. (2002). Components of statistical thinking and implications for instruction and assessment. *Journal of Statistics Education*, 10(3).
- [3] Garfield, J. B. (2003). Assessing statistical reasoning. *Statistics Education Research Journal*, 2(1), 22-38.
- [4] Jones, G. A., Thornton, C. A., Langrall, C. W., Mooney, E. S., Perry, B., & Putt, I. J. (2000). A framework for characterizing children's statistical thinking. *Mathematical thinking and learning*, 2(4), 269-307.
- [5] Martadiputra, B. A. P. (2010). Kajian Tentang Kemampuan Melek Statistis Statistical Literacy, Penalaran Statistis Statistical Reasoning, Dan Berpikir Statistis Statistical Thinking Guru Smp. 640, 83.
- [6] O'Neil, H. F., & Brown, R. S. (1997). Differential effects of question formats in math assessment on metacognition and effect (Tech. Rep. No. 449). Los Angeles: University of California. *National Center for Research on Evaluation, Standards, and Student Testing*.
- [7] Plomp, T. (2013). Educational design research: An introduction. *Educational design research*, 11-50.
- [8] Riduwan. 2005. *Easy Learning Research Teachers, Employees and Beginner Researchers*. Bandung: Alfabeta.
- [9] Rusliah, N. (2016). Improving Higher-Order Thinking Skills of Students in Learning Mathematics. Proceeding of The Second International Conference on Education, Technology, and Sciences: "Integrating Technology and Science into Early Childhood and Primary Education". 628-636
- [10] Rusliah, N., Handican, R., Deswita, R., & Oktafia, M. (2021). Mathematical problem-solving skills on relation and function through Model-Eliciting Activities (MEAs). In *Journal of Physics: Conference Series*. 1778(1), 012016
- [11] Shaughnessy, J., Garfield, J., Greer, B., Bishop, A., Clements, K., Keitel, C., ... & Laborde, C. (1996). International handbook of mathematics education. *AJ Bishop, K. Clements, C. Keitel, J. Kilpatrick, & C. Laborde, International Handbook of Mathematics Education*, 4, 205-238.



- [12] Sukardi. 2008. *Educational Research Methodology, Competence and Practice*. Jakarta: PT. Earth Literacy
- [13] Tessmer, M. (1993). *Planning and conducting formative evaluations: Improving the quality of education and training*. Psychology Press.
- [14] Wulansari, T., Putra, A., Rusliah, N., & Habibi, M. (2019). Pengaruh model pembelajaran berbasis masalah pada materi statistika terhadap kemampuan penalaran statistik siswa. *AKSIOMA: Jurnal Matematika dan Pendidikan Matematika*, 10(1), 35-47.

# *Digital Literacy: The Need for Technology-Based Learning Media in the Revolutionary Era 4.0 for Elementary School Children*

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**Abstract**— Digital literacy today is indispensable for students to use technology according to their needs and capacities. This study aims to analyze educational game-based learning media's needs in the era of industrial revolution 4.0 using descriptive research with an explorative qualitative approach. The research was conducted on grade V elementary school students in Surakarta City. Data collection through interviews and questionnaires. Interviews were conducted on three teachers selected with purposive sampling techniques. The questionnaire was distributed to 85 students online through JotForm. Source triangulation was chosen as a way to assess the validity of data and by using interactive analysis consisting of data collection, data reduction, data presentation, and conclusion drawing obtained research results that show that students need interactive learning multimedia in the form of educational games that can be used on smartphones and computers or laptops. Educational games are expected to be a solution to elementary school students' learning media needs in math subjects and improve students' learning motivation and understanding.

**Keywords**— *the era of industrial revolution 4.0; educational games; digital literacy; interactive learning multimedia*

## I. INTRODUCTION

The development of technology in industrial revolution 4.0 led to systematic changes in various fields such as technology, education, culture, politics, and economics [1], [2]. One of the most significant impacts on the world of education [3]. The emergence of the industrial revolution 4.0 had a massive effect [4], resulting in changes in the education system, such as adjusting educational objectives, learning curriculum, teaching strategies, school management, administrative processes, assessment, and evaluation of learning [5]. Qualified human resources are certainly needed to catch up with the quality of education in Indonesia.

Era 4.0 is also referred to as the digital age [6], where almost all life elements cannot be separated from technology [7]. There is no denying that all human beings need technology nowadays, including students at the basic education level. One of the pieces of evidence that everyone needs technology is the smartphone needed by everyone, including students at the elementary education level. Especially during this pandemic, all educational activities are carried out online to demand students to use smartphones [8].

Smartphones are one of the digital devices that can support the implementation of learning [9]. However, smartphone learners have a significant influence on their daily lives [10]. Many of them use smartphones just to spend time in vain by playing games, social media such as Facebook, TikTok, Instagram, and others as such [11]. As a result, they lose time to learn to have an impact

on learning outcomes. Learners are the country's most significant investment [12]. As the next generation in the future, of course, it should be prepared as best as possible included in smartphones.

Efforts to print a quality generation cannot be separated from the role of a teacher. Teachers are one of the most critical elements in education. Teachers are professional educators with the main tasks of educating, teaching, guiding, directing, training, assessing, and evaluating learners from early childhood education to formal education, primary and secondary education [13]. In addition to mastering technology, teachers should also explain to students how to apply technology in daily life [14]. Therefore, educators and students must be able to keep up with the current educational developments. Education in the 4.0 era is an education characterized by digital technology in the learning process or known as a cyber system [15]. This system can make the learning process can take place continuously without space limits and time limits [16]. Through the integration of technology in freedom of learning, it is expected that effective and efficient learning will be created. Therefore, teachers who become the vanguard in the world of education are required to conduct innovative learning.

In addition to teachers, two elements are essential to achieving learning objectives, namely learning models and learning media [17]. Teachers, learning models, and learning media are integrated. Teachers as implementers of learning should choose the suitable model and learn media for their students. Teacher's selection of learning models dramatically influences the learning media to be used [18]. Learning media serves as a tool that can affect the condition of learners [19]. Therefore, learning media has an essential role in the learning process. The effectiveness and efficiency of learning can be obtained through learning media [20].

There are several learning media types, namely visual-based media, audio-based media, audio-visual and multimedia-based media [21]. Based on its classification, multimedia is one of the most complex media because it is necessary to combine several media in its application. The use of interactive media in the learning process can increase the interest and motivation of learning caused by its interest in multimedia systems that display text, images, video, audio, and animation [22]. From the statement, it can be said that students' interest in learning using interactive multimedia is due to the attractive appearance and support of the learning process. Several studies related to interactive multimedia development concluded the same thing [23]-[25]. Besides, through multimedia, students can develop their digital literacy [26]. This can happen by utilizing multimedia to encourage students to interact with technology interactively. Digital literacy is the ability to use and understand information from various formats (audio, images, video, text, and animation) and multiple sources available through digital devices [27]. Digital literacy is one of the four domains needed to live in the 21st century [28]. Today's digital literacy needs are urgently needed so that students can use technology according to their needs and capacities.

Some elementary schools in Indonesia still use conventional learning media when learning face-to-face and online learning [29]. Therefore, the development of android-based interactive multimedia (smartphone) becomes a thing that must be done immediately. Delays in interactive multimedia development are feared to make it wrong for primary school students to take advantage of smartphone use. This study aims to analyze and describe the needs of teachers and students on appropriate learning media to improve the digital literacy of students in elementary schools. This study's findings are expected to be a reference for other researchers to develop innovative interactive multimedia to be applied in elementary schools.

## **II. RESEARCH METHOD**

This study uses a descriptive research design with an explorative qualitative approach. Descriptive research is defined as a study that aims to present a complete picture of social settings or is intended for exploration and clarification of a phenomenon or social reality [30]. An explorative qualitative approach aims to explore broadly and deeply the causes or things that affect the occurrence of something. The exploration design was chosen because it could investigate various complex patterns of individual and group experiences involved [31].

### **2.1. Research Subjects**

The research was conducted in Surakarta, with 85 respondents from grade V and three teachers from three schools with more certified teachers than uncertified teachers. The three teachers were chosen using purposive sampling techniques, namely, in addition to being a grade V teacher from each school and a teacher who has a certificate of professional educators.

## **2.2. Research Instruments and Data Collection Techniques**

In addition to researchers as the main instrument, this study used two auxiliary instruments in interview guidelines and questionnaires. Two experts have validated both instruments in the field of mathematics education with doctorates from Sebelas Maret University. Interviews were conducted with grade V teachers, and questionnaires were distributed to all student respondents online through JotForm. Interviews and questionnaires will be conducted from March 25 to 27, 2021.

## **2.3. Data Analysis Techniques**

The validity of data using source triangulation is by comparing data from interviews with teachers and questionnaires of students' needs. Furthermore, the data obtained in the analysis uses an interactive analysis put forward by Miles and Huberman consisting of data collection, data reduction, data presentation, and conclusion drawing [32].

### **III. RESULT AND DISCUSSION**

As explained earlier, in this study, the study respondents consisted of two categories, namely teachers and students. Interviews are conducted with teachers, while questionnaires need to be distributed to students. An interview used in this study is an in-depth interview, which is the process of obtaining information for research purposes through question and answer while face-to-face between the interviewer and the respondent [33]. Questions are asked in-depth on a predetermined topic (based on the interview's purpose and intent) using an open question [34].

Interviews were conducted with V-grade teachers in each school where the three teachers have been certified. Educator certification is a benchmark for teachers to be said to be professionals. Referring to the Regulation of the Minister of National Education (PERMENDIKNAS) number 16 of 2007 concerning academic qualification standards and teacher competencies, teacher professional competency standards include (1) mastering materials, structures, concepts, and scientific mindsets that support the subjects mastered; (2) mastering the standard of competence and essential competencies of the subjects/areas of development that are mastered. (3) develop creatively capable learning materials. (4) develop professionalism sustainably by performing reflective actions. (5) utilizing information and communication technology to communicate and develop themselves [35].

The criteria of professional teachers defined in PERMENDIKNAS no 16 are contrary to the existing circumstances. Based on the results of interviews that have been conducted show that the teachers are elderly, it is challenging to meet professional teachers' criteria as stated in PERMENDIKNAS no. 16 even though they have a certificate a professional educator. Also, from the results of the interview obtained information, namely: 1) the absence of digital-based multimedia learning; 2) the weak ability of teachers in the use of technology so that it is challenging to be able to innovate in digital-based learning; 3) the use of smartphones by students is limited because the smartphone owned belongs to his parents; 4) the prohibition of the use of smartphones in schools during face-to-face learning; 5) the learning media used today only uses concrete objects around as a support for mathematics learning; 6) digital-based learning support components such as LCD projectors are limited in number; 7) all teachers already have laptops, and 8) students have difficulty in understanding mathematics without any tools (learning media).

The interview results can be concluded that the teacher needs learning media that all students can use through smartphones during online learning or while studying at home and the media can be used in classroom learning using the help of the teacher's laptop and LCD projector. With the limitations of teachers' ability to the latest technology, teachers hope that the media developed later in media use and easy to operate. Teachers feel that they are no longer able to develop or operate complex media.

The needs questionnaire distributed to 85 students showed some of the same conclusions as what the teacher said, among them that the smartphone used by the student belonged to his parents or brother. However, the findings are surprising that in a day, the average student uses a smartphone for 2-5 hours, and most of the time, it is used only for tinkering. So, the function of smartphones that are supposed to learn media becomes misused. Some of the other questions asked in the needs poll are presented in Table 1.

Table 1. Results of Filling the Questionnaire Needs by Students

Aspects	Questions	Answer	
		Yes	Not
Assessment of math learning in primary schools	1. Are math subjects difficult?	61%	39%
	2. Is the explanation of the teacher in math subjects elusive?	31%	69%
	3. Have teachers ever used digital learning media when teaching math subjects?	20%	70%
Availability of facilities and supporting learning media.	4. Is it in teaching math teachers using laptops and LCD projectors?	36%	64%
	5. Is there a mobile phone (smartphone) at home, and you can use the mobile phone (smartphone)?	95%	5%
The need for interactive multimedia in the form of educational games	6. Do you know about interactive multimedia?	32%	68%
	7. Do teachers use interactive multimedia when learning mathematics?	48%	52%
	8. Do you play educational games related to math subjects?	59%	41%
	9. Do you need multimedia learning in the form of educational games to learn math?	100%	0%

Table 1 shows that the process of learning mathematics in elementary school has not been maximized, especially in the aspect of the utilization of learning media. Aspects of difficulties and limitations in the provision of learning media are shown by 70% of students who answer that teachers never use digital learning media when teaching mathematics, and in the use of LCD projectors, only 36% of students answer that teachers have used it. Therefore, 61% of students say that math subjects are difficult subjects because teachers do not use assistive media to attract students' learning interest in the learning process. Through conventional learning, 69% of students said that the teacher's explanation is easy to understand. This needs to be appreciated, meaning that teachers have been able to teach math subjects well conventionally. Of course, it would be better if learning uses engaging learning media. So, the percentage of students who easily understand math subjects will be higher. Through the use of exciting learning media, it students are easier to understand the materials taught.

The availability of smartphones at home indicated by 95% of students can use and operate them can undoubtedly support the learning process through android-based development media. Also, with LCD projectors in schools and every teacher already has a laptop, digital-based learning media can still be used when learning in class. 68% of students said they knew about interactive multimedia, and 48% of students said that teachers had used interactive multimedia during learning. This means that digital learning media is not a foreign thing for students and teachers because they were once users. Of the 85 students, 59% said they had played educational games, and 90% said they needed multimedia learning based on educational games. Thus, approximately 30% of students have never used educational games and want an educational game developed as a learning medium.

Based on the results of interviews and questionnaires, it is known that teachers have used learning media in the form of images, real objects, and the environment. Teachers tend to use conventional learning models and use books more often as a medium of learning. Computer laboratories have been owned by several schools and only functioned for information and communication technology learning. While the class teacher never used the laboratory for math learning. Teachers only use a personal laptop connected to the projector LCD when they feel needed.

Overall, learning media helps students understand the lesson more efficiently, even if it is not yet maximized. Through the medium of learning the ability to remember students increased by 75% compared to just reading a book. Also, students are easier to understand the material systematically [36]. Learning media that is more in demand by elementary school students in interactive media is audio, audio-visual, animation, and so forth [37]. The use of learning media that does not suit students' needs and

environmental conditions will be free [38]. Based on the interviews and analysis of appropriate learning media questionnaires in the form of educational games.

Educational games developed must be usable through smartphones and computers or laptops. This is following students who can only use smartphones when learning outside the school while at school students are prohibited from carrying and using smartphones. While at school, educational games can be run through the teacher's laptop displayed in the classroom with LCD projectors' help so that students can take turns using them and those who do not use them can see and give instructions. Therefore, with this educational game, teachers can apply various learning models to collaborate with the media to be developed.

#### IV. CONCLUSION

Currently, students need interactive learning media that can be used in online learning and face-to-face learning. The learning media in question is interactive multimedia in the form of educational games. Educational games are designed to be used through smartphones and computers or laptops. Educational games are expected to be a solution to elementary school students' learning media needs in math subjects.

#### REFERENCES

- [1] B. Agung Pambudi and I. Gunawan, "Instructional Leadership as an Effort to Increase Teacher Professionalism in the Industrial Revolution Era 4.0," in *Advances in Social Science, Education and Humanities Research*, 2020, vol. 381, no. CoEMA, pp. 216–220, doi: 10.2991/coema-19.2019.43.
- [2] J. Rymarczyk, "Technologies, Opportunities and Challenges of the Industrial Revolution 4.0: Theoretical Considerations," *Entrep. Bus. Econ. Rev.*, vol. 8, no. 1, pp. 185–198, 2020, doi: 10.15678/EBER.2020.080110.
- [3] A. Oke and F. A. P. Fernandes, "Innovations in Teaching and Learning: Exploring The Perceptions of The Education Sector on The 4th Industrial Revolution (4IR)," *J. Open Innov. Technol. Mark. Complex.*, vol. 6, no. 2, 2020, doi: 10.3390/JOITMC6020031.
- [4] N. J. Harahap and M. Rafika, "Industrial Revolution 4.0: and the Impact on Human Resources," *Ecobisma (Jurnal Ekon. Bisnis Dan Manajemen)*, vol. 7, no. 1, pp. 89–96, 2020, doi: 10.36987/ecobi.v7i1.1545.
- [5] N. N. Sukawati, I. Gunawan, E. Ubaidillah, S. Maulina, and F. B. Santoso, "Human Resources Management in Basic Education Schools," in *Advances in Social Science, Education and Humanities Research*, 2020, vol. 487, no. Ecpe, pp. 292–299, doi: 10.2991/assehr.k.201112.052.
- [6] I. M. Mujtahid, M. Berlian, R. Vebrianto, M. Thahir, and D. Irawan, "The Development of Digital Age Literacy: A Case Study in Indonesia," *J. Asian Financ.*, vol. 8, no. 2, pp. 1169–1179, 2021, doi: 10.13106/jafeb.2021.vol8.no2.1169.
- [7] D. Xiang, P. Li, X. Yuan, P. Cui, and W. Huang, "Highly Efficient Carbon Utilization of Coal-to-Methanol Process Integrated with Chemical Looping Hydrogen and Air Separation Technology: Process Modeling and Parameter Optimization," *J. Clean. Prod.*, vol. 258, p. 120910, 2020, doi: 10.1016/j.jclepro.2020.120910.
- [8] P. Klein *et al.*, "Studying Physics During the COVID-19 Pandemic: Student Assessments of Learning Achievement, Perceived Effectiveness of Online Recitations, and Online Laboratories," *Phys. Rev. Phys. Educ. Res.*, vol. 12, no. 1, 2021, doi: 10.1103/PhysRevPhysEducRes.17.010117.
- [9] R. Metruk, "EFL Learners' Perspectives on the use of Smartphones in Higher Education Settings in Slovakia," *Electron. J. e-Learning*, vol. 18, no. 6, pp. 537–549, 2020, doi: 10.34190/JEL.18.6.006.
- [10] W. Hong, R. De Liu, Y. Ding, X. Sheng, and R. Zhen, "Mobile Phone Addiction and Cognitive Failures in Daily Life: The Mediating Roles of Sleep Duration and Quality and the Moderating Role of Trait Self-regulation," *Addict. Behav.*, vol. 107, no. 19, 2020, doi: 10.1016/j.addbeh.2020.106383.
- [11] E. Gentina, R. Chen, and Z. Yang, "Development of Theory of Mind on Online Social Networks: Evidence from Facebook, Twitter, Instagram, and Snapchat," *J. Bus. Res.*, vol. 124, pp. 652–666, 2021, doi: 10.1016/j.jbusres.2020.03.001.
- [12] I. Mupfudze and T. Mapolisa, "Variables Affecting Learners' Performance at Ordinary Level in Zimbabwean Secondary

- Schools," *Indiana J. Humanit. Soc. Sci.*, vol. 2, no. 2, pp. 25–40, 2021.
- [13] I. P. M. Dewantara, "Curriculum Changes in Indonesia: Teacher Constraints and Students of Prospective Teachers' Readiness in The Implementation of Thematic Learning at Low Grade Primary School," *Elem. Educ. Online*, vol. 19, no. 2, pp. 1047–1060, 2020, doi: 10.17051/ilkonline.2020.696686.
- [14] J. König, D. J. Jäger-Biela, and N. Glutsch, "Adapting to Online Teaching During COVID-19 School Closure: Teacher Education and Teacher Competence Effects Among Early Career Teachers in Germany," *Eur. J. Teach. Educ.*, vol. 43, no. 4, pp. 608–622, 2020, doi: 10.1080/02619768.2020.1809650.
- [15] A. F. Subarkah, S. Y. Slamet, and M. Indriayu, "Curriculum Management in Education Era 4.0 at International Islamic Elementary School Al-Abidin Surakarta (SDII Al-Abidin)," in *Advances in Social Science, Education and Humanities Research*, 2020, vol. 397, no. Iclique 2019, pp. 581–586, doi: 10.2991/assehr.k.200129.072.
- [16] Istikomah, A. Puji Astutik, and M. Jannah, "The Website-based Information Literacy system and Application in Education Facing the Age of Industrial Revolution 4.0", in *Journal of Physics: Conference Series*, 2021, vol. 1779, no. BICED 2020, p. 012055, doi: 10.1088/1742-6596/1779/1/012055.
- [17] L. Mutia, Gimin, and Mahdum, "Development of Blog-Based Audio Visual Learning Media to Improve Student Learning Interests in Money and Banking Topic," *J. Educ. Sci.*, vol. 4, no. 2, pp. 436–448, 2020, doi: <https://doi.org/10.31258/jes.4.2.p.436-448>.
- [18] Rasmitadila *et al.*, "The Perceptions of Primary School Teachers of Online Learning During the Covid-19 Pandemic Period: A Case Study in Indonesia," *J. Ethn. Cult. Stud.*, vol. 7, no. 2, pp. 90–109, 2020, doi: 10.29333/ejecs/388.
- [19] T. T. Wijaya, Z. Ying, S. Chotimah, M. Bernard, Zulfah, and Astuti, "Hawgent Dynamic Mathematic Software as Mathematics Learning Media for Teaching Quadratic Functions," in *Journal of Physics: Conference Series*, 2020, vol. 1592, no. ICPMS 2020, doi: 10.1088/1742-6596/1592/1/012079.
- [20] M. Rohman, F. Baskoro, and L. Endahcahyaningrum, "The Effectiveness and Efficiency of Google Classroom as an Alternative Online Learning Media to Overcome Physical Distancing in Lectures Due to the Covid-19 pandemic: Student Perspectives," 2020, doi: 10.1109/ICVEE50212.2020.9243258.
- [21] S. Nurkamilah, D. I. Putri, and R. Muthmainnah, "Pemanfaatan Teknologi Pendidikan Kawasan Pengembangan Dalam Membuat Media Pembelajaran," *JOEAI (Journal Educ. Instr.*, vol. 3, no. 2, pp. 339–347, 2020, doi: <https://doi.org/10.31539/joeai.v3i2.1768> PEMANFAATAN.
- [22] C. Lange and J. Costley, "Improving Online Video Lectures: Learning Challenges Created by Media," *Int. J. Educ. Technol. High. Educ.*, vol. 17, no. 16, pp. 1–18, 2020, doi: 10.1186/s41239-020-00190-6.
- [23] K. N. Abadi and Y. Sukmayadi, "Interactive Media Design to Train Basic Singing Technique for Kindergarten Students," in *Advances in Social Science, Education and Humanities Research*, 2021, vol. 519, no. Icade 2020, pp. 324–329, doi: 10.2991/assehr.k.210203.069.
- [24] A. H. Fansury, R. January, A. W. Rahman, and Syawal, "Digital Content for Millennial Generations: Teaching the English Foreign Language Learner on COVID-19 Pandemic," *J. Southwest Jiaotong Univ.*, vol. 55, no. 3, 2020, doi: 10.35741/issn.0258-2724.55.3.40.
- [25] F. P. Rachmavita, "Interactive Media-based Video Animation and Student Learning Motivation in Mathematics," 2020, doi: 10.1088/1742-6596/1663/1/012040.
- [26] C. Chen, "Impacts of augmented reality and a digital game on students' science learning with reflection prompts in multimedia learning," *Educ. Tech Res. Dev.*, vol. 68, pp. 3057–3076, 2020.
- [27] J. Coiro, "Toward a Multifaceted Heuristic of Digital Reading to Inform Assessment, Research, Practice, and Policy," *Read. Res. Q.*, vol. 56, no. 1, pp. 9–31, 2021, doi: 10.1002/rrq.302.
- [28] P. Bejaković and Ž. Mrnjavac, "The Importance of Digital Literacy on The Labour Market," *Empl. Relations*, vol. 42, no. 4,

- pp. 921–932, 2020, doi: 10.1108/ER-07-2019-0274.
- [29] R. S. Putri, A. Purwanto, R. Pramono, M. Asbari, L. M. Wijayanti, and C. C. Hyun, "Impact of the COVID-19 Pandemic on Online Home Learning: An Explorative Study of Primary Schools in Indonesia," *Int. J. Adv. Sci. Technol.*, vol. 29, no. 5, pp. 4809–4818, 2020.
- [30] J. Thompson-Burdine, S. Thorne, and G. Sandhu, "Interpretive Description: A Flexible Qualitative Methodology for Medical Education Research," *Med. Educ.*, vol. 5, no. 3, 2020, doi: 10.1111/medu.14380.
- [31] D. S. Bhattacharyya *et al.*, "Challenges and Facilitators of Implementation of An Information Communication and Technology (ICT)-based Human Resources Management Tool in The Government Health Sector in Bangladesh: Protocol for An Exploratory Qualitative Research Study," *BMJ Open*, vol. 10, no. 12, pp. 1–7, 2020, doi: 10.1136/bmjopen-2020-043939.
- [32] H. D. Listiningrum, W. Wisetsri, and ..., "Principal's Entrepreneurship Competence in Improving Teacher's Entrepreneurial Skill in High Schools," *J. Soc. Work Sci. Educ.*, vol. 1, no. 1, pp. 87–95, 2020, [Online]. Available: <http://ejournal.karinosseff.org/index.php/jswse/article/view/20>.
- [33] D. Kwesiga *et al.*, "Barriers and Enablers to Reporting Pregnancy and Adverse Pregnancy Outcomes in Population-based Surveys: EN-INDEPTH Study," *Popul. Health Metr.*, vol. 19, no. 15, pp. 1–14, 2020, doi: 10.1186/s12963-020-00228-x.
- [34] S. Döringer, "The Problem-centred Expert Interview'. Combining Qualitative Interviewing Approaches for Investigating Implicit Expert Knowledge," *Int. J. Soc. Res. Methodol.*, vol. 24, no. 3, pp. 265–278, 2021, doi: 10.1080/13645579.2020.1766777.
- [35] D. Y. Bagou and A. Sukung, "Analisis Kompetensi Profesional Guru," *Jambura J. Educ. Manag.*, vol. 1, no. 2, pp. 122–130, 2020, doi: 10.37411/jjem.v1i2.522.
- [36] Y. Hadiani and Rahman, "The Use of BAIK Card as Learning Media to Improve Learning in The Animal Caring Lesson," *Adv. Soc. Sci. Educ. Humanit. Res.*, vol. 509, no. Icollite, 2020, doi: 10.2991/assehr.k.201215.126.
- [37] S. Zakir, E. Maiyana, A. Nur Khomarudin, R. Novita, and M. Deurama, "Development of 3D Animation Based Hydrocarbon Learning Media," *J. Phys. Conf. Ser.*, vol. 1779, no. 1, 2021, doi: 10.1088/1742-6596/1779/1/012008.
- [38] A. Septian, R. F. Suwarman, E. Monariska, and R. Sugiarni, "Somatic, Auditory, Visualization, Intellectually Learning Assisted by GeoGebra to Improve Student's Mathematical Representation Skills," *J. Phys. Conf. Ser.*, vol. 1657, no. 1, 2020, doi: 10.1088/1742-6596/1657/1/012023.



# *Psychoneurological Complications In Children With Facial Nerve Neuropathy*

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**Abstract** – The prevalence of facial nerve neuropathy (NLN), according to the WHO, per 1000 population is about 20 cases, and is one of the leading pathologies of the peripheral system. Most of those with literary sources describe clinical cases of the disease, relying on the forms of lesion, primary and secondary. Primary, or idiopathic NLN occurs up to 90%, respectively, according to the etiological factor in percentage in the first place. The cause of the disease, according to modern scientific research, involves a connection with viruses, the herpes virus occupies a leading position. As a result of the reactivation of the virus, the immune system begins to produce antibodies, as a result, causing an inflammatory reaction in the narrow fallopian canal and, as a result, damage to the facial nerve. During this period, there is an acute demyelization of the nerve trunk. Along with the viral theory, there are theories of the development of ILN, such as hereditary, vascular, immune, compression, lymphatic, the theory of histocompatibility of antigens. The pathological mechanism of NLN, therefore, is complex-ischemic, with dysfunction of the vascular apparatus in the areas of the bone canal and autoimmune, leading to demyelization.

**Keywords** – Demyelization, Facial Nerve Neuropathy.

## I. INTRODUCTION

Since children have an anatomical feature (length of the canal, blood circulation of the nerve), then also minor swelling leads to squeezing of blood vessels and impaired conduction. The outcome of the disease in children with IMF is favorable, compared with the adult category of patients and in terms of the number of complications in the aisles 5%, and in adults it is more than 55%. With NLN, the fact of distortion of the face, the increased interest of others in patients, is reflected in the emotional sphere. Evaluation of the psycho-emotional state will help to identify emotional stress that affects the recovery of the disease. And if we take into account the connection of the mimic muscles with the limbic brain, which in turn is responsible for emotion, it is promising to establish a connection and prognosis of NLN, which depends on the psycho-emotional state of the patient.

## II. AIM

To study the neuropsychiatric features of the facial nerve neuropathy in children.

## III. MATERIAL AND RESEARCH METHODS

The examination included 40 children from 2 to 16 years old, who were treated in the children's neurological department of the 1st Clinic of SamMI. All children were diagnosed with IMF in the acute period. During hospitalization and dynamics, a clinical and

neurological examination was carried out, with a view to identifying lesions of the trigeminal and facial nerves. Examination by an ophthalmologist, an ENT doctor was obligatory. The psycho-emotional sphere was assessed according to the questionnaire of Aizit G.Yu. (only in children 13-16 years old) in the amount of 20 patients. The use of the Spielberg-Khanin scale was important in identifying anxiety. The degree of cut prose was assessed according to the qualifications of Rosier C.M. the ENMG program included the registration of cutaneous derivation using standard electrodes, and the average amplitude was determined. The use of ENMG was carried out on the side of the cut and on the healthy part of the face. Several children underwent MRI as indicated. Statistical data processing was carried out on an individual computer using the Student-Khanin test.

**IV. RESEARCH RESULT**

Among the surveyed children, 41% for a boy, 59% for girls, respectively. In 48% of cases, WFN developed on the right side of the face In 3 children there was a relapse of the disease, in 2 children on the other side, in contrast to the primary lesion. The repeated cases were severely prolonged and with complications. These children underwent neuroimaging studies, MRI revealed signs of organic disorders in the form of internal hydrocephalus. In anamnesis, one patient began on the background of otitis media and on a heratic rash on the auricle. In many other cases, an idiopathic form of NLN was diagnosed, with a history of hypothermia or signs of acute respiratory viral infections. The degree of cut, taking into account the qualifications of the 2nd degree is 14%, the 3rd degree is 55%, the 4th degree is 31% (in this category, many had signs of contracture beginning). According to the main clinical signs, the localization of the nerve lesion was determined in the distal segment of the phallionial canal. This was indicated by the following signs, taste disturbance and hypercausia in 5 children. Of the older children examined, 8 children had pain in the behind-the-ear region, both constant and aching, the duration of pain varied within a week. These children also felt constriction or numbness in the paretic part of the face. In order to assess the psycho-emotional state in older patients, they were carried out according to the Aizik questionnaire, according to which the nature of the types of temperament was determined, by the analysis of mental factors. In 11 children, the type of sanguine person was identified, which is characterized by balance. 5 children have a type of melancholic, who have periodic breakdowns in a psycho-emotional state. In 4 patients, phlegm was noted, characterized by the constancy of the nervous system. The results on the Silberg-Khanin scale showed a high level of anxiety, that is, a response to stress in this case, medium and high, which proves an emotional experience of the current situation (Table 1). In comparison with the type of character, there was no difference, all adolescents perceived the disease emotionally, which showed an increase in the level of reactive anxiety.

Table 1. Reactive anxiety in ILN children with different types of temperament

Temper-t	sanguine n = 11	melancholic n = 5	phlegmatic n = 4
PT	42(34;51)	48,6 (42;54)	47,1 (38;54)

In accordance with the set goal, the examined children underwent ENMG. The degree of paresis was determined using the formula in the ratio of the amplitudes of the paretic and healthy sides, 69% of which were 3 and 4 degrees. ENMG was carried out in the dynamics of treatment, so the M-response on admission was high compared to the repeated study (Table 2). A statistically significant lengthening of the latent period of the M-response was noted upon admission to treatment, which indicates the onset of the nerve demilination (Table 3).

Table 2. M-response to stimulation of the facial nerve on the diseased, healthy side in children with HFN

M-answer	Side of paresis n = 40	Healthy side n = 40
M amplitude, mV	0,71(0,49;1,01)*	1,45(1,15;1,99)

Table 3. Latency of the M-response during stimulation of the facial nerve on the diseased, healthy side in children with IMF

M-answer	Side of paresis n = 40	Healthy side n = 40
M лат, мс	3,1 (3;3,5)*	2,3 (2,1;2,6)****

The same indicators can be traced when examining the duration of the M-response. The increase in changes is associated with uneven myelination of motor fibers. The data from the analysis of the blink reflex turned out to be interesting and controversial. In

almost 50% of children, the reflex was blocked. The block of conduction includes the pathways of the trigeminal and facial nerves, respectively, the afferent links of the chain are included in the pathological process of NLN (Table 4).

Table 4. Blinking reflex on the side of paresis, the healthy side in children with ILI

Blinking reflex	Side of paresis n = 20	Healthy side n = 20
Latency, ms	11,6 (10,8;13,1)*	10 (9,6; 10,4)**
Amplitude, mV	0,3 (0,17; 0,59)*	0,59 (0,44;1,35)**
Duration, ms	5,7 (5,4;6,6)*	8,25 (6,1;9,1) **

ENMG of children with NLN on the background of pain syndrome, more often gives a severe degree of paresis, compared with patients without pain syndrome. So the M-response is significantly reduced, the assessment of the blink reflex in all children with pain syndrome is blocked, which is confirmed by the literature data and speaks of a more pronounced affective-effective disintegration with a change in the functional state of both the trigeminal and facial nerves.

#### V. CONCLUSION

1. Analysis of the clinical features of NLN in children showed that the lesion at the level of the lower part of the fallopian canal corresponded, which gives pain symptoms to the face
2. Indicators of the level of reactive anxiety are high in older children and does not depend on the nature of the personality
3. The ENMG is indicative in the diagnosis of NLN, the revealed parameters on the paretic side indicate the involvement of the entire chain of effective afferent pathways of the trigeminal and facial nerves in the process.

#### REFERENCES

- [1] Saodat, Igamova, Djurabekova Aziza, and Bazarova Aziza. "Changes in Psychomotor Development in Children with Perinatal Brain Hypoxia." *International Journal of Human Computing Studies 2.5* (2020): 11-14.
- [2] Aziza, Djurabekova, Abdullayeva Nargiza, and Samatov Farrukh. "Structural Causes and Prevalence of Neurosensorial Hearing Loss in Children in Samarkand Region." *International Journal of Human Computing Studies 2.5* (2020): 5-7.
- [3] Djurabekova A., Shamansurov S., Vaseeva U. Hemihyperplasia-symptoms and diagnostics on the example of a clinical case //CENTRAL ASIAN JOURNAL OF MEDICAL AND NATURAL SCIENCES. – 2021. – T. 2. – №. 1. – C. 91-97.
- [4] Djurabekova A., Ikromov A., Dilnoza S. Modern clinical diagnostic concepts about congenital brain defects //CENTRAL ASIAN JOURNAL OF MEDICAL AND NATURAL SCIENCES. – 2021. – T. 2. – №. 1. – C. 77-81.
- [5] Akmal G. et al. Modern methods of diagnostics of polyneuropathy //European science review. – 2018. – №. 9-10-2.
- [6] Shavkatovic S. I., Suratovna I. S., Takhirovna D. A. NEUROPSYCHOLOGICAL CHANGES IN PATIENTS WITH A CONSEQUENCE OF TRAUMATIC BRAIN INJURY //Журнал неврологии и нейрохирургических исследований. – 2020. – Т. 3. – №. 1.
- [7] Salimovna S. D. et al. Endothelial dysfunction factor as an indicator of clinical and neurological disorders in pregnant women with preeclampsia //Достижения науки и образования. – 2019. – №. 11 (52).
- [8] Taxirovna D. A., Suratovna E. S., Qaxramanovna A. Z. Changes in Psychomotor Development in Children with Perinatal Brain Hypoxia //Annals of the Romanian Society for Cell Biology. – 2021. – C. 5172-5176.
- [9] Takhirovna D. A., Sur'atovna I. S., Kahramonovna A. Z. A MODERN APPROACH TO THE THERAPY OF PATIENTS WITH SYNDROMECHRONIC FATIGUE (EMOTIONAL SYNDROME BURNOUT, MANAGER'S SYNDROME) //International Engineering Journal For Research & Development. – 2021. – Т. 6. – №. ICDSIIL. – C. 4-4.

# *The Linguaculturological And Nominative Features Of Military Terms*

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**Abstract – The article deals with the linguacultural and semantic features of military terms in texts. As the world is growing rapidly the technology and terminology of all sphere also growing at the same time. Here in this article we discussed some changes in military terminological base of English language.**

**Keywords – Military Terms, General Scientific Vocabulary, Terminological Phrases, Armed Forces, Technical Concepts, Military Business Texts, Military-Technical Texts, Military Environment.**

Continuous development of military technology is the main cause of emergence of new military terms and terminological phrases. According to S.A. Pavlova, terminological, as well as general scientific vocabulary as a means of expressing, storing and transmitting information about special scientific and technical concepts develops “in direct proportion to the level of development of science and technology” [4, 378].

Texts of military subjects also contribute to “creating the image of the armed forces within the country and abroad” [3, 123].

According to G.M. Strelkovsky, all military texts, both written and oral, constitute a group of texts of the same functional style - the style of military speech. In terms of their functional purpose and content, two types of military texts are distinguished: informational and regulatory. Informational texts include military-scientific, military-technical, military-informational and military-publicistic types of texts. Regulatory types of text intended to regulate the life and activities of troops include charters, manuals, and military business texts [6, 272].

During the 90s of the XX and the beginning of the XXI centuries, there is an increasing interest of cultural linguists, lexicographers, specialists in other spheres of national linguistics to the problems of social dialectology and, in particular, to military vocabulary. This is partly due to the penetration of the lexemes of the language of soldiers-conscripts into the national speech, as well as the influence of the language of modern youth, social classes and criminal elements on the language of soldiers serving in the army and navy. This does not mean that military vocabulary has not been previously studied. Anyway, this study was connected with the study of the linguoculture of complete or limited freedom.

There are a number of controversial issues related to word production within the framework of the linguistic culture of non-freedom. The identification of the main and specific methods and techniques of word formation, meanwhile, makes it possible to compare military terms with the national language, to clarify the nature of its vocabulary. The features of phonetics, syntax, text

formation in the linguistic culture of non-freedom were not investigated. No less relevant at present is the characteristic of the basic functions of military terms in the military environment and its elements in various jargons and youth slangs.

Studying, through military terms, the worldview of conscripted soldiers helps fill in the gaps and correct inaccuracies in research on various aspects of the life of a given society, which, in turn, is relevant both from the point of view of how to manage the soldier's collective from the side of the army personnel and from adaptation of demobilized soldiers to civilian life.

The novelty of the research lies in the fact that in this article an attempt was made for the first time to make a systematic linguistic-cultural research of military terms. In the process of work, not only a wide factual material was collected, but also the extra linguistic conditions of the origin, existence and development of military terms were studied. Military terms is considered from systemological, grammatical and cultural studies points of view. An attempt was made to study the functioning of military terms in various systems of the national language, and identified the main directions of the language policy of the state and the officer corps of the army in relation to the language of soldiers.

Learning the language of the soldiers began in the middle of the XIX century. During this period, factual material was mainly collected, which was included in various dictionaries of jargon and argo etc. At the same time, fragmentary attempts were made to describe military terms (for example, the works of I.A. Baudouin de Courtenay, S.V. Maximov, P.P. Ilin).

From the second half of the 30s to the mid-80s of the 20<sup>th</sup> century, the study of military terms virtually ceased. The collection of factual material presented a certain difficulty, as the linguist encountered unusual informants who, for reasons of their own safety, gave knowingly false information, or did not go at all to contact with the collector.

In the linguistic culturology of the 90s of the 20<sup>th</sup> century, little attention was also paid to military terminology, the reason for which can be seen in the complex tasks that linguoculturology faced during this period. In the 90s V.V. Vinogradov studied in connection with the creation of an electronic version of the "Dictionary of modern youth slang" by a team of authors. However, there were no special marks that referred a specific lexeme to the category of military terms. In the 90s, a lot of profanity glossaries were published, which included military terminology. A distinctive feature of these glossaries was their weak scientific character, the incompatibility of the modern lexicographic tradition.

In our study, we turn to military-technical texts containing a description of various devices of military equipment and weapons and manuals for their operation.

In the study of military-technical text is also important external compositional structure, which includes the heading, section subheadings, the sections themselves, introductory paragraphs. The main linguistic means of military-technical texts are the presence of military-technical terminology, impersonality of statements, conciseness, clarity and concreteness of formulations, accuracy and clarity of presentation, clear separation of one thought from another, ease of perception of information due to the presence of drawings, lack of expressiveness of the statement.

Military terminology also includes words and phrases that do not denote military concepts, but are used exclusively in the military environment. D.A. Maslov identifies characteristics of military terminology that distinguish it from common words and terms from other areas:

- 1) the correlation of military terminology units with the concepts of military science and military affairs;
- 2) functioning in the military environment;
- 3) the fixedness of the connection of the term with the concept in the military documentation;
- 4) the regulation of definitions [2, 154].

The military vocabulary includes, above all the words and combinations denoting military concepts, i.e., concepts directly related to the armed forces, military affairs, war, etc. In addition, the military vocabulary should include scientific and technical terms used in connection with military concepts (for example, *track* "tank track or any combat vehicle, on a track").

Further, military vocabulary may include words and combinations that, although they do not denote military concepts proper, are used almost exclusively in a military environment, but are generally unknown or completely unknown (for example, *boondocks* "jungle"; *behavior report* "letter (soldier) home"; *side arms* "tableware"), as well as some foreign borrowing, various jargon, etc.

Thus, military vocabulary includes both words and combinations expressing specific military concepts, as well as words and combinations commonly used in the armed forces.

Military vocabulary in English can be divided into the following two groups:

1. Military terminology.

Military terminology in turn is divided:

a) on official terminology consisting of statutory terms;

b) the terminology of non-statutory, used in the oral speech of military personnel and in some types of military literature, but not officially accepted.

2. Emotionally colored elements of military vocabulary.

Emotionally colored elements of military vocabulary are in most cases stylistic synonyms of the relevant military terms (for example, *doughboy* (colloquially) and *infantryman* (term) have the meaning "infantryman").

The above groups of military vocabulary are closely interrelated with regard to their place in the vocabulary of the language, the sphere of use, and certain functions.

The corresponding series of words of different groups of military vocabulary, as a rule, synonymously denote the same objects, processes and phenomena. They may have such common for both groups properties as the comparative narrowness of their use, lack of clarity or incomprehensibility for persons not belonging to the armed forces.

Modern English military terminology is developing most intensively in the field of developing new types of weapons - primarily nuclear-weapon and space combat systems (*orbital weapon*; *global missile* "global rocket"; *silo launcher* "launching structure of the mine type"; *stratospheric fallout* "Contamination of the stratosphere by radioactive products of a nuclear explosion"), *radio electronic and other technical means* (*beam rider guidance* "guidance along the beam"; *laser range finder* "laser range finder"; *ambush detection device* "(technical) means of detecting ambushes"; *air cushy on vehicle* "hovercraft").

Aviation terminology is constantly updated, in particular, the terminology of army aviation (*continuous airborne alert*; *radar picket aircraft*, *radar patrol aircraft*; *gunship*; *armed helicopter*; *copter-borne*; *transported by helicopters*; *aviation battalion*; *aviation battalion*; *army aviation battalion*; *helilift* "helicopter transfer").

Many new terms emerged in connection with the reorganization of the formations of ground forces and higher command (*strike command* "shock command"; *field army support command* "command of the rear of the army"; *division base* "common organizational elements of divisions, division base"; *logistics operations center* "center rear control").

There are also new terms related to the change of some principal provisions (doctrines) in tactics and operational art (*area defense* "defense of the area; positional defense"; *forward edge of the battle area*; "safety edge" of nuclear safety; "Spoiling attack" preemptive strike; *counterattack with going beyond the leading edge*; "nuclear environment" conditions of use of nuclear weapons, "nuclear situations").

Especially many new words are noted in terminology, reflecting the concepts of the so-called "war by unusual means and methods" (unconventional warfare). The terms related to various issues of the American military strategy (*balance of terror* "balance of intimidation forces"; *massive retaliation* "massive retaliation, massive counter-strike"; *brush fire war* "local war, local war; local action"; *quick -response strategy* "flexible response strategy).

Many new military terms arose in connection with the American aggression in Vietnam (*enclave* "coastal bridgehead; strong point"; *strategic hamlet* "strategic village (fortified settlement)"; *jungle canopy platform* "helicopter landing pad on the crowns in the jungle").

It is necessary to keep in mind quite significant differences in the English military vocabulary used in the USA and England. This is primarily due to some specific features of the organization, weapons, tactics of the armed forces of these countries, as well as certain differences between the English and American versions of modern English. Despite the ongoing work within the framework of NATO on the unification of English military terminology (especially in the field of tactics and operational art), discrepancies in terminology continue to exist. For example, the terms "compound" or "union" in the United States are expressed

using the term large unit, and in England - *formation*. The same term may have different meanings in the USA and England. For example, the general staff in the United States has the meaning of “*the general part of the headquarters*,” and in England, the “*operational-intelligence part of the headquarters*”. There are noticeable differences in military ranks and especially in the terminology of the organization: the “Secretary of Defense” in the United States is called the *Secretary of Defense* and in England the *Defense Minister*. A number of terms are used only in the United States (for example, *the Chief of Staff* “*chief of staff (type of armed forces)*”) or only in England (for example, *the commandos* “*commando*”). Some differences in spelling and pronunciation should also be considered.

English military vocabulary also includes a number of military terms specific to the armed forces of Canada, Australia and other English-speaking countries.

The presence of the army is an obligatory characteristic of any modern sovereign state. A distinctive feature of the army is the number and degree of its combat capability. The composition of the army, traditions and the attitude of society to the army are the most important factors that influence the formation and further development of military terminology.

It should be noted that military terminology is replenished not only during various kinds of conflicts, but also during military reforms and transformations. The secrecy and closeness of the army form the prerequisites for the emergence and development of the military language.

The word term is derived from the Latin terminus and is translated as “limit, ending”. The main difference between terminological and non-terminological vocabulary is its maximum abstractness, unambiguity, internationality, consistency and semanticism. Thus, the term refers to a word or phrase assigned to a specific concept in the system of concepts of a given field of science or technology [1, 14].

V.N. Shevchuk defines military terminology as follows: “an orderly set of military language terms that reflect the conceptual apparatus of military science and, more broadly, military affairs and are associated with the forms and methods of warfare, with the strategic use of the armed forces, as well as the operational and tactical use of the unions, connections, units and divisions, with their organization, armament and technical equipment” [5, 94].

Military terms can be classified as follows:

In the field of use (different types of *troops, staff, general tactical, organizational, military topographical, command-drill*);

Terms of various types of troops - terms that are used to describe concepts in the formations of the armed forces: units, formations, associations, institutions, establishments, organizations and control bodies, for example *artillery, infantry, radio technical troops, air force, airborne troops*.

Staff terms are terms that are widely used in military command and control bodies, for example *head quarters, staff car, personnel*.

General tactical terms - terms that are used in solving general tactical tasks, conducting combined-arms combat and its preparation, for example, *defense, field gendarmerie, offensive*.

Organizational terms are terms that are used in various military units, for example, *unit, battalion, division, company*.

Military topographic terms are terms that are used in the study of terrain, orientation, target designation, the measurement of the terrain, for example, *topographic map, cartography, land survey, aero photography*.

Command-line terms - terms that are used in the drill and command speech of military personnel, for example, *Arms, port!, Weapons on the chest!, Eyes, right!, Look right!*

According to the method of education (morphological word formation, semantic word formation, borrowing, abbreviations);

Morphological word formation is the main method of word formation and includes the following methods: affixation, composition, reduction and conversion.

Affixing is a way of word-formation, which allows you to create new terms by attaching word-forming affixes to the basics of different parts of speech, for example *maintainability, surveillance, deterrence, reunion*.

Composition - this is a method of word formation, which allows you to form new words by combining the foundations of two or more words, for example *aircraft*, *break-through*, *battle wise*.

According to the structure (one-piece, two-part, multi-part) the basis of the military terminology of the English language is one-piece and multi-component nominative units, which are mainly represented by substantive connections, for example, *battle - battle field - battlefield interdiction - battlefield interdiction line - battlefield air interdiction*.

Under the emotional coloring refers to the meaning of the word emotional attitude to the concept, called the word. Examples of emotionally colored military vocabulary of the English language are the following words: *push-button war* "button war", *trigger-happy* "shooting indiscriminately", and *slick ship* "unarmed helicopter" [5, 19].

It should be noted that military terms are usually represented by lexical units neutral in emotional coloring. Nevertheless, one should cite this classification by stylistic characteristics, since emotionally-colored lexical units of the military sphere denote the same concepts as neutral lexical units.

### REFERENCES

- [1] Borisov V.V. Abbreviation and Acronym // Military and Scientific-Technical Abbreviations in Foreign Languages HELL. Schweitzer. M., 2004. pp. 132–135.
- [2] Maslov D.A. Military terminology of the modern Japanese language (in the functional-comparative aspect): M., 2002. 154 p.
- [3] Murog I.A. The verbal component of the English military advertising texts // Philological sciences. Questions of theory and practice. 2017. № 6 (72): in 3 hours. Part 2. pp. 123-127.
- [4] Pavlova S.A. Thematic groups of the English terminology of shipbuilding and ship repair [Electronic resource]. M.: Military edit., 1988. 378 p.
- [5] Shevchuk V.N. Military terminology system in statics and dynamics: dis. ... dr. filol. sciences. Moscow, 1985. 160 p.
- [6] Strelkovsky G.M. Theory and practice of military translation. German [Electronic resource]. M.: Military edit., 1979. 272 p.



# Viscous - Radial Oscillations As A Result Of Internal Pressure Of The Cylindrical Shell

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**Abstract** – In this scientific work be learned the viscous vibrations of the cylindrical shell were studied, while the viscous fluid in the interior was flowing under certain pressure, and the mathematical model of the problem was solved by using the model of integral exchanges and specific issues were solved.

The algebraic equations made using Maple-7 have been removed and the material of the cylindrical shell is argillite and alevrolite, oil is viscous, and graphs are drawn on the results obtained.

**Keywords** – Shell, cylinder, elastic, fluid, symmetric, pressure, mathematical model, integral substitution, density, argillite, alevrolide, oil, adhesive.

## I. INTRODUCTION

In a cylindrical system of coordinates  $(r, \theta, z)$  the homogeneous and isotropic circular cylindrical elastic layer  $r_1$  with internal and external radii  $r_2$  is considered. In this case,  $r_1 = const, r_2 = const, r_2 > r_1$  and the thickness of the layer takes  $h = r_2 - r_1$  arbitrary values  $r_1$  and  $r_2$  depending on and. In addition, it is assumed that the cylindrical layer, as a three-dimensional body, strictly obeys the mathematical theory of elasticity and is described by its three-dimensional equations. In addition, it is assumed that the cylindrical layer, as a three-dimensional body, strictly obeys the mathematical theory of elasticity and is described by its three-dimensional equations. It is believed that the inner cavity of the layer is filled with viscous incompressible resting liquid, described by the linearized equations of Navier-Stokes [1]. In the future we will consider the torsional fluctuations of the layer and assume that it is loaded only along the axis  $Oz$  [1,2]

Equation of motion of a layer

$$\sigma_{ij,j} = \rho \ddot{U}_i, \quad (i, j = r, \theta, z) \quad x_i \in V \quad (1)$$

Used in the form of Wave equations

$$(\lambda + \mu)\Delta \hat{O} = \rho \frac{\partial^2 \hat{O}}{\partial t^2},$$

$$x_i \in V_1 \quad (2)$$

$$\mu \Delta \vec{\varphi} = \rho \frac{\partial^2 \vec{\varphi}}{\partial t^2}.$$

For the potentials of longitudinal  $f$  and transverse waves  $\vec{\varphi}$ , entered by the formula

$$\vec{U} = \text{grad } \phi + \text{rot}(\vec{e}_3 \varphi_1) + \text{rot}(\vec{e}_3 \varphi_2), \quad x_i \in V_1 \quad (a)$$

Where is the Laplace operator in the coordinate system  $(r, \theta, z)$ ;

$\sigma_{ij}, U_i$  - components of stress tensor and displacement vector;

$\lambda, \mu$  - lamé coefficients;  $\rho$  - density  $V_1$  - the volume occupied by the layer.

For viscous incompressible liquid, at its small fluctuations we have the following ratios:

Non-compressibility condition (3)

$$\text{div } \vec{v} = 0, \quad x_i \in V_2 \quad (3)$$

Navier - Stokes equation

$$\frac{\partial \vec{V}}{\partial t} - \nu' \Delta \vec{V} + \frac{1}{\rho_0} \text{grad } p = 0, \quad x_i \in V_2 \quad (4)$$

Navier-Stokes Law (5)

$$P_{ij} = -P \sigma_{ij} + \mu' e_{ij}, \quad x_i \in V_2 \quad (5)$$

Where  $\vec{V}$  - the velocity vector of liquid particles;

$\mu$  - viscosity coefficient;

$\nu' = \frac{\mu'}{\rho'}$  - kinematic coefficient of viscosity;

$\rho_0$  - density of the resting liquid;

$P$  - hydrodynamic pressure;

$P_{ij}$  - components of stress tensor in the liquid;

$e_{ij}$  - components of strain velocity Tenzora;

$V_2$  - volume of space occupied by the liquid (inner cavity of the layer).

The introduction of scalar  $G$  and vector functions  $\vec{x} = \vec{x}(x_1, x_2)$  according to the formula ,

$$\vec{V} = \frac{\partial}{\partial t} \{grad G + zot[\vec{e}_3 x_1 + rot(\vec{e}_3 x_2)]\} \quad (6)$$

Equations (3), (4) are given and the view

$$\Delta G = 0, \quad \left(\frac{\partial}{\partial t} - \nu' \Delta\right) x_1 = 0, \quad \left(\frac{\partial}{\partial t} - \nu' \Delta\right) x_2 = 0 \quad (7) \quad \text{For liquid we put}$$

$$V_r = V_z = 0, \quad V_\theta = V_\theta(r, z, t), \quad p = 0, \quad x_i \in V_2 \quad (8)$$

Then the condition of continuity, taking into account the conditions of incompressibility, should be

$$\frac{\partial \rho'}{\partial t} = 0, \quad x_i \in V_2 \quad (9)$$

According to (6)  $P$  and  $\rho'$  and through  $G$ ,  $x_1$  and  $x_2$  conditions (7) and (8) are fulfilled, if in (6) [3,4]

$$G = 0, \quad x_2 = 0, \quad x_1 = x_1(r, z, t) \quad (10)$$

In case (10) of (6) we get to  $V_\theta$  represent

$$V_\theta = - \frac{\partial^2 x_1}{\partial r \partial t}, \quad x_i \in V_2 \quad (11)$$

Where the function  $X_1$  is the solutions of the equation

$$\left[\frac{\partial}{\partial t} - \nu' \left(\frac{\partial^2}{\partial r^2} + \frac{1}{r} \frac{\partial}{\partial r} + \frac{\partial^2}{\partial z^2}\right)\right] x_1 = 0, \quad x_i \in V_2 \quad (12)$$

For the layer, accept the following

$$U_r = U_z = 0, \quad U_\theta = U_\theta(r, z, t), \quad x_i \in V_1 \quad (13)$$

Conditions (13) will be performed if put

$$U_\theta = - \frac{\partial \varphi_1}{\partial r}, \quad x_i \in V_1 \quad (14)$$

Where the function  $\varphi_1$  based on (2) satisfies the equation

$$\left(\frac{\partial^2}{\partial r^2} + \frac{1}{r} \frac{\partial}{\partial r} + \frac{\partial^2}{\partial z^2}\right) \varphi_1 = \frac{1}{b^2} \varphi_1, \quad x_i \in V_1 \quad (15)$$

Conditions on the surface of the layer at  $r = r_2$  and at the boundary of  $r = r_1$  of the environment section are

$$\begin{aligned} \sigma_{r\theta}(r_2, z, t) &= f_{r\theta}(z, t), \\ \sigma_{r\theta}(r_1, z, t) &= p_{r\theta}(r_1, z, t), \\ \sigma_{r\theta}(r_1, z, t) &= \frac{\partial}{\partial t} U_{\theta}(r_1, z, t) \end{aligned}$$

(16) Initial conditions are zero.

Thus, the problem of torsional oscillations of a cylindrical layer with viscous incompressible liquid is given to the solution of equations (12), (15) with boundary (16) and zero conditions [3, 4].

To solve equations (12) and (15)  $x_1$   $u$   $\varphi_1$  imagine functions as

$$[x_1, \varphi_1] = \int_0^{\infty} \left. \begin{matrix} \sin kz \\ -\cos kz \end{matrix} \right\} dk \int_{(t)} [x_{10}, \varphi_{10}] e^{pt} dp, \tag{17}$$

The substitution of which in (12) and (15) gives

$$\begin{aligned} \frac{\partial^2 \varphi_{10}}{\partial r^2} + \frac{1}{r} \frac{\partial \varphi_{10}}{\partial r} - \alpha^2 \varphi_{10} &= 0, & \alpha^2 &= k^2 + \frac{1}{b^2} p^2, \\ \frac{\partial^2 x_{10}}{\partial r^2} + \frac{1}{r} \frac{\partial x_{10}}{\partial r} - \beta^2 x_{10} &= 0, & \beta^2 &= k^2 + \frac{1}{v'} p. \end{aligned} \tag{18}$$

General solutions of equations (18), limited in appearance  $r \rightarrow \infty$   $u$   $r = 0$

$$\begin{aligned} \varphi_{10}(r) &= A_1 I_0(\alpha r) + A_2 K_0(\alpha r), \\ x_{10} &= B I_0(\beta r) \end{aligned} \tag{19}$$

The function of external influences is also presented as

$$f_{r\theta}(z, t) = \int_0^{\infty} \left. \begin{matrix} \sin kz \\ -\cos kz \end{matrix} \right\} dk \int_{(t)} [x_{10}, \varphi_{10}] e^{pt} dp. \tag{20}$$

Expressing the tension through  $\sigma_{r\theta}$   $u$   $p_{r\theta}$  the entered potentials  $\varphi_1$   $u$   $x_1$ , and also presenting them as (20), from the boundary conditions (16),

$$\begin{aligned} \left( \frac{1}{r} \frac{\partial}{\partial r} - \frac{\partial^2}{\partial r^2} \right) \varphi_{10} &= \frac{1}{\mu} f_{r\theta}^{(0)}, & n p u \quad r &= r_2, \\ \left( \frac{1}{r} \frac{\partial}{\partial r} - \frac{\partial^2}{\partial r^2} \right) \varphi_{10} &= 2 \frac{\mu'}{\mu} \left[ \frac{1}{r} \frac{\partial}{\partial r} - \frac{1}{2} \beta^2 \right] p x_{10}, & n p u \quad r &= r_1 \end{aligned}$$

## II. FUNDAMENTAL PART

We get to take the desired values of displacement in the points of some intermediate surface of the cylindrical layer, the radius of which is determined by the formula

$$\xi = \left( V - \frac{r_1}{r_2} \right) \tag{21}$$

Having expressed the transformed movement substituting in it general decisions  $U$  and  $U_0$  from  $\varphi_{10}$  u  $x_{10}$ , movement substituting in it general decisions (19) and using standard expansions of modified functions of Bessel in power series, believing in the resolution  $r = \xi$  and proceeding from its general kind we introduce new functions depending on parameters to  $\kappa$  and  $p$ , by formulas

$$U_{0,0}^{(0)} = -\frac{1}{2}\alpha^2 \left\{ A_1 - A_2 \left[ \ln \frac{\alpha\xi}{2} - \varphi(1) - \frac{1}{2} \right] \right\}, \quad U_{0,0}^{(0)} = \frac{1}{\xi} A_2, \quad (22)$$

By substituting Solutions (19) in the boundary conditions we will get

$$\alpha^2 [A_1 I_1(\alpha r_1) + A_2 K_2(\alpha r_2)] = -\mu^{-2} f_{ro}^{(0)},$$

$$\frac{2}{r_1} [A_1 I_1(\alpha r_1) + A_2 K_2(\alpha r_2)] = -\alpha [A_1 I_0(\alpha r_1) + A_2 K_0(\alpha r_2)] = -\frac{\mu'}{4\mu} \beta^2 p r_1 \alpha^2 [A_1 I_1(\alpha r_1) + A_2 K_2(\alpha r_2)], \quad (23)$$

Using standard expansions of Bessel functions into power series  $r_1$  and  $r_2$ , by degrees as well as substituting the expressions of constant  $A_1$  and  $A_2$  by formulas (22) and by entering functions by formulas  $U_{\Theta,0}$  u  $U_{\Theta,1}$  and  $\lambda^n$  from conditions

$$[U_{0,0}, U_{0,1}] = \int_0^\infty \frac{\sin kz}{-\cos kz} \left. \right\} dk \int_{(I)} [U_{0,0}^{(0)}, U_{0,1}^{(0)}] e^{pt} dp.$$

$$\lambda^n(\zeta) = \int_0^\infty \frac{\sin kz}{-\cos kz} \left. \right\} dk \int_{(I)} [\lambda^{2n}(\zeta)] e^{pt} dp.$$

We get equations (22)

$$C_{11}U_{0,0} + C_{12}U_{0,1} = \mu^{-1} f_{ro},$$

$$(C_{12} - RC_{31})U_{0,0} + (C_{22} - RC_{32})U_{0,1} = 0, \quad (26)$$

Where the operators of  $C_{ij}$  have the form

$$C_{1i} = 2 \sum_{n=0}^\infty \frac{(r_i/2)^{2n+2}}{n!(n+2)!} \lambda_2^n.$$

Here R is a reaction of viscous incompressible liquid to the vibrations of the shell

$$R = \frac{r_1}{4} \frac{\mu'}{\mu} \frac{\partial}{\partial t} \left( \frac{1}{V} \frac{\partial}{\partial t} - \frac{\partial^2}{\partial z^2} \right) \quad (27)$$

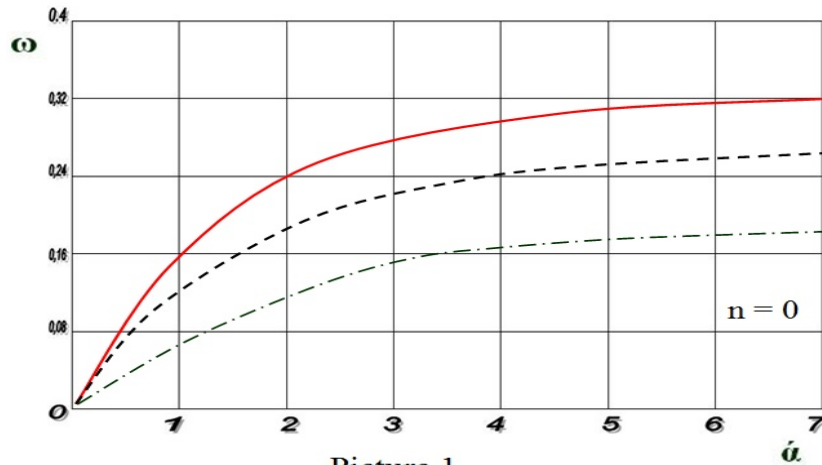
Based on the expression

$$\alpha^2 = k^2 + \frac{1}{b^2} p^2$$

It is easy to conclude that the operators  $\lambda^n$  in the variables  $(z, t)$  are equal

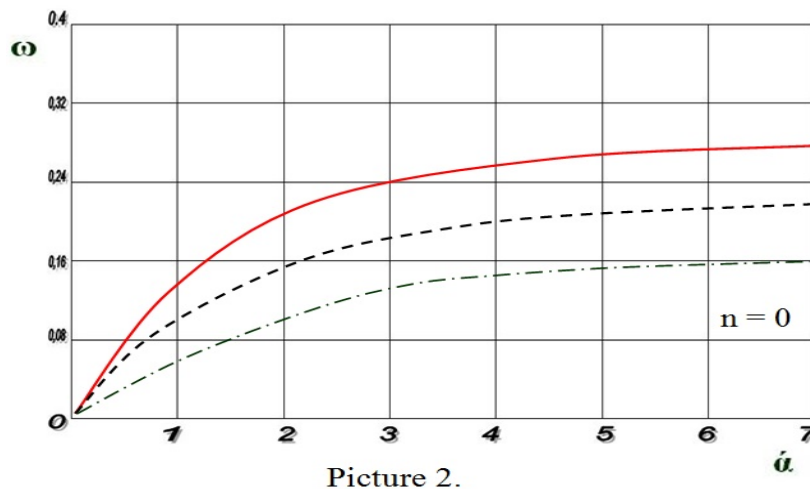
$$\lambda^n = \left[ \frac{1}{b^2} \left( \frac{\partial^2}{\partial t^2} \right) - \frac{\partial^2}{\partial z^2} \right]^n, \quad n = 1, 2, 3, \dots \quad (28)$$

In accordance with (28) equations (27) are the differential equations of infinitely high order relative to the main parts of the circular movement of the points of the intermediate surface of the cylindrical elastic layer with viscous incompressible liquid.



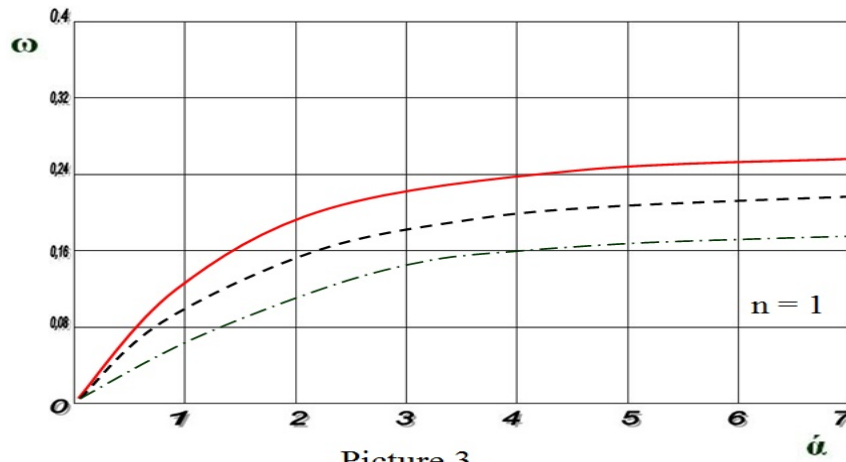
Picture 1.

Picture 1. Graph of dependence of oscillatory frequencies from wave numbers at siltstone of a cylindrical layer in absence of a liquid (petroleum), where  $h = 0, 1, r_1=1,0, r_2=1,10$ .



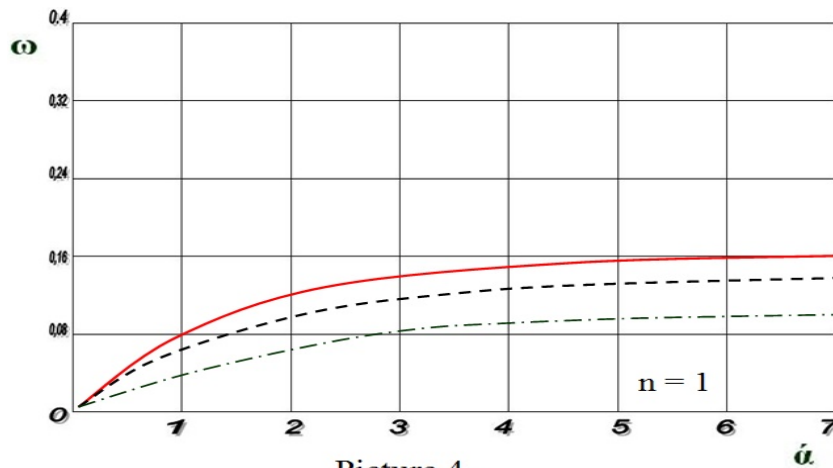
Picture 2.

Picture 2. Graph of the dependence of oscillatory frequencies on the wave numbers at the siltstone of the cylindrical layer in the absence of liquid (petroleum), where  $h= 0.3, r_1=1,0, r_2=1,30$



Picture 3.

Picture 3. Graph of dependence of oscillatory frequencies from wave numbers at siltstone of a cylindrical layer in filling with petroleum products, where  $h = 0, 1, r_1=1,0 r_2=1,10$ .



Picture 4.

Picture 4. Graph of dependence of oscillatory frequencies from cylindrical sloywave numbers at siltstone in filling with petroleum products, where  $h = 0, 3, r_1=1,0, r_2=1,30$

### III. CONCLUSION

It is easy to express the movement  $U_{\theta}$  and tension of  $\sigma_{r\theta}, \sigma_{z,\theta}$  internal sections of the layer and pressure,  $P_{r\theta}$  *через*  $U_{\theta,0}, U_{\theta,1}$ , which by the results of solving equations (27) Allow to determine the stress-strain state of the arbitrary section of the layer and stress on the liquid surface. Note that infinitely high order of equations makes them unsuitable for solving applied problems.

Therefore, considering the fulfilled conditions obtained in earlier works imposed on the frequency of oscillations and the wave number of propagating waves limited to zero ( $n = 0$ ), the first ( $n = 1$ ) and other approximations can get the equations of oscillation suitable To solve engineering problems.

It should be noted that the restrictions are imposed on both the purity and the wave number, which means that the truncated equations do not describe the high-frequency and shortwave processes, and that they are suitable only for low-frequency external influences. In addition, the resulting approximate equations at any approximation are not applicable in the case of concentrated impacts on the system.

However, it does not follow that these equations are applicable to a very narrow class of tasks or do not apply at all, because the functions  $f_r$  presented in the form (20), represent a sufficiently broad class and therefore truncated equations have a sufficiently wide Scope of applicability [4].

Note that infinitely high order of equations makes them unsuitable for solving applied problems. Therefore, considering fulfilled conditions, received in earlier works [4], imposed on frequency of fluctuations wave number of propagating waves and limiting zero ( $n = 0$ ), first ( $n = 1$ ), and other approximations it is possible to get equations of oscillation suitable for solving engineering problems.

### REFERENCES

- [1] Volmir A.S. Shells in the flow of liquid and gas. The problem of hydroelasticity. Science 2009-320p
- [2] Kraskevich V.E, Zlenskiy K.Kh, Grechko V.I., Numerical methods in engineering studies, Kiyev Visha School 2007-263p
- [3] Khudoynazarov X.X. To the theory of longitudinal-radial oscillations of a circular cylindrical viscoelastic shell with a compressible fluid in it. Dynamics and strength of heavy machines . Dnepropetrovsk. Publishing 1998-53-62p
- [4] Khudoynazarov X.X. Unsteady oscillations of three-layer viscoelastic plate . Samarkand state university. Science journal 2018



# *Quelle Place De L'éducation A L'environnement Et Au Développement Durable Dans Les Programmes Scolaires Au Maroc ? Cas De L'éducation Familiale Dispensée Au Secondaire Collégial*

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**Abstract** – Protecting the environment and sustainable use of natural resources is everyone's responsibility; therefore, environmental education for sustainable development is an obvious instrument for awareness-raising throughout society, in all fields and especially in schools medium, supposed help learners acquire knowledge and develop skills, values and attitudes necessary for positive and responsible citizenship.

In the Moroccan education system, Family Education (FE) is one of the school disciplines taught at the middle school level, which promotes environmental education; however, the non-generalization of this discipline, the absence of textbooks and teaching aids are major challenge of maximizing learning and developing best teaching practice.

This paper analyzed the official instructions and scholar program of FE to highlight the place of the Environmental Education; then, a survey was conducted among teachers of that matter in the region of Fes-Meknes.

The results show that, although Environmental Education is one of its main vocations, the FE suffers from serious needs Environmental teaching methods and didactic tools, mainly in terms of biodiversity. Almost 89% of the teachers surveyed expressed that they have a high level of need for professional training and teaching aids, to improve environmental life skills for sustainable development.

**Keywords** – Environmental education for sustainable development, Family Education; biodiversity; Fes-Meknes; Morocco.

**Résumé** – La préservation de l'environnement et l'utilisation durable des ressources naturelles sont des responsabilités qui incombent à tout un chacun ; par conséquent, l'Education à l'Environnement et au Développement Durable (EEDD) s'avère une mesure inéluctable pour la sensibilisation et la conscientisation, partout dans la société, dans tous les domaines et surtout en milieu scolaire.

En effet, dans le système éducatif Marocain, l'Education Familiale (EF) est une des disciplines scolaires enseignées au secondaire collégial porteuse de l'éducation à l'environnement (EE) ; cependant, la non-généralisation de la matière, l'absence de manuels scolaires et le manque de supports didactiques constituent des handicaps majeurs qui limitent l'opérationnalisation de ses orientations et la traduction de ses objectifs en pratiques pédagogiques.

Aussi, dans le présent travail, nous nous sommes d'abord proposé d'analyser les données monographiques scolaires, les instructions officielles et les programmes de l'EF pour mettre en relief la place de l'EEDD dans cette discipline ; puis, dans la même optique, une enquête a été menée auprès des enseignantes de la matière dans la région Fès- Meknès. Le but était de collecter leurs opinions au sujet de l'EE dans le programme scolaire de l'EF et de mettre au point certains défis et enjeux liés à sa traduction en activités pédagogiques.

Les résultats de ce travail montrent que, même si l'EEDD est l'une des principales vocations de cette discipline, l'EF souffre d'un manque flagrant, aussi bien au niveau des programmes dispensés que du matériel et des outils pédagogiques nécessaires à l'enseignement des questions environnementales, notamment en matière de la biodiversité. A ce propos plus de 89% des enseignantes enquêtées ont exprimé un besoin prioritaire de formation, afin d'améliorer leurs compétences professionnelles et leurs pratiques d'enseignement/apprentissage en matière d'éducation à l'environnementale pour un développement durable.

**Mots-clés – Education à l'environnement et au développement durable, Education familiale ; Biodiversité ; Fès-Meknès ; Maroc.**

## I. INTRODUCTION

L'éducation à l'environnement et au développement durable est structurée autour d'un ensemble de valeurs susceptible d'induire des changements des attitudes des citoyens actuels et futurs afin qu'ils s'impliquent de façon responsable dans des actions dédiées à la gestion rationnelle de l'environnement et à l'utilisation durable des ressources naturelle. Il s'agit en fait d'un processus de socialisation aidant les apprenants à acquérir des connaissances et à développer les compétences nécessaires pour devenir des personnes compatissantes, capables d'œuvrer individuellement et collectivement pour solutionner les problèmes actuels et prévenir les Futurs [1]. Ce qui veut dire qu'elle vise à développer non seulement la sensibilisation, la compréhension et les compétences, mais également à développer le sentiment d'être concerné par l'environnement et sa protection.

Dès lors, l'éducation à l'environnement ne peut se limiter à traiter les problèmes écologiques, mais doit s'inscrire plus largement dans le champ de l'éducation à la citoyenneté, comme l'a rappelé la conférence de Rio en 1992. Ces finalités ont été rapportées par les différents auteurs en parlant de cette éducation sous ses trois appellations, à savoir l'Education Relative à l'Environnement, l'Education pour l'Environnement et l'Education à l'Environnement [2-4].

Ainsi l'éducation se veut, aujourd'hui, plus ouverte à la prise en compte de l'environnement et de la mouvance des réalités sociales [5, 6]. Ce qui nécessite la formation des enseignants en la matière et l'accès aux supports didactiques adéquats pour contribuer fortement à l'amélioration des pratiques éducatives.

Sur le plan national, le Maroc, depuis la conférence de Stockholm en 1972, a participé à toutes les conférences et les sommets sur l'environnement et le développement durable et a ratifié toutes les déclarations. Il a réaffirmé sa détermination en 2002 à l'occasion du sommet mondial de Johannesburg, à accorder davantage d'importance à l'éducation et la sensibilisation à l'environnement. Quoique l'EEDD n'ait jamais été enseignée en tant que discipline à part entière, elle est plutôt véhiculée à travers une diversité de disciplines et d'unités didactiques.

Ce n'est qu'en 2004, que l'EF, en tant que matière plus au moins dédiée à ce genre d'éducation, a été introduite dans les programmes scolaires de deux premières années du collège de l'enseignement secondaire collégial, sans pour autant qu'elle ne soit généralisée dans tous les établissements scolaires du pays.

Si les ambitions de l'éducation à l'environnement pour un développement durable sont circonscrites dans un ensemble de circulaires, et textes officiels tels que « la Stratégie Nationale d'Education et de Sensibilisation à l'Environnement et au Développement Durable de 2008 ». Les constats sur l'état des pratiques enseignantes constituent un frein à la volonté de généralisation. La mise à niveau et l'accompagnement des enseignants, des animateurs et autres éducateurs en EEDD restent actuellement un défi majeur pour stimuler la réflexion et la créativité pédagogique, et à faire des choix éclairés adaptés à leur contexte d'intervention.

C'est pourquoi, la présente étude s'est fixée comme principal objectif d'évaluer l'apport de l'EF dans l'EEDD en termes de contenu qu'elle véhicule et des compétences qu'elle développe. Ainsi, dans un premier temps, nous avons procédé à l'analyse des documents officiels liés à l'EF pour dégager tous les aspects relatifs à l'éducation environnementale et par-là, analyser la contribution de cette discipline au développement des habilités de vie requises chez l'apprenant. Puis, une enquête a été conduite auprès des enseignantes de la matière, notamment dans la région Fès-Meknès ainsi que des entretiens avec d'autres acteurs pédagogiques concernés, ce qui nous a permis de collecter leurs opinions sur les thèmes abordés dans l'EF et à quelles mesures, ils sont traduits en pratiques pédagogiques responsables visant l'engagement citoyen pour l'environnement.

## II. REVUE BIBLIOGRAPHIQUE

Dans la littérature, il n'y a pas de consensus sur la définition de l'éducation environnementale. Par ailleurs, différents termes sont parfois utilisés comme par exemple l'éducation relative à l'environnement, l'éducation au développement durable ou l'éducation à l'environnement pour le développement durable. La Charte de Belgrade [7] fournit une déclaration d'objectif de cette éducation, qui va au-delà du savoir cognitif et englobe les aspects qui mènent les apprenants à développer des comportements environnementaux responsables. La Déclaration de Tbilisi de 1978 a fourni les objectifs pour l'EE qui consistent à comprendre la possibilité de choisir, d'utiliser et de mettre en œuvre des programmes scolaires d'EE [8].

Dans les années 1970, on croyait que l'acquisition de connaissances sur l'environnement menait automatiquement à l'adoption de comportements plus respectueux de celui-ci ; actuellement, cette équation est jugée plus complexe et fait intervenir un nombre important de variables qui ont une influence sur les outputs [9].

Bien que les premières réflexions conduites dans le cadre du système des Nations Unies aient été amorcées lors de la conférence de Stockholm en juin 1972, l'UNESCO fait remonter l'origine de l'internationalisation de l'éducation à l'environnement au sommet de Rio de 1992. En décembre 2002, l'Assemblée générale des Nations Unies a proclamé la Décennie des Nations Unies pour l'éducation au service du développement durable (DEDD 2005-2014), et a désigné l'UNESCO son chef de file [10].

Désormais, l'UNESCO ne parle plus d'Education Relative à l'Environnement ou d'Education à l'Environnement mais d'Education au Développement Durable (EDD). Il va sans donc dire que dans le contexte international, quel que soit son appellation, ses enjeux sont désormais reconnus, mais les choix à faire pour sa mise en œuvre appartiennent aux États et la définition retenue devrait être adaptée aux réalités régionales [11].

Les discussions et débats autour de ce sujet ont mené les spécialistes et les chercheurs à recommander de réorienter EEDD vers l'amélioration de la qualité de vie de tous les citoyens [12]. Dès lors, elle ne se limite plus à traiter les problèmes écologiques, elle recouvre également le champ de l'éducation à la citoyenneté. C'est ainsi que pour intervenir de façon plus appropriée, l'éducateur doit prendre en compte les multiples facettes de cette relation, qui correspondent à diverses façons complémentaires d'appréhender l'environnement.

Dans ce sens, de nombreuses réformes ont été adoptées afin de l'intégrer dans les systèmes éducatifs d'un grand nombre de pays, en se dotant de nouvelles approches pédagogiques favorisant l'acquisition des différentes dimensions de la citoyenneté dont les dimensions émotives et sociales, où il est possible de développer, en plus d'un contenu scientifique, des pratiques et des valeurs [13, 14].

Dans le système éducatif Marocain, l'éducation environnementale ne peut être abordé sans se référer à la Charte Nationale d'Education et de Formation (CNEF) adopté en 2000. Celle-ci préconise, à travers un ensemble d'articles, la prise en compte du milieu naturel de l'école, considérée comme un lieu de sensibilisation et de conscientisation aux différents fléaux : pollution, corruption, maladies, malnutrition, etc. Elle recommande également la sensibilisation à l'économie de l'eau et à sa bonne gestion en tant que ressource précieuse. Les articles 65, 66, 68 et 162 signalent l'importance de la prise de conscience des autorités vis-à-vis de l'environnement, notamment en rapport le développement socioéconomique [15].

La réforme de l'Education et de la Formation opérée au Maroc en 2000 a concerné aussi bien le contenu des programmes que la pédagogie préconisée, en adoptant l'approche par compétences à la place de l'enseignement par objectifs. Le curriculum recommande l'introduction des thèmes environnementaux dans les programmes scolaires des trois cycles (primaire, collège et lycée), en les intégrant dans chaque discipline. Les questions environnementales sont traitées en profondeur dans certaines disciplines telles que les sciences de la vie et de la terre, la géographie, l'éducation à la citoyenneté et l'éducation islamique. Le concept de développement durable (DD) n'est explicitement présent que dans le programme de géographie de la deuxième année du Collège et au niveau du Lycée [16].

En ratifiant les conventions et les traités internationaux sur la biodiversité, les changements climatiques et la lutte contre la désertification, le Maroc s'est ainsi solennellement engagé dans la voie du développement durable et la promotion de l'éducation et de la sensibilisation à l'environnement. L'analyse des programmes et stratégies sectorielles nationales en de sensibilisation et d'éducation à l'environnement, montre que malgré sa présence, elle est insuffisamment valorisée. Son traitement dans les curricula et programmes scolaires, est axé, sur l'acquisition des connaissances [17].

### III. MATÉRIEL ET MÉTHODES

Pour se constituer une idée générale sur la place de la discipline de l'EF dans le système éducatif et curricula scolaire et son apport dans l'EEDD, nous avons tout d'abord passé en revue certaines données monographiques, ensuite nous avons analysé les textes et instructions officielles concernant l'EF et enfin nous avons investigué certaines représentations et opinions des enseignantes EF sur le programme scolaire de l'EF et ses apports dans l'EEDD. Pour cela un questionnaire composé de questions ouvertes, semi-ouvertes et fermées, a été utilisé dans échantillon constitué de 55 enseignantes de l'EF exerçant dans un ensemble d'établissements l'enseignement secondaire relevant de l'Académie Régionale de Fès-Meknès.

### IV. RÉSULTATS ET DISCUSSION

#### 4.1. Place de l'EF dans les programme scolaires

Depuis l'année scolaire 1985-1986 jusqu'en 1996, l'éducation féminine était une matière enseignée uniquement aux collégiennes. Un premier pas dans le sens du nivellement entre les deux sexes a été accompli en 1996, où il a été décidé que garçons et filles profitent de cette matière, qui est devenue dès lors « éducation familiale » au lieu d'éducation féminine, et trouve sa place parmi les matières d'éveil non généralisée comme l'informatique, les arts plastiques, les technologies industrielles, l'éducation musicale, etc.

Cependant, ces matières d'éveil dites « non généralisées » ne sont pas dispensées dans l'ensemble des établissements et, pour ceux qui les dispensent, toutes les classes n'en bénéficient pas. Ce constat est illustré dans le tableau ci-dessous :

Tableau 1. Part de l'éducation dans les programmes scolaires et les disciplines d'éveil non-généralisées au secondaire collégial [18].

	Part des établissements dispensant les matières d'éveil	Part des classes dans ces établissements bénéficiant des matières d'éveil
Education Artistique	39%	31%
Education familiale	35%	21%
Technologie industrielle	32%	22%
Education musicale	16%	10%

Le tableau1 illustre bien, la place de cette discipline, qui malgré son importance dans l'éducation environnementale sensu-largo, l'EF ne couvre qu'un nombre très limité de collégiens majoritairement en milieu urbain. Quant au volume horaire assigné aux matières d'éveil, il occupe à peine 20% de l'enveloppe horaire totale du secondaire collégial, soit l'équivalent d'une séance hebdomadaire de 2h pour les apprenants qui ont la chance de bénéficier des cours de l'EF.

Pour avoir une idée sur la répartition des établissements dispensant l'EF, En comparant à titre d'exemple, les provinces relevant de deux Académies Régionales voisines, Fès-Meknès et Draa-Tafilalet, nous constatons, comme le montre la Figure 1, que la répartition des enseignantes de l'EF est inégale et que leurs affectations dans les délégations ne fait pas en fonction du nombre des collèges.

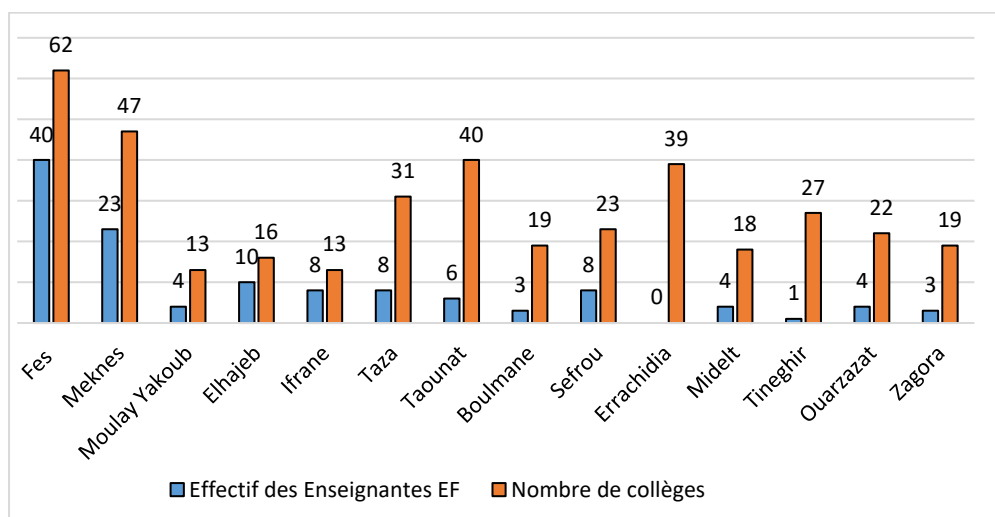


Figure 1. Taux de couverture des délégations par les enseignantes de l'EF

Aussi, nous constatons, d'après les textes officiels et les données et réalités de terrains, qu'il n'y a pas de stratégie claire concernant le devenir de l'EF, voire même que cette discipline est en évolution régressive d'année en année et tend à disparaître des emplois de temps des collégiens.

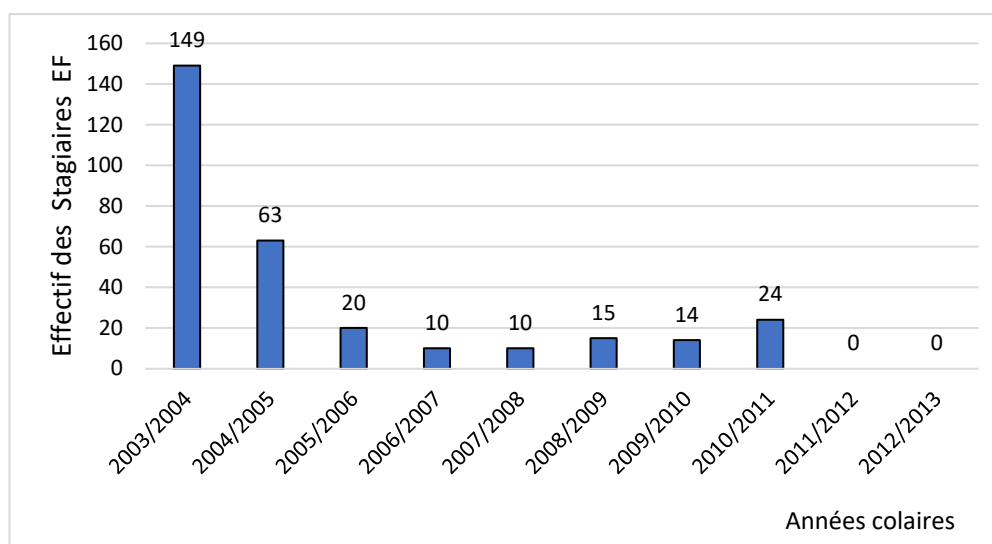


Figure 2. Evolution des effectifs des enseignantes (enseignants ou enseignantes ?) stagiaires de l'EF durant la décennie 2003-2013 [18].

La figure 2 montre que, les plus grands effectifs des enseignantes-stagiaires de l'EF ont été enregistrés au cours des années scolaires 2003/2004 et 2004/2005, qui sont en fait les deux premières promotions de la filière telle qu'elle est enseignée aujourd'hui et qui a remplacé la matière de ce qui s'appelait la culture féminine. Mais depuis la mise en place des Centres Régionaux des Métiers d'Education et de Formation (CRMEF) en 2011, à la suite de la réforme du système de formation du corps enseignants, la formation de la majorité des matières d'éveil dont l'EF a été abrogée. Ce qui a mené à une régression de plus en plus du nombre d'établissements dispensant l'EF, surtout avec le départ en retraite des enseignantes de la matière.

Même constatation pour l'encadrement pédagogique qui lui aussi enregistre un besoin de plus en plus croissant, surtout en absence de nouvelle affectation d'inspecteurs de l'EF parmi les nouveaux sortants du Centre Nationale de Formations des Inspecteurs Pédagogiques. A cet égard, nous tenons à signaler que le nombre des inspectrices de l'EF a baissé de 11 en 2003 à 3 en

2016 à l'échelon national avec une seule coordinatrice nationale, qui elle aussi fait le travail de terrain. Ce qui est loin d'être suffisant pour répondre aux besoins liés à l'accompagnement des enseignantes et à leur encadrement pour améliorer la qualité de leur prestation.

#### **4.2. Programmes et instructions pédagogiques pour l'enseignement de l'EF**

Le document intitulé « Programmes et instructions pédagogiques de l'EF » est un papier de références qui est, en quelque sorte, une note de cadrage pour l'organisation pédagogique et l'enseignement de la discipline, qui est élaborée par la direction des curricula au niveau du ministère et mise au service des enseignants de la matière des directeurs des établissements scolaires et des inspecteurs.

Il s'agit dans le cas de l'EF d'un document, en langue arabe, dont la dernière version est celle de 2009 et compte 30 Pages articulées autour de six parties qui sont récapitulées dans le tableau ci-dessous :

Tableau 2. Les parties constitutives des « Programmes et instructions de l'EF [18]

1 <sup>ère</sup> partie	Choix et orientations et descriptions du profil de la sortie à la fin du cycle
2 <sup>e</sup> partie	Descriptif de la discipline, ses finalités, ses objectifs, les compétences à développer, le contenu et la répartition
3 <sup>e</sup> partie	Méthodologie, modalités didactiques de travail, supports pédagogiques et techniques d'animation
4 <sup>e</sup> Partie	Evaluation
5 <sup>e</sup> Partie	Soutien pédagogique

Les compétences visées par l'EF telles qu'elles sont définies dans les instructions officielles peuvent être résumées comme suit:

Tableau 3. Compétences visés par l'enseignement de l'EF

1	Développer chez l'apprenant des comportements civiques individuels, familiaux et collectifs adaptés aux ressources du milieu environnant
2	Approfondir la prise de conscience de soi en relation avec son environnement
3	Etre en mesure de prendre des décisions responsables et positives vis-à-vis des questions environnementales, socio-économiques ainsi que celle liées à la consommation et à la santé

Les tableaux 2 et 3 montrent que le programme de l'EEDD est au cœur du programme de l'EF et de ses objectifs pédagogiques. L'enjeu réside surtout de son opérationnalisation et sa traduction en activités pédagogique et pratiques d'enseignement-apprentissage. Une telle déclinaison en scénarios pédagogiques, demande de la part des enseignants, des prérequis didactiques et un savoir-faire de transmission de connaissances et des habilités ce qui dépend du système de formation initiale et continue de ces enseignants, mais aussi de la qualité de leur encadrement et de leur accompagnement pédagogique.

#### **4.3. Opinions et représentations des enseignantes de l'EF sur les apports de la discipline dans l'EEDD**

##### **4.1.1. Informations générales sur l'échantillon**

Il s'agit d'un échantillon totalement féminin du fait que tout le corps enseignant de l'EF au niveau national est de sexe féminin, D'après la figure 3, on peut noter que la tranche d'âge comprise entre [30-40] représente plus de 50%, alors que les enseignantes ayant moins de 30 ans ne représente que 6%.

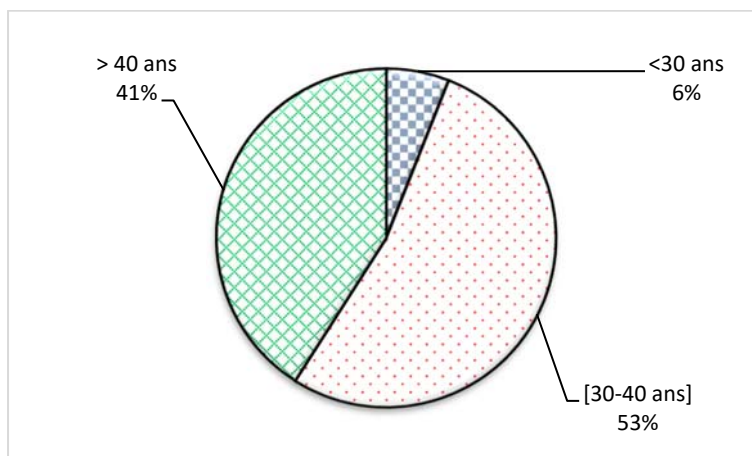


Figure 3. Répartition des enseignantes les tranches d'âges

Quant à l'ancienneté, plus de 80% des enseignantes de l'EF au niveau des deux régions cibles ont plus de 8 ans d'expériences et plus de 40% ont plus de 15 ans d'expérience (Figure 4).

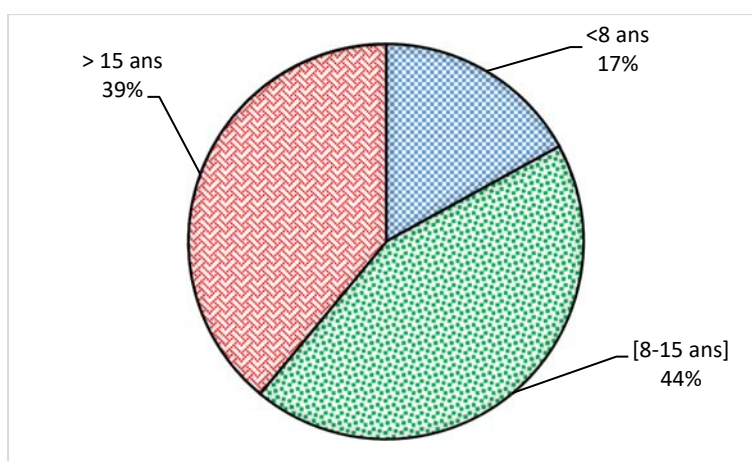


Figure 4. Répartition des enquêtées selon l'ancienneté

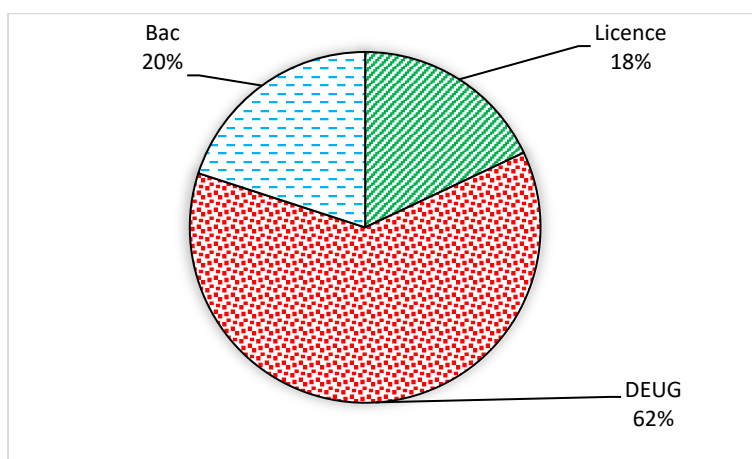


Figure 5. Répartition des enquêtées selon leur niveau d'instruction

Concernant le niveau académique, les résultats obtenus montrent que 80 % des enseignantes EF ont un niveau d'étude d'au moins BAC+2, avec 18% ayant une licence, 62% ayant le Diplôme d'Etude Universitaire Générale (DEUG) et 20% ayant le baccalauréat (Figure 5).

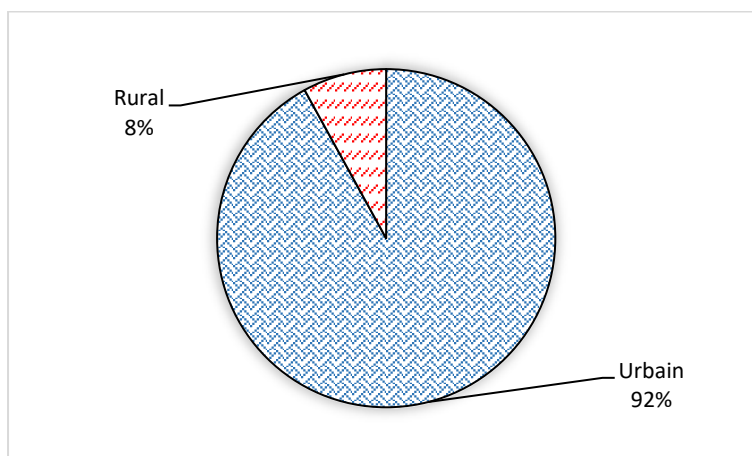


Figure 6 : Répartition des enseignantes EF selon le milieu d'affectation

En outre, selon la figure 6, le milieu d'affectation, 92% des établissements scolaires dispensant l'EF sont situés en milieu urbain, ainsi les affectations en milieu rural des enseignantes EF sont seulement de l'ordre de 8% .

#### 4.1.1. Présentations et analyse des résultats de l'enquête

##### 4.1.1.1. Importance de la discipline comme support de l'éducation à l'environnement

Le degré d'importance de la discipline dans l'éducation à l'environnement, demandait aux enseignantes de comparer les compétences visées par la discipline de l'EF avec les objectifs de l'EEDD.

67% des enseignantes voient que les objectifs de l'éducation familiale concordent totalement avec l'EEDD et que toutes les unités didactiques enseignées en 1<sup>ère</sup> et 2<sup>ème</sup> années de collège sont étroitement liées à l'éducation à l'environnement, tandis que 23% des enquêtées jugent que seulement certaines unités traitant les déchets ménagers, l'eau et l'électricité qui ciblent directement la sensibilisation et l'éducation à l'environnement.

##### 4.1.1.2. Degré de pertinence des leçons et activités pédagogiques proposés avec les l'éducation à l'environnement

Ici (Dans cette partie de...) les enseignantes ont été invitées à exprimer leurs avis sur la pertinence des activités pédagogiques et les pratiques habituellement adoptées dans les leçons et les unités didactiques en relation avec l'éducation à l'environnement.

Le dépouillement des réponses montre que 71% des enseignantes pensent que la présentation des leçons en classe telle qu'elle est habituellement pratiquées est insuffisante pour appréhender et développer les compétences visées. 19% ont exprimé leur insatisfaction en égard aux activités proposés dans le programme de la discipline et propose de laisser plus de marge de manœuvre aux établissements et aux enseignants.

##### 4.1.1.3. Pratiques et approches pédagogiques jugées plus efficaces dans l'EEDD d'après les enseignantes EF

Il s'agit d'une question qui demandait aux enseignantes de citer les activités et approches pédagogiques préconisées dans l'EF qui sont plus efficaces en matière de l'EEDD.

Les approches pédagogiques les plus préférés sont celles ciblant le développement d'attitudes respectueuses de l'environnement, en effet 48% des enseignantes pensent que le travail en atelier et par projet favorise plus le développement de des éco-gestes. Tandis que 27% des réponses préconisent l'intégration des technologies d'information et de communication dans l'enseignement des thématiques environnementales, quant aux 25% des réponses restantes, elles recommandent plus de travaux pratiques et les sorties pédagogiques dans l'enseignement des questions environnementales.



#### 4.1.1.5. Besoins prioritaires des enseignantes de l'EF en matière d'enseignement des questions liées à la protection de l'environnement

Le questionnaire invitait les enseignantes à déterminer leurs besoins prioritaires pour mieux enseigner les thématiques liées à l'environnement et au développement durable.

La majorité des enseignantes enquêtées ont exprimé leur besoin en matière de renforcement de capacités dans le domaine. 89% ont recommandé des formations continues thématiques notamment en relation avec la biodiversité. 82% d'entre elles ont aussi réclamé le manque de manuels scolaires de la matière et ont préconisé la nécessité de la refonte des programmes scolaires et la généralisation de la matière dans les 3 niveaux scolaires de l'enseignement secondaire collégial et dans tous les établissements.

#### V. CONCLUSION :

L'EEDD est structurée autour d'un réseau de concepts en relation avec des enjeux socio-économiques, économiques, scientifiques, culturels et politique, mais aussi à un système de valeurs et de représentations que les enseignants doivent maîtriser et de s'approprier pour orienter leurs choix éducatifs et adopter des stratégies didactiques adéquates dans l'enseignement des questions environnementales.

Les résultats de cette étude montrent que même si l'EF est une matière porteuse de l'éducation à l'environnement selon les enseignantes et d'après les instructions officielles et les orientations curriculaires, les activités pédagogiques et les pratiques d'enseignement-apprentissage d'éducation à l'environnement restent très limitées et insuffisantes. Le besoin en formation et à l'encadrement des enseignantes et l'absence d'outils pédagogiques sont les défaillances majeures exprimés par les enquêtées. La justification est liée aux finalités de l'EEDD et au concept liées au développement durable qui est en continuelle évolution, qui demande une mise en connexion constante entre les 3 piliers, le social, l'économique et l'environnemental à travers toute une variété de thèmes. Ainsi, son implémentation dans le secteur de l'éducation implique une approche holistique et systémique ciblant des savoirs, des attitudes, des aptitudes et des compétences spécifiques.

#### RÉFÉRENCES

- [1] Désautels, J., Une éducation aux technosciences pour l'action sociale. La recherche en didactique au service de l'enseignement, 1998: p. 9-27.
- [2] Giordan, A. and C. Souchon, Une éducation pour l'environnement: vers un développement durable. 2008: Delagrave édition.
- [3] Giolitto, P. and M. Clary, Eduquer à l'environnement. 1994: Hachette édition.
- [4] Sauvé, L., L'approche critique en éducation relative à l'environnement: origines théoriques et applications à la formation des enseignants. Revue des sciences de l'éducation, 1997. 23(1): p. 169-187.
- [5] Delors, J., L'éducation, un trésor est caché dedans. 1996: Odile Jacob.
- [6] Morin, E., La tête bien faite, repenser la réforme, réformer la pensée. L 'histoire immédiate, Seuil. 1999: L'Histoire immédiate.
- [7] UNESCO-PNUE, La Charte de Belgrade. Colloque international sur l'éducation relative à l'environnement, Belgrade, 13-22 octobre 1975. Bulletin de l'éducation relative à l'environnement, 1976: p. 1-3.
- [8] Sauvé, L., L'éducation relative à l'environnement entre modernité et postmodernité Les propositions du développement durable et de l'avenir viable. Education, 2000. 57: p. 71.
- [9] Kollmuss, A. and J. Agyeman, Mind the gap: why do people act environmentally and what are the barriers to pro-environmental behavior? Environmental education research, 2002. 8(3): p. 239-260.
- [10] Buckler, C. and H. Creech, Façonner l'avenir que nous voulons: Rapport final de la Décennie des Nations Unies pour l'éducation au service du développement durable (2015-2014). 2016: UNESCO Publishing.
- [11] Diemer, A. and C. Marquat, L'éducation au développement durable. Editions De Boeck, 2014: p. 1-481.
- [12] Tilbury, D., Environmental education for sustainability: Defining the new focus of environmental education in the 1990s. Environmental education research, 1995. 1(2): p. 195-212.

- [13] Clément, P., Didactic transposition and the KVP model: conceptions as interactions between scientific knowledge, values and social practices. Proceedings summer school ESERA, 2006: p. 9-17.
- [14] Clément, P. and S. Hovart, Environmental Education: analysis of the didactic transposition and of the conceptions of teachers. State of the art of empirical research on environmental education, 2000: p. 77-90.
- [15] CSEF, (Commission Spécial Education Formation). Charte nationale d'éducation et de formation, Royaume du Maroc. 1999. p. 1-157.
- [16] Clément, P. and S. Caravita, Education pour le Développement Durable (EDD) et compétences des élèves dans l'enseignement secondaire. HAL archives-ouvertes, 2011: p. 1-89.
- [17] El Moussaouy, A., J. Abderbi, and M. Daoudi, Environmental Education in the Teaching and the Learning of Scientific Disciplines in Moroccan High Schools. International Education Studies, 2014. 7(4): p. 33-46.
- [18] MEN, Pour un nouveau souffle de la réforme de l'Education Formation. (Ministère de l'Education Nationale, de l'Enseignement Supérieur, de la Formation des Cadres et de la Recherche Scientifique: Direction des curricula). Royaume du Maroc. 2008. Rapport détaillé: p. 1-324.

# *Asymmetric Laws Of Motion In The Cam Mechanisms*

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**Abstract** – Various technological processes require the generation of asymmetric laws of motion. A family of asymmetric laws of motion for the synthesis of cam mechanisms was introduced to facilitate engineer-designers. These laws of motion depend on only one independent parameter, which can be determined by conditions related to the necessary asymmetry of the first input-output transfer function (analog of velocities) and the desired ratio of the extreme values of the second transfer function - analog of accelerations.

The study aims to derive a family of asymmetric laws of motion for the synthesis of cam mechanisms dependent on only one independent parameter, with the possibility of being determined by conditions, related to the required asymmetry of the first transfer function and the desired ratio of the extreme values of the second transfer function.

Among the asymmetric laws, the ordinary and the "smoothing" trapezoidal law takes the main place. Its disadvantages compensate for a different power, trigonometric and power-trigonometric laws of motion. But achieving pre-defined conditions requires high skill and time on the part of the engineer-designers. Therefore, asymmetric laws of motion are derived for the synthesis of cam mechanisms depending on only one independent parameter. This parameter can easily be determined by the conditions associated with the required asymmetry of the first transfer function and the desired ratio of the extreme values of the accelerations.

**Keywords** – *Cam Mechanisms, Laws Of Motion, Asymmetry.*

## I. INTRODUCTION

Various technological processes require the generation of asymmetric laws of motion, for example in weaving machines (looms). It has been established that the law of motion of the shafts must be asymmetric [1]. The requirements for other technological processes are similar. For this purpose, it is necessary to generate laws of motion with different asymmetries and a ratio of the extreme values of the second transfer function - analog of accelerations.

A law used to design cam mechanisms for the formation shed for weaving machines is the asymmetric trapezoidal law for changing acceleration [2], which results in an intermittent rectangular change of the second accelerations (the so-called jerk) and increased vibrations and rattle of the mechanism. Better results are obtained with a modified trapezoidal law for changing acceleration [3], [4]. Modification by "smoothing" with parabolic arcs with common tangents in the transitions to the straight sections [5], [6], [7] derives a trapezoidal law for changing the second acceleration. Despite the good results obtained, a significant drawback of the trapezoidal functions of the acceleration is that they are defined individually by intervals, the

number of intervals increases from 5 to 9 when "smoothing" the upper trapezoid bases and at 11 intervals to overall "smoothing" the trapezoids.

Power, trigonometric and power-trigonometric polynomials provide good possibilities for generating asymmetric laws of motion of the cam mechanisms [8], [9], [10], [11], [12]. The synthesis disadvantage is related to the difficulty in determining the coefficients of the polynomials to satisfy the conditions for the asymmetry of the transfer functions and the corresponding ratios of the extreme values of the second transfer function.

*The purpose of the study is to derive a family of asymmetric laws of motion for the synthesis of cam mechanisms dependent on only one independent parameter, with the possibility of being determined by conditions, related to the required asymmetry of the first transfer function and the desired ratio of the extreme values of the second transfer function. Such a family of laws of motion would facilitate the synthesis of cam mechanisms, since it is relatively easy to draw up a desired asymmetric law of motion.*

## II. A FAMILY OF A ONE-PARAMETER FAMILY OF LAWS OF MOTION

For a family of asymmetric laws of motion, the *displacement function*  $\Delta\psi = \Delta\psi(\varphi)$  will be determined, of the oscillating follower (roller or flat-face) of the cam mechanism and its derivatives of the first and second transfer functions -  $\psi' = \psi'(\varphi)$  and  $\psi'' = \psi''(\varphi)$ , where the input coordinate  $\varphi \in [0, \Phi]$  is the rotation of the cam within a predetermined phase angle  $\Phi$  and the output coordinate  $\psi$  is the rotation of the follower angular motion (swing)  $\alpha$ . Similarly, cases where the input-output movements are different can be considered.

*Asymmetry* is an important factor in choosing a law of motion. It is found at odd derivatives  $u'(\xi), u'''(\xi), \dots$ , of the normalized function  $u(\xi) \in [0, 1]$ ;  $\xi \in [0, 1]$ , where  $u(\xi) = \psi(\varphi) / \alpha$ ;  $\xi = \varphi / \Phi$ . It is evaluated by the *asymmetry coefficient*.

$$(1) \quad a = 2\xi^* - 1,$$

where  $\xi^*$  is the value of the argument  $\xi$ , at which function  $u'(\xi)$  has maximum, respectively the derivative  $u''(\xi)$  is zeroed.

When setting the value of  $a$  as a condition of synthesis, from (1) is determined

$$(2) \quad \xi^* = 0.5(1 + a).$$

A *family of one-parameter laws of motion* can be determined by the first transfer function of the mechanisms with elliptical gears [13] (Figure 1):

$$(3) \quad i_{2,1} \equiv \frac{\omega_2}{\omega_1} = \frac{d\varphi_2}{d\varphi_1} = \frac{1 - \varepsilon^2}{1 + \varepsilon^2 - 2\varepsilon \cos \varphi_1} \quad \left( \begin{array}{l} 0 < \varepsilon < 1, \\ \varphi_1 \in (0, \pi) \end{array} \right),$$

in which the angles of rotation of the gears 1 and 2, are indicated by  $\varphi_1$  and  $\varphi_2$ , respectively.

Function (3) can be modified and converted into a *second transfer function* suitable for the synthesis of cam mechanisms generating asymmetric motion laws dependent on one independent parameter ( $\varepsilon$ ).

The changes are as follows:

- from function (3) is develop the mean  $(i_{2,1})_{av} = 1$  of the  $i_{2,1}$ ;
- the angle  $\varphi_1$  is replaced by  $\varphi_1 = (2\pi\varphi / \Phi_1) - \varphi_1^*$  where  $\varphi \in (0, \Phi_1)$  is the angle of rotation of the cam,  $\Phi_1$  is the cam angle of the follower rise,  $\varphi_1^* = \arccos(\varepsilon)$  is the angle at which  $i_{2,1} = (i_{2,1})_{av} = 1$ ;
- a factor  $f$  is introduced, which is determined by the condition that at  $\varphi = \Phi_1$  the output angle  $\Delta\psi$  is equal to the angular motion (swing)  $\alpha = \Delta\psi_{max}$  of the follower.

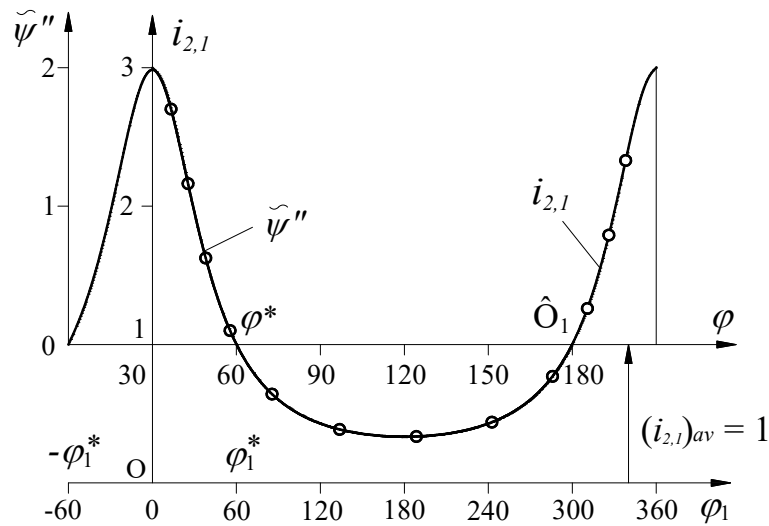


Fig. 1. Graphs of: first transfer function  $i_{2,1}(\varphi_1)$  of an elliptical gear mechanism; second transfer function  $\psi''(\varphi)$  of the cam mechanism at  $\Phi_1 = \pi$  and  $\varepsilon = 0.5$

These changes for the *second transfer function* of the cam mechanism (Figure 2) determined:

$$(4) \quad \psi''(\varphi) \equiv \frac{d^2\psi}{d\varphi^2} = f \cdot \tilde{\psi}''(\varphi),$$

where

$$(5) \quad \tilde{\psi}'' = \frac{1 - \varepsilon^2}{1 + \varepsilon^2 - 2\varepsilon \cos\left(\frac{2\pi\varphi}{\Phi_1} - \varphi_1^*\right)} - 1.$$

The function  $\psi''$  is zeroed at:

$$(6) \quad \varphi = 0; \varphi = \varphi^* = \left(\frac{\Phi_1}{\pi}\right) \cdot \arccos(\varepsilon); \varphi = \Phi_1.$$

The extremums

$$(7) \quad \begin{cases} \psi''_{\max} = f \left( \frac{1 + \varepsilon}{1 - \varepsilon} - 1 \right), \\ \psi''_{\min} = f \left( \frac{1 - \varepsilon}{1 + \varepsilon} - 1 \right) \end{cases}$$

of the function  $\psi''$  are determined respectively at angles

$$(8) \quad \begin{cases} \varphi_{(\max)} = \varphi^* / 2 = 0.5 \pi^{-1} \Phi_1 \arccos(\varepsilon); \\ \varphi_{(\min)} = (\varphi^* + \Phi_1) / 2 = 0.5 \Phi_1 \left( 1 + \pi^{-1} \arccos(\varepsilon) \right), \end{cases}$$

determined from zeroing of the *third transfer function*:

$$(9) \quad \psi''' = \frac{4 \pi f \varepsilon (\varepsilon^2 - 1) \sin \left( (2\pi\varphi / \Phi_1) - \varphi_1^* \right)}{\Phi_1 \left[ 1 + \varepsilon^2 - 2\varepsilon \cos \left( (2\pi\varphi / \Phi_1) - \varphi_1^* \right) \right]^2}$$

The only independent parameter is the  $\varepsilon \in (0, 1)$ , on which the extreme ratio depends

$$(10) \quad p = \psi''_{\max} / \psi''_{\min} = -(1 + \varepsilon) / (1 - \varepsilon)$$

and asymmetry coefficient

$$(11) \quad a = 2\xi^* - 1 = (2\varphi^* / \Phi_1) - 1 = 2 \cdot \pi^{-1} \arccos(\varepsilon) - 1.$$

As the value of the parameter  $\varepsilon$  ( $\varepsilon = 0.3; 0.4; 0.5$ ) increases, the asymmetry coefficient also increases ( $a \approx 0.194; 0.292; 0.333$ ), with no asymmetry for the interval  $a \in (0, 1)$  at  $a = 0$  and  $p = \psi''_{\max} / \psi''_{\min} = -1$ , and at  $a = 1$ , respectively  $\varepsilon = 1$  practically unacceptable results are calculated -  $\varphi^* = 0$  and  $p = \psi''_{\max} / \psi''_{\min} = -\infty$ .

Graphs of  $\psi''(\varphi)$  at  $f = 0.16$  and  $\Phi_1 = \pi$  for three values of  $\varepsilon = 0.3; 0.4; 0.5$  are given in Figure 2.

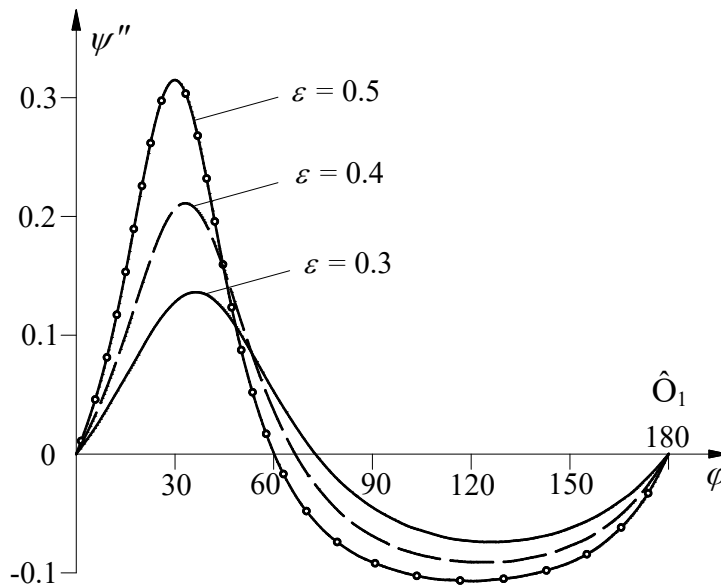


Fig. 2. Graphs of  $\psi''(\varphi)$  at  $f = 0.16$  and  $\Phi_1 = \pi$  for three values of  $\varepsilon = 0.3; 0.4; 0.5$

- There are two main tasks in determining the second transfer function by the set points of the angular motion  $\alpha = \Delta\psi_{\max}$  of the oscillating follower (roller or flat-face) and phase angle.

**Problem 1.** Determine the value of the parameter  $\varepsilon$  from the appropriately chosen extreme ratio

$$p = \psi''_{\max} / \psi''_{\min} = (\varepsilon + 1) / (\varepsilon - 1), \text{ from which:}$$

$$(12) \quad \varepsilon = (p + 1) / (p - 1).$$

For example, at  $p = -2; -3; -4$  are determined corresponding values of  $\varepsilon = 1/3; 0.5; 0.6$ .

**Problem 2.** Determine the value of the parameter  $\varepsilon$  from the appropriately chosen asymmetry coefficient

$$a = 1 - (2\varphi^* / \Phi_1) = 1 - 2 \cdot \pi^{-1} \arccos(\varepsilon),$$

from where determined:

$$(13) \quad \varepsilon = \cos(0.5\pi(1 - a)).$$

For example, at  $a = 1/6; 1/3; 1/2$  are determined corresponding values of  $\varepsilon = 0.2588; 0.5; 0.7071$ .

Graphs of the functions (12) and (13) are presented in Figure 3. These graphs can be used for parameters quick evaluation of the second transfer function. If necessary, this assessment may be analytically specified. For example, given a coefficient of asymmetry  $a = 0.3$  from (13),  $\varepsilon = 0.454$  is obtained, at this value of (9) the extreme ratio  $p = -2.663$  is determined, as shown in Figure 4. Conversely, for a given ratio  $p$ , the values of  $\varepsilon$  and of the coefficient  $a$  successively are determined.

The first transfer function can be determined analytically in the quadratures of equations (4) and (5):

$$(14) \quad \psi'(\varphi) = f \cdot \tilde{\psi}'(\varphi),$$

where

$$(15)$$

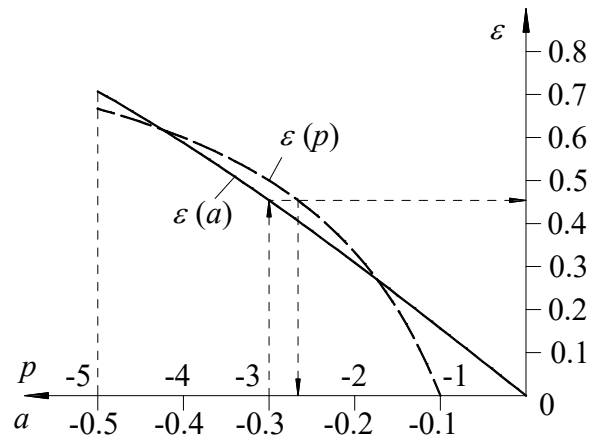


Fig. 3. Graphs of  $\varepsilon(p)$  and  $\varepsilon(a)$ , determined corresponding from equations (8) and (3)

$$\begin{aligned} \tilde{\psi}'(\varphi) &= \int_0^\varphi \tilde{\psi}''(\varphi) d\varphi + C = \\ &= 2 \operatorname{arctg} \left[ \frac{1 + \varepsilon}{1 - \varepsilon} \operatorname{tg} \left( \frac{\pi\varphi}{\Phi_1} - \frac{\varphi_1^*}{2} \right) \right] - \frac{2\pi\varphi}{\Phi_1} + \varphi_1^* + C. \end{aligned}$$

The constant  $C$  is derived from the initial condition  $\tilde{\psi}' = 0$  at  $\varphi = 0$ :

$$(16) \quad C = -2 \operatorname{arctg} \left[ \frac{1 + \varepsilon}{1 - \varepsilon} \operatorname{tg} \left( -\frac{\varphi_1^*}{2} \right) \right] - \varphi_1^* .$$

The **displacement function**  $\Delta\psi(\varphi)$  of the follower is derived after integrating  $\psi'(\varphi)$ :

$$(17) \quad \Delta\psi(\varphi) = f \cdot \Delta\tilde{\psi} = f \cdot \left( \int_0^\varphi \tilde{\psi}'(\varphi) d\varphi + C_0 \right).$$

The constant  $C_0$  is derived from the initial condition  $\Delta\psi = 0$  at  $\varphi = 0$ . The multiplier  $f$  is determined by the condition  $\Delta\psi(\varphi) = \alpha$  at  $\varphi = \Phi_1$ :

$$(18) \quad f = \alpha \left( \int_{\varphi=0}^{\Phi_1} \tilde{\psi}'(\varphi) d\varphi + C_0 \right)^{-1}.$$

By determining the multiplier  $f$ , the functions are finally derived:

$$(19) \quad \Delta\psi(\varphi) = f \cdot \Delta\tilde{\psi}; \quad \psi'(\varphi) = f \cdot \tilde{\psi}'(\varphi); \quad \psi''(\varphi) = f \cdot \tilde{\psi}''(\varphi).$$

The integrals  $\int_0^\varphi \tilde{\psi}'(\varphi) d\varphi + C$  and  $\int_{\varphi=0}^{\Phi_1} \tilde{\psi}'(\varphi) d\varphi + C_0$  corresponding from (14) and (15) are determined numerically by Simpson's method.

The graphs of the functions  $\Delta\psi(\varphi)$ ,  $\psi'(\varphi)$  and  $\psi''(\varphi)$  determined at a given angular motion  $\alpha = \pi / 6$ , phase angle  $\Phi_1 = \pi$ , and asymmetry coefficient  $a = 1/3$  at which of the equation (13) are derived  $\varepsilon = 0.5$ , are presented in Figure 4. From the equation (10) are determined  $p = -3$ , respectively  $\psi''_{\max} = 3|\psi''_{\min}|$ .

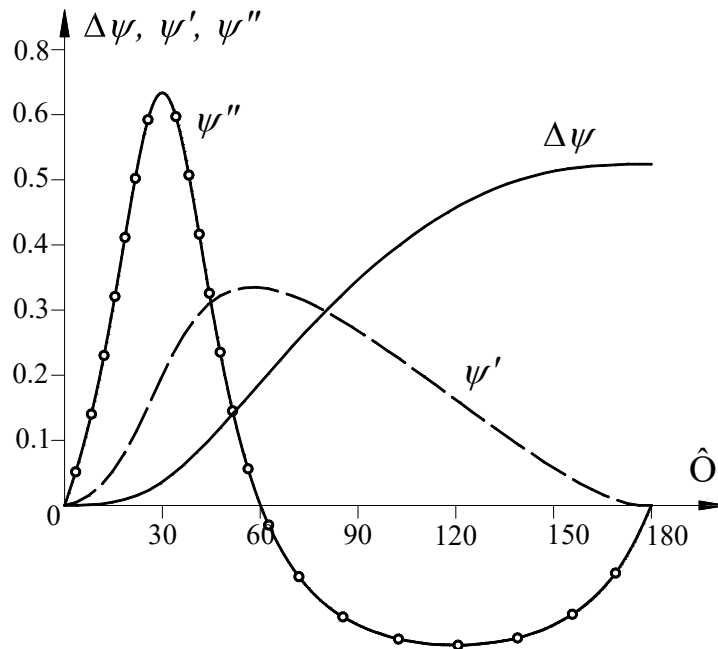


Fig. 4. Graphs of the functions  $\Delta\psi$ ,  $\psi'$  and  $\psi''$  when given:  
 $\alpha = \pi/6, \Phi_1 = \pi$  and  $a = 1/3$

*A detailed solution to the question of the laws of motion and synthesis of cam mechanisms was made by Galabov, Roussev, and Paleva-Kadiyska in [14].*

### III. CONCLUSION

Among the asymmetric laws, the ordinary and the "smoothing" trapezoidal law takes the main place. Its disadvantages compensate for a different power, trigonometric and power-trigonometric laws of motion. But achieving pre-defined conditions requires high skill and time on the part of the engineer-designers. Therefore, asymmetric laws of motion are derived for the synthesis of cam mechanisms depending on only one independent parameter. This parameter can easily be



determined by the conditions associated with the required asymmetry of the first transfer function and the desired ratio of the extreme values of the accelerations.

### REFERENCES

- [1] Roussev R. Weaving. Sofia: New Man Publishing House, 2017. (in Bulgarian)
- [2] Galabov V., Roussev R. and Avramov I. Modernized design of cam mechanisms for textile machinery. Scientific papers National Military University "Vasil Levski", Veliko Tarnovo, vol. 52, pp. 415-422, 1997. (in Bulgarian)
- [3] Nekultin C. N. Designing cams for controlled Inertia and Vibration., Machine Design, 24, 6, pp. 143-160, 1952.
- [4] Roussev R. and Galabov V. Laws of motion of the shafts in weaving machines. Textiles and Garments, ISSN 1310-912X, vol. 11-12, pp. 14-18, 2000. (in Bulgarian)
- [5] Galabov V., Avramov I., Mihaylov V. and Roussev R. Modernization of textile machines by the structural-dimensional synthesis of function generator cam-lever mechanisms. Mechanics of machines, vol. 14, pp. 70-76, 1996. (in Bulgarian)
- [6] Roussev R. and Galabov V. Synthesis of cam mechanisms with two-roller levers for textile machines. Textiles and Garments, ISSN 1310-912X, vol. 10, 2001, pp.12-17. (in Bulgarian)
- [7] Roussev R. and Galabov V. Modernization of "shed" formation mechanisms in weaving machines. Collection of Scientific Papers - Innovative Techniques and Technologies, South-West University "Neofit Rilski", Blagoevgrad, pp.78-89, 2008. (in Bulgarian)
- [8] Levitsky N. I. Cam mechanisms Moscow: Mechanical engineering, 1964, (in Russian)
- [9] Chen F. Y. Mechanics and Design of CAM Mechanisms. New York: Pergamon press, 1982.
- [10] Galabov V., Rousev R. and Shivarov N. Planning of Movement Laws Using Trigonometric Polynomials. BAS, Theor. & Appl. Mechanics, vol. 3, pp. 3-12, 2010.
- [11] Galabov V., Savchev S. and Slavov G. Planning of Motion Laws Using Power-Trigonometric Polynomials. Conferences & Symposia IFAC-PapersOnLine, 16th IFAC Conference on Technology, Culture and International Stability TECIS 2015, Sozopol, Bulgaria, 24-27 September 2015, pp. 134-137, <https://www.sciencedirect.com/journal/ifac-papersonline/vol/48/issue/24>.
- [12] Rothbart H. A. CAMES. Design, Dynamics and Accuracy, N. Y.: John Wiley & Sons, 1965.
- [13] Litvin F. L. Theory of gearing. NASA Reference Publication, 1989.
- [14] Galabov V., Roussev R. and Paleva-Kadiyska Bl. Synthesis of cam mechanisms I. Sofia: New Man Publishing House, 2020. (in Bulgarian)

# *Quinquinomial Power Functions With One Phase Of The Dwell In Cam Mechanisms*

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**Abstract** – A family of quinquinomial power motion laws without finite and infinite spikes with better characteristics has been compiled and studied than in the case of analogous quinquinomial motion laws. They are suitable for cases where polydyne cam mechanisms are synthesised with only one phase of dwell at the follower. The aim is to compile and investigate a family without a finite and infinite spikes quinquinomial power laws of motion with better characteristics than similar quinquinomial power laws of motion, which are suitable for the synthesis of cam mechanisms with phases of dwell. The composite family without a finite and infinite spikes quinquinomial power laws of motion are suitable for cases where polydyne cam mechanisms are synthesized with only one phase of dwell at the follower. Extreme values of output velocities and accelerations are reduced, thus reducing the inertial loading of the mechanisms. The derived family of quinquinomial power normalized functions for modeling the laws of motion without a finite and infinite spikes of the cam mechanisms enables us to achieve better dynamic characteristics in comparison with other laws of motion for polydyne cams, in cases where one of the phases of dwell of the follower is missing.

**Keywords** – Cam Mechanisms, Laws Of Motion, Power Functions

## I. INTRODUCTION

The laws of motion of polydyne cam mechanisms are smooth, non-peaked functions at least up to the fourth derivative of the output motion, to avoid acceleration peaks in high-speed and elastic mechanical systems [1], [2], [3], [4], such as are the cam-lever distribution valves mechanisms of automotive engines [5], [6], [7] and many other modern mechanical systems of various technological machines [8], [9], [10], [11], [12]. This advantage of the laws of motion is due to the greater extreme values of the output velocities and accelerations. These values can be significantly reduced in single-phase cam mechanisms [13] if the output acceleration has the same ultimate value in the transition from the return phase (reverse move, return stroke) to the distance phase (rise phase, outstroke phase) of the follower (in the lack of a high dwell) or in the transition from rise phase to the return phase of the follower (in the lack of a low dwell).

Otherwise, at zero acceleration in the transition from one phase to another of motion of follower, the acceleration rapidly changes from one extreme value to zero and again to an extreme value in the next phase of motion, with significant elastic vibrations possible.

The aim is to compile and investigate a family without finite and infinite spikes quinquinomial power laws of motion with better characteristics than similar quinquinomial power laws of motion, which are suitable for the synthesis of cam mechanisms with phases of dwell. The composited family without a finite and infinite spikes quinquinomial power laws of motion is suitable for cases where polydyne cam mechanisms are synthesized with only one phase of dwell at the follower [14].

## II. TWO CASES FOR GEOMETRIC CYCLE WITH ONE PHASE OF DWELL

A condition for deriving power laws of motion of polydyne cam mechanisms with one phase of dwell is the use of basic normalized functions with at least five terms, the first of which must be of exponent 2 ( $k = 2$ ) and the others exponents of five upwards.

The normalized function and its derivatives for the rise and return phases  $\Phi_1 = \Phi_3 = \Phi$  for an argument  $\xi = \varphi / \Phi \in [0; 1]$  can be described by an output normalized function and its derivatives  $u'(\xi)$ ,  $u''(\xi)$ ,  $u'''(\xi)$  and  $u''''(\xi)$ . There are two possible cases:

**Case 1.** One cycle involves only a phase of high dwell  $\Phi_2$  (Figure 1a);

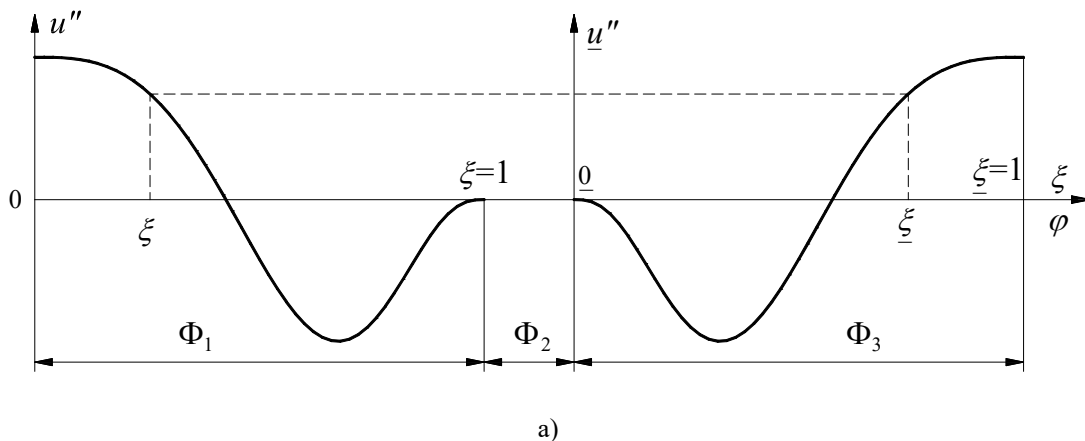
**Case 2.** One cycle involves only a phase of low dwell  $\Phi_4$  (Figure 1b).

In both cases, an argument  $\underline{\xi} = 1 - \xi$ , is introduced, which follows:

$$\begin{cases} \underline{u}(\underline{\xi}) = u(1 - \xi); \underline{u}'(\underline{\xi}) = -u'(1 - \xi); \underline{u}''(\underline{\xi}) = u''(1 - \xi); \\ \underline{u}'''(\underline{\xi}) = -u'''(1 - \xi); \underline{u}''''(\underline{\xi}) = u''''(1 - \xi) . \end{cases} \quad (1)$$

In case 1 ( $\Phi_4 = 0$ ), for the distance phase  $\Phi_1$ , the normalized function and its derivatives coincide with the output normalized function  $u(\xi)$  and its derivatives  $u'(\xi)$ ,  $u''(\xi)$ ,  $u'''(\xi)$  and  $u''''(\xi)$ . In the return phase  $\Phi_3$  the argument is  $\underline{\xi} = 1 - \xi$  and equations (1) are used.

In case 2 ( $\Phi_2 = 0$ ) for the return phase  $\Phi_3$ , the normalized function and its derivatives coincide with the output normalized function  $u(\xi)$  and its derivatives  $u'(\xi)$ ,  $u''(\xi)$ ,  $u'''(\xi)$  and  $u''''(\xi)$ . In the distance phase  $\Phi_1$  the argument is  $\underline{\xi} = 1 - \xi$  and equations (1) are used.



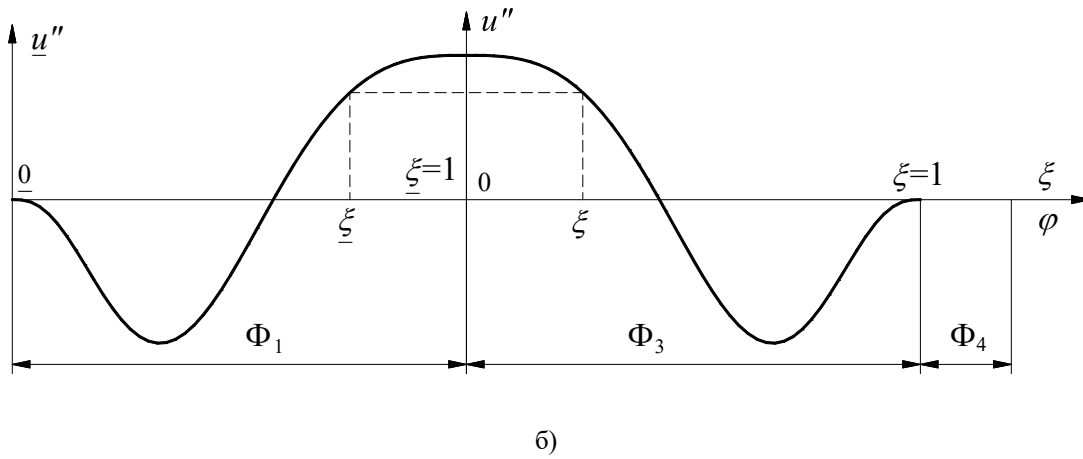


Fig. 1. Coupling the function with for one geometric cycle in one phase of dwell:

a) high; b) low

Under these conditions, the analogs of the accelerations  $u''(\xi)$  and  $\underline{u}''(\xi)$  are coupling without jump in the transition between the phases of the rise and the return of the follower (Figure 1).

### III. DERIVATION OF POWER POLYNOMIALS

By the well-known formula [15] and selected values of  $j = k, m, p, q, s$  of a polynomial of type  $u(\xi) = \sum_j a_j \xi^j$ , the coefficients  $a_k, a_m, a_p, a_q, a_s$  of the polynomial can be determined.

Let the values of the exponents  $k, m, p, q, s$  be chosen by the formula  $z = 2 + in$ , where  $z$  is a generalized registration of a series of exponents  $m, p, q, s$ , respectively at  $i = 1, 2, 3, 4$  and  $n = 3, 6, 9, 12$ . A family of four polynomials and the corresponding power exponents are presented in Table 1, with  $k = 2$  for each polynomial. Thus, for the coefficients  $a_k, a_m, a_p, a_q, a_s$ , the values recorded in Table 2 are calculated.

Table 1. Exponents  $k, m, p, q, s$

polynomial $i$	n	m	p	q	s
1	3	5	8	11	14
2	6	8	14	20	26
3	9	11	20	29	38
4	12	14	26	38	50

Table 2. Coefficients  $a_k, a_m, a_p, a_q, a_s$

polynomial	$a_k$	$a_m$	$a_p$	$a_q$	$a_s$
1	$\frac{770}{243}$	$-\frac{1232}{243}$	$\frac{1155}{243}$	$-\frac{560}{243}$	$\frac{110}{243}$

2	$\frac{455}{243}$	$-\frac{455}{243}$	$\frac{390}{243}$	$-\frac{182}{243}$	$\frac{35}{243}$
3	$\frac{30305}{19683}$	$-\frac{22040}{19683}$	$\frac{18183}{19683}$	$-\frac{8360}{19683}$	$\frac{1595}{19683}$
4	$\frac{43225}{31104}$	$-\frac{24700}{31104}$	$\frac{19950}{31104}$	$-\frac{9100}{31104}$	$\frac{1729}{31104}$

• For power polynomial №1 with coefficients of row №1 of table 2 and its derivatives, are obtained:

$$\left\{ \begin{aligned} u &= \frac{1}{243}(770\xi^2 - 1232\xi^5 + 1155\xi^8 - 560\xi^{11} + 110\xi^{14}), \\ u' &= \frac{1540}{243}(\xi - 4\xi^4 + 6\xi^7 - 4\xi^{10} + \xi^{13}), \\ u'' &= \frac{1540}{243}(1 - 16\xi^3 + 42\xi^6 - 40\xi^9 + 13\xi^{12}), \\ u''' &= \frac{6160}{81}(-4\xi^2 + 21\xi^5 - 30\xi^8 + 13\xi^{11}), \\ u^{(4)} &= \frac{6160}{81}(-8\xi + 105\xi^4 - 240\xi^7 + 143\xi^{10}). \end{aligned} \right. \quad (2)$$

• For power polynomial №2 with coefficients of row №2 of table 2 and its derivatives are obtained:

$$\left\{ \begin{aligned} u &= \frac{1}{243}(455\xi^2 - 455\xi^8 + 390\xi^{14} - 182\xi^{20} + 35\xi^{26}), \\ u' &= \frac{910}{243}(\xi - 4\xi^7 + 6\xi^{13} - 4\xi^{19} + \xi^{25}), \\ u'' &= \frac{910}{243}(1 - 28\xi^6 + 78\xi^{12} - 76\xi^{18} + 25\xi^{24}), \\ u''' &= \frac{7280}{81}(-7\xi^5 + 39\xi^{11} - 57\xi^{17} + 25\xi^{23}), \\ u^{(4)} &= \frac{7280}{81}(-35\xi^4 + 429\xi^{10} - 969\xi^{16} + 575\xi^{22}). \end{aligned} \right. \quad (3)$$

• For power polynomial №3 with coefficients of row №3 of table 2 and its derivatives, are calculated:

$$\left\{ \begin{aligned} u &= \frac{1}{19683}(30305\xi^2 - 22040\xi^{11} + 18183\xi^{20} - 8360\xi^{29} + 1595\xi^{38}), \\ u' &= \frac{60610}{19683}(\xi - 4\xi^{10} + 6\xi^{19} - 4\xi^{28} + \xi^{37}), \\ u'' &= \frac{60610}{19683}(1 - 40\xi^9 + 114\xi^{18} - 112\xi^{27} + 37\xi^{36}), \\ u''' &= \frac{60610}{2187}(-40\xi^8 + 228\xi^{17} - 336\xi^{26} + 148\xi^{35}), \\ u'''' &= \frac{242440}{2187}(-80\xi^7 + 969\xi^{16} - 2184\xi^{25} + 1295\xi^{34}). \end{aligned} \right. \tag{4}$$

• For power polynomial №4 with coefficients of row №4 of table 2 and its derivatives, are obtained:

$$\left\{ \begin{aligned} u &= \frac{1}{31104}(43225\xi^2 - 24700\xi^{14} + 19950\xi^{26} - 9100\xi^{38} + 1729\xi^{50}), \\ u' &= \frac{86450}{31104}(\xi - 4\xi^{13} + 6\xi^{25} - 4\xi^{37} + \xi^{49}), \\ u'' &= \frac{86450}{31104}(1 - 52\xi^{12} + 150\xi^{24} - 148\xi^{36} + 49\xi^{48}), \\ u''' &= \frac{129675}{3888}(-52\xi^{11} + 300\xi^{23} - 444\xi^{35} + 196\xi^{47}), \\ u'''' &= \frac{129675}{972}(-143\xi^{10} + 1725\xi^{22} - 3885\xi^{34} + 2303\xi^{46}). \end{aligned} \right. \tag{5}$$

The derivative functions  $u'$ ,  $u''$  and  $u'''$  of all polynomials are zeroed for the interval boundaries  $\xi \in [0, 1]$ , as can be seen from the graphs in Figure 2. These polynomials make it possible to generate uniform acceleration motion of the output unit at a considerable interval of change of the input coordinate. This interval increases with increasing polynomials exponents, as can be seen from Figure 2.

In table 3 of the extremums of functions  $u'$ ,  $u''$  and  $u'''$ , comparison is made.

Table 3. Comparison table of the extremums of functions  $u'$ ,  $u''$  and  $u'''$

normalized polynomial $u(\xi)$	$u'_{\max}$	$u''_{\max}$	$u''_{\min}$	$u'''_{\max}$	$u'''_{\min}$
polynomial 1 (2)	1.957	6.337	-6.309	33.03	-35.859
polynomial 2 (3)	1.86	3.745	-8.386	75.515	-48.149
polynomial 3 (4)	1.848	3.079	-10.769	138.079	-73.247
polynomial 4 (5)	1.85	2.779	-13.226	220.249	-106.376

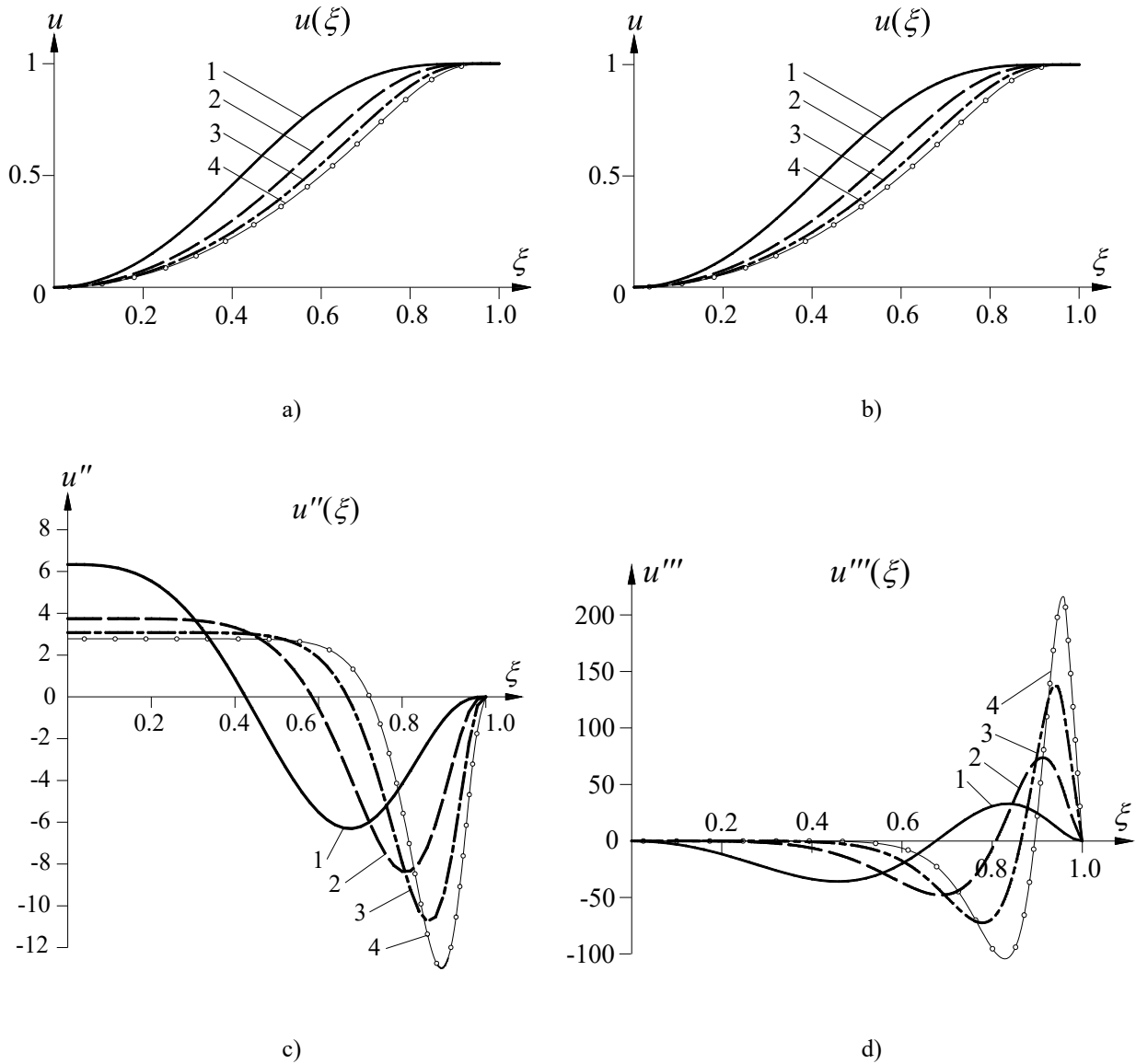


Fig. 2. Graphs of polynomials 1, 2, 3 и 4: a)  $u(\xi)$ ; b)  $u'(\xi)$ ; c)  $u''(\xi)$ ; d)  $u'''(\xi)$

A detailed solution to the question of the laws of motion and synthesis of cam mechanisms was made by Galabov, Roussev, and Paleva-Kadiyska in [16].

#### IV. CONCLUSION

The derived family of quinquinomial power normalized functions for modeling the laws of motion without a finite and infinite spikes of the cam mechanisms enables us to achieve better dynamic characteristics in comparison with other laws of motion for polydyne cams, in cases where one of the phases of dwell of the follower is missing.

#### REFERENCES

[1] Dudley, W. M. "New Methods in Valve Cam Design". Transactions S. A. E., 2, p. 19, 1948.

- [2] Thoren, T. R., Engemann, H. H., Stoddart, D. A. "Cam Design as Related to Valve Train – Dynamics". Transactions S. A. E., vol. 6, 1952.
- [3] Stoddart, D.A. "Polydyne Cam Design". Machine Design, vol. 25, Jan. 25, pp. 121-149, 1953.
- [4] Chen, F. Y. "Mechanics and Design of CAM Mechanisms". Pergamon press, N. Y, p. 523, 1982.
- [5] Rothbart, H., A. "Cames. Design, Dynamics and Accuracy". N., Y., John Wiley & Sons, p. 336, 1965.
- [6] Tounsi, M., Chaari, F., Walha, L., Fakhfakh, T., Haddar, M. "Dynamic behavior of a valve train system in presence of camshaft errors". Wseas Transactions on Theoretical MechaNICS, ISSN: 1991-8747, Issue 1, vol.6, 2011.
- [7] Moreno, D., Mucchi, E., Dalpiaz, G., Rivola, A. "Multybody analysis of the desmodromic valve train of the Ducati MotoGP engines". Multibody Dynamics 2007, ECCOMAS Thematic Conference, Milano, 2007.
- [8] Galabov, V., Roussev, R. "On mathematical models for synthesis of cam mechanism according to kinematically equivalent for-bar mechanism". Textiles and Garments, ISSN 1310-912X, vol. 11, 2009, pp. 7 – 11. (in Bulgarian)
- [9] Sadek, K.S.H., Daadbin, A. "Improved Cam Profiles for High-Speed Machinery Using Polynomial Curve Fitting". J. of Process Mechanical Engineering, vol. 204, n.E 2, 1990, pp.127-132.
- [10] Blechsmidt, J. L., Lee, C. H. "Design and Analysis of Cam Profiles Using Algebraic Functions". ASME, DE, New York, vol. 32 pt. 2, 1991, pp. 451-459.
- [11] Cardona, A., Lens, E., Nigro, N. "Optimal Design of Cams". Multibody System Dynamics, 7, 2002, pp. 285–305.
- [12] Norton, R., L. "Design of Machinery". McGraw-Hill Inc., New York, 1992, p. 306.
- [13] Levitsky, N.I. "Cam mechanisms". Moscow, Mechanical engineering, 1964, p. 287. (in Russian)
- [14] Roussev, R., Paleva-Kadiyska, Bl., Galabov, V. "Quinquinomial power laws of motion of cam mechanisms". (upcoming print)
- [15] Paleva-Kadiyska, Bl., Roussev, R., Galabov, V. "Rational possibility of generating power laws in the synthesis of cam mechanisms". (upcoming print)
- [16] Galabov, V., Roussev, R., Paleva-Kadiyska, Bl. "Synthesis of cam mechanisms I". Sofia: New Man Publishing House, 2020. (in Bulgarian)



# *Impacts Des Chocs Macroeconomiques Sur La Capitalisation Des Banques Individuelles A Madagascar*

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## RESUME

Les crises financières, qui se sont succédées, ont mis en exergue l'interdépendance entre le système financier et l'économie réelle. Les mesures prudentielles, pour limiter les répercussions néfastes de la crise financière, à travers les accords de Bâle I et Bâle II ont montré leurs limites et les accords de Bâle III ont intégré en conséquence le volet macro-prudentiel qui vise à assurer la stabilité du secteur financier dans son ensemble au sein de l'économie. L'outil d'évaluation de la stabilité financière sous le nom de « stress test » s'est également développé sous différentes formes et son application au niveau du secteur financier, notamment le secteur bancaire, est fortement recommandé par la Banque des Règlements Internationaux. En effet, l'objet de la présente étude consiste à évaluer la résilience du secteur bancaire malgache face aux chocs macroéconomiques et d'évaluer son impact sur la capitalisation du système bancaire à travers l'outil de stress test macroéconomique. Pour ce faire, nous avons recouru à un modèle de panel dynamique. Les prévisions des prêts non performants sont utilisées pour obtenir des projections des capitaux propres à la fois au niveau du système bancaire et au niveau des banques lors des scénarios défavorables. Les résultats montrent que la plupart des banques ont pu détenir des fonds propres supérieurs au seuil minimum réglementaire de 8% selon les normes de Bâle III. Toutefois, une seule banque n'arrive pas à respecter le seuil minimum d'adéquation de capitaux propres.

*Mots clés :* Stabilité financière, stress test, capitalisation, secteur bancaire

## ABSTRACT

The successive financial crises have highlighted the interdependence between the financial system and the real economy. Prudential measures to limit the negative repercussions of the financial crisis, through the Basel I and Basel II agreements, have shown their limits and the Basel III agreements have consequently integrated the macro-prudential component which aims to ensure the stability of the financial sector as a whole within the economy. The financial stability assessment tool known as the "stress test" has also been developed in various forms and its application to the financial sector, particularly the banking sector, is strongly recommended by the Bank for International Settlements. Indeed, the purpose of this study is to assess the resilience of the Malagasy banking sector to macroeconomic shocks and to evaluate its impact on the capitalization of the banking system through the macroeconomic stress test tool. To do so, we used a dynamic panel model. Non-performing loan forecasts are used to obtain capital projections at both the banking system and bank levels under adverse scenarios. The results show that most banks were able to hold capital above the minimum regulatory threshold of 8% under Basel III standards. However, only one bank fails to meet the minimum capital adequacy threshold.

**Keywords:** Financial stability, stress test, capitalization, banking sector

## GLOSSAIRE

Nom	Définition
Accords de Bâle	Accords établis par le Comité de Bâle sur la Supervision Bancaire (CBSB) et dont le principal objectif est « de renforcer la régulation, la supervision et les pratiques bancaires dans le monde dans le but de renforcer la stabilité financière ».
Banque des Règlements Internationaux (BRI)	La BRI est une organisation financière internationale créée en 1930 sous la forme juridique d'une société anonyme, dont les actionnaires sont des banques centrales. Sa mission est de servir les banques centrales dans leur objectif de stabilité monétaire et financière, de favoriser la coopération internationale dans ces domaines et d'agir comme banque des banques centrales. (Article 15 des « Statuts de la Banque des règlements internationaux »).
<i>Credit scoring</i>	C'est un outil qui permet aux banques d'évaluer le risque représenté par le demandeur de prêt et de garantir la solvabilité du candidat au prêt. Ainsi, cet outil permet à la banque de limiter les risques de non remboursement des crédits en se basant sur un certain nombre de critères notamment la fiabilité et la solvabilité de l'emprunteur.
Effet de levier	C'est une technique qui consiste à utiliser l'endettement pour augmenter la capacité d'investissement. Le ratio de levier mesure le rapport entre le total des capitaux propres sur le total des actifs.
Hypothèse de « trop grande pour faire faillite »	Les banques de grande taille prennent des risques excessifs en augmentant leur influence sur la présomption d'être grand pour échouer et possède donc plus de prêts improductifs.
Hypothèse de « risque moral »	La faible capitalisation des banques conduit à une augmentation des prêts improductifs. La justification réside dans les incitations de risque moral de la part des dirigeants des banques, qui augmentent le risque de leur portefeuille de prêts lorsque leurs banques sont peu capitalisées.

Hypothèse de «mauvaise gestion »	Le faible rapport coût-efficacité est positivement associé à des augmentations des prêts non performants futurs. A cette supposition a été rajouté le lien négatif entre la performance et les augmentations des NPL futurs. En effet, la faible performance peut être un indicateur de la moindre qualité des compétences activités de prêt. Ce qui implique une relation négative entre les revenus passés et les problèmes de prêts.
Macro stress test	Les tests de résistance appliqués dans un contexte plus large, dans le but de mesurer la sensibilité d'un groupe d'institutions ou même de tout le système financier aux chocs courants.
Micro stress test	Le stress test est utilisé au départ pour tester la performance des portefeuilles individuels ou la stabilité des institutions individuelles dans des conditions particulièrement défavorables.
Modèle « satellite »	Modèle qui fournit un cadre prévisionnel pour analyser les liens essentiels entre le système financier et l'économie réelle.
Politique macro-prudentielle et politique micro-prudentielle	<p>Les décideurs se sont traditionnellement concentrés sur les institutions financières individuelles pour s'assurer qu'elles sont sûres, saines et capables d'honorer leurs obligations, en particulier les institutions comme les banques commerciales qui collectent des fonds du grand public. Mais la crise financière mondiale a mis en évidence les limites de cette approche traditionnelle, connue sous le nom de politique micro-prudentielle.</p> <p>En se concentrant principalement sur les entreprises individuelles, les décideurs ont involontairement laissé les risques financiers à l'échelle du système croître sans contrôle. Depuis la crise, nombreux pays ont élargi leur arsenal d'outils pour explorer une approche plus systémique de la réglementation et de la supervision financières. Cette approche visant à protéger le système financier dans son ensemble est appelée politique macro-prudentielle (FMI, 2019).</p>
Procyclicité	Le phénomène de procyclicité s'explique par la tendance de l'activité de prêt des banques à suivre le cycle de l'économie réelle, c'est-à-dire une forte croissance pendant la période de reprise économique et une faible croissance voire une contraction en période de récession économique.



Risque de crédit	Le risque de crédit se définit comme le risque qu'un emprunteur soit incapable de rembourser sa dette.
Risque systémique	« Un événement à l'origine de pertes économiques importantes ou d'une perte de confiance, ce qui suscite des inquiétudes sur la situation d'une partie importante du système financier, suffisamment sérieuses pour avoir des effets négatifs sur l'économie réelle » (BRI). Il existe plusieurs types de risque systémique tel le risque de crédit, le risque de liquidité et le risque du taux d'intérêt.
Stabilité financière	En l'absence d'une définition commune, la stabilité financière peut être caractérisée par la capacité de résilience du système financier face aux chocs considérables provenant de l'extérieur du système ou à l'intérieur même du système financier, permettant de réduire les répercussions néfastes au sein du système financier qui se répandent à l'échelle de l'économie.
Stress test	Le stress test du système financier décrit une chaîne de technique utilisée pour évaluer la vulnérabilité du portefeuille des institutions financières face aux changements ou chocs macroéconomiques importants. Il fournit les informations sur le comportement du système sous des chocs exceptionnels mais plausibles, aidant décideurs politiques pour évaluer l'importance des vulnérabilités du système.
Système financier	Le système financier a trois composantes principales à savoir : (1) les institutions financières qui sont les acteurs comprenant notamment les banques, maisons de titres, entreprises d'assurance et fonds de pension, (2) les marchés financiers couvrant les opérations bilatérales de gré à gré et les marchés organisés et (3) les systèmes de paiement et de règlement qui sont les instruments, intégrant notamment les prêts, les obligations, les actions et instruments dérivés.

## LISTE DES ABBREVIATIONS

<b>ADF</b>	Dikey-Fuller Augmenté
<b>AR</b>	AutoRégressif
<b>BCBS</b>	Based Committee on Banking Supervision
<b>BBCE</b>	Banque Centrale Européenne
<b>BFM</b>	Banky Foiben'i Madagasikara
<b>BIS</b>	Bank for International Settlements
<b>BoE</b>	Bank of England
<b>BoS</b>	Bank of Spain
<b>BRI</b>	Banque des Règlements Internationaux
<b>CAR</b>	Capital Adequacy Ratio ou ratio d'adéquation de capitaux propres
<b>CBSB</b>	Comité de Bâle pour la Supervision Bancaire
<b>CDL</b>	Créances Douteuses et Litigieuses
<b>CEMAC</b>	Communauté Économique et Monétaire de l'Afrique Centrale
<b>CET1</b>	Fonds propres de base de catégorie 1
<b>CGFS</b>	Committee on the Global Financial System
<b>CSF</b>	Conseil de Stabilité Financière
<b>DNB</b>	De Nederlandsche Bank
<b>DSGE</b>	Dynamic Stochastic General Equilibrium ou Modèles d'équilibre général dynamique stochastique
<b>EBA</b>	European Bank Authority
<b>EEA</b>	European Economic Area

<b>FE</b>	Fixed effects
<b>FED</b>	Federal Reserve Board
<b>Fisher PP</b>	Phillips-Perron Fisher-Chi Square-PP
<b>FMI</b>	Fonds Monétaire International
<b>FSAP</b>	Financial System Assessment Program
<b>FSB</b>	Financial Services Board
<b>GIPSI</b>	Grèce, Irlande, Portugal, Espagne et Italie
<b>GIRFs</b>	Generalized Impulse Response Functions
<b>GMM</b>	Generalized Method of Moments ou Méthode des moments généralisée
<b>GVAR</b>	Global Vector Autoregressive
<b>ICD</b>	Institutions Collectrices de Dépôts
<b>IFS</b>	International Financial Statistics
<b>INSTAT</b>	Institut National de la Statistique de Madagascar
<b>IPC</b>	Indice des prix à la consommation
<b>IPS</b>	Im-Pesaran et Shin W
<b>LLC</b>	Levin-Lin-Chu
<b>LLC</b>	Tests de Levin-Lin-Chu
<b>LLP</b>	Loan Loss Provision ou provisions pour créances douteuses
<b>LR</b>	Leverage Ratio ou Ratio de levier
<b>LtD</b>	Loan-to-deposit ratio ou ratio des prêts sur dépôts
<b>MCO</b>	Méthode des Moindres Carrés Ordinaire
<b>NIGEM</b>	National Institute Global Econometric Model

<b>NPL</b>	Non Performing Loan ou prêts improductifs
<b>OeNB</b>	Oesterreichische National Bank
<b>ONU</b>	Organisation des Nations Unies
<b>OPEP</b>	Organisation des Pays Exportateurs de Pétrole
<b>PAS</b>	Politique d'Ajustement Structurel
<b>PdDS</b>	Dees, Filippo, di, Pesaran, Smith
<b>PIB</b>	Produit Intérieur Brut
<b>PoD</b>	Probability of Default ou probabilité de défaut des emprunteurs
<b>PSW</b>	H.Pesaran, T. Schuermann, M. Weiner
<b>RE</b>	Random effects
<b>ROA</b>	Return of Actif ou rendement des actifs
<b>ROE</b>	Return of Equity ou rendement des passifs
<b>RSF</b>	Rapport sur la Stabilité Financière
<b>RWA</b>	Risk-Weighted Assets ou actifs pondérés par les risques
<b>SGVAR</b>	Modèle satellite-GVAR
<b>TCER</b>	Taux de change effectif réel
<b>UE</b>	Union Européenne
<b>UEMOA</b>	Union Economique et Monétaire Ouest Africaine
<b>USD</b>	United States Dollar
<b>VaR</b>	Valeur à risque
<b>VAR</b>	Vector Autoregressive
<b>VECM</b>	Vector Error Correction Model

## INTRODUCTION

Cette étude a pour objet d'effectuer un stress test macroéconomique du risque de crédit auprès des banques individuelles qui composent le secteur bancaire de Madagascar. Plus précisément, l'étude englobe 6 banques sur 11 du secteur qui représentent 95% de l'actif du secteur bancaire en 2015. La stabilité financière de ces banques sera par la suite mesurée par les fonds propres qu'elles détiennent après les scénarios macroéconomiques défavorables, notamment le ratio d'adéquation des Capitaux Propres (CAR) qui est le ratio des capitaux propres sur les actifs pondérés par les risques.

Cette étude est une continuité des analyses effectuées avec Rakotonirainy et Rasolomanana publiée en 2020 et tiré des travaux de recherches de Rakotonirainy en 2021. En effet, dans l'évaluation de la stabilité financière d'un secteur financier, le stress test du portefeuille global à l'échelle du système devrait être complété par le calcul des impacts des scénarios de stress test au niveau de chaque banque suivant la disponibilité des micro-données (Foglia (2008), Kapinos et Mitnik (2016)). En réalité, faute de disponibilité de données, la plupart des études, autre que celles effectuées par les autorités de régulation, demeurent au niveau du système bancaire et d'autres essaient de faire une analyse désagrégée en menant une étude sectorielle par catégorie de prêts. Malgré cela, beaucoup de travaux sur la stabilité financière essaient de déployer le stress test à la fois au niveau agrégé du système bancaire qu'à l'échelle des banques. Notre étude se focalise sur 6 banques malgaches individuelles notées de A à F.

L'organisation de l'étude se fera comme suit : d'abord, une revue de littérature sur le stress test du risque de crédit au niveau individuel des banques sera présentée (section 1). Ensuite, la section suivante se focalisera sur l'étude empirique des banques de Madagascar en utilisant un modèle de panel dynamique comme modèle satellite qui relie les facteurs macroéconomiques et financières avec les indicateurs de risque de crédit de chaque banque. Les scénarios macroéconomiques utilisés pour les banques ont été générés à partir du modèle GVAR (section 2). Enfin, la dernière section présentera les résultats sur la situation des risques de crédits et les projections des capitaux propres sous les scénarios défavorables. Une discussion sur les

résultats de chaque banque sera également mise en évidence dans cette dernière section du chapitre (section 3).

## Section 1. REVUE DE LITTERATURE SUR LE STRESS TEST DES BANQUES INDIVIDUELLES ET LA CAPITALISATION DES BANQUES

La littérature sur les stress test du risque de crédit au niveau des banques individuelles diverge en termes de déterminants. D'une part, les exercices de stress test par rapport aux évolutions au sein de la macroéconomie, qui mettent en relation les fondamentaux macroéconomiques et l'indicateur de risque de crédit (Kosmidou et Moutsianas (2015), Onder, *et al.*, (2016)). D'autre part, les travaux de stress test qui soutiennent que le risque de crédit du secteur bancaire est également influencé par les indicateurs spécifiques de chaque banque (Koju, *et al.*, (2018), Kiemo, *et al.*, (2019)). Ces derniers considèrent alors dans leurs analyses les facteurs macroéconomiques avec les variables spécifiques des banques. En effet, les déterminants des prêts improductifs ne doivent pas être recherchés exclusivement parmi les variables macroéconomiques, qui sont exogènes à l'industrie bancaire. Les particularités du secteur bancaire et les choix politiques de chaque banque, notamment en ce qui concerne leurs efforts pour améliorer l'efficacité et la gestion des risques, sont susceptibles d'influencer l'évolution des prêts non performants (NPL).

L'approche du stress test individuel se distingue du stress test macroéconomique du secteur bancaire agrégé dans la mesure où les impacts des scénarios macroéconomiques sur chaque banque sont observables ; ce qui complète le résultat global au niveau du secteur. De plus, le modèle auxiliaire de risque de crédit pour un stress test individuel est différent du modèle adopté par le stress test agrégé. Le modèle de panel est le plus utilisé pour le modèle satellite du stress test individuel (Kapinos et Mitnik (2016), Dua et Kapur (2017) Wu, *et al.*, (2018)).

Ainsi, avant d'entamer la revue des travaux sur le risque de crédit et la capitalisation des banques, il est nécessaire de présenter tout d'abord les exigences de Bâle en matière de fonds propres de base ainsi que différentes mesures du ratio d'adéquation de capitaux propres des banques par rapport aux normes réglementaires (I). Ensuite, le deuxième paragraphe relate la littérature sur le stress test du risque de crédit de banques vis-à-vis des déterminantes macroéconomiques uniquement (II). Le troisième paragraphe expose les travaux qui tiennent compte des variables bancaires dans leurs processus de stress test (III). Puisque les risques de crédits seront traduits au niveau des bilans de chaque banque pour mesurer leur solvabilité, le dernier paragraphe met en évidence les théories sur la capitalisation des banques sous les scénarios de stress test (IV).

## I. Prévision de pertes et exigence de fonds propres des banques sous les accords de Bâle

Depuis l'adoption des accords de Bâle I en 1989, puis des accords de Bâle II en 2004 et, plus récemment, des accords de Bâle III en 2010, la définition des capitaux propres réglementaires des banques a considérablement évolué afin d'améliorer la stabilité du système bancaire et de combler l'écart d'harmonisation qui avait causé les crises financières précédentes.

Sur la base des enseignements tirés de la dernière crise financière, la réglementation en matière d'adéquation des fonds propres des banques a été révisée dans Bâle III, pour être complètement mise en œuvre au plus tard pour l'année 2019. En conséquence, le Comité de Bâle, reconnaissant les insuffisances du cadre réglementaire dans le secteur bancaire, a publié Bâle III en 2011. Bâle III visait à renforcer la stabilité du système financier par des mesures micro-prudentielles pour le renforcement des banques en temps de crise et des mesures macro-prudentielles pour la protection du système bancaire contre le risque systémique. L'application des dispositions de Bâle III est prévue pour 2013-2019 et est très complexe. Elle relève les exigences en matière de fonds propres des banques et introduit de nouvelles réglementations en matière de liquidité et d'effet de levier bancaire. Dans l'hypothèse d'un strict respect de la nouvelle réglementation, le secteur bancaire international deviendra plus stable et les banques internationales se verront offrir de nouvelles opportunités (Hadjixenophontos et Christodoulou-Volos, 2018).

### 1. Le ratio de capitaux propres réglementaires fondés sur le risque sous Bâle III

Bâle III est la troisième et dernière avancée des Accords de Bâle, approuvés en 2010 (BIS, 2017). Il s'agit d'une norme réglementaire mondiale établie par le CBSB sur l'adéquation des fonds propres y compris un nouveau ratio d'endettement et des niveaux minimum de capital, le risque de liquidité du marché avec de nouveaux ratios de liquidité à court et long terme et les simulations de crise axées sur la stabilité. L'objectif principal de ces réformes est de renforcer les exigences en matière d'adéquation des fonds propres en ce qui concerne la qualité et la quantité des fonds propres que les banques doivent détenir pour absorber les pertes. Les accords de Bâle III soulignent également la nécessité d'améliorer la qualité et la quantité des composantes du capital, le ratio de levier, les normes de liquidité et une meilleure information (BCBS, 2010).

Le cadre de Bâle III est un élément central de la réponse du Comité de Bâle à la crise financière mondiale. Il comble un certain nombre de lacunes du cadre réglementaire d'avant la crise et jette les bases d'un système



bancaire résilient qui permettra d'éviter l'accumulation de vulnérabilités systémiques. Le cadre permettra au système bancaire de soutenir l'économie réelle tout au long du cycle économique (BIS, CBSB 2017).

Les réformes de Bâle III du Comité complètent la phase initiale des réformes de Bâle III annoncées en 2010. Les réformes de 2017 visent à rétablir la crédibilité du calcul des actifs pondérés en fonction des risques et à améliorer la comparabilité des ratios de fonds propres des banques. Les actifs pondérés en fonction du risque sont une estimation du risque qui détermine le niveau minimal de capital réglementaire qu'une banque doit maintenir pour faire face à des pertes imprévues. Un calcul prudent et crédible des actifs pondérés en fonction des risques fait partie intégrante du cadre de fonds propres fondé sur le risque (BIS, CBSB 2017).

Alors que la première phase de Bâle III s'est largement concentrée sur le calcul du ratio de fonds propres (le numérateur), les réformes de 2017 se sont concentrées sur le calcul des actifs pondérés en fonction des risques (le dénominateur).

$$\text{Ratio de capital fondé sur le risque (1)} = \frac{\text{Capital réglementaire (2)}}{\text{Actifs pondérés par les risques (3)}}$$

Les définitions du ratio de capital (1), du capital réglementaire (2) ainsi que des actifs pondérés par les risques (3) sont présentées ci-après.

#### (1) Le ratio du capital

Le ratio du capital correspond au montant du capital réglementaire divisé par le montant de l'actif pondéré en fonction des risques. Plus le montant de l'actif pondéré en fonction des risques est élevé, plus le capital requis est élevé, et vice versa.

#### (2) Le capital réglementaire

Les banques financent leurs investissements avec du capital et des dettes, comme les dépôts des clients. Le capital peut absorber les pertes d'une manière qui réduit la probabilité qu'une banque fasse faillite et l'impact si elle fait faillite. Le capital réglementaire se compose de :

- Capitaux propres ordinaires de catégorie 1 (*Common Equity Tier 1, CET1*) - actions ordinaires, bénéfiques non répartis et autres réserves.
- Autres instruments de capital de catégorie 1 (*Additional Tier 1*) - des instruments de capital à échéance indéterminée.

- Capitaux propres ordinaires de Catégorie 2 (Tier 2) - dette subordonnée et réserves générales pour pertes sur prêts.

Les banques disposant d'un capital réglementaire plus important sont en mesure de financer plus facilement la croissance des prêts.

### (3) Les actifs pondérés en fonction des risques (*Risk-weighted assets-RWAs*)

L'actif d'une banque comprend habituellement l'encaisse, les titres et les prêts consentis à des particuliers, à des entreprises, à d'autres banques et à des gouvernements. Chaque type d'actif présente des caractéristiques de risque différentes. Une pondération de risque est attribuée à chaque type d'actif, afin d'indiquer à quel point il est risqué pour la banque de détenir l'actif.

Pour déterminer le montant des fonds propres que les banques doivent conserver pour se prémunir contre les pertes imprévues, la valeur de l'actif (c'est-à-dire l'exposition) est multipliée par la pondération de risque correspondante. Les banques ont besoin de moins de capital pour couvrir leurs expositions à des actifs plus sûrs et de plus de capital pour couvrir des expositions plus risquées.

## 2. Evaluation de la résilience des banques

L'évaluation de la résilience des banques face au scénario de tension est fondée sur quatre ratios et seuils de fonds propres différents (BIS, BCBS 2017). Les quatre ratios et les seuils correspondants utilisés pour calculer les déficits de fonds propres des banques dans le cadre du test de résistance sont détaillés ci-dessous (Pierret et Steffe, 2018):

- Ratio de Capitaux propres ordinaires de première catégorie (*Common Equity Tier 1 Capital ratio*) : cette première méthode utilise un ratio des fonds propres ordinaires de première catégorie (CET 1) et un seuil de 4,5 % comme point de référence pour calculer les manques à gagner. Le ratio est défini comme étant le ratio des fonds propres attribuables aux actionnaires ordinaires de catégorie 1 sur les actifs pondérés en fonction des risques.
- Ratio du capital de première catégorie (*Tier 1 Capital ratio*) : le deuxième ratio de capital est le ratio du capital de première catégorie (Tier 1) et un ratio du capital de référence de 6 %. Le ratio du capital de première catégorie est défini comme le ratio du capital de première catégorie sur l'actif pondéré en fonction des risques.

- Ratio du capital total (*Total Capital ratio*) : le troisième ratio de capital est le ratio du capital total et un indice de référence de 8 %. Ce ratio est défini comme étant le rapport entre le capital total et l'actif pondéré en fonction des risques.
- Ratio de levier financier de niveau 1 (*Tier 1 Leverage ratio*) : le quatrième ratio de capital est le ratio de levier financier de première catégorie (*Leverage*) et un indice de référence de 4 %. Ce ratio est défini comme le ratio du capital de première catégorie par rapport à l'exposition totale au ratio de levier financier.

## II. Les facteurs macroéconomiques du risque de crédit des banques individuelles

Dans les travaux qui examinent la relation entre l'environnement macroéconomique et la qualité des prêts, il a été émis l'hypothèse qu'en phase d'expansion de l'économie, les prêts improductifs sont relativement peu élevés, tant les consommateurs que les entreprises font face à un flux suffisant de revenus et ces revenus au service de leurs dettes. Cependant, à mesure que la période de croissance se poursuit, le crédit est accordé aux débiteurs de qualité inférieure et, par la suite, lorsque la récession s'installe, les prêts improductifs augmentent (Borio et Drehmann, 2009).

Les études examinées ci-après utilisent différents niveaux d'agrégation pour la variable de risque de crédit.

Vazquez, *et al.*, (2012) dans le cadre de leur études sur le stress test macroéconomique du risque de crédit du secteur bancaire brésilien, a effectué un stress test auprès de 78 banques sur les trimestres de 2001Q1 à 2009Q1. À part les données macroéconomiques, les données sur les portefeuilles de crédits bancaires utilisées pour chacune des banques sont constituées par : le total des prêts, le ratio des prêts non performants, le volume des opérations de prêt, le volume des opérations de prêt en défaillance, et la perte sur les provisions des prêts. Le modèle de panel dynamique est employé pour déterminer la sensibilité du ratio des prêts non performants aux conditions macroéconomiques. Les variables macroéconomiques utilisées sont constituées par la croissance du PIB, le taux de chômage, les taux d'intérêt à court terme et à long terme, le taux de change en termes réel et nominal. Les scénarios macroéconomiques ont été générés à partir du modèle VAR. Après l'analyse de la sensibilité du ratio NPL face aux conditions macroéconomiques, l'impact des différents scénarios de stress test sur le ratio NPL est testé sous trois scénarios adverses. Le scénario de base est constitué par le résultat de simulation avec le modèle VAR sans choquer le système ; les trois scénarios adverses utilisent le résultat du modèle VAR pour simuler (1) l'effet d'une augmentation de 11,6 points de pourcentage dans la pente de la courbe de rendement en 2009 Q2, équivalent à la moyenne de la courbe de la période étudiée plus deux écart-types ; (2) les effets d'un choc négatif sur la croissance du crédit de 2,4 points de pourcentage en 2009Q2, équivalent à la moyenne de la croissance du crédit moins deux écart-types et (3) les effets d'un choc négatif sur la croissance du PIB égale à 1,9 point de pourcentage en 2009Q2, le choc équivaut à la moyenne de la croissance du PIB moins deux écart-types. Les résultats de l'estimation des données de panel montrent l'existence d'une relation inverse robuste entre la croissance du PIB et les prêts improductifs. Les résultats indiquent également les différences dans la persistance de NPL selon les types de crédit, et dans leur sensibilité à l'activité économique. Pour le scénario de base, les prêts improductifs culminent à 6,7% au quatrième trimestre de 2010, avant de récupérer. Les prêts improductifs

projetés sous les scénarios en difficulté sont plus élevés que pour le scénario de base mais suivent une dynamique qualitativement similaire. Sous le scénario 3, le plus sévère relatif à la détérioration de la qualité du crédit, le ratio des NPL atteint un maximum de 8,5%, ce qui est élevé à environ deux fois du ratio maximum observé pendant l'échantillon période. Parmi les types de crédit, les niveaux les plus élevés de prêts improductifs sont associés au crédit aux consommateurs. Ainsi, la qualité du prêt en Brésil semble-t-elle plus sensible à la croissance du PIB des petites entreprises, prêts à la consommation, crédit à l'agriculture, sucre et alcool, bétail, et textiles. De plus, crédit pour acquisition de véhicule et les équipements électriques et électroniques affichent un haut niveau de NPL dans des scénarios macroéconomiques en difficulté. Les banques avec des expositions relativement élevées à ces secteurs sont susceptibles de connaître des pertes de crédit plus importantes en période de ralentissement macroéconomique.

Kosmidou et Moutsianas (2015) ont effectué un stress test de risque de crédit sur les banques grecques qui a pour objectif d'identifier les effets de l'environnement macroéconomique sur le bon fonctionnement du système bancaire grec et, plus précisément, dans quelle mesure la détérioration de la situation économique affecte le risque de crédit des banques grecques. Puis, l'étude a développé un cadre de tests de résistance macroéconomique pour évaluer la stabilité du système bancaire grec et le risque de crédit des banques grecques dans le contexte d'une dégradation hypothétique de l'environnement macroéconomique. La relation entre les variables macroéconomiques et la qualité des actifs a été déterminée sur quatre banques grecques représentant 89.69% de l'ensemble des actifs de leur système financier. L'étude couvre la période allant du premier trimestre 2001 jusqu'au dernier trimestre 2013. Les données sont composées des variables financières des établissements bancaires et des données relatives aux variables macroéconomiques qui sont les suivantes : croissance annuelle du produit intérieur brut, inflation exprimée par l'indice des prix à la consommation, indice de la production industrielle, taux de chômage et indicateur du climat économique. L'indicateur de risque de crédit est la provision sur les pertes de prêts (LLP) et pour l'estimation, l'estimateur des méthodes des moments généralisés (GMM) du modèle de panel est utilisé par ces auteurs. Les résultats confirment que les conditions macroéconomiques affectent la qualité des prêts et donc le risque de crédit des établissements bancaires. Le taux de croissance annuel du PIB en pourcentage est corrélé négativement, comme prévu, et il est statistiquement important, comme le montrent d'autres études. Ce qui implique que lorsque les conditions macroéconomiques deviennent défavorables, la qualité des prêts des banques grecques se détériore. Cette situation est liée au fait que lorsqu'une économie est en récession, la capacité des entreprises et des ménages à rembourser leurs obligations est réduite. Dans la mise en œuvre du

stress test, deux types de scénarios ont été développés. Le scénario de base comprend les valeurs des variables macroéconomiques en fonction des projections et le scénario défavorable comprend les valeurs négatives historiques pour la période allant du premier trimestre 2001 au quatrième trimestre 2013 qui sont tous fondés sur les coefficients des variables macroéconomiques obtenus à partir de l'analyse de données de panel. Les résultats des tests de résistance montrent que le risque de crédit auquel le système bancaire grec est exposé, exprimé en provisions sur les pertes de prêts, augmente de 9,32%. Bien que les tests de résistance constituent un outil de gestion des risques prospectif et que les scénarios historiques incluent des situations économiques antérieures, les résultats fournissent des informations utiles pour le système bancaire grec et les quatre banques à système. L'augmentation à 9,32% de la provision pour pertes sur prêts liée à la détérioration probable de l'environnement macroéconomique suggère que le risque de crédit auquel sont exposées les banques est assez élevé.

Les études qui ont traduit les pertes sur le risque de crédit sur la capitalisation des banques sont présentées ci-après :

Vu, *et al.* (2018) ont évalué la capacité des banques commerciales vietnamiennes à résister aux effets d'une augmentation de risque de crédit résultant de chocs macroéconomiques. L'étude couvre la période de 2008 à 2015 sur 10 banques commerciales représentant 74.09% des actifs du secteur bancaire. Le modèle VAR est utilisé pour estimer la relation entre les variables macroéconomiques (PIB réel, taux de change réel, taux d'intérêt et taux d'inflation), et générer à partir de là les scénarios macroéconomiques sur un horizon de douze trimestres à partir de 2015q4. Ensuite, les auteurs ont employé un modèle GMM comme « modèle satellite » de risque de crédit pour estimer la relation entre le ratio de prêts non productifs de chaque banque et variables macroéconomiques impliquées dans la première étape. Le résultat de la régression montre la relation positive entre le ratio de prêts non productifs et l'inflation et le taux d'intérêt ; la corrélation négative entre ce ratio avec le PIB réel et le taux de change réel ; et le coefficient de la variable d'inflation non significatif. Enfin, le ratio de solvabilité de chaque banque est recalculé, en fonction de l'augmentation de la provision pour prêts et des prêts non performants par rapport aux différents scénarios. A part, les scénarios macroéconomiques défavorables, une hypothèse d'augmentation des actifs pondérés par les risques a été considérée, dans le but d'évaluer les effets simultanés sur le ratio d'adéquation des capitaux propres des banques vietnamiennes. Les résultats montrent que le risque de crédit auquel les banques commerciales sont confrontées est relativement faible lorsque leurs actifs pondérés par les risques sont inchangés. Seule une banque sur dix possède un ratio de solvabilité inférieur à 9% sous les scénarios de chocs macroéconomiques moyens et sévères. Cependant, sous l'hypothèse d'augmentation des actifs

pondérés par les risques dans tous les scénarios, à mesure que les banques élargissent leurs prêts, les ratios de solvabilité de toutes les banques ont connu une réduction considérable et quatre grandes banques manqueront sérieusement de capital et ne peut pas répondre à l'exigence de la banque centrale vietnamienne.

Busch, *et al.*, (2015) ont développé un test de stress test macroéconomique de portefeuille qui s'adresse spécifiquement aux petites et moyennes banques. Ils ont combiné le stress test du risque de crédit qui simule les dépréciations de crédit via un modèle de portefeuille multifactoriel de type CreditMetrics avec un stress test du revenu sous la forme de régressions de données de panel dynamiques. Sur la base d'un scénario de stress qui prolonge l'expérience de la crise financière en intégrant l'environnement actuel de faibles taux d'intérêt, les impacts du stress test sur les ratios de fonds propres des banques sont analysés. Les résultats montrent que les banques coopératives et les caisses d'épargne se révèlent solides face à nos défis de scénario macroéconomiques de stress test. Cela s'explique principalement par la solidité de leurs fonds propres et par les dépréciations de crédit relativement faibles pour les banques coopératives. La résistance des banques de crédit est plus hétérogène. Une part importante de 6 % est inférieure au capital minimum de 8 %. L'impact du stress test sur les dépréciations de crédit est plus prononcé dans les cas des caisses d'épargne, suivies des banques de crédit et des banques coopératives. La distribution de la perte de valeur montre que la plus grande partie se situe principalement dans les secteurs des ménages privés, de l'industrie, de l'artisanat et de l'agriculture, les biens et services, suivis par les PME du commerce de détail. La faible incidence sur les ratios de capital des banques coopératives s'explique par leurs expositions plus élevées et leurs plus faibles probabilités d'insolvabilité (DP) dans le secteur privé relativement sûr des ménages par rapport aux deux autres groupes bancaires. Les principaux facteurs de risque pour l'ensemble des groupes bancaires sont les dépréciations d'actifs, avec une proportion de l'effet de risque global variant entre 79% (banques coopératives et banques de crédit) et 83% (caisses d'épargne) par rapport aux autres composantes du résultat net.

Kapinos et Mitnik (2016) ont évalué l'impact des chocs sur les variables macroéconomiques sur la capitalisation des banques américaines à travers un test de résistance utilisant l'approche de stress test *top down*. L'analyse s'est limitée aux institutions dont l'actif est supérieur ou égal à 10 milliards de dollars depuis au moins un trimestre au cours de la période allant du premier trimestre au troisième trimestre 2013, car ces banques sont les seules qui fassent l'objet des exigences des tests de résistance. L'échantillon est ainsi composé d'un panel de 156 banques qui représentent presque 80% du total des actifs du système

bancaire américain. Les scénarios CCAR<sup>1</sup> de 2013 et 2014 sont des résultats macroéconomiques hypothétiques fournis par la Réserve fédérale. Le modèle produit des prévisions conditionnelles pour deux indicateurs clés du compte de résultat : le produit net avant provisionnement et les charges nettes, et leurs réponses aux changements de l'environnement macroéconomique. Les prévisions sont utilisées pour modéliser la provision pour pertes sur prêts et obtenir des projections du bénéfice net avant impôts de chaque banque. Les trajectoires de contrainte pour les mesures de capitalisation sous des hypothèses alternatives sont créées à partir de ces projections. Les résultats des estimations suggèrent que si la capitalisation du secteur bancaire américain s'est améliorée ces dernières années, dans des hypothèses raisonnables quant à la croissance des actifs et des prêts, ces scénarios peuvent impliquer une détérioration considérable de la position de capital des banques.

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Comprehensive Capital Analysis and Review ou CCAR est un cadre réglementaire américain mis en place par la Réserve fédérale pour évaluer, réglementer et superviser les grandes banques et institutions financières.



### III. Effets des déterminants spécifiques à chaque banque sur le risque de crédit

Outre les déterminants macroéconomiques du risque de crédit, un autre volet de la littérature insiste sur l'effet des caractéristiques spécifiques des banques sur les problèmes de prêts. La littérature présentée ci-après considère deux types distincts de déterminants du risque de crédit, à savoir les déterminants macroéconomiques ou systématique et les déterminants spécifiques à la banque connus sous le nom de facteurs idiosyncratiques. Les variables macroéconomiques et les variables spécifiques à la banque peuvent avoir un impact différent sur chaque type de prêts improductifs (Kolecek, 2008).

Le choix des variables spécifiques à la banque repose sur des hypothèses qui vont être développées dans les paragraphes ci-après. En étudiant l'existence d'un lien de causalité entre la qualité des prêts, la rentabilité et le capital bancaire, les travaux de Berger et DeYoung (1997) formulent des mécanismes possibles entre efficacité et adéquation des fonds propres, à savoir «mauvaise gestion», «sabotage» et «aléa moral». Ces hypothèses sont testées pour un échantillon de banques commerciales américaines couvrant la période de 1985 à 1994 et concluent que, généralement, les diminutions de la rentabilité conduisent à une augmentation de problème de prêts dans le futur. Les hypothèses concernant les déterminants spécifiques à la banque sont approfondies par la suite par plusieurs travaux plus tard, notamment celui de Louzis, *et al.*, (2012).

#### 1. Les hypothèses relatives à la relation entre les variables bancaires et l'indicateur de risque de crédit

Les hypothèses sur l'existence d'un lien de causalité entre la qualité des prêts, la rentabilité et le capital bancaire formulées par Berger et DeYoung (1997) sont les suivantes :

L'hypothèse de «mauvaise gestion». Le faible rapport coût-efficacité est positivement associé à des augmentations des NPL futurs. La justification proposée établit un lien entre une «mauvaise» gestion et de faibles compétences en matière de *credit scoring*, d'évaluation des garanties mises en gage et de suivi des emprunteurs.

L'hypothèse de «sabotage». Une mesure élevée de l'efficacité cause une augmentation des prêts improductifs. Selon ce point de vue, il existe un échange entre l'allocation de ressources pour la souscription et le suivi des prêts d'une part et mesure de la rentabilité d'autre part. En d'autres termes, les banques qui consacrent moins d'efforts à une qualité de prêt plus élevée seront plus rentables, cependant, il y aura une augmentation des NPL à long terme.

L'hypothèse de « l'aléa moral ». La faible capitalisation des banques conduit à une augmentation des prêts improductifs. La justification réside dans les incitations de risque moral de la part des dirigeants des banques, qui augmentent le risque de leur portefeuille de prêts lorsque leurs banques sont peu capitalisées.

Berger et DeYoung (1997) ont montré à l'issue de leur analyse l'évidence de l'hypothèse de «mauvaise gestion», impliquant un lien de causalité négative entre la rentabilité et les prêts improductifs et de l'hypothèse de l'aléa moral. Podpiera et Weill (2008) ont poursuivi dans cette voie de recherche et ont examiné le rapport entre l'efficacité et les créances irrécouvrables dans le secteur bancaire tchèque de 1994 à 2005. Ils fournissent également des preuves empiriques en faveur d'une relation négative entre la diminution de la rentabilité et les prêts non performants futurs. D'autres travaux se concentrent uniquement sur les déterminants spécifiques aux banques.

Ces hypothèses relatives aux relations entre les variables bancaires et les prêts improductifs formulées ci-dessus sont ensuite approfondies et étendues à d'autres hypothèses par Louzis, *et al.* (2012) suivant l'évolution de littérature sur les relations entre les variables spécifiques de la banque et le risque de crédit, telles que l'hypothèse de « diversification » et l'hypothèse de « trop grande pour faire faillite».

L'hypothèse de « diversification ». La taille de la banque et la proportion des revenus hors intérêts en proportion du revenu total sont négativement liés aux prêts non performants. En effet, les opportunités de diversification des banques peuvent également être liées à la qualité du prêt. Nous nous attendons à une relation négative entre la diversification et les créances improductives, car la diversification réduit le risque de crédit. Certains auteurs utilisent taille de la banque en tant que proxy des opportunités de diversification. Dans cette ligne de recherche, Salas et Saurina (2002) découvrent une relation négative entre taille de la banque et NPL et soutiennent que la taille plus grande permet plus opportunités de diversification. Malgré la diversification, les opportunités peuvent également être représentées par proxy en utilisant le revenu hors intérêts en pourcentage du revenu total, au motif que ce ratio reflète la dépendance des banques à d'autres types de revenus, à l'exception des prêts; et donc sur des sources de revenus diversifiées.

L'hypothèse de « trop grande pour faire faillite ». Les grandes banques prennent des risques excessifs en augmentant leur influence sur la présomption d'être grand pour échouer et possède donc plus de prêts improductifs. Un effet positif de l'effet de levier sur les prêts non productifs est attendu, en fonction de la taille. En effet, une préoccupation réside dans le fait que les banques d'une taille élevée puissent recourir à des prises de risque puisque la discipline de marché n'est pas imposée par ses créanciers qui s'attendent à la protection du gouvernement en cas de faillite d'une banque (Stern et Feldman, 2004). Par conséquent, les

grandes banques peuvent augmenter de manière conséquente leur endettement et étendent même l'octroi des prêts aux emprunteurs de qualité moindre.

L'hypothèse de « mauvaise gestion ». A cette hypothèse a été rajouté le lien négatif entre la performance et les augmentations des NPL futurs. Cela peut être justifié d'une manière analogue à l'hypothèse de « mauvaise gestion » formulée par Berger et DeYoung (1997) en considérant les performances passées comme un indicateur de la qualité de la gestion. En effet, la faible performance peut être un indicateur de la moindre qualité des compétences activités de prêt. Ce qui implique une relation négative entre les revenus passés et les problèmes de prêts.

Le sens inverse de cet effet est également possible, et delà découle l'hypothèse de « politique de crédit procyclique » qui suppose que la performance est positivement liée aux augmentations futures de créances improductives, car elle reflète la politique d'octroi de crédit plus libérale de la banque. Rajan (1994) vise à expliquer la corrélation entre les changements dans la politique de crédit et les conditions de la demande. Dans ce modèle, la politique de crédit n'est pas uniquement déterminée par la maximisation des bénéfices des banques, mais également par les préoccupations relatives à la réputation à court terme de la direction des banques rationnelles. Par conséquent, la direction peut tenter de manipuler les bénéfices actuels en recourant à une politique de crédit libérale. De cette manière, une banque peut tenter de convaincre le marché de sa rentabilité en gonflant les bénéfices courants aux dépens des prêts à problème futurs. Une banque peut également utiliser des provisions pour pertes sur prêts afin de renforcer ses bénéfices actuels. En conséquence, les bénéfices passés peuvent être positivement liés aux NPL futurs.

La dispersion de la propriété est également comme un facteur déterminant des prêts improductifs, qui s'est traduit en hypothèse de « contrôle strict » qui suppose que la concentration accrue de propriété tend à promouvoir une prise de risque prudente par un contrôle plus strict de la direction de la banque. Par conséquent, la concentration de propriété est négativement liée aux NPL. Dans une étude fondamentale, Means (1993) affirme que la dispersion de la propriété des fonds propres peut nuire à la performance de l'entreprise, car elle incite les actionnaires à affaiblir la surveillance de la gestion. Selon un point de vue opposé, les marchés de capitaux efficaces imposent de la discipline à la direction de l'entreprise et que, par conséquent, une propriété dispersée ne devrait pas avoir d'effet sur la performance de l'activité de l'entreprise (Fama, 1980). Un volet de la littérature empirique teste ces points de vue opposés en utilisant la qualité de prêt comme indicateur de risque, mais les preuves données sont non concluantes. Par exemple, Iannotta, *et al.*, (2007) trouvent un lien entre des concentrations de propriété plus élevées et la qualité du prêt en utilisant échantillon de 181 grandes banques sur la période 1999-2004, permettant ainsi de soutien à

la vue de Means (1993). D'autre part, Laeven et Levine (2009) utilisent des données sur 279 banques et trouvent une association positive entre des droits de trésorerie plus importants d'un grand propriétaire et de prise de risque. De plus, Shehzad, *et al.*, (2010) présente des preuves empiriques à partir d'un ensemble de données comprenant 500 banques de 2005 à 2007 ; la propriété représentée par trois niveaux d'actionnariat (10%, 20% et 50%) a un impact positif sur le ratio NPL lorsque le niveau de concentration de la propriété est défini à 10% mais a un impact négatif lorsque le niveau de concentration de la propriété est défini à 50%. Par conséquent, ils suggèrent que le partage du contrôle ait des effets défavorables sur la qualité des prêts consentis jusqu'à un certain niveau, mais dans les cas où le contrôle est fort, la direction de la banque devient plus efficace, ce qui entraîne une réduction des prêts improductifs. Enfin, Azofra et Santamaría (2011) constatent que les niveaux élevés de propriété concentration profitent à la fois à la rentabilité de la banque et à l'efficacité pour un échantillon de banques commerciales espagnoles.

## 2. Les travaux sur les risques de crédit et les variables bancaires

Les travaux présentés ci-après ont considéré comme facteurs du risque de crédit les variables spécifiques à la banque à part les déterminants macroéconomiques et ont vérifié en conséquence l'évidence des hypothèses sur les déterminants spécifiques à chaque banque.

Louzis, *et al.* (2012) en étudiant le risque de crédit sur le système bancaire grec, ont examiné les déterminants des ratios des prêts non performants à travers différentes catégories de prêts, plutôt qu'à travers le niveau global des prêts improductifs. En effet, l'approche basée sur les prêts non productifs agrégés peut masquer des canaux importants par lesquels le risque de crédit fluctue. L'importance de cette approche désagrégée a été également vérifiée par Sinkey et Greenawalt (1991) en analysant les déterminants des taux de pertes sur les prêts, selon les différentes catégories de prêts. Par conséquent, le travail a fait une distinction entre les prêts à la consommation, les prêts aux entreprises et les prêts hypothécaires et a étudié séparément leurs déterminants correspondants. Les différences de sensibilité des diverses catégories de prêts non productifs aux évolutions macroéconomiques peuvent être liées à des effets différentiels du cycle économique, en particulier les ralentissements économiques, les flux de trésorerie des agents et la valeur des actifs garantis. En utilisant les méthodes de données de panel dynamique sur 9 grandes banques grecques sur une période trimestrielle de 2001q1 à 2003q3, les résultats trouvés montrent que, pour toutes les catégories de prêts, les prêts non productifs dans le système bancaire grec s'expliquent principalement par les facteurs macroéconomiques notamment le PIB, le taux de chômage, le taux d'intérêt et la dette publique. En outre, les variables propres à la banque comme la performance et l'efficacité possèdent des caractéristiques

explicatives supplémentaires lorsqu'elles sont ajoutées au modèle de référence. Ceci appuie l'hypothèse de « mauvaise gestion » qui relie ces indicateurs de risque de crédit aux indicateurs de l'efficacité et de qualité de gestion. De plus, des preuves de l'existence d'un effet « trop grand pour faire faillite » sont constatées pour les prêts hypothécaires et les prêts aux entreprises jusqu'à un certain niveau de taille. Enfin, les différences dans l'impact quantitatif des facteurs macroéconomiques entre les catégories de prêts sont évidentes, les prêts hypothécaires non productifs étant les moins sensibles aux changements des conditions macroéconomiques.

Vuković (2014) a effectué un stress test du risque de crédit pour le secteur bancaire de Monténégro afin de déterminer à quel point le système est résistant à des scénarios de stress test sévères. L'analyse sur les données agrégées du secteur bancaire est complétée par un stress test basé sur les données spécifiques pour les banques monténégrines. Les relations entre les variables des données micro des banques et le LLP permettent d'expliquer les éventuelles pertes des banques. L'étude a déterminé les variables macroéconomiques qui influent le plus le ratio des provisions des pertes de prêt (*Loan Loss Provision ou LLP*). La résilience du système bancaire face au scénario macroéconomique est mesurée par le ratio de fonds propres. Pour le stress test du secteur bancaire agrégé, le scénario défavorable a été construit à partir de l'estimation des variables macroéconomiques à partir d'un modèle VAR ; les agrégats macroéconomiques utilisés sont le taux de croissance du PIB, le taux de chômage et le taux d'intérêt à court terme, le taux de croissance de l'exportation, la consommation intérieure, l'indice boursier et les taux d'intérêt à long terme. Le modèle satellite est constitué par la variable dépendante LLP et les résultats issus de l'estimation du modèle VAR. Le calcul du ratio de capital après la situation défavorable est effectué par les étapes suivantes : d'abord la différence dans le ratio LLP avant et après le stress test, par hypothèse, transformée en perte en capital par pertes sur prêts. Ensuite, les actifs pondérés en capital et en risque sont également, en raison des contraintes de données, conservés. Ainsi, la différence au niveau de LLP se transforme en perte en capital et le capital dans le scénario de base est diminué de ce montant. Puis, le ratio d'adéquation de capitaux propres sous contrainte est calculé. Pour le stress test à l'échelle des banques individuelles, le modèle panel VAR estimé à partir de la méthode GMM a été utilisé et les réponses du LLP face aux différents chocs sont déterminées par des analyses de fonction de réponses impulsionnelle. Les variables spécifiques à chaque banque utilisées comprennent le rendement des actifs, le rendement des capitaux propres, le ratio de solvabilité, le ratio des prêts sur dépôt, le taux de croissance du crédit, le pouvoir du marché et la taille de la banque. Les données utilisées dans le modèle de panel VAR sont constituées par les séries trimestrielles des données macroéconomiques sus mentionnées les données

bancaires des 10 banques entre 2007q1 et 2012q4. Pour le scénario de stress test, à part l'influence de la situation macroéconomique sur la qualité des prêts, les chocs au niveau des variables bancaires ont été analysés. Pour cela, deux hypothèses principales ont été testées: l'hypothèse « la mauvaise gestion » et l'hypothèse de «risque moral». L'hypothèse de mauvaise gestion bancaire a été testée à travers deux variables: le rendement des actifs et le rendement des capitaux propres. Cette hypothèse a été confirmée avec la deuxième variable indiquant que le faible rendement des capitaux propres stimule une augmentation du ratio de provision des pertes sur prêts. Cela implique le fait que l'on essaie de couvrir la mauvaise gestion dans les banques en approuvant des prêts plus risqués et, par conséquent, en augmentant le ratio LLP. De cette façon, la mauvaise position de la banque en ce qui concerne le rendement des fonds propres tente d'être améliorée par une activité de crédit plus élevée. En raison du motif de cette activité de crédit, les prêts ne sont pas révisés avec prudence et davantage de prêts non productifs sont présents augmentant en conséquence les provisions pour pertes sur prêts. La réponse de LLP au choc de rapport des prêts sur dépôt confirme l'hypothèse d'aléa moral. Par l'augmentation du ratio des prêts sur dépôt, le ratio LLP a également augmenté indiquant que les prêts qui ne sont pas sauvegardés avec des dépôts sont aussi les plus risqués car ils indiquent l'augmentation de LLP. La principale conclusion est que les pratiques de provisionnement pour pertes sur prêts ne sont pas prospectifs mais précisément le contraire ; c'est-à-dire quand la situation concernant l'activité de profit ou de crédit est mauvaise, on essaie de l'améliorer en augmentant le niveau des prêts, même si cette augmentation implique des prêts plus risqués de la part de la banque.

Koju, *et al.* (2018) ont évalué l'impact de la dynamique des variables macroéconomiques et des déterminants bancaires spécifiques sur les prêts non productifs (NPL) au Népal en utilisant à la fois des approches d'estimation statique et dynamique de panel. L'étude prend en compte 30 banques commerciales népalaises et couvre la période entre 2003 et 2015. Ils utilisent 7 variables bancaires spécifiques à savoir l'écart du taux d'intérêt, la taille, l'inefficience mesurée par le ratio des produits et les charges d'exploitations, le rendement des actifs, le ratio d'adéquation des capitaux propres, les prêts sur dépôt et les prêts sur l'actifs ; et 5 variables macroéconomiques qui sont le PIB, la dette, l'inflation, le revenu et le commerce extérieur, pour évaluer l'impact de la gestion bancaire et des indicateurs économiques sur les NPL. Les résultats montrent que les NPL ont une relation positive significative avec le ratio des exportations sur les importations, l'inefficacité et la taille des actifs, et une relation négative avec le taux de croissance du PIB, l'adéquation du capital et la capacité de financement et le taux d'inflation. En effet, les créances douteuses sont affectées non seulement par la politique monétaire et la croissance économique, mais aussi par la gestion du secteur bancaire, ce qui est évident à partir des hypothèses de « mauvaise

gestion », « d'aléa moral » et de « trop gros pour échouer » soutenues par les résultats. Les résultats indiquent également que la faible croissance économique est la principale cause des NPL élevés au Népal et suggèrent qu'une gestion efficace et des politiques financières efficaces sont nécessaires pour assurer la stabilité du système financier et de l'économie.

#### IV. La capitalisation des banques sous les scénarios de stress test

##### 1. Conditions macroéconomiques et structures du capital

###### 1.1. Caractère cyclique des capitaux propres

Les conditions macroéconomiques ont un impact non seulement sur le risque de crédit mais également sur la structure du capital des banques. La relation entre le cycle économique et l'adéquation des fonds propres des banques opérant dans de nombreux pays différents a été étudiée par de nombreux chercheurs. Les résultats de ces études ont non seulement contribué à la littérature, mais ont également mis en évidence les pouvoirs publics lorsqu'il s'agit de décider des politiques économiques et financières opérationnelles et réglementaires.

Les accords de Bâle II ont fourni un cadre bien défini pour aligner pleinement les risques du portefeuille et les exigences de fonds propres. La procyclicité des exigences de fonds propres a gagné en importance, en référence à sa contribution au cycle économique, ce qui signifie que les exigences de fonds propres diminuent lorsque l'économie est en expansion et augmentent pendant la récession (Kashyap et Stein (2004) ; Gordy et Howells (2006) ; Panetta, *et al.*, (2009) ; Repullo et Suarez (2012)).

L'analyse empirique de la relation entre les variables conjoncturelles telles que le taux de croissance du PIB, le taux de croissance du crédit total au secteur privé non financier, et l'adéquation du capital du système bancaire peut être regroupée en deux approches. La première approche analyse les effets de la capitalisation des banques sur le crédit à travers les fluctuations du cycle économique et propose que les banques à faible capitalisation soient forcées de réduire leur offre de prêts pendant une récession, aggravant ainsi la récession (Peek et Rosengren (1995) ; Gambacorta et Mistrulli (2004)).

La deuxième approche se concentre sur les ratios de capital et leur positionnement dans les cycles économiques, et indique que les banques élargissent leurs portefeuilles de prêts en période d'expansion sans augmenter leur capital, et qu'elles ne peuvent donc pas absorber les risques de crédit qui se matérialisent en période de récession sans réduire leurs prêts. La relation négative entre le cycle économique et les ratios de capital des banques a été déterminée par Ayuso, *et al.*, (2004), en examinant les données des banques espagnoles; Lindquist (2004), concernant les banques norvégiennes ; et Stolz et Wedow (2011) sur les banques allemandes.



Miles, *et al.*, (2012) donnent un aperçu des coûts et des avantages à long terme du financement d'une plus grande partie des actifs au moyen de capitaux propres. Le montant de capital souhaitable est inférieur à l'objectif fixé dans le cadre de Bâle III. En ce qui concerne le comportement cyclique des capitaux propres, Ayuso, *et al.* (2004) constatent une relation négative entre le cycle économique espagnol et les tampons de capital détenus par les banques commerciales et d'épargne espagnoles entre 1986 et 2000. Leurs résultats suggèrent qu'une augmentation d'un point de pourcentage de la croissance du PIB pourrait réduire les tampons de capital de 17%. D'autres documents confirment également les avantages de la détention d'un capital plus élevé. Heid (2007) s'interroge sur les raisons pour lesquelles les réserves de fonds propres de Bâle augmentent pendant les crises et constate que la réserve de fonds propres que les banques détiennent en plus du capital minimum requis joue un rôle crucial pour atténuer l'impact de la volatilité des exigences de fonds propres due aux variations du risque. Thakor (2014) montre qu'une augmentation des fonds propres est associée à une augmentation des prêts, de la création de liquidités et de la valeur des banques ainsi qu'à leur probabilité de survie pendant les crises.

En revanche, Tabak, *et al.*, (2011) utilisent un échantillon de banques brésiliennes pour la période 2000-2010 et constatent que le capital excédentaire est négativement lié à la croissance des prêts. Ils soutiennent également que dans la tourmente économique, les banques peuvent réduire leurs prêts afin d'augmenter leur capitalisation.

Košak, *et al.*, (2015) concilient le débat controversé en montrant que les interactions entre le capital des banques et le crédit dépendent de l'état de l'économie. Dans un échantillon de banques internationales, ils constatent que pendant la crise, les grandes banques prêtent davantage si le ratio de capital de première catégorie des banques concurrentes était faible, mais cette tendance s'inverse en temps normal. Gambacorta et Shin (2016) examinent en outre l'effet du capital des banques sur les coûts de financement et la croissance des prêts en utilisant un échantillon de grandes banques internationales sur la période 1994-2007. Cummings et Wright (2016) montrent théoriquement qu'une augmentation du capital entraîne une baisse du coût des capitaux propres et de la dette et peut entraîner une hausse du coût total du financement. Le coût total du financement peut être plus élevé lorsque le ratio de capital augmente et que le coût des capitaux propres est plus élevé que le coût de la dette, ce qui explique l'augmentation du coût du capital.

## 1.2. Structure du capital des banques et les exigences des normes réglementaires

Les organismes de réglementation des banques ont recours à la réglementation sur les fonds propres pour s'assurer que les fonds propres d'une banque sont suffisants pour faire face à son exposition au risque. Mishkin (1999) soutient que les décisions relatives à la structure du capital prises par les autorités de réglementation influent sur les décisions prises par les banques en matière de structure du capital. En général, la structure du capital d'une banque est déterminée par des décisions qui sont prises par les banques elles-mêmes sur la base de la théorie de la structure du capital, et les décisions prises à l'initiative des organismes de réglementation sur la détermination de l'existence des exigences minimales en matière de capital (Besanko et Kanatas, 1996).

Dans le cadre d'une structure de capital volontaire, il est possible que la banque maintienne un niveau de capital plus élevé que les exigences minimales en matière d'adéquation des fonds propres fixés par les autorités réglementaires. Hadjixenophontos et Christodoulou-Volos (2018) fournissent les raisons expliquant pourquoi le ratio de fonds propres d'une banque est maintenu au-dessus du minimum requis. L'une de ces raisons est une stratégie de couverture. Dans des conditions normales, les décisions relatives à la structure du capital sont prises par la direction, mais les propriétaires/actionnaires peuvent exercer un contrôle sur le processus décisionnel ou les politiques d'une société. Les relations d'agence au sein du secteur bancaire sont beaucoup plus complexes, car elles comprennent la relation entre les actionnaires et la direction, la relation entre la banque et ses clients emprunteurs et la relation entre la banque et les autorités réglementaires. Ainsi, outre l'exposition au risque et les exigences de fonds propres supplémentaires correspondantes, d'autres facteurs critiques influent sur le pourcentage d'adéquation des fonds propres.

Les différences dans les préférences en matière de risque entre les propriétaires et les dirigeants peuvent également influencer sur les niveaux de capital. Selon Saunders, *et al.*, (1990), les administrateurs exécutifs peuvent être incités à réduire le risque de défaillance, car ce sont eux qui risquent le plus de perdre en cas de faillite, comme la perte de salaires élevés et autres avantages intéressants. Par conséquent, les dirigeants peuvent chercher à couvrir le risque de défaillance par un faible effet de levier, ce qui permet d'établir une relation positive entre les variations du risque et du capital (Shrieves et Dahl, 1992). En outre, une hausse inattendue des coûts des défauts de paiement peut obliger les banques à augmenter soudainement leur ratio de solvabilité. Berger et Bouwman (2013) rapportent que le niveau optimal de fonds propres pour les banques pourrait dépendre de la compensation entre l'avantage fiscal provenant du financement des dépôts bancaires et l'avantage fiscal découlant de l'accumulation de capital. Étant donné que le coût prévu de la

faillite reflète la probabilité de faillite, les banques peuvent augmenter leur capital lorsque l'actif à risque élevé augmente.

## 2. Importance de la capitalisation et stabilité du secteur bancaire

Le capital bancaire est la partie des fonds de la banque qui est apportée par les propriétaires ou les actionnaires, par opposition aux sources externes de financement qui comprennent les dépôts, le financement interbancaire et les obligations. L'objectif principal est de s'assurer que les banques disposent de ressources internes suffisantes pour résister aux chocs économiques défavorables et pour améliorer les distorsions d'incitation créées par un certain nombre d'imperfections du marché dans le secteur bancaire (Karmakar et Gambacorta, 2018).

Les théories économiques fournissent des prévisions différentes concernant l'impact du capital sur la stabilité des banques. Les travaux de Bitar, *et al.*, (2018) ont mis en relief les différentes hypothèses sur la dynamique entre le capital des banques, la prise de risque et la rentabilité des banques.

### 2.1. Risque bancaire et capital bancaire

Les études empiriques sur le capital et sur le risque bancaire peuvent être groupées en trois catégories. Premièrement, les études empiriques qui soutiennent que les ratios de capital fondés ou non sur le risque plus élevés sont associées à un risque bancaire moins élevé.

Anginer et Demirguc-Kunt (2014) expliquent que les banques visent à avoir des ratios de fonds propres élevés pour résister aux chocs sur les bénéfices et pour s'assurer que capacité d'honorer les retraits de dépôts et autres engagements. Ils expliquent également que des tampons de capital plus élevés font que les propriétaires de banques plus prudents et plus sages dans leurs choix d'investissement.

Ediz, *et al.*, (1998) examinent plus en détail la relation entre la réglementation et la stabilité bancaire. L'étude d'un échantillon de banques commerciales britanniques montre qu'une exigence de capital minimum est en corrélation positive avec la sécurité et la solidité des banques et ne fausse pas leurs activités de prêt. De plus, Berger et Bouwman (2013) constatent que le capital a un impact positif sur la probabilité de survie des petites banques. Enfin, Tan et Floros (2013) et Anginer et Demirguc-Kunt (2014) Anginer et Demirguc-Kunt (2014) constatent une relation négative significative entre plusieurs mesures du capital et du risque bancaire. Ainsi, une gestion plus prudente peut jouer un rôle clé dans l'harmonisation des intérêts des actionnaires et des déposants, et suggérant ainsi une association négative entre le capital et le risque.

Deuxièmement, selon une autre série de théories, les ratios de capital fondés ou non sur le risque plus élevés sont associés à un risque bancaire plus élevé. En effet, les banques non réglementées ont tendance à prendre des risques excessifs pour maximiser la valeur pour les actionnaires au détriment des déposants. En fait, les directeurs de banque peuvent bénéficier de régimes d'assurance-dépôts pour se livrer à des activités plus risquées parce que l'argent des déposants est garanti si les investissements ne portent pas leurs fruits. Pour prévenir ce problème d'aléa moral, Kim et Santomero (1988) proposent un plan de fonds propres fondé sur le risque qui oblige les banques à internaliser leurs pertes et à augmenter leurs ratios de fonds propres proportionnels au niveau de risque pris. Le même schéma s'applique aux banques systémiques parce que l'idée du fait d'être trop gros pour faire faillite produit un comportement d'aléa moral qui entraîne une prise de risque excessive, tant au niveau de l'assurance-dépôts que des renflouements du gouvernement. Pour cette raison, il est exigé aux banques de détenir un montant minimum de capital par rapport au risque bancaire, ce qui suggère une association positive entre capital et risque. Les études empiriques de Koehn et Santomero (1980) ont montré que la hausse des ratios de fonds propres accroît la variance du risque total pour le secteur bancaire.

Blum (1999) utilise un cadre dynamique et démontre que la mobilisation de capitaux peut conduire à terme à une augmentation du risque. Il explique que si c'est trop pour une banque d'augmenter son niveau de fonds propres pour faire face à ses besoins futurs en fonds propres, alors la seule solution pour la banque dans le présent est d'augmenter le risque de son portefeuille. Iannotta, *et al.* (2007) constatent aussi un lien positif important entre les provisions pour pertes sur capital et celles pour pertes sur prêts lors de l'examen d'un échantillon des plus grandes banques européennes de 1999 à 2004.

Troisièmement, plusieurs études plus récentes ont examiné l'efficacité des ratios de capital à risque et ont conclu qu'il n'y a aucun lien entre les ratios de capital fondés sur le risque et le risque bancaire. La plupart d'entre eux montrent que les ratios de capital fondés sur le risque n'ont pas d'incidence importante sur le risque bancaire. Par exemple, Blum (2008) constate que si les banques sont libres de déterminer leurs propres expositions au risque, elles seront incitées à sous-estimer leurs risques afin d'éviter des risques plus élevés. Ces évaluations erronées pourraient mener à des investissements plus élevés dans des activités plus risquées. Dermine (2015) démontre également que le seul moyen de prévenir toute information mensongère et l'augmentation de l'exposition des banques au risque qui en découle est de créer un ratio d'endettement complémentaire non fondé sur le risque qui sert de complément au ratio du capital réglementaire.

Dans le même contexte, Cathcart, *et al.*, (2015) signalent que les 25 premières grandes banques aux États-Unis et en Europe avaient des ratios de capital de première catégorie de 8,3 % et de 8,1 % avant le début de

la crise financière, qui sont beaucoup plus élevés que l'exigence du CBCB de 4 % du ratio réglementaire du capital de première catégorie. Toutefois, malgré ces ratios de solvabilité élevés, ces banques n'ont pas été en mesure d'absorber leur exposition au risque et de prévenir le risque systémique. L'étude de Cathcart, *et al.* (2015) s'aligne avec les travaux de Haldane et Madouros (2012), qui ne montrent pas de résultats concluants sur la preuve que les ratios de fonds propres réglementaires réduisent la probabilité de défaut des banques.

## 2.2. Efficacité, rentabilité et capital bancaire

Concernant les relations entre le capital avec l'efficacité des banques et la rentabilité des banques, la littérature apporte une vision commune. D'une part, l'existence d'une corrélation positive entre le capital et l'efficacité. Les ratios de capital fondés ou non sur le risque élevés sont associés à une plus grande efficacité bancaire. Lee et Hsieh (2013) soutiennent que la relation entre le capital et le risque devrait être étendue à l'efficacité des banques et la rentabilité. Barth, *et al.*, (2013) constatent que la rigueur des fonds propres et le ratio capitaux propres sur l'actif sont associés positivement à l'efficacité des banques. En examinant un panel de banques composé de 5227 observations dans 22 pays de l'Union européenne, Chortareas, *et al.*, (2012) constatent que le capital a un effet positif sur l'efficacité et un effet négatif sur les coûts bancaires. Leurs résultats suggèrent qu'une capitalisation plus élevée atténue les problèmes d'agence entre les gestionnaires et les actionnaires. Ainsi, les actionnaires auront une plus grande incitation à surveiller la performance de la direction et à s'assurer que la banque est efficace. Les résultats de Staub, *et al.*, (2010) mettent en évidence que lorsque les banques détiennent davantage de fonds propres, elles sont plus prudentes en termes de comportement à risque, qui peut être canalisé vers des scores d'efficacité plus élevés. De même, Banker, *et al.*, (2010) montrent que le ratio de capital est corrélé positivement à l'agrégat des fonds propres, l'efficacité, l'efficacité technique et l'efficacité allocative lorsqu'il s'agit d'examiner l'efficacité de 14 banques coréennes. Pasiouras (2008) constate également que l'efficacité technique augmente avec la capitalisation des banques.

D'autre part, il existe une abondante documentation sur la relation entre le capital et la rentabilité qui soutient que les ratios de capital fondés ou non sur les risques élevés sont associés à une plus grande rentabilité des banques. Iannotta, *et al.* (2007) constatent que les banques ayant des ratios de fonds propres plus élevés sont plus rentables. Tan et Floros (2013) constatent une faible association positive entre capital et rentabilité (et entre capital et efficacité bancaire) à partir d'un échantillon de banques chinoises. Demircuc-Kunt, *et al.*, (2013) constatent que les ratios de fonds propres, en particulier le capital de première catégorie, ont eu une influence positive sur le rendement des actions des grandes banques pendant la crise

financière de 2007-2008. Récemment, Tan (2016) a montré que les banques plus capitalisées sont plus rentables parce qu'elles ont une solvabilité plus élevée, et s'engagent davantage dans une gestion prudente de leurs risques et empruntent moins, ce qui réduit leurs coûts et augmente leur rentabilité.

## **Section 2. METHODOLOGIE DU STRESS TEST MACROECONOMIQUE POUR LES BANQUES DE MADAGASCAR**

Cette section a pour objectif de présenter la méthodologie adoptée pour l'évaluation du risque de crédit des banques individuelles sous les scénarios macroéconomiques défavorables. Comme il s'agit d'une étude auprès de chaque banque, l'approche du modèle de panel dynamique est la plus utilisée pour relier les déterminants économiques et bancaires avec le risque de crédit. Les scénarios macroéconomiques sont soit de type hypothétique et/ou historique, soit générés à partir d'un modèle économétrique à part, tel le modèle DSGE ou le modèle GVAR. Des travaux de stress test utilisent également les scénarios prédéfinis par l'autorité de régulation. Les scénarios utilisés dans cette évaluation des banques individuelles sont un choc négatif sur le PIB correspondant à une récession économique, un choc positif du taux de change effectif réel, c'est-à-dire une dépréciation de la monnaie locale, un choc positif du prix des pétroles en tant que variable globale et un choc négatif sur les prix des matières premières agricoles. Les impacts sur les risques de crédits seront ensuite transmis au sein des capitaux propres des banques afin d'évaluer leurs solidités.

L'organisation de la section se fera comme suit : le premier paragraphe abordera le modèle de panel dynamique qui servira à mesurer l'impact du risque de crédit face aux déterminants économiques et financiers (I). Le second paragraphe décrira les variables utilisées avec leurs sources respectives (II). Le troisième paragraphe montrera les scénarios de stress test avec le processus de projection de capitaux propres de chaque banque sous les scénarios adverses (III).

### I. Modèle de panel dynamique

Suite à la littérature récente sur les études de stress test du risque de crédit au niveau des banques individuelles [Chaibi et Ftiti (2015), Kosmidou et Moutsianas (2015) Dimitrios, *et al.*, (2016)], une approche de panel dynamique est adoptée pour estimer l'effet des variables macroéconomiques et les variables spécifiques des banques sur l'indicateur de risque de crédit, le ratio des prêts non performants (NPL). L'approche dynamique permet de tenir compte de la persistance du temps dans de la structure du ratio NPL en incluant la variable dépendante retardée en tant que variable explicative dans le modèle à effets fixes statiques [Louzis, *et al.* (2012), Youssef (2018)].

L'approche utilisée se base sur la méthodologie de Chaibi et Ftiti (2015).

Considérons le modèle de panel dynamique avec effets fixes :

$$Y_{it} = \alpha_i + \mu(U_{it}) + \sum_{s=1}^k \phi_s(U_{it})Y_{i,t-s} + \beta(U_{it})'X_{it} + \gamma(U_{it})'Z_t \quad (1)$$

Avec  $i = 1, \dots, N$  et  $t = 1, \dots, T$ .  $i$  désigne la coupe transversale et  $t$  la dimension temporelle dans l'échantillon de panel.

$Y_{it}$  est la variable endogène, dans notre cas l'indicateur de risque de crédit NPL

$X_{it}$  est un vecteur ( $l \times 1$ ) des variables dans le temps spécifiques à chaque banque.

Les éléments du paramètre du vecteur  $\theta(U)_{it} \equiv [\mu U_{it}, \phi_1(U_{it}), \dots, \phi_k(U_{it}), \beta_1(U_{it}), \dots, \beta_l(U_{it}), \dots, \gamma_1(U_{it}), \dots, \gamma_m(U_{it})]$  sont des fonctions inconnues  $\theta_s: [0,1] \rightarrow \mathbb{R}, s = 1, \dots, (1 + k + l + m)$  qui doivent être estimées.

$\alpha_i$  représente des effets fixes spécifiques, supposé indépendant du processus d'innovation ( $U_{it}$ ) et est destiné à contrôler toute hétérogénéité transversale non observée (supposée invariante dans le temps) non prise en compte par les variables bancaires  $X_{it}$ .

$Z_t$  un vecteur ( $m \times 1$ ) des variables macroéconomiques.

De ce fait, le modèle de panel dynamique à estimer s'écrit comme suit :

$$NPL_{it} = \alpha_i + \phi_{i,t}NPL_{i,t-1} + \beta'X_{i,t} + \gamma'Z_t + \mu_i + \varepsilon_{i,t} \quad (2)$$

Avec  $\alpha_i$  les effets fixes



$N$  désigne le nombre des banques et  $T$  la dimension de la série chronologique. Avec  $i$  la section transversale allant de la banque 1 à la banque 6 ; et  $t$  note la dimension chronologique allant de 2005q2 à 2015q2.

$NPL_{it}$  le ratio des prêts non performants (NPL) de la banque  $i$  pour la période  $t$ .

$X_{i,t}$  le vecteur des variables bancaires, spécifiques à chaque banque (rendement des capitaux propres, total des prêts sur dépôts, ratio de levier et la taille des banques).

$Z_t$  le vecteur des variables macroéconomiques, communes à toutes les banques, décrivant le scénario macroéconomique.

$\Phi_{i,t}$ ,  $\beta'$  et  $\gamma'$  sont les vecteurs de coefficients à estimer

$\mu_i$  les effets non observés spécifiques à chaque banque

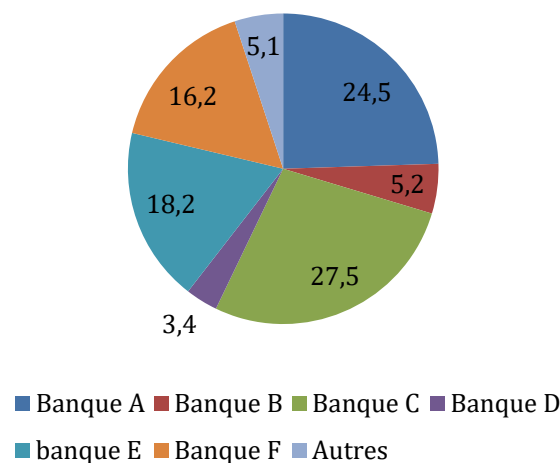
$\varepsilon_{i,t}$  le terme d'erreur

Les modèles de panel dynamique seront estimés à l'aide de la méthode des moments généralisés (GMM), en utilisant la variable dépendante en tant qu'instrument GMM et les valeurs décalées des variables explicatives en tant qu'instruments exogènes dans le contexte d'Arellano et de Bond (1991).

## II. Description des données et leurs sources

Pour examiner l'impact des facteurs macroéconomiques et de la qualité des actifs sur le risque de crédit des banques, six (06) banques commerciales sur onze (11) ont été sélectionnées (banques A, B, C, D, E, F), représentant environ 95% du secteur bancaire de Madagascar en termes d'actif total en 2015. Conformément à la revue de la littérature dans le chapitre précédent, nous retenons deux types de variables: les variables spécifiques à la banque et les déterminants macroéconomiques.

**Figure 1- Répartition des actifs du secteur bancaire**



*Note : Les parts des actifs sont présentées en pourcentage. Source : BCM 2015, auteur*

La littérature sur l'analyse du risque de crédit spécifique à chaque banque a noté que les déterminants des NPL ne doivent pas être recherchés exclusivement parmi les variables macroéconomiques, qui sont exogènes à l'industrie bancaire. Les particularités du secteur bancaire et les choix politiques de chaque banque, notamment en ce qui concerne leurs efforts pour améliorer l'efficacité et la gestion des risques, sont susceptibles d'influencer l'évolution des NPL [Berger et De Young (1997), Salas et Saurina (2002), Podpiera et Weill (2008) Chaibi et Ftiti (2015), Zheng, *et al.*, (2018), Moussa (2018), Kiemo, *et al.* (2019)].

Le tableau suivant présente la description des variables bancaires.

**Tableau 1- Description des variables bancaires**

Variable	Définition	Hypothèse correspondante	Références	Signes prédicts
Rendement des capitaux propres	<i>Return on equity (ROE)</i> $ROE_{it} = \frac{Profits_{it}}{Total\ Equity_{it}}$	Mauvaise gestion	Vuković (2014) Abid, <i>et al.</i> , (2014)	-
Total des prêts sur total des dépôts	<i>Loans to deposit Ratio (LtD)</i> $LtD_{IT} = \frac{Loans_{it}}{Deposit_{it}}$	Risque moral	Chaïbi et Ftiti (2015) Makri, <i>et al.</i> , (2014)	+
Ratio de levier	<i>Leverage Ratio (LR)</i> $LR_{it} = \frac{Total\ liabilities_{it}}{Total\ Assets_{it}}$	Trop gros pour échouer	Chaïbi et Ftiti (2015)	+
Taille	$SIZE_{it} = \frac{SIZE}{\sum_{i=1}^n Total\ Assets_{it}}$	Diversification	Kiemo, <i>et al.</i> (2019), Youssef (2018)	-

Source : adapté par l'auteur

Louzis, *et al.* (2012) ont effectué des études sur les hypothèses associées à chaque variable bancaire. L'hypothèse de «mauvaise gestion» implique qu'une faible rentabilité est positivement liée à l'augmentation des prêts non productifs futurs. L'hypothèse de «l'aléa moral» implique que la faible capitalisation des banques entraîne une augmentation des prêts non performants. Les dirigeants des banques peuvent également augmenter le risque de leur portefeuille en augmentant le ratio prêts / dépôts (plus de prêts non avec des dépôts) et cela conduit davantage à de prêts non performants. Similairement, la logique est valable pour le ratio LLP concernant cette hypothèse. Enfin, l'hypothèse de la «taille» suggère que la taille des banques a une corrélation négative avec les prêts non performants.

Les variables utilisées dans tout le modèle avec la description détaillée des données et les hypothèses de corrélation sont les suivantes:

- Le ratio de levier (LR) : la structure du capital est susceptible d'affecter le risque de crédit. Un capital fortement endetté conduit à une tendance à une prise de risque plus importante en raison de la

nécessité de produire des rendements plus élevés avec un capital plus faible. Comme le risque financier augmente avec l'endettement, une relation positive entre le risque d'une entreprise bancaire et l'effet de levier est attendue.

- Le ratio des prêts sur dépôts (LtD) examine la liquidité bancaire en mesurant les fonds utilisés en prêts à partir des dépôts collectés. Selon des études antérieures ((Louzis, *et al.* (2012), Vuković (2014)) [ENREF\\_26](#), Makri, *et al.* (2014), ), cet indicateur devrait avoir un effet positif sur le NPL.
- A titre de rappel, les ratios des prêts non performants (NPL) qui s'obtiennent par les provisions pour pertes sur prêts, sont considérés comme un moyen de contrôler les pertes sur prêts anticipées et permettent de détecter et de couvrir les pertes importantes sur créances des prêts bancaires. Par conséquent, les banques qui anticipent des pertes de capital élevées devraient constituer des provisions plus importantes pour réduire la volatilité des résultats (Hasan et Wall, 2004). Ainsi, les provisions pour pertes sur prêts élevées indiquent des ratios NPL élevés.
- Rendement des capitaux propres (ROE) : la performance est associée négativement aux augmentations de créances douteuses futures. En outre, les performances passées peuvent refléter la qualité élevée de la gestion (Louzis et al., 2012), ce qui a entraîné une baisse du nombre de prêts improductifs. Nous nous attendons à ce que la rentabilité des banques ait un impact négatif sur les prêts non performants. Le ROE est défini comme le montant du bénéfice net exprimé en pourcentage des capitaux propres.
- La taille (SIZE) : sous la présomption de «trop gros pour faire faillite», les grandes banques prennent des risques excessifs (Chaibi et Ftiti, 2015) . Stern et Feldman (2004) affirment que «*too big to fail*» a joué un rôle important dans plusieurs crises bancaires survenues dans le monde au cours des dernières décennies. Ils expliquent que les grandes banques ont tendance à prendre des risques plus excessifs, car leurs créanciers n'imposent pas la discipline du marché, qui s'attend à ce que le gouvernement leur protège en cas de faillite. En conséquence, les banques renforcent leur endettement, augmentent leurs prêts aux «mauvais» emprunteurs et ont donc davantage de créances improductives. Suivant les études de Louzis et al. (2012), un effet de levier positif de la taille des banques sur les prêts non performants conditionnels est attendu. Une autre branche de la littérature suggère un impact négatif de la taille des banques sur le risque de crédit. Cette littérature fonde son analyse sur l'argument théorique de la diversification par la taille. Zribi et Boujelbegrave (2011) ont noté que cela pourrait indiquer que les grandes banques sont plus diversifiées et sont probablement plus compétentes en matière de gestion des risques, ce qui leur permet de traiter plus efficacement les «mauvais» emprunteurs.

- Le Produit Intérieur Brut (PIB) est la variable macroéconomique d'intérêt, permettant de contrôler le cycle économique. La variable est supposée être corrélée négativement avec le ratio NPL. Pendant les périodes d'expansion économique, les emprunteurs individuels et privés ont besoin de fonds suffisants pour rembourser leurs dettes, mais en période de récession, leur capacité à les rembourser diminue. Le crédit est donc étendu aux débiteurs de mauvaise qualité, ce qui entraîne une augmentation des prêts improductifs. Nous prévoyons une relation négative entre la croissance du PIB.
- Les variables macroéconomiques de contrôle sont l'indice des prix à la consommation et le taux de change effectif réel (Bitar, *et al.*, 2018). Pour l'Indice des prix à la consommation (IPC), bien qu'il n'existe pas de consensus empirique sur l'effet de l'inflation sur la rentabilité des banques, une inflation élevée est généralement associée à des taux d'intérêt élevés, ce qui accroît la rentabilité des banques. Dans cette étude, nous prévoyons une relation positive avec l'inflation et les profits des banques.
- Pour la variable taux de change effectif réel (TCER), la hausse de cette variable peut avoir des répercussions mitigées. Les études empiriques (Castro, 2013 ; Nkusu, 2011) incluent cette variable pour contrôler la compétitivité externe. Suivant Fofack (2005), l'appréciation de cette variable peut affaiblir la compétitivité des entreprises axées sur l'exportation et les rendre incapables d'assurer le service de leur dette. De plus, une appréciation réelle de la monnaie locale entraîne des coûts plus élevés pour les biens et services locaux. Néanmoins, une augmentation du taux de change peut améliorer la capacité de ceux qui empruntent en devises à assurer le service de leur dette (Nkusu, 2011). Dans ce contexte, le signe de la relation entre le taux de change et les NPL peut être positif ou négatif.

Les variables bancaires sont extraites de la base de données de la Banque Centrale de Madagascar, actuellement *Banky Foiben'i Madagasikara* et les variables macroéconomiques sont issues de l'INSTAT. Les variables couvrent la période de 2005q2 à 2015q2 suite à la disponibilité des données bancaires uniquement sur cette période. Ainsi, les données de panel comprennent 6 banques avec 240 observations sur la période de 2005q2 à 2015q2.

### III. Scénarios de stress test et projection de capitaux propres

#### 1. Projection des NPL sous les différents scénarios de stress test

Les résultats des estimations des données de panel seront ensuite utilisés pour soumettre les ratios NPL de chaque banque sous les scénarios macroéconomiques adverses.

Dans l'équation (2), le vecteur  $Z_t$  des variables macroéconomiques, communes à toutes les banques, décrit les scénarios macroéconomiques issus d'un modèle auxiliaire, dans notre cas le modèle GVAR.

$$NPL_{it} = \alpha_i + \phi_{i,t} NPL_{i,t-1} + \beta' X_{i,t} + \gamma' Z_t + \mu_i + \varepsilon_{i,t} \quad (2)$$

Dans un exercice de simulation de crise, les trajectoires des facteurs macroéconomiques sont considérées comme «exogènes», en ce sens supposé que les pertes / profits des banques ne sont pas répercutés sur l'économie en général. Toutefois, dans la pratique, les variables macroéconomiques qui entrent dans un modèle sont déterminées à l'aide d'une combinaison de jugement d'expert et du résultat d'un modèle auxiliaire et essayez donc de prendre en compte implicitement la boucle de rétroaction entre les conditions financières et la macroéconomie (Covas, *et al.*, 2014).

Dans le cas présent, les scénarios adverses de stress test sont issus des résultats du modèle GVAR, définis dans le chapitre 2. En effet, dans un exercice de stress test, les scénarios sont préalablement définis ou sont issus d'un modèle auxiliaire. Plusieurs études sur le stress test ont utilisé le même scénarios prédéfinis tels que les travaux de Covas, *et al.* (2014) et Kapinos et Mitnik (2016) où ils ont utilisé dans leurs exercices de stress test de les mêmes scénarios macroéconomiques qui sont déterminées à l'aide d'une combinaison de jugement d'expert et des résultats d'un modèle d'équilibre général dynamique stochastique (DSGE) pour l'exercice de stress test des banques des Etats Unis de moyenne et de grande tailles. Ce sont, en effet, les mêmes scénarios définis et utilisés par le *Reserve Federal* pour les exercices de stress test périodiques pour l'année 2013-2014.

A titre de rappel, les scénarios macroéconomiques utilisés pour la prévision des ratios des prêts non performants de chaque banque sont les suivants :

- Le scénario de base ou scénario de référence est constitué par l'évolution attendue de la situation économique, c'est-à-dire la projection des résultats du modèle GVAR sans provoquer de choc pour le système.

- Les scénarios adverses correspondent au résultat de la simulation des fonctions de réponses impulsionnelles du modèle GVAR suite à une diminution ou d'une augmentation d'un écart-type de la variable considérée pour le choc. A titre d'exemple :
  - Le scénario de choc négatif du PIB local correspond au résultat des fonctions de réponses impulsionnelles généralisées (GIRFs) du modèle GVAR sur les variables locales suite à une diminution d'un écart-type du PIB local.
  - Le scénario de choc positif du prix de pétrole correspond au résultat des fonctions de réponses impulsionnelles généralisées du modèle GVAR sur les variables locales suite à une augmentation d'un écart type du prix de pétrole.

Les scénarios macroéconomiques adverses sont composés principalement des résultats sur les variables macroéconomiques locales des chocs suivants :

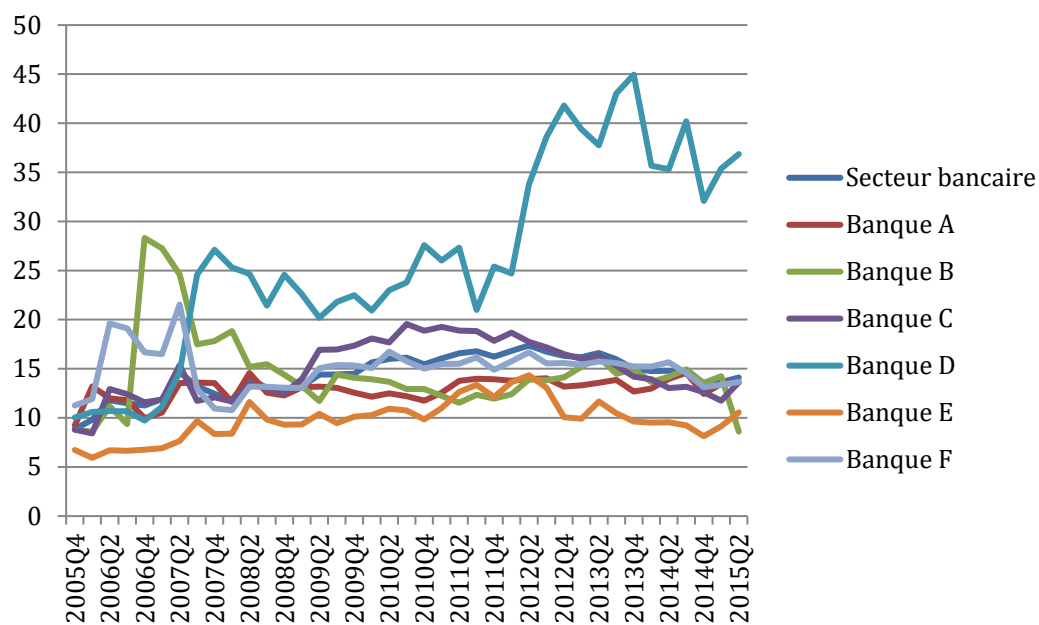
- un choc négatif sur le PIB correspondant à une période de récession économique ;
- un choc positif du taux de change effectif réel, c'est-à-dire une dépréciation de la monnaie locale ;
- un choc positif du prix des pétroles en tant que variable globale ;
- et un choc négatif sur les prix des matières premières agricoles.

## 2. Projection sur les capitaux propres des banques

Les projections de capitaux propres sont calculées sur la base de l'évolution des ratios de risque de crédit sous les conditions de scénarios macroéconomiques adverses. Le ratio d'adéquation des capitaux propres (CAR) pour chaque banque sera calculé pour vérifier l'impact sur les banques des événements de chocs macroéconomiques. Cet indicateur est obtenu par le ratio du capital sur les actifs pondérés par les risques.

La méthode de projection des capitaux propres avec les scénarios est identique à l'approche adoptée pour mesurer la capitalisation du secteur bancaire agrégé. De ce fait, outre les quatre scénarios de chocs macroéconomiques qui sont mesurés dans un premier temps, les actifs pondérés par les risques des banques sont ensuite augmentés de 16% dans un second temps. Ces deux catégories de scénarios sont appliquées aux capitaux propres des banques et de voir par la suite si ces derniers sont encore dans la norme réglementaire en termes de fonds propres, malgré le fait que les ratios CAR de la plupart des banques sont toujours au-dessus de 8%. La figure ci-après montre l'évolution du ratio CAR de chaque banque avec le CAR du secteur agrégé.

Figure 2- Evolution des fonds propres des banques entre 2005 et 2015



Source : BCM 2015, auteur



### Section 3. ESTIMATIONS ECONOMETRIQUES ET RESULTATS

Cette section a pour objectif de présenter les résultats des différentes estimations économétriques ainsi que les résultats de la mise en œuvre du stress test sur les banques. La présentation des statistiques descriptives sur les variables bancaires et les variables macroéconomiques utilisées dans le modèle de panel (I) est nécessaire avant de présenter les résultats des différentes étapes de l'estimation du modèle de panel (II). Ensuite, les réactions des risques de crédit des banques sous les scénarios macroéconomiques défavorables seront mesurées (III) et seront par la suite traduites au niveau des capitaux propres de chaque banque (IV). Le dernier paragraphe de cette section sera consacré à une discussion des résultats du stress test auprès de chaque banque (V).

Les données sont traitées sous le logiciel Stata.

## I. Statistique descriptive

Le tableau ci-dessous présente les statistiques descriptives (moyenne, minimum, maximum et écart-type) des variables bancaires utilisées dans la présente étude pour la période de 2005 à 2015. Les 6 banques qui constituent l'échantillon représentant plus de 95% du total des actifs du secteur bancaire.

Tableau 2- Statistique descriptive des variables spécifiques des banques et des variables macroéconomiques

Variables bancaires					
	LR	LtD	NPL	ROE	SIZE
Toutes les banques					
Mean	0,932052	0,518897	0,12579	0,342479	0,162277
Maximum	0,963836	1,125314	0,471355	1,345581	0,316739
Minimum	0,878493	0,167206	0,029946	-0,27881	0,019172
Std. Dev.	0,017636	0,167995	0,082662	0,256454	0,092179
Observations	240	240	240	240	240
Banque A					
Mean	0,930662	0,511949	0,15948	0,218187	0,244961
Maximum	0,942728	0,617969	0,217618	0,516261	0,301167
Minimum	0,913552	0,426937	0,115186	0,058309	0,190947
Std, Dev,	0,005682	0,042586	0,033373	0,109135	0,028118
Observations	40	40	40	40	40
Banque B					
Mean	0,917815	0,754555	0,079758	0,318473	0,051632
Maximum	0,959179	1,125314	0,167977	1,2966	0,06512
Minimum	0,878493	0,517634	0,031813	0,063936	0,044944
Std. Dev.	0,020537	0,153736	0,036931	0,244412	0,0045
Observations	40	40	40	40	40
Banque C					
Mean	0,931353	0,4993	0,082532	0,317575	0,274719
Maximum	0,963836	0,660274	0,138269	0,961481	0,316739
Minimum	0,913375	0,425348	0,029946	0,073629	0,235913
Std. Dev.	0,014613	0,058108	0,03718	0,225931	0,018056
Observations	40	40	40	40	40
Banque D					
Mean	0,940593	0,359172	0,245213	0,195367	0,033689
Median	0,94334	0,321027	0,471355	0,205626	0,035017
Minimum	0,915213	0,167206	0,052471	-0,27881	0,019172
Std. Dev.	0,011527	0,151336	0,116897	0,188818	0,005367

Observations	40	40	40	40	40
Banque E					
Mean	0,953847	0,38721	0,092855	0,642133	0,182007
Maximum	0,960392	0,57145	0,128267	1,345581	0,211159
Minimum	0,941668	0,236096	0,038264	0,236169	0,162794
Std. Dev.	0,003784	0,088689	0,02294	0,277208	0,011411
Observations	40	40	40	40	40
Banque F					
Mean	0,932052	0,601196	0,094901	0,342479	0,162277
Maximum	0,963836	0,787275	0,170366	1,345581	0,316739
Minimum	0,878493	0,502797	0,036866	-0,27881	0,019172
Std. Dev.	0,017636	0,07112	0,042988	0,256454	0,092179
Observations	40	40	40	40	40
<b>Variables macroéconomiques</b>					
	PIBC	TCER	IPC		
Mean	6.410852	4.696734	5.552436		
Maximum	6.524113	4.862846	5.908264		
Minimum	6.262009	4.369736	5.118193		
Std. Dev.	0.065179	0.161135	0.231119		
Observations	240	240	240		

Sources : BCM (2016), INSTAT, auteur

L'analyse concerne d'abord les statistiques récapitulatives pour l'ensemble de l'échantillon et ensuite pour chaque banque. En ce qui concerne le niveau du risque de crédit, mesuré par le ratio NPL, le tableau montre une moyenne de 12% pour toutes les banques. Ce qui montre la présence non négligeable de risque de crédit pour les banques dans son ensemble. L'écart-type de 8% indique une variabilité légèrement importante des prêts non performants d'une banque à l'autre. En regardant au niveau de chaque banque, le ratio moyen plus élevé du NPL est de 24% correspondant à la banque D ; et le ratio NPL moyen moins élevé est de 7.9% correspondant à la banque B.

Le tableau montre ensuite que le ratio de levier (LR) moyen pour toutes les banques est de 0.93. Presque toutes les banques ont un effet de levier élevé, ceci est également justifié par la valeur très faible de l'écart-type qui est de 0.01.

En ce qui concerne le ratio des prêts sur dépôts (*LtD*), la moyenne du système est de 0.51, ce qui signifie que globalement la moitié des dépôts se sont mobilisés en prêt. En regardant les banques, la moyenne

maximale correspond à 0.75 de la banque B, ce qui induit que pour cette banque, 75% des dépôts sont utilisés pour les prêts. La moyenne minimale du ratio prêt sur dépôt est celui de la banque D dont les prêts représentent 35% de son dépôt.

Pour la rentabilité (ROE), le tableau montre que le système bancaire est rentable avec un ratio moyen de 0.34. Ce ratio varie également d'une banque à l'autre avec la valeur de l'écart-type qui est de 0.25. Au niveau de chaque banque, la banque E semble le plus rentable que les autres avec un ratio ROE de 0.64. Pour les autres, la valeur tourne autour de 0.3 sauf pour la banque D avec un ratio de 0.19.

En regardant la taille des banques, les plus grandes sont la banque A et la banque C avec un actif représentant respectivement de 24% et de 27% de l'actif total du secteur bancaire. La banque B et la banque D sont de taille petite parmi les échantillons, dont leurs parts d'actifs au sein du secteur sont respectivement de 5.1% et de 3.1%.

A travers ces statistiques, il peut être noté que l'octroi des prêts n'est pas forcément corrélé positivement avec la taille des banques. Il en est de même pour le pourcentage des prêts douteux sur le total des prêts. Les résultats économétriques ainsi que les résultats de la mise en œuvre du stress test fournissent plus d'éléments permettant d'analyser et de relier le comportement des banques et leurs situations sous les conditions de scénarios macroéconomiques défavorables.

## II. Les résultats économétriques: régression du modèle de panel

Avant d'entreprendre toute analyse économétrique, des tests préalables de spécification des données de panel ont été effectués.

### 1. Test de stationnarité

Pour déterminer la stationnarité des données du panel, un test de racine unitaire du panel a été appliqué aux variables de l'étude. Le test de la racine de l'unité du panneau implique la résolution de  $\rho_i$  dans un processus autorégressif AR (1) pour l'équation (3) estimée :

$$Y_{it} = \rho_i Y_{it-1} + X_{it} \delta_{it} + \varepsilon_{it} \quad (3)$$

Où  $i = 1, 2, \dots, 6$  banques commerciales, observées sur les périodes  $t = 2005, \dots, 2015$

$X_{it}$  représentent toutes les variables explicatives utilisées dans le modèle,

$\rho_i$  les coefficients autorégressifs

$\varepsilon_{it}$  les termes d'erreur.

Si  $|\rho_i| = 1$ , cela signifie que la variable dépendante  $Y_i$  était dépendante de son propre retard et que  $Y_i$  contient une racine unitaire (non stationnaire) ce qui peut conduire à des résultats erronés lors du test d'hypothèse de significativité des variables explicatives (Gujarati, 2009).

Le tableau suivant fournit le résumé des tests de racine unitaire des données de panel :

**Tableau 3- Test de stationnarité des variables du modèle de panel**

Variables	Test	Valeur statistique	p-value
NPL	Levin, Lin & Chu t	-7.80786	0.0000
	Im, Pesaran and Shin W-stat	-7.45259	0.0000
	ADF - Fisher Chi-square	75.8894	0.0000
	PP - Fisher Chi-square	148.299	0.0000
ROE	Levin, Lin & Chu t	-7.70261	0.0000*
	Im, Pesaran and Shin W-stat	-7.71818	0.0000
	ADF - Fisher Chi-square	79.1502	0.0000
	PP - Fisher Chi-square	88.0807	0.0000
LR	Levin, Lin & Chu t	-3.75211	0.0001
	Im, Pesaran and Shin W-stat	-4.91369	0.0000
	ADF - Fisher Chi-square	50.5465	0.0000
	PP - Fisher Chi-square	49.6856	0.0000
LtD	Levin, Lin & Chu t	-14.1399	0.0000
	Im, Pesaran and Shin W-stat	-12.5629	0.0000
	ADF - Fisher Chi-square	137.922	0.0000
	PP - Fisher Chi-square	145.208	0.0000
SIZE	Levin, Lin & Chu t	-15.2766	0.0000
	Im, Pesaran and Shin W-stat	-14.8691	0.0000
	ADF - Fisher Chi-square	165.173	0.0000
	PP - Fisher Chi-square	179.245	0.0000
PIB	Levin, Lin & Chu t	-1.78236	0.0373
	Im, Pesaran and Shin W-stat	-4.25833	0.0000
	ADF - Fisher Chi-square	38.9401	0.0001
	PP - Fisher Chi-square	42.2896	0.0000
IPC	Levin, Lin & Chu t	-12.3953	0.0000
	Im, Pesaran and Shin W-stat	-11.9616	0.0000
	ADF - Fisher Chi-square	130.457	0.0000
	PP - Fisher Chi-square	136.984	0.0000

*\*Variables stationnaires à niveau. La p-value des tests de Fisher est calculée à l'aide d'une distribution asymptotique du chi deux. Tous les autres tests supposent une normalité asymptotique. Source: calculs de l'auteur*

Les résultats des tests de racine unitaire sont basés sur les tests de Levin-Lin-Chu (LLC), Im-Pesaran et Shin W-stat (IPS), Fisher-Chi Square (Fisher ADF), et de Phillips-Perron Fisher-Chi Square-PP (Fisher PP). Tous ces tests reposent sur l'hypothèse nulle: les données du panel ne sont pas stationnaires  $\rho_i = 1$ , et l'hypothèse alternative : les données sont stationnaires  $\rho_i \neq 1$ .

Le test de LLC suppose que les paramètres de persistance transversaux sont communs c'est-à-dire  $\rho_i = \rho$  pour tout  $i$ . Cette hypothèse prend en compte les effets transversaux non homogènes dans le modèle spécifié généralisé, par contre pour les tests de IPS, Fisher-ADF et Fisher-PP, tous les  $\rho_i$  peuvent varier d'une section à l'autre. L'application de tous ces tests permet une comparaison. En outre, le test IPS a complété et confirmé les résultats des tests LLC, ADF et PP.

D'après les tests de racine unitaire des données de panel, les variables macroéconomiques sont stationnaires en différence première et les variables bancaires également sauf pour la variable rendement des capitaux propres (ROE) qui est stationnaire à niveau.

## 2. Test de diagnostic sur les données de panel

Les tests de diagnostic seront effectués afin de vérifier l'utilisation du modèle de panel dynamique.

### 2.1. Test de présence d'effets individuels

Ce test consiste à vérifier s'il y a une présence d'effets individuels dans les données. Ces effets sont représentés par une intercepte  $u_i$  propre à chaque individu. L'hypothèse nulle à tester est  $H_0: u_i = 0$ , c'est-à-dire qu'il y a seulement une intercepte commune, aucun effet individuel dans la régression suivante :

$$Y_{it} = \rho_i Y_{it-1} + X_{it} \delta_{it} + u_i + \varepsilon_{it} \quad (4)$$

Le résultat du test est une statistique F de Fisher représentée dans le tableau suivant :

Tableau 4- Résultat test de Fisher de présence d'effets individuels

Spécification du modèle	F Statistique	p-value (Prob > F)
Equation (4)	21.12	0.000

Source: calculs de l'auteur

Les résultats montrent un p-value inférieur à 5%, donc l'hypothèse nulle est rejetée. Alors, le modèle inclue des effets individuels.

### 2.2. Test d'Hausman : choix entre modèle à effet individuel fixe ou effet individuel aléatoire

Le test d'Hausman est employé pour déterminer le modèle le plus approprié entre le modèle à effets fixes (FE) et le modèle à effets aléatoires (RE). Ce qui implique d'estimer les deux modèles dans un ordre particulier. Le test d'Hausman est un test de spécification qui permet de déterminer si les coefficients des deux estimations, fixe et aléatoire, sont statistiquement différents. Sous l'hypothèse nulle est que le modèle approprié est les effets aléatoires par rapport à l'alternative les effets fixes.

Le résultat du test figuré dans le tableau suivant indique les statistiques du test de Chi-deux et la p-value correspondante pour l'équation du modèle de panel.

Tableau 5- Résultat du Test d'Hausman

Spécification du modèle	Statistique de Chi-Deux	p-value
Equation 4	325.10	0.000

Source: calculs de l'auteur

Le test d'Hausman sur le choix entre les deux modèles montre un p-value inférieur à 5%. L'hypothèse nulle de préférence pour le modèle à effet aléatoire est rejetée, donc le modèle à effet fixe est le mieux approprié pour notre analyse.

### 2.3. Test d'hétéroscédasticité

Le test de Wald est utilisé pour détecter l'hétéroscédasticité entre les individus. L'hypothèse nulle étant l'homoscédasticité, c'est-à-dire que la variance  $\sigma$  des erreurs de chaque individu  $i$  est la même pour tous les individus :  $\sigma_i^2 = \sigma^2$  pour tout  $i$  (Leblond et Belley-Ferris, 2004) et la statistique suit une loi  $\chi^2$  de degré de liberté N.

Le tableau des résultats ci-après montre la statistique de Chi-deux :



Tableau 6- Test du test de Wald

Hypothèse nulle	Statistique de Chi-deux (6)	p-value
$\sigma_i^2 = \sigma^2$ pour tout i	139.98	0.0000

Source: calculs de l'auteur

Le p-value du test est inférieur à 5%, donc l'hypothèse nulle est rejetée, ce qui montre la présence d'hétéroscédasticité entre les individus.

#### 2.4. Test d'autocorrélation

Pour tester la présence de corrélation entre les erreurs des individus, le test de Wooldridge est utilisé. L'hypothèse nulle du test est l'indépendance des résidus entre les individus.

Tableau 7-Test de Wooldridge

Hypothèse nulle	Statistique de Fisher	p-value
Les erreurs non corrélées	19.756	0.0067

Source: calculs de l'auteur

Les résultats montrent un p-value inférieur à 5%, l'hypothèse nulle d'indépendance des erreurs est rejetée. Les erreurs des individus sont donc auto corrélées.

Les conclusions des tests ci-dessus montrent la présence d'effets individuels fixes dans le modèle, avec la présence d'hétéroscédasticité et de corrélation des erreurs. Le modèle MCO usuel est donc invalide. Dans ce cas, Arellano et Bond (1991) proposent l'estimateur de la méthode des Moments généralisés (GMM). Le modèle prend en compte le problème d'autocorrélation et de l'hétéroscédasticité des aléas du modèle en différence.

#### 2.5. Test de validité des instruments

Pour les modèles à effets individuels fixes dynamiques, le test de validité des instruments vérifie l'hypothèse nulle : les instruments ne sont pas asymptotiquement corrélés aux aléas. Pour cela, le test de Sargan-Hansen est utilisé. Dans la méthode des moments généralisés, il est fondamental que les instruments

ne soient pas corrélés aux aléas du modèle (Cadoret, *et al.*, 2004) .

Tableau 8- Résultats du test de Sargan-Hansen

<b>Statistique de Sargan-Hansen</b>	<b>p-value</b>
8.396	0.0150

*Source: calculs de l'auteur*

La p-value est supérieure à 5%, l'hypothèse nulle est acceptée. Donc, les aléas du modèle ne sont pas autocorrélés. Ce qui implique que les instruments sont valides.

Les résultats des différents tests de spécification de modèle de panel ci-dessus justifient ainsi l'utilisation du modèle de panel dynamique avec effets fixes, en employant l'estimateur des méthodes de moments généralisés. Semblables à toutes les régressions des variables instrumentales, les estimateurs GMM sont non biaisés. Arellano et Bond (1991) ont comparé les performances des différences estimateurs GMM et MCO. À l'aide de simulations, ils ont constaté que les estimateurs GMM présentaient le plus faible biais.

### 3. Résultats de régression du modèle de panel dynamique

Le tableau suivant présente les coefficients de l'estimateur GMM de la spécification dynamique à effets fixes selon l'approche de Arellano-Bond (1991). L'incorporation des variables spécifiques à chaque banque dans le modèle n'affecte pas l'impact de la variable macroéconomique d'intérêt sur l'indicateur de risque de crédit. En effet, l'ajout une à une des variables bancaires n'affecte pas le signe de la variable macroéconomique d'intérêt et même celui des autres variables comme montré successivement dans les colonnes (2), (3), (4) et (1). Cela démontre également la stabilité du modèle.

Tableau 9- Résultats de l'estimation du modèle de panel dynamique avec effets fixes

Variable dépendante : Ratio des prêts non performants					
Estimateur : GMM					
Variables	Coefficient (t-statistique)				Signes prédits
<i>Spécifiques des banques</i>					
	(1)	(2)	(3)	(4)	
Ratio des prêts non performants retardé $NPL_{t-1}$	0,25* (4.65)	0.27* (4.09)	0.25* (3.72)	0.25* (3.77)	+
Ration des prêts sur dépôts ( $LiD$ )	2,22** (2.27)	2.58* (1.90)	2.34** (2.10)	2.11*** (1.78)	+
Rendement des capitaux propres ( $ROE$ )	-0,62* (4.60)		-0.45* (5.69)	-0.61* (4.14)	-
Ratio de levier ( $LR$ )	-5,77* (4.20)			-4.67* (3.09)	-/+
Taille des banques ( $SIZE$ )	-6,43* (6.27)				+
<i>Variables macroéconomiques</i>					
Produit Intérieur Brut PIB	-2,46*** (1.61)	-2.55*** (5.27)	-1.54*** (2.07)	-2.20*** (1.70)	-
Inflation (IPC)	-0.20 (0.12)	1.87 (1.46)	0.50 (0.41)	0.12 (0.07)	-/+
Taux de change (TCER)	-1.81*** (1.76)	-1.29 (1.52)	-1.94*** (1.75)	-1.97*** (1.78)	-/+
Constante	2,77 (0.01)	4.94 (0.14)	3.6 (1.62)	2.77 (2.45)	

Valeur absolue des T-statistiques entre parenthèse.  
 \*\*\* signifie  $p$ -value < 1% ; \*\*  $p$ -value < 5% \*  $p$ -value < 10%.

Source : calculs de l'auteur

Les résultats du tableau ci-dessus mettent en évidence que, mise à part la sensibilité aux conditions macroéconomiques, le ratio des prêts non performants est également sensible aux facteurs spécifiques des banques. En effet, selon les résultats de la régression du modèle de panel, les variables explicatives, y compris la variable dépendante retardée, à l'exception de l'indice des prix à la consommation (IPC), sont tous statistiquement significatives.

Les coefficients estimés ont les signes attendus, compatibles avec les arguments théoriques de la littérature. Le coefficient du ratio des prêts non performants retardé d'une période ( $NPL_{t-1}$ ) est positif et significatif. Une augmentation de la variation des ratios NPL au cours du dernier trimestre sera suivie d'une hausse au cours du trimestre considéré.

Le ratio des prêts sur dépôt ( $LtD$ ) est corrélé positivement avec l'indicateur de risque de crédit, ce qui soutient l'hypothèse de risque moral. Le ratio de performance des fonds propres ( $ROE$ ) est utilisé pour tester la mauvaise gestion des banques. Les résultats montrent une relation négative significative entre le ROE et le ratio NPL, ce qui suggère que ROE peut influencer de manière significative le niveau des NPL. Le ratio de levier ( $LR$ ) est un déterminant négatif du risque de crédit. La taille des banques ( $SIZE$ ) affecte négativement et significativement l'indicateur de risque de crédit.

Pour les variables macroéconomiques, le coefficient de variable d'intérêt principal (PIB) est significatif et négativement corrélé avec le ratio des prêts non performants. Le coefficient de l'indice des prix à la consommation (IPC) a le signe négatif attendu. Cependant, la variable IPC n'a pas d'impact significatif sur le ratio des prêts non performants. Le taux de change (TCER) est un déterminant négatif du risque de crédit.

La discussion des relations entre les variables macroéconomiques et bancaires avec l'indicateur de risque de crédit des banques sera présentée dans le paragraphe V avec celle des capitaux propres.

### III. Réaction des indicateurs de risque de crédit face aux scénarios de chocs macroéconomiques

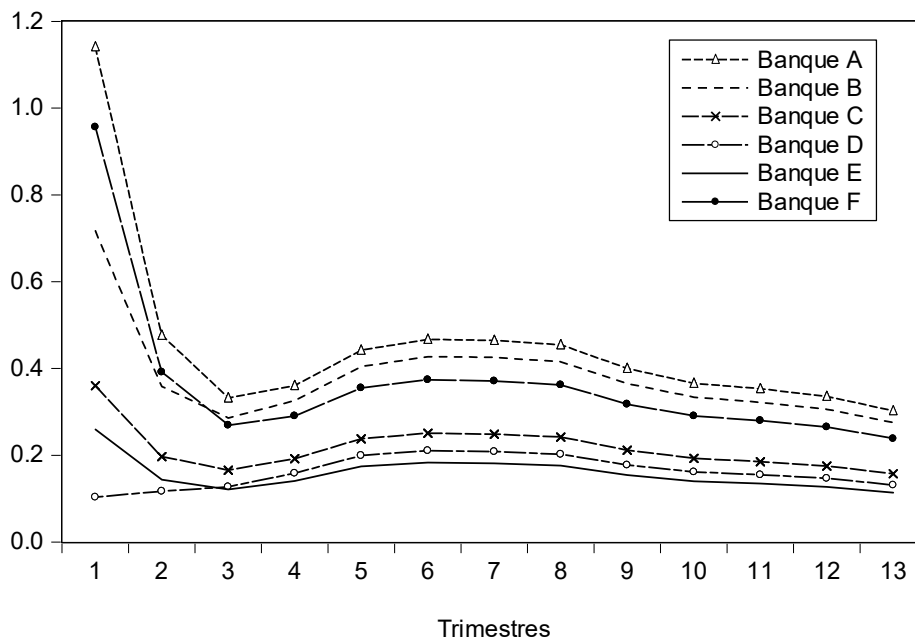
Les résultats de la régression de panel sont ensuite utilisés pour déterminer l'évolution du ratio des prêts non performants sous les conditions des scénarios macroéconomiques de stress test. Les scénarios sont constitués par les évolutions apparentes du PIB suite aux chocs des variables macroéconomiques suivantes : choc négatif du PIB, choc positif du taux de change effectif réel, choc négatif du prix des matières premières agricoles et choc positif du prix de pétrole. Les scénarios de chocs sont obtenus par le modèle GVAR.

Ces scénarios sont identiques aux scénarios appliqués au modèle satellite GVAR du risque de crédit du secteur bancaire agrégé. Les impacts des scénarios macroéconomiques sur l'indicateur de risque de crédit de chaque banque sont présentés et discutés ci-après.

Les réactions des banques aux conditions macroéconomiques défavorables sont presque similaires tandis que l'ampleur de l'impact diffère d'une banque à l'autre. Toutes les réactions du ratio NPL s'inscrivent dans le cadre des limites de l'intervalle de confiance (cf. annexe 5).

Le choc négatif du PIB engendre une nette augmentation du ratio des prêts non performants de toutes les banques dans les horizons futurs. Les banques A, B et F sont les plus affectées en regardant les variations du ratio NPL (figure 3).

Figure 3- Variation des ratios NPL des banques suite à un choc négative du PIB



Source : Calculs de l'auteur

Le choc positif du taux de change, c'est-à-dire une dépréciation de la monnaie locale, a un impact positif faible sur les indicateurs de risque de crédit pour toutes les banques. La variation du ratio NPL est en dessous de 1% pour toutes les banques (tableau 10).

Le choc positif du prix de pétrole engendre une augmentation entre 0.3% à 0.8% des ratios NPL des banques (tableau 10).

Enfin, une variation négative d'un écart-type du prix des matières premières agricoles conduit à une augmentation modeste des ratios des prêts non performants, avec une variation jusqu'à 0.68%. Les banques A et F sont les plus affectés par le choc du prix des matières premières (tableau 10).

Au vu des réactions des ratios NPL, les banques sont plus affectées aux chocs du PIB et du prix de pétrole par rapport aux chocs du prix des matières premières et elles sont faiblement affectées par la variation du taux de change. Le tableau suivant synthétise variations des ratios NPL suite aux différents chocs par rapport à leurs valeurs de base, c'est-à-dire ratio des prêts improductifs en 2015q2. Les détails des réactions des NPL issues des fonctions de réponses impulsionnelles des différents scénarios de chocs sont présentés en annexe 6.

Tableau 10- Evolution des ratios NPL des banques après les chocs macroéconomiques

Banques	Scénario de base		Scénarios adverses						
	NPL 2015q2	Choc négatif du PIB		Choc positif du prix du Pétrole		Choc négatif du prix des Matières premières agricoles		Choc positif du taux de change	
		<i>h+4</i>	<i>h+8</i>	<i>h+4</i>	<i>h+8</i>	<i>h+4</i>	<i>h+8</i>	<i>h+4</i>	<i>h+8</i>
A	17,73	20,04 (2,31)	21,87 (4,14)	18,31 (0,58)	18,53 (0,80)	18,23 (0,50)	18,41 (0,68)	17,14 (-0,59)	18,24 (0,51)
B	15,59	17,28 (1,69)	18,95 (3,36)	16,12 (0,53)	16,31 (0,73)	15,61 (0,02)	15,78 (0,19)	15,48 (-0,11)	16,50 (0,91)
C	8,57	9,48 (0,91)	10,46 (1,89)	8,88 (0,31)	9,00 (0,43)	8,49 (-0,08)	8,59 (0,02)	8,59 (0,03)	9,21 (0,64)
D	6,85	7,35 (0,51)	8,18 (1,33)	7,11 (0,26)	7,21 (0,36)	6,52 (-0,33)	6,60 (-0,25)	7,14 (0,29)	7,66 (0,81)
E	6,14	6,81 (0,66)	7,52 (1,38)	6,37 (0,23)	6,46 (0,32)	6,21 (0,06)	6,13 (-0,01)	6,17 (0,03)	6,62 (0,48)
F	13,81	15,71 (1,91)	17,18 (3,37)	14,28 (0,47)	14,45 (0,64)	14,25 (0,45)	14,40 (0,59)	13,29 (-0,52)	14,18 (0,38)

Note: Les évolutions du ratio NPL sont exprimées en pourcentage. *h* indique l'horizon de trimestres après 2015q2. Les valeurs entre parenthèses sont les variations par rapport à la valeur initiale du ratio NPL en 2015q2. Source : Calculs de l'auteur

#### IV. Projections de capitaux propres des banques individuelles

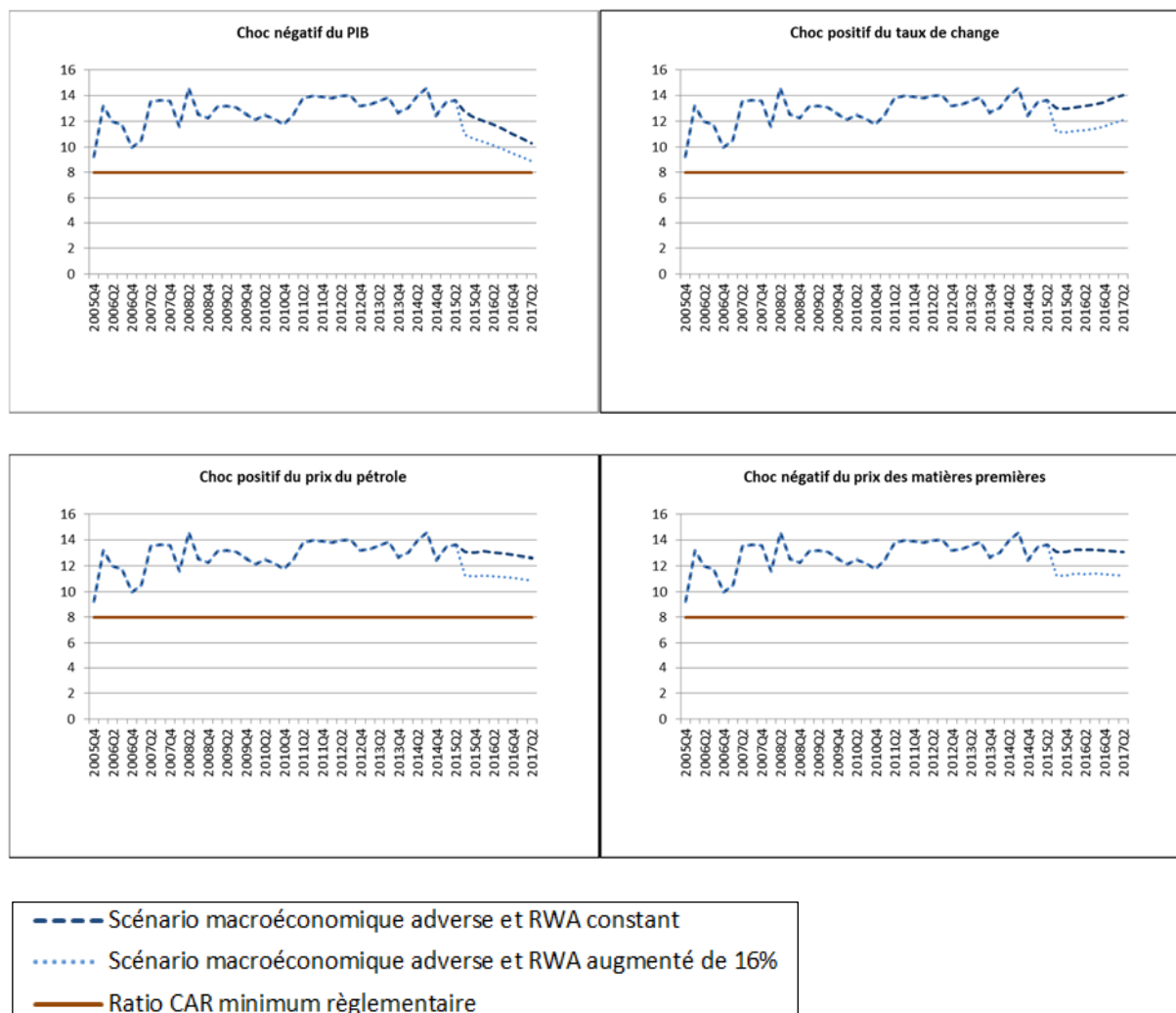
Puisque la dernière étape du stress test consiste à mesurer la capacité des banques à absorber les chocs à travers leurs fonds propres, les changements au niveau du risque de crédit des banques sont alors traduits au niveau des capitaux propres à travers une projection. En effet, les détériorations au niveau du risque de crédit suivant les chocs ont un impact et limitent le ratio d'adéquation des fonds propres des banques, et peuvent donc compromettre le système si leur ratio d'adéquation des fonds propres tombe en dessous des normes internationales de Bâle III.

Les méthodes de calculs des capitaux propres et les hypothèses de scénarios adverses sont les mêmes que celles adoptées dans le chapitre précédent lors du calcul du ratio d'adéquation de fonds propres du secteur bancaire agrégé. Deux hypothèses de scénarios défavorables sont considérées, la première englobe les différents chocs macroéconomiques avec les actifs pondérés par les risques des banques supposés constants, tandis que la deuxième suppose une augmentation de 16% des actifs pondérés par les risques en plus des chocs macroéconomiques défavorables.

Les projections du ratio d'adéquation de capitaux propres pour chaque banque suite aux scénarios de stress test sont présentées dans les figures qui suivent.

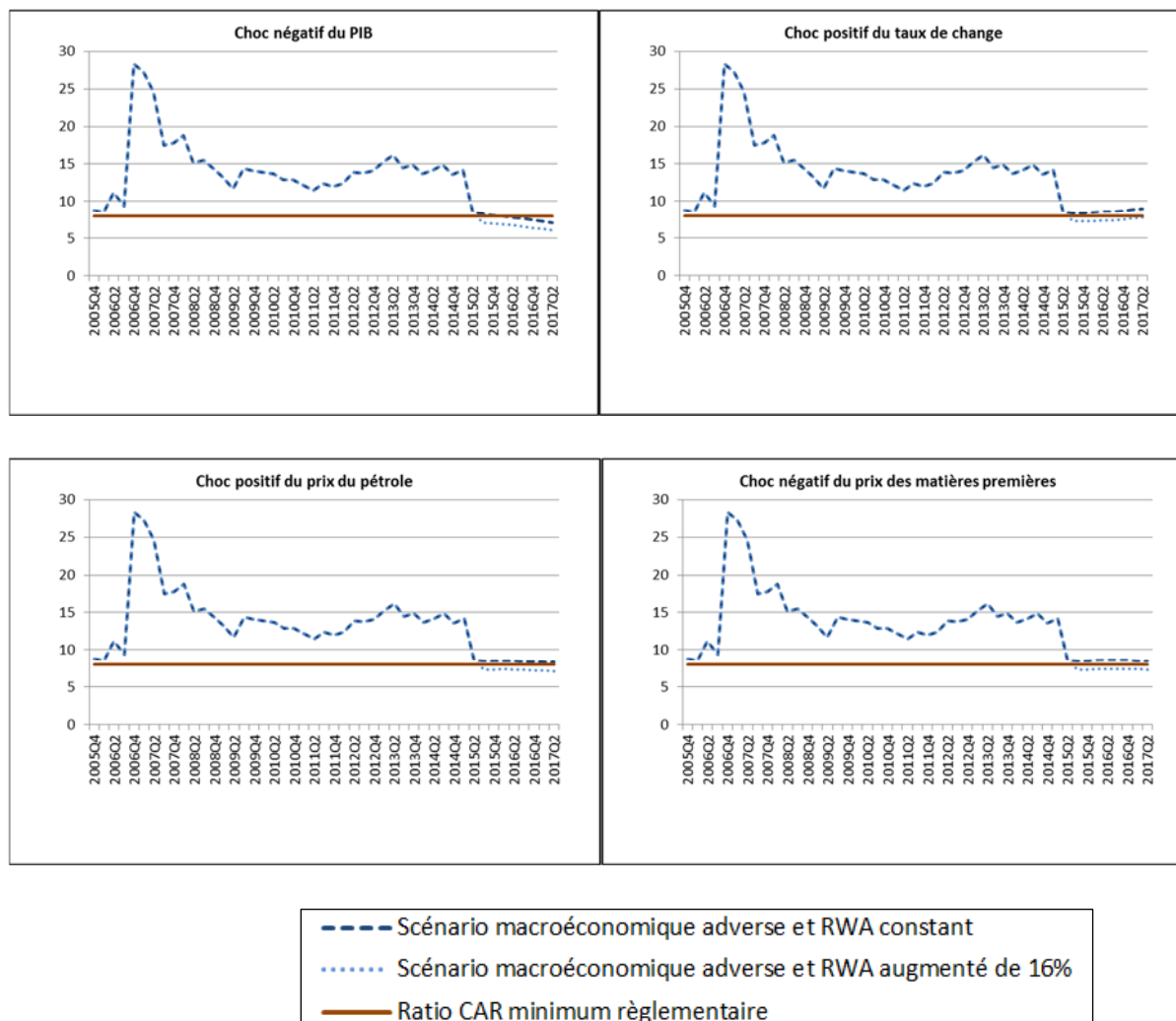


Figure 4- Projection de capitaux propres pour la Banque A



Axe des ordonnées : le pourcentage du CAR de chaque banque. Source : calculs de l'auteur

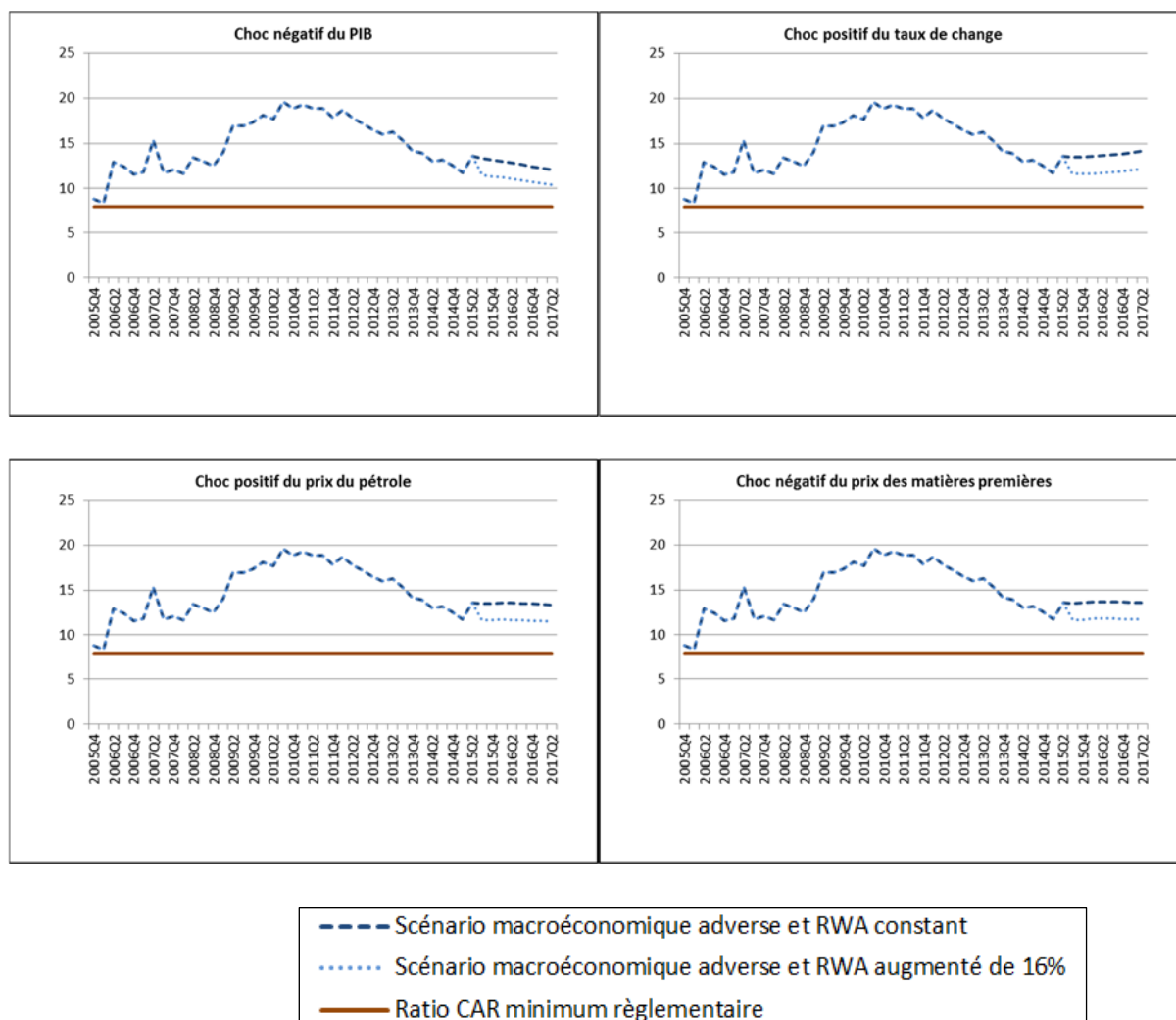
Figure 5- Projection de capitaux propres pour la Banque B



Axe des ordonnées : le pourcentage du CAR de chaque banque

Source : calculs de l'auteur

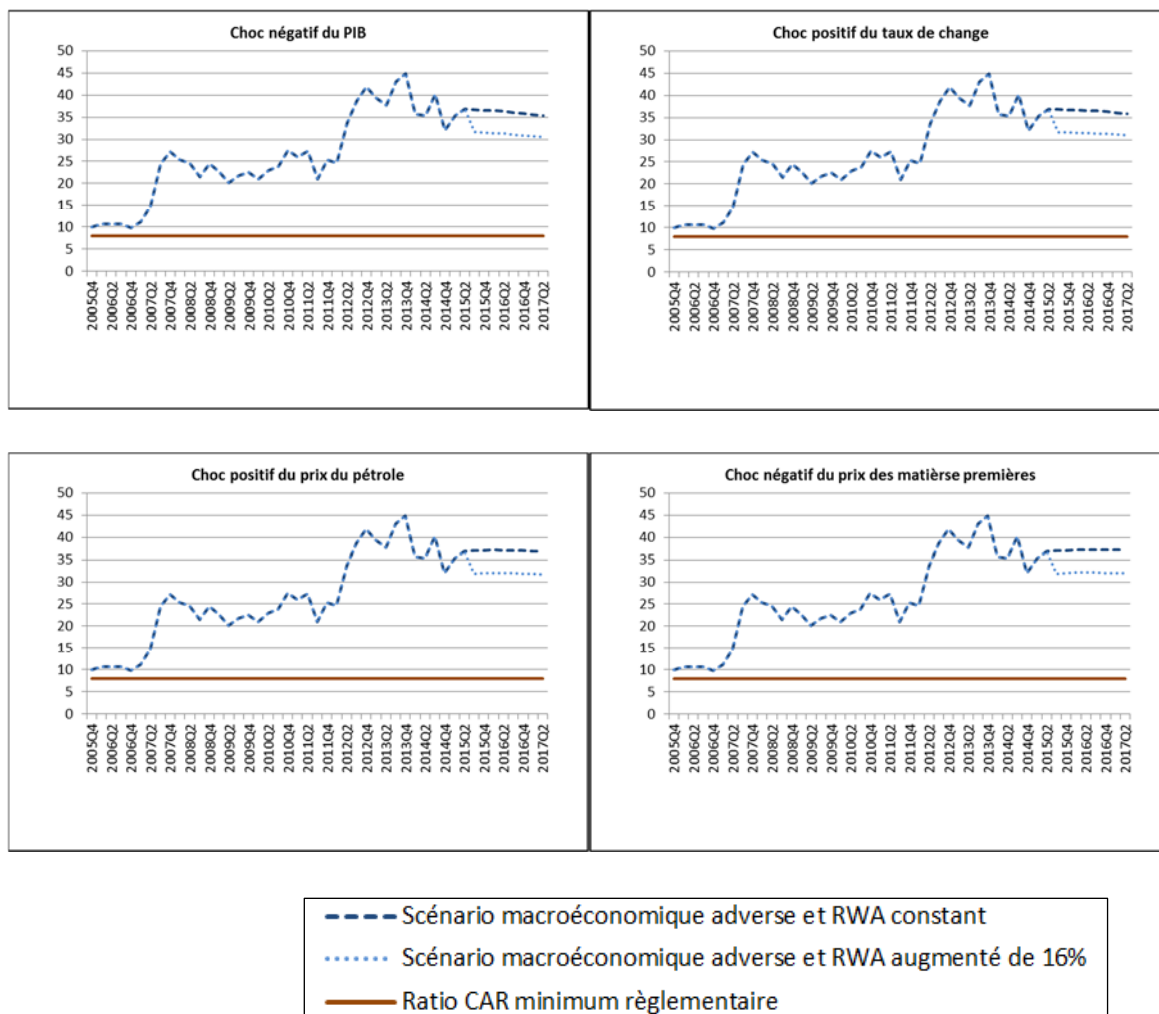
Figure 6- Projection de capitaux propres pour la Banque C



Axe des ordonnées : le pourcentage du CAR de chaque banque

Source : calculs de l'auteur

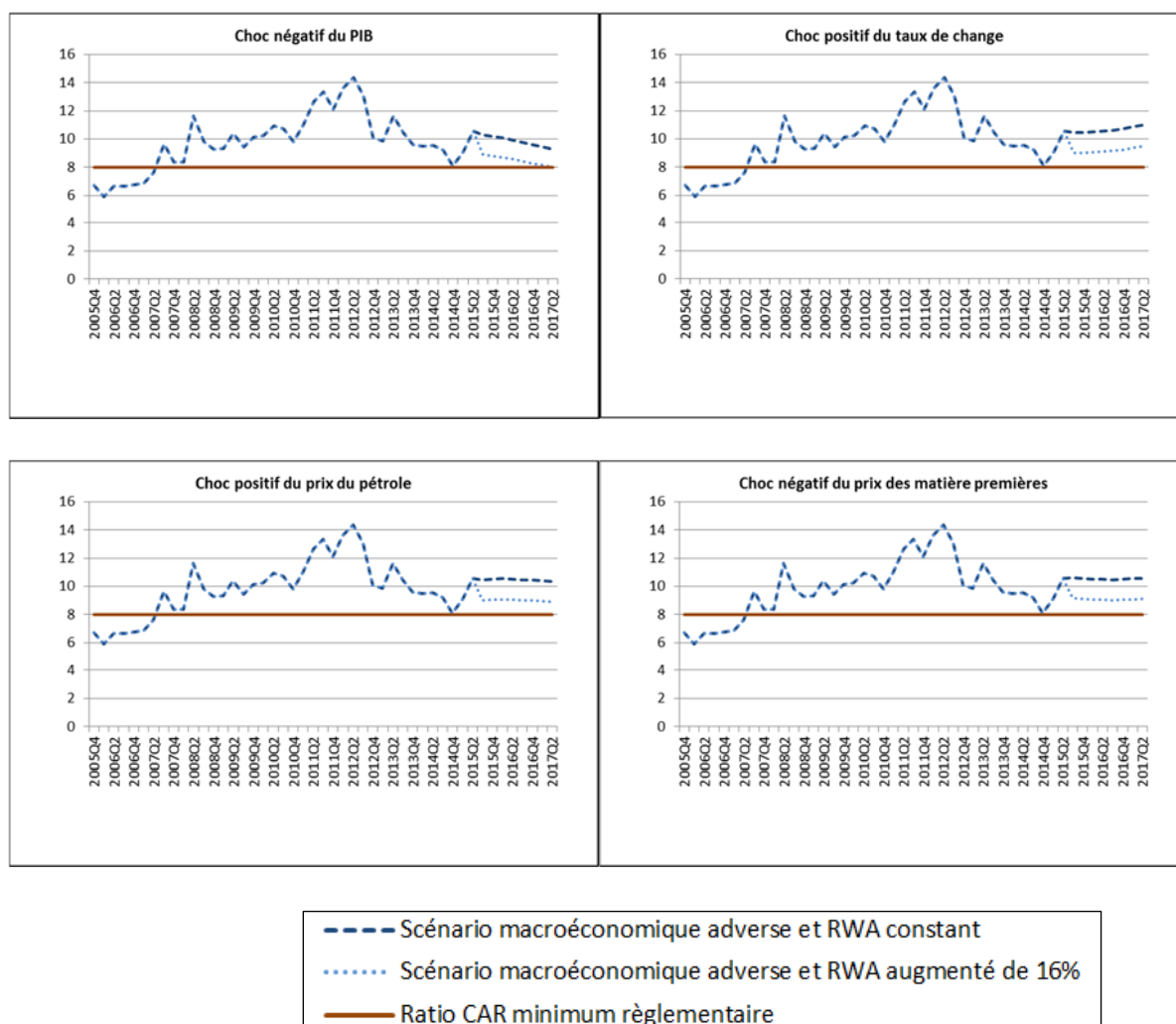
Figure 7- Projection de capitaux propres pour la Banque D



Axe des ordonnées : le pourcentage du CAR de chaque banque

Source : calculs de l'auteur

Figure 8- Projection de capitaux propres pour la Banque E



Axe des ordonnées : le pourcentage du CAR de chaque banque

Source : calculs de l'auteur

Figure 9- Projection de capitaux propres pour la Banque F



*Axe des ordonnées : le pourcentage du CAR de chaque banque*

*Source : calculs de l'auteur*

Les résultats sur la projection des capitaux propres sous les différents scénarios montrent le potentiel d'absorption de risque de crédit des banques. Globalement, la plupart des banques ont pu respecter le seuil minimum de fonds propres, c'est-à-dire le ratio de capital de première catégorie de 8%. Pour la première hypothèse de scénarios défavorable, c'est le choc négatif du PIB qui engendre plus d'impact sur la diminution des fonds propres de toutes les banques, suivi du choc du prix de pétrole. En effet, ces impacts sont issus de l'ampleur des conséquences de ces chocs sur la détérioration du crédit bancaire. Les tableaux dans l'annexe 6 montrent les détails sur l'évolution de la baisse des fonds propres de chaque banque durant les horizons de trimestres futurs.

Pour le choc négatif du PIB, ce sont les banques A, C et F qui ont subi une forte diminution de fonds propres. La banque B est la seule qui possède un ratio de CAR au-dessous de 8% même si l'ampleur de l'impact du choc du PIB sur cette banque est moindre par rapport aux trois banques précédentes. Cela est dû sur le fait qu'à la fin de deuxième trimestre de 2015, le ratio de fonds propres de la banque B se trouve juste au-dessus du minimum avec un ratio de CAR de 8.59%.

Le choc du prix de pétrole engendre également une baisse du ratio de fonds propres des banques mais avec une variation moindre par rapport au choc du PIB. Les effets des chocs sur le taux de change et les prix des matières premières sur les ratios de fonds propres des banques restent modestes.

En regardant l'impact des scénarios défavorables avec l'hypothèse d'augmentation de 16% des actifs pondérés par les risques, les ratios de fonds propres des banques connaissent une chute considérable pour tous types de chocs tandis que la variation de cette baisse, comparée à la diminution engendrée par les scénarios de la première hypothèse, diffère d'une banque à l'autre. En effet, avec l'augmentation des actifs pondérés par les risques, les ratios de fonds propres des banques A, D et E sont les plus affectés, et suivis de ceux des banques C et F. Le ratio de fonds propres de la banque B connaît une variation négative moindre par rapport aux autres banques.

Le paragraphe suivant fournit une discussion par rapport à ces résultats des scénarios défavorables sur les capitaux propres des banques.

## V. Discussions des résultats du stress test sur la capitalisation des banques

### 1. Relation entre le ratio de risque de crédit des banques individuelles et les variables macroéconomiques et financières

#### 1.1. Relation entre le ratio NPL et les indicateurs macroéconomiques

##### – Relation négatif entre le ratio NPL et le PIB

Comme le résultat du modèle GMM de l'estimation des données de panel indique, le risque de crédit tend à augmenter lorsque la conjoncture économique se détériore. Ce résultat s'aligne avec les différentes théories sur le cycle économique et le risque de crédit que les conditions macroéconomiques affectent la qualité des prêts des établissements bancaires. Ce résultat témoigne la vulnérabilité d'une partie des emprunteurs aux chocs macroéconomiques et donc la détérioration de leur capacité à rembourser leurs dettes en situation économique défavorable.

##### – Relation entre le risque de crédit et les variables de contrôle : IPC et TCER

Le taux d'inflation est corrélé de manière négative mais non significatif au ratio NPL, ce qui implique que le risque de crédit est insensible par rapport à l'évolution du taux d'inflation. La relation négative s'explique par le fait qu'une inflation plus élevée affaiblit la capacité des emprunteurs à assurer le service de leur dette en réduisant leurs revenus réels. Ce résultat non significatif est cohérent avec celui de Castro (2013), qui explique que l'inflation affecte non seulement la valeur réelle des prêts en cours, mais aussi le revenu réel des emprunteurs. Ainsi, un effet est pratiquement annulé par l'autre et l'impact final de l'inflation sur le risque de crédit est annulé.

La relation négative entre le taux de change effectif réel (TCER) et le ratio NPL indique qu'une dépréciation (appréciation) de la monnaie locale contribue à une baisse (hausse) du ratio des prêts non performants. En effet, la dépréciation réelle de la monnaie locale (hausse du TCER) favorise la compétitivité des entreprises exportatrices et améliore ainsi leur capacité de remboursement, réduisant ainsi les opérations de prêts non performants. Ce résultat se concorde avec les conclusions trouvées par de Beck, *et al.*, (2013), Chaibi et Ftiti (2015) et Dua et Kapur (2017).



## 1.2. Relation entre le risque de crédit et les variables bancaires

### – Relation le ratio NPL et NPL-1

La significativité positive du ratio NPL retardée signifie que les prêts improductifs vont probablement augmenter quand ils ont augmenté l'année précédente, cela est dû aux amortissements. La persistance de la croissance du ratio NPL est également confirmée par les travaux précédents tels que Sorge et Virolainen (2006), Beck, *et al.* (2013).

### – Relation positive entre NPL et le ratio des prêts sur dépôt *LtD*

Le ratio crédit sur dépôts mesure la liquidité et reflète l'attitude des banques à l'égard du risque, ce ratio est également associé à l'hypothèse de «risque moral». Les résultats qui montrent un effet positif significatif sur le ratio des prêts non performants confirment l'hypothèse de risque moral et s'alignent avec les conclusions de Dimitrios, *et al.* (2016) et Koju, *et al.* (2018). L'augmentation du ratio des prêts sur dépôts révèle une préférence pour le risque et devrait entraîner une hausse des prêts non productifs de revenu. En effet, dans le but d'obtenir plus de rentabilité, les banques accordent des prêts sans maintenir la qualité du crédit, ce qui peut réduire la qualité des prêts et, par conséquent, augmenter le ratio des prêts non productifs.

### – Relation entre NPL, le ratio de levier (LR) et la taille (SIZE)

La relation négative non significative entre le ratio NPL et le ratio de levier n'est pas en faveur de l'hypothèse «trop grand pour faire faillite» sur la prise de risque. Cette hypothèse prédit que plus le passif est élevé par rapport à l'actif total, plus la probabilité de prêts douteux devrait être élevée. Une explication pourrait être fournie par les travaux de Louzis, *et al.* (2012) qui montrent que la relation entre le ratio de levier avec le risque de crédit est conditionnée par la taille des banques. Ces résultats suggèrent que l'effet de levier tend à augmenter les NPL, mais cet effet ne se produit que jusqu'à un certain seuil de taille. Après ce seuil, l'effet de levier n'a pas d'effet positif sur les NPL, ce qui signifie que parmi les grandes banques, il n'y a pas d'effet « trop grand pour faire faillite » sur les NPL. C'est-à-dire que les banques de petite taille ont tendance à augmenter leur ratio de levier en élargissant les prêts à des emprunteurs de qualité non fiables et ont donc plus de prêts non performants. Or, le secteur bancaire est constitué principalement par les banques de grande taille, les quatre banques sur six de notre échantillon détiennent plus de 80% du total de l'actif, ce qui explique cette relation non significative, traduite par le fait que l'augmentation de la dette ne conduit pas à une hausse des prêts non performants.

Pour la relation directe entre la taille des banques et le risque de crédit, les résultats montrent un effet négatif significatif. Ceci s'explique par le fait que contrairement aux résultats des autres travaux précédents [comme Louzis, *et al.* (2012), Asamoah et Adjare (2015) Chaibi et Ftiti (2015)], seules les banques de petite taille prennent de risques excessifs en augmentant leur endettement et ont donc davantage de ratio de prêts non performants. Ce résultat s'aligne avec les conclusions de Lis *et al.* (2001) qui ont trouvé également une relation négative entre la NPL et la taille des banques. L'explication réside dans le fait que la taille reflète la force et l'asymétrie de l'information de la banque en raison de la disponibilité d'une main-d'œuvre hautement qualifiée et de bases technologiques. De plus, les grandes banques surveillent régulièrement les prêts, elles ont une meilleure politique de gestion des risques et des possibilités de diversification élevées.

– Relation négative entre NPL et le rendement des passifs ROE

La relation négative entre l'indicateur de performance (ROE) et le risque de crédit appuie l'hypothèse de «mauvaise gestion» et s'aligne avec les conclusions trouvées par les travaux de Louzis, *et al.* (2012), Makri, *et al.* (2014) Dimitrios, *et al.* (2016). En effet, la performance sert d'indicateur de la qualité de la gestion. Les banques qui se caractérisent par une forte rentabilité sont moins susceptibles de participer à des activités dangereuses, telles que l'octroi de prêts risqués et sont capable de gérer le risque de crédit.

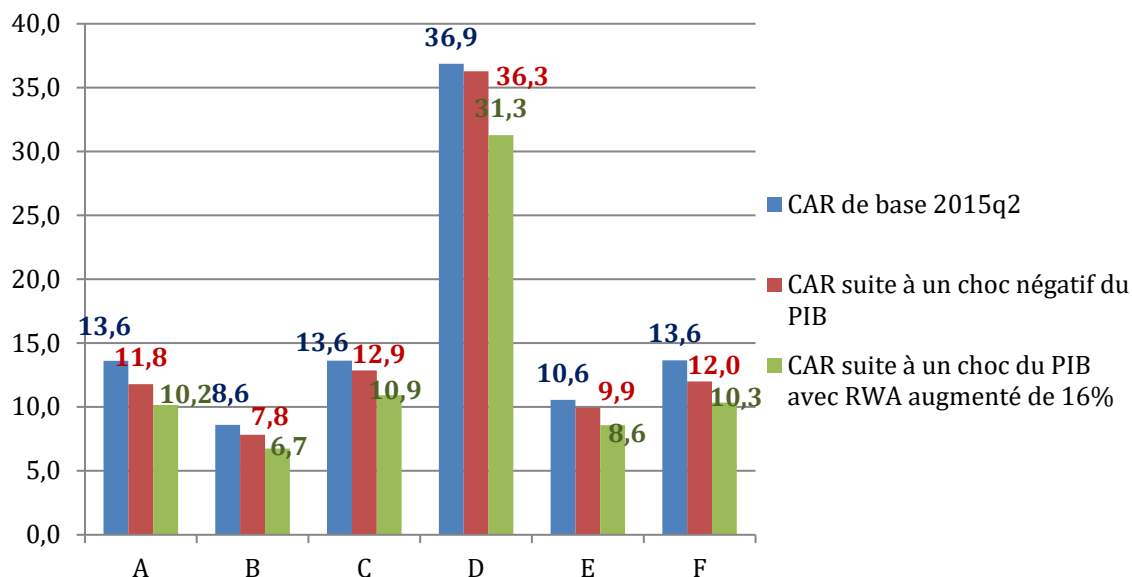
## 2. Projection sur les capitaux propres des banques sous les scénarios de stress test

Les résultats des exercices de stress test sur les banques montrent que durant le scénario de référence c'est-à-dire à la fin du second semestre de 2015, le système bancaire est bien capitalisé au regard du dispositif d'adéquation des fonds propres de Bâle III avec un ratio de capital supérieur au seuil minimum de 8%. En revanche, durant les scénarios de stress test, un affaiblissement de l'adéquation de fonds propres des banques est constaté. De ce fait, tous les établissements de crédits font face à une baisse de leurs fonds propres durant les périodes de tensions macroéconomiques.

L'analyse de la répartition des niveaux de fonds propres a révélé une certaine divergence entre les banques. Durant les scénarios macroéconomiques défavorables considérés dans l'hypothèse 1, la plupart des banques disposent de très bons indicateurs avec un ratio de capital supérieur à 12% et certaines d'entre elles se situent à l'intérieur d'une fourchette étroite entre 8 à 12% et une seule (banque B) se trouve à un niveau de fonds propres inférieur à 8% (figure 10 et les figures dans l'annexe 5 à l'appui).

En appliquant les scénarios considérés en hypothèse 2 avec l'augmentation de 16% des actifs pondérés par les risques, la majorité des fonds propres des banques se concentrent entre 8 à 12%. Le ratio de capital d'une banque se trouve toujours au-dessous du seuil minimum (banque B) et seule une banque détient un ratio d'adéquation de fonds propres largement supérieur à 12% (banque D).

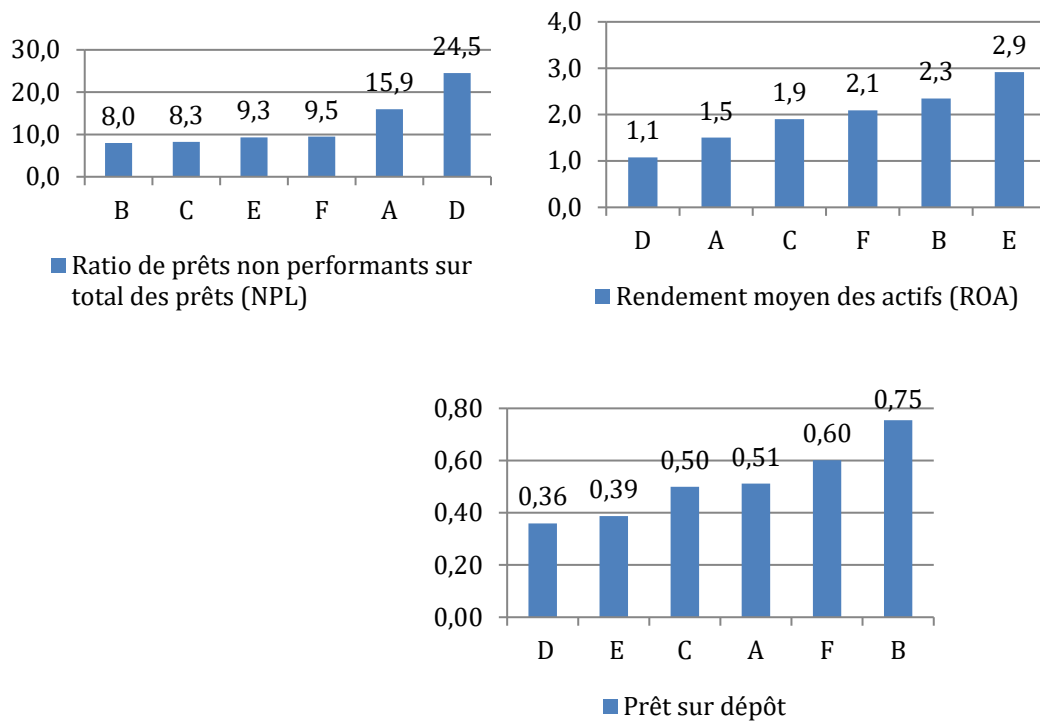
**Figure 10- Projection du ratio d'adéquation des capitaux propres (CAR) des banques sous les scénarios macroéconomiques défavorables : choc négatif du PIB**



*Note : L'axe des ordonnées montre le ratio des capitaux propres des banques après quatre trimestres en pourcentage. L'axe des abscisses présente les banques. Source : calculs de l'auteur.*

Les banques qui ont les mêmes caractéristiques après les scénarios de chocs macroéconomiques (A, C, E et F) sont celles qualifiées de grande taille avec un actif entre 16 à 27% de l'actif total du secteur bancaire. Les deux autres banques (B et D) se caractérisent par leur taille qui peut être qualifiée de petite par rapport aux autres banques de l'échantillon avec un pourcentage d'actif respectivement autour de 5% et de 3%. Toutefois, leurs comportements pendant les périodes défavorables se divergent complètement. La figure 11, qui montre l'évolution des ratios moyens des variables bancaires, servira d'appui pour l'explication des situations des banques dans les conditions de stress test.

Figure 11- Ratios moyens des variables bancaires (en abscisses) entre 2005 à 2015



Source : BCM 2015, calculs de l'auteur

Les banques de petite taille (D et B) :

*Banque D*

La projection des capitaux propres présentée dans la figure 23 précédente montre une banque (D) qui se caractérise par une adéquation de fonds propres extrêmement élevée. Cette banque se trouve parmi les banques de petite taille de l'échantillon dont l'actif est de 3% de l'actif total du secteur. En effet, le ratio d'adéquation des fonds propres tient compte de la taille des banques. Banai, *et al.*, (2014) ont également noté que ce sont les petites banques qui ont tendance à détenir un ratio élevé d'adéquation de fonds propres, car il serait très coûteux pour les grandes banques de détenir des multiples du montant requis.

L'explication de cette forte capitalisation réside également dans le fait que malgré l'importance du risque de crédit au sein de la banque D par rapport aux autres banques (figure 24, NPL), ses emprunteurs sont moins affectés par la détérioration de l'environnement macroéconomique (voir figure 16 et les résultats sur les risques de crédit). En d'autres termes, la plupart des crédits de cette banque ne sont octroyés qu'à des emprunteurs de qualité. La faiblesse du ratio des prêts sur dépôt de cette banque témoigne également ce fait.

### *Banque B*

Contrairement à la banque D, la banque B qui se trouve au-dessous du seuil minimum après les scénarios de chocs, étant donné que le risque de crédit de cette banque est le plus faible de toutes les banques (figure 11, NPL). Cela est dû au fait que les crédits de cette banque figurent parmi les plus exposés aux chocs macroéconomiques (cf. figure 3 et les résultats sur les risques de crédit). En d'autres termes, les emprunteurs de la banque B sont plus affectés par les conditions macroéconomiques défavorables. De plus, cette faiblesse de résistance est due également à l'ampleur des prêts octroyés par cette banque par rapport au dépôt avec un pourcentage de 75% (figure 11, prêt sur dépôt). En termes de prise de risque, la situation de cette banque vérifie l'hypothèse de « risque moral ». En effet, la banque se focalise surtout sur l'accroissement de la rentabilité et pour ce faire, elle accorde des prêts sans maintenir la qualité de l'emprunteur, ce qui réduit la qualité des prêts surtout en période de détresse et engendre par la suite l'augmentation du ratio des prêts non productifs. La figure 11 montre que la banque B figure parmi les plus rentables par rapport aux autres banques en se référant au rendement des actifs (ROA) qui mesure le rapport entre le profit et le total de l'actif.

### Les banques de grande taille (A-C-F et E) :

Les banques plus capitalisées sont celles qualifiées de grandes banques et détiennent des fonds propres entre 8 à 12% après les scénarios de chocs (figure 10). Plus précisément, trois de ces banques détiennent plus de 10% de fonds propres même après les scénarios extrêmes de l'hypothèse 2 (A, C et F) ; pour l'une d'entre elles (banque E), le ratio de capital baisse en dessous de 10% sous les deux hypothèses de chocs.

### *Banques A, C et F*

Pour les banques A, C et F, la moitié de leur dépôt sont affectés aux prêts (cf. figure 11, prêt sur dépôt). De ce fait, durant les périodes de récession, même si ces banques sont également exposées aux risques de crédits lors des situations macroéconomiques défavorables, elles arrivent à détenir des fonds propres nécessaires. Ces banques diversifient donc leurs activités en utilisant l'autre moitié des dépôts à d'autres activités génératrices de revenus telles que les portefeuilles de transaction, les portefeuilles d'investissement et les opérations en monnaies étrangères ; et obtiennent par conséquent diverses sources de revenus hors intérêts. Ces différentes sources de revenus permettent à ces banques d'être plus résistantes même durant les situations de détresse vu que leurs profits ne dépendent pas uniquement des prêts.

En effet, sur la base des résultats sur la réaction des risques de crédit, même si l'une de ces banques (A) est la plus exposée aux risques lors des récessions tandis que les deux autres sont légèrement affectées, elle arrive à maintenir un ratio d'adéquation de fonds propres élevé durant les périodes de chocs. Cette aversion aux risques plus prononcée s'explique par le fait que les emprunteurs de cette banque sont sensibles aux conditions macroéconomiques d'une part, et d'autre part, la qualité des emprunteurs est plus faible par rapport à celles des deux autres (C et F). En d'autres termes, sur la base des 50% de leurs dépôts transformés en prêts, en moyenne 15% des prêts de la banque A sont improductifs alors que pour les deux autres, ce ratio est autour de 8% seulement. Néanmoins, vu que cette banque (A) arrive à maintenir un niveau de fonds propres comme les deux autres banques en période de résistance grâce aux autres sources de revenus, elle peut être ainsi considérée d'avoir une forte capacité d'absorption des chocs macroéconomiques.

Quant aux deux autres banques (C et F), elles peuvent être considérées comme sélectives en termes d'octroi de crédit. Leurs emprunteurs sont faiblement sensibles à la détérioration de la situation macroéconomique. De ce fait, elles arrivent à détenir des fonds propres en dessous du seuil minimum durant les scénarios défavorables (figure 16).

#### *Banque E*

Pour la banque E qui fait partie des grandes banques, elle se distingue des trois banques précédentes (A, C et F) par le fait qu'elle a un ratio de fonds propres inférieur à 10% après les hypothèses de chocs macroéconomiques (figure 10). En effet, cette banque est la plus faiblement affectée par le risque de crédit en période de chocs macroéconomiques (figure 3) et qui sélectionne également ses emprunteurs comme les banques C et F. A la différence des deux autres (C et F), elle privilégie largement les autres sources de revenus par rapport au financement de l'économie : seulement 38% de ces dépôts sont convertis en prêt malgré sa taille. C'est ainsi qu'elle est la plus rentable en termes de rendement des actifs (ROA), (cf. figure 11). Toutefois, elle n'arrive pas à détenir autant de fonds propres en période de chocs contrairement aux trois grandes banques (A, C et F), c'est-à-dire supérieur à 10%. Cela s'explique par le fait que le ratio des capitaux propres en période normale de cette banque est moindre par rapport à celui des autres banques, avec un pourcentage de 10.3% contre 13.6% (figure 10). Plus précisément, le capital et les réserves de la banque E sont plus faibles par rapport à ceux des trois autres banques, voire la moitié, et cela affaiblit en conséquence le ratio d'adéquation de fonds propres en période de tension macroéconomique.

## CONCLUSION GENERALE

Nous avons effectué un exercice de stress test macroéconomique du risque de crédit auprès de chaque banque. Les ratios d'adéquation de capitaux propres ont servi d'indicateur pour mesurer la stabilité des banques vis-à-vis des événements macroéconomiques défavorables. D'abord, la littérature sur le stress test de risque de crédit sur les banques individuelles a mis en évidence l'importance des facteurs spécifiques à chaque banque à part les facteurs macroéconomiques. En effet, la relation entre le risque de crédit et les variables bancaires notamment l'efficacité et la capitalisation des banques est fondée sur des hypothèses formulées initialement par (Berger et DeYoung (1997)), entre autres l'hypothèse de «mauvaise gestion» notant que le faible rapport entre coût et efficacité est positivement associé à des augmentations des NPL futurs, et l'hypothèse de l'«aléa moral» dont la faible capitalisation des banques conduit à une augmentation des prêts improductifs. Plus tard, ces hypothèses ont été approfondies et élargies par d'autres hypothèses comme l'hypothèse de «diversification» stipulant que la taille de la banque et la proportion des revenus hors intérêts en proportion du revenu total sont négativement liées aux prêts non performants; et l'hypothèse de «trop grand pour faire faillite» qui soutient que les grandes banques prennent des risques excessifs en augmentant leur influence sur la présomption d'être grand pour échouer et possède en conséquence plus de prêts improductifs.

La littérature sur le stress test du risque de crédit a également montré le caractère cyclique des capitaux propres des banques. Les situations macroéconomiques défavorables affectent non seulement le risque de crédit des banques mais aussi leurs fonds propres. Les travaux empiriques sur la relation entre le risque de crédit, la capitalisation et la stabilité des banques sont classés en trois groupes. Certains travaux notent la relation positive entre le ratio du capital et le risque de crédit tandis que d'autres soutiennent l'effet inverse entre le ratio de capital élevé et le risque de crédit, et il y a aussi ceux qui mentionnent l'absence de relation entre ces deux indicateurs. Par contre la littérature apporte une vision commune sur les ratios de capital élevés qui sont associés à une grande efficacité et à une grande rentabilité des banques.

Ensuite, l'application du stress test macroéconomique sur les banques de Madagascar a été effectuée en trois étapes. Premièrement, la relation entre l'indicateur de risque de crédit de toutes les banques avec les variables macroéconomiques et les variables bancaires est estimée à l'aide d'un modèle de panel dynamique en utilisant l'estimateur GMM d'Allerano-Bond (1991). Deuxièmement, les ratios NPL sont soumis aux différents scénarios de chocs macroéconomiques. Les scénarios utilisés pour les banques sont identiques aux

scénarios de chocs appliqués au secteur bancaire agrégé, générés à partir du modèle GVAR. Troisièmement, les réactions des ratios NPL sont traduites au sein des capitaux propres de chaque banque afin de mesurer leurs résistances face aux scénarios défavorables.

Enfin, les résultats du stress test macroéconomique auprès des banques individuelles ont mis en évidence que la plupart des banques restent capitalisées après les chocs macroéconomiques. Il est toutefois à noter que l'exposition des banques au risque de crédit ne dépend pas de leurs tailles. Les différents scénarios de chocs macroéconomiques affectent le risque de crédit de toutes les banques, notamment le choc négatif du PIB, mais avec un degré différent. Les résultats ont montré que parmi les banques les plus affectées par le risque de crédit lors de la survenance de chocs macroéconomiques figurent une grande banque et une petite banque. Pour la capitalisation des banques sous les scénarios défavorables, en plus des scénarios de chocs macroéconomiques (hypothèse 1), une autre hypothèse d'augmentation des actifs pondérés par les risques des banques a été également considérée (hypothèse 2). Les résultats au niveau de chaque banque ont montré que seule une banque n'arrive pas à détenir un ratio d'adéquation de capitaux propres supérieur au minimum réglementaire de 8% après les scénarios. Cette banque figure parmi les plus affectées par le risque de crédit. Parmi les autres banques qui arrivent à détenir un niveau de capital supérieur au minimum requis, il y a celle qui détient un capital suffisamment large que même si elle est également sensible au risque de crédit, elle arrive à absorber les chocs. Certaines d'entre elles, principalement composées par les banques de grande taille, détiennent un ratio de capital supérieur à 10% même après les scénarios sévères de la deuxième hypothèse. En effet, l'exposition des banques au risque de crédit dépend notamment de la sensibilité des emprunteurs en situation économique défavorable. Autrement dit, certaines banques octroient en prêt la majorité de leurs dépôts alors que les prêts improductifs sont faiblement sensibles en période de contraction économique. A part la sélection de la qualité des crédits à octroyer, la solidité des banques s'explique aussi par le fait qu'elles diversifient leurs activités aux autres sources de revenus hors intérêt, ce qui leur permet d'avoir des ratios de capitaux propres suffisants après les situations de chocs.



## BIBLIOGRAPHIE

- ABID, L., M. N. OUERTANI, and S. ZOUARI-Ghorbel (2014): "Macroeconomic and Bank-Specific Determinants of Household's Non-Performing Loans in Tunisia: A Dynamic Panel Data," *Procedia Economics and Finance*, 13, 58-68.
- ABOAGYE, A. Q., and E. AHENKORA (2018): "Stress Testing Exposure of Banks to Sectors of the Ghanaian Economy," *Journal of African Business*, 19, 27-38.
- ALESSI, L., and C. DETKEN (2009): "'Real Time'early Warning Indicators for Costly Asset Price Boom/Bust Cycles: A Role for Global Liquidity," *European Journal of Political Economy*, 27, 520-533.
- ALLEN, W. A., and G. WOOD (2006): "Defining and Achieving Financial Stability," *Journal of Financial Stability*, 2, 152-172.
- ANGINER, D., and A. DEMIRGUC-KUNT (2014): *Bank Capital and Systemic Stability*. The World Bank.
- ARELLANO, M., and S. BOND (1991): "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations," *The review of economic studies*, 58, 277-297.
- ASAMOAH, L., and D. ADJARE (2015): "Determinants of Credit Risk of Commercial Banks in Ghana," *Available at SSRN 2679100*.
- ÅSBERG, P., and H. SHAHNAZARIAN (2008): "Macroeconomic Impact on Expected Default Frequency," *Sveriges Riksbank Working Paper Series*.
- AYUSO, J., D. PÉREZ, and J. SAURINA (2004): "Are Capital Buffers Pro-Cyclical?: Evidence from Spanish Panel Data," *Journal of financial intermediation*, 13, 249-264.
- AZOFRA, V., and M. SANTAMARÍA (2011): "Ownership, Control, and Pyramids in Spanish Commercial Banks," *Journal of Banking & Finance*, 35, 1464-1476.
- BABOUČEK, I., and M. JANČAR (2005): *Effects of Macroeconomic Shocks to the Quality of the Aggregate Loan Portfolio*. Czech National Bank.
- BANERJEE, S., and D. MURALI (2015): "Stress Test of Banks in India: A Var Approach."
- BANKER, R. D., H. CHANG, and S.-Y. LEE (2010): "Differential Impact of Korean Banking System Reforms on Bank Productivity," *Journal of Banking & Finance*, 34, 1450-1460.

BARTH, J. R., C. LIN, Y. MA, J. SEADE, and F. M. SONG (2013): "Do Bank Regulation, Supervision and Monitoring Enhance or Impede Bank Efficiency?," *Journal of Banking & Finance*, 37, 2879-2892.

BCM (2015a): "Rapport Sur La Stabilité Financière N°1".

BCM (2015b): "Rapport Sur La Stabilité Financière N°2".

BCM (2016): "Rapport Sur La Stabilité Financière N°3".

BECK, R., P. JAKUBIK, and A. PILOIU (2013): "Non-Performing Loans: What Matters in Addition to the Economic Cycle?."

BERGER, A. N., and C. H. BOUWMAN (2013): "How Does Capital Affect Bank Performance During Financial Crises?," *Journal of Financial Economics*, 109, 146-176.

BERGER, A. N., and R. DEYOUNG (1997): "Problem Loans and Cost Efficiency in Commercial Banks," *Journal of Banking & Finance*, 21, 849-870.

BESANKO, D., and G. KANATAS (1996): "The Regulation of Bank Capital: Do Capital Standards Promote Bank Safety?," *Journal of financial intermediation*, 5, 160-183.

BIKKER, J., and P. METZEMAKERS (2002): "Bank Provisioning Behavior and Procyclicality, Dnb Staff Reports, No. 111".

BIKKER, J. A., and H. HU (2001): "Cyclical Patterns in Profits, Provisioning and Lending of Banks and Procyclicality of the New Basel Capital Requirements," *Research Series Supervision*, 39.

BIS (2008): "Principles for Sound Liquidity Risk," *Basel Committee on Banking Supervision*.

BIS, B. C. O. B. S.-. (2017): "Finalising Basel III in Brief."

BITAR, M., K. PUKTHUANHONG, and T. WALKER (2018): "The Effect of Capital Ratios on the Risk, Efficiency and Profitability of Banks: Evidence from Oecd Countries," *Journal of International Financial Markets, Institutions and Money*, 53, 227-262.

BLASCHKE, W., M. S. M. PERIA, G. MAJNONI, and M. T. JONES (2001): *Stress Testing of Financial Systems: An Overview of Issues, Methodologies, and Fsap Experiences*. International Monetary Fund.

BLAVARG, M., and P. NIMANDER (2002): "Interbank Exposures and Systemic Risk," *Citeseer*, 287-305.

BLUM, J. (1999): "Do Capital Adequacy Requirements Reduce Risks in Banking?," *Journal of Banking & Finance*, 23, 755-771.

BONGINI, P., L. LAEVEN, and G. MAJNONI (2002): "How Good Is the Market at Assessing Bank Fragility? A Horse Race between Different Indicators," *Journal of Banking & Finance*, 26, 1011-1028.

BORGY, V., L. CLERC, and J.-P. RENNE (2009): "Asset-Price Boom-Bust Cycles and Credit: What Is the Scope of Macro-Prudential Regulation?."

BORIO, C. (2003): "Towards a Macroprudential Framework for Financial Supervision and Regulation?," *CESifo Economic Studies*, 49, 181-215.

— (2009): "L'approche Macroprudentielle Appliquée À La Régulation Et À La Surveillance Financières," *Revue de la stabilité financière, Banque de France, septembre*, 35-46.

BORIO, C., M. DREHMANN, and K. TSATSARONIS (2014): "Stress-Testing Macro Stress Testing: Does It Live up to Expectations?," *Journal of Financial Stability*, 12, 3-15.

BORIO, C., C. FURFINE, and P. LOWE (2001): "Procyclicality of the Financial System and Financial Stability: Issues and Policy Options," *BIS papers*, 1, 1-57.

BORIO, C. E., and M. DREHMANN (2009): "Assessing the Risk of Banking Crises—Revisited." *BIS Quarterly Review, March*.

— (2009): "Towards an Operational Framework for Financial Stability:'Fuzzy' measurement and Its Consequences." In *Financial stability, monetary policy and central banking, 12th Annual Conference of the Banco Central de Chile, Santiago, November 6th–7th*.

BRI (2010): " 80e Rapport Annuel: 1er Avril 2009-31 Mars 2010 (Bâle)."

BUSCH, R., P. KOZIOL, and M. MITROVIC (2015): "Many a Little Makes a Mickle: Macro Portfolio Stress Test for Small and Medium-Sized German Banks." *Discussion Papers 23/2015*, Deutsche Bundesbank.

— (2018): "Many a Little Makes a Mickle: Stress Testing Small and Medium-Sized German Banks," *The Quarterly Review of Economics and Finance*, 68, 237-253.

CABRERA, W., J. GUTIÉRREZ RUEDA, and J. MENDOZA (2012): "Credit Risk Stress Testing: An Exercise for Colombian Banks," Banco de la Republica de Colombia.

- CADORET, I., C. BENJAMMIN, F. MARTIN, N. HERRARD, and S. TANGUY (2004): "Econométrie Appliquée: Methodes, Applications," *Corrigés, deboeck*.
- CARUANA, J. (2010): "Systemic Risk: How to Deal with It?," *Bank for International Settlement*.
- CASTRÉN, O., S. DÉES, and F. ZAHER (2008): "Global Macro-Financial Shocks and Expected Default Frequencies in the Euro Area." *Working paper series, No.875*, European Central Bank.
- CASTRÉN, O., T. FITZPATRICK, and M. SYDOW (2008): "Assessing Portfolio Credit Risk Changes in a Sample of Eu Large and Complex Banking Groups in Reaction to Macroeconomic Shocks." *Working paper series, No.1002*, European Central Bank.
- CASTRO, V. (2013): "Macroeconomic Determinants of the Credit Risk in the Banking System: The Case of the Gipsi," *Economic Modelling*, 31, 672-683.
- CATHCART, L., L. EL-JAHEL, and R. JABBOUR (2015): "Can Regulators Allow Banks to Set Their Own Capital Ratios?," *Journal of Banking & Finance*, 53, 112-123.
- CHAIBI, H., and Z. FTITI (2015): "Credit Risk Determinants: Evidence from a Cross-Country Study," *Research in international business and finance*, 33, 1-16.
- CHORTAREAS, G. E., C. GIRARDONE, and A. VENTOURI (2012): "Bank Supervision, Regulation, and Efficiency: Evidence from the European Union," *Journal of Financial Stability*, 8, 292-302.
- CHUDIK, A., and M. H. PESARAN (2014): "Theory and Practice of Gvar Modelling," *Journal of Economic Surveys*, 30, 165-197.
- ČIHÁK, M. (2007): "Introduction to Applied Stress Testing." International Monetary Fund.
- CLAUDIO, B., and P. LOWE (2002): "Assessing the Risk of Banking Crises," *BIS Quarterly Review*, 43-54.
- CLEMENT, P. (2010): "The Term'macroprudential': Origins and Evolution," *BIS Quarterly Review*, March 2010, 59-67.
- COVAS, F. B., B. RUMP, and E. ZAKRAJŠEK (2014): "Stress-Testing Us Bank Holding Companies: A Dynamic Panel Quantile Regression Approach," *International Journal of Forecasting*, 30, 691-713.

- CROCKETT, A. (2000): "Marrying the Micro-and Macro-Prudential Dimensions of Financial Stability." BIS speech before the Eleventh International Conference of Banking Supervisors, held in Basel, 20-21 September 2000.
- CUMMINGS, J. R., and S. WRIGHT (2016): "Effect of Higher Capital Requirements on the Funding Costs of Australian Banks," *Australian Economic Review*, 49, 44-53.
- DANTHINE, J.-P. (2014): "La Mise En Œuvre Des Politiques Macroprudentielles : L'approche Suisse," *Banque de France, Revue de la stabilité financière N° 18*, 106-113.
- DE BANDT, O., and P. HARTMANN (2000): "Systemic Risk: A Survey," *European central Bank Working Paper Series N°35*.
- DELGADO, J., and J. SAURINA (2004): "Riesgo De Crédito Y Dotaciones a Insolvencias. Un Análisis Con Variables Macroeconómicas," *Moneda y Crédito*, 219, 11-41.
- DEMIRGUC-KUNT, A., E. DETRAGIACHE, and O. MERROUCHE (2013): "Bank Capital: Lessons from the Financial Crisis," *Journal of Money, Credit and Banking*, 45, 1147-1164.
- DERMINE, J. (2015): "Basel Iii Leverage Ratio Requirement and the Probability of Bank Runs," *Journal of Banking & Finance*, 53, 266-277.
- DIMITRIOS, A., L. HELEN, and T. MIKE (2016): "Determinants of Non-Performing Loans: Evidence from Euro-Area Countries," *Finance research letters*, 18, 116-119.
- DREGER, C., and Y. ZHANG (2013): "Is There a Bubble in the Chinese Housing Market?," *Urban Policy and Research*, 31, 27-39.
- DREHMANN, M. (2005): "A Market Based Macro Stress Test for the Corporate Credit Exposures of Uk Banks."
- (2009): "Macroeconomic Stress Testing Banks: A Survey of Methodologies," *Stress Testing the Banking System: Methodologies and Applications*, ed. by M. Quagliariello. Cambridge University Press, Cambridge, UK, 37-67.
- DREHMANN, M., A. PATTON, and S. SORENSEN (2006): "Corporate Defaults and Macroeconomic Shocks: Non-Linearities and Uncertainty," *Bank of England, mimeo*.

- DUA, P., and H. KAPUR (2017): "Macro Stress Testing of Indian Bank Groups," *Margin: The Journal of Applied Economic Research*, 11, 375-403.
- EDIZ, T., I. MICHAEL, and W. PERRAUDIN (1998): "The Impact of Capital Requirements on Uk Bank Behaviour," *Economic Policy Review*, 4.
- ELSINGER, H., A. LEHAR, and M. SUMMER (2006): "Risk Assessment for Banking Systems," *Management science*, 52, 1301-1314.
- ERICSSON, N. R., and E. L. REISMAN (2012): "Evaluating a Global Vector Autoregression for Forecasting," *International Advances in Economic Research*, 18, 247-258.
- EVANS, O., A. M. LEONE, M. GILL, P. HILBERS, W. BLASCHKE, R. KRUEGER, M. MORETTI, J. NAGAYASU, M. O BRIEN, and J. T. BERGE (2000): *Macroprudential Indicators of Financial System Soundness*. Citeseer.
- FAMA, E. F. (1980): "Agency Problems and the Theory of the Firm," *Journal of political economy*, 88, 288-307.
- FELDKIRCHER, M., and F. HUBER (2016): "The International Transmission of Us Shocks—Evidence from Bayesian Global Vector Autoregressions," *European Economic Review*, 81, 167-188.
- FELL, J. (2007): "Micro Data Needs for Financial Stability Analysis."
- FMI (2008): "Indicateur De Solidité Financière : guide d'établissement," International Monetary Fund.
- FOGLIA, A. (2008): "Stress Testing Credit Risk: A Survey of Authorities' Approaches." *Bank of Italy occasional paper* No.37.
- FORNARI, F., and W. LEMKE (2009): "A Simple Model for Predicting Economic Activity in Main Economic Areas," *European Central Bank, mimeo*.
- FSB (2011): "Macroprudential Policy Tools and Frameworks Update to G20 Finance Ministers and Central Bank Governors", *unpublished (February 2011)*.
- GALATI, G., and R. MOESSNER (2011): "Macroprudential Policy—a Literature Review," *BIS Working Papers No 337*
- GALESI, A., and M. J. LOMBARDI (2009): "External Shocks and International Inflation Linkages: A Global Var Analysis." *Working paper series No.1062*, European Central Bank.

GALESI, A., and V. L. SMITH (2014): "Gvar Toolbox 2.0."

GAMBACORTA, L., and P. E. MISTRULLI (2004): "Does Bank Capital Affect Lending Behavior?," *Journal of Financial Intermediation*, 13, 436-457.

GAMBACORTA, L., and H. S. SHIN (2016): "Why Bank Capital Matters for Monetary Policy," *Journal of Financial Intermediation*, 35, 17-29.

GORDY, M. B., and B. HOWELLS (2006): "Procyclicality in Basel Ii: Can We Treat the Disease without Killing the Patient?," *Journal of financial intermediation*, 15, 395-417.

GREENWOOD-NIMMO, M., V. H. NGUYEN, and Y. SHIN (2015): "Measuring the Connectedness of the Global Economy." *Melbourne Institute Working Paper Series No.7*.

GUJARATI, D. N. (2009): *Basic Econometrics*. Tata McGraw-Hill Education.

H.DE WET, A., R. VAN EYDEN, and R. GUPTA (2009): "Linking Global Economic Dynamics to a South African-Specific Credit Risk Correlation Model," *Economic Modelling*, 26, 1000-1011.

HADAD, M. D., S. SAFUAN, W. SANTOSO, D. S. BESAR, and I. RULINA (2007): "Macroeconomic Model to Measure the Financial Stability Index: Indonesian Case Study." *Romanian journal of economic forecasting*, 13,81-98.

HADJIXENOPHONTOS, A., and C. CHRISTODOULOU-VOLOS (2018): "Financial Crisis and Capital Adequacy Ratio: A Case Study for Cypriot Commercial Banks," *Journal of Applied Finance and Banking*, 8, 1-6.

HALDANE, A., and V. MADOUROS (2012): "The Dog and the Frisbee". Bank of England.

HASAN, I., and L. D. WALL (2004): "Determinants of the Loan Loss Allowance: Some Cross-Country Comparisons," *Financial review*, 39, 129-152.

HAVRYLCHYK, O. (2010): "A Macroeconomic Credit Risk Model for Stress Testing the South African Banking Sector." MPRA Paper No. 21639.

HEID, F. (2007): "The Cyclical Effects of the Basel Ii Capital Requirements," *Journal of Banking & Finance*, 31, 3885-3900.

HILBERS, P. L. C., and M. T. JONES (2004): *Stress Testing Financial Systems*. International Monetary Fund.

- HIRTLE, B., A. KOVNER, J. VICKERY, and M. BHANOT (2016): "Assessing Financial Stability: The Capital and Loss Assessment under Stress Scenarios (Class) Model," *Journal of Banking & Finance*, 69, S35-S55.
- HOGGARTH, G., S. SORENSEN, and L. ZICCHINO (2005): "Stress Tests of Uk Banks Using a Var Approach." *Working Paper No. 282*, Bank of England.
- HOWARD, S. (2008): "Stress Testing with Incomplete Data: A Practical Guide," Citeseer, 344-355.
- IANNOTTA, G., G. NOCERA, and A. SIRONI (2007): "Ownership Structure, Risk and Performance in the European Banking Industry," *Journal of Banking & Finance*, 31, 2127-2149.
- JIANG, B., B. PHILP, and Z. WU (2014): "Macro Stress Testing in the Banking System of China," *Journal of Banking Regulation*, 1-12.
- JONES, M. T., and P. HILBERS (2004): "Stress Testing Financial Systems: What to Do When the Governor Calls."
- KAPINOS, P., and O. A. MITNIK (2016): "A Top-Down Approach to Stress-Testing Banks," *Journal of Financial Services Research*, 49, 229-264.
- KARMAKAR, S., and L. GAMBACORTA (2018): "Leverage and Risk Weighted Capital Requirements," *International Journal of Central Banking*.
- KASHYAP, A. K., and J. C. STEIN (2004): "Cyclical Implications of the Basel Ii Capital Standards," *Economic Perspectives-Federal Reserve Bank Of Chicago*, 28, 18-33.
- KATTAL, R. (2010): *Credit Risk Model for the Estonian Banking Sector*. Eesti Pank.
- KIEMO, S. M., T. O. OLWENY, W. M. MUTURI, and L. W. MWANGI (2019): "Bank-Specific Determinants of Commercial Banks Financial Stability in Kenya," *Journal of Applied Finance & Banking*, 9, 119-145.
- KIM, D., and A. M. SANTOMERO (1988): "Risk in Banking and Capital Regulation," *The Journal of Finance*, 43, 1219-1233.
- KOEHN, M., and A. M. SANTOMERO (1980): "Regulation of Bank Capital and Portfolio Risk," *The journal of finance*, 35, 1235-1244.



- KOJU, L., R. KOJU, and S. WANG (2018): "Macroeconomic and Bank-Specific Determinants of Non-Performing Loans: Evidence from Nepalese Banking System," *Journal of Central Banking Theory and Practice*, 7, 111-138.
- KOLECEK, L. (2008): "Bankruptcy Laws and Debt Renegotiation," *Journal of Financial Stability*, 4, 40-61.
- KOŠAK, M., S. LI, I. LONČARSKI, and M. MARINČ (2015): "Quality of Bank Capital and Bank Lending Behavior During the Global Financial Crisis," *International review of financial analysis*, 37, 168-183.
- KOSMIDOU, K. V., and K. A. MOUTSIANAS (2015): "Stress Testing the Greek Banking System," *Journal of Finance and Economics*, 3(3), 89-102.
- LAEVEN, L., and R. LEVINE (2009): "Bank Governance, Regulation and Risk Taking," *Journal of financial economics*, 93, 259-275.
- LAEVEN, L., and G. MAJNONI (2003): "Loan Loss Provisioning and Economic Slowdowns: Too Much, Too Late?," *Journal of financial intermediation*, 12, 178-197.
- LAKSTUTIENE, A., A. BREITERYTE, and D. RUMSAITE (2009): "Stress Testing of Credit Risk Lithuania Banks under Simulated Economical Crisis Environment Conditions," *Engineering Economics*, 65.
- LEBLOND, S., and I. BELLEY-FERRIS (2004): "Guide D'économétrie Appliquée À L'intention Des Étudiants Du Cours Ecn 3950."
- LEE, C.-C., and M.-F. HSIEH (2013): "The Impact of Bank Capital on Profitability and Risk in Asian Banking," *Journal of international money and finance*, 32, 251-281.
- LEHMANN, H., and M. MANZ (2006): "The Exposure of Swiss Banks to Macroeconomic Shocks-an Empirical Investigation." *Working paper No 2006-4*, Swiss National Bank.
- LINDQUIST, K.-G. (2004): "Banks' Buffer Capital: How Important Is Risk," *Journal of International Money and Finance*, 23, 493-513.
- LONGIN, F. M. (2000): "From Value at Risk to Stress Testing: The Extreme Value Approach," *Journal of Banking & Finance*, 24, 1097-1130.
- LOUZIS, D. P., A. T. VOULDIS, and V. L. METAXAS (2012): "Macroeconomic and Bank-Specific Determinants of Non-Performing Loans in Greece: A Comparative Study of Mortgage, Business and Consumer Loan Portfolios," *Journal of Banking & Finance*, 36, 1012-1027.

LOWE, P. W. (2002): "Credit Risk Measurement and Procyclicality." *CPB document No.210*, Netherlands Bureau for Economic Policy Analysis.

MAKRI, V., A. TSAGKANOS, and A. BELLAS (2014): "Determinants of Non-Performing Loans: The Case of Eurozone," *Panoeconomicus*, 61, 193-206.

MEANS, G. (1993): *The Modern Corporation and Private Property*. Routledge.

MILES, D., J. YANG, and G. MARCHEGGIANO (2012): "Optimal Bank Capital," *The Economic Journal*, 123, 1-37.

MISHKIN, F. S. (1999): "Global Financial Instability: Framework, Events, Issues," *Journal of economic perspectives*, 13, 3-20.

MISINA, M., and D. TESSIER (2008): "Non-Linearities, Model Uncertainty, and Macro Stress Testing."

MOUSSA, M. A. B. (2018): "Determinants of Bank Capital: Case of Tunisia," *Journal of Applied Finance & Banking*, 8.

NICULA, I. (2013): "Some Aspects Concerning the Measurement of Credit Risk," *Procedia Economics and Finance*, 6, 668-674.

NILI, F., J. MARCUCCI, and M. QUAGLIARIELLO (2005): "Is Bank Portfolio Riskiness Procyclical? Evidence from Italy Using a Vector Autoregression."

ONDER, S., B. DAMAR, and A. A. HEKIMOGLU (2016): "Macro Stress Testing and an Application on Turkish Banking Sector1," *Procedia economics and finance*, 38, 17-37.

PADOA-SCHIOPPA, T. (2003): "Central Banks and Financial Stability: Exploring the Land in Between," *The Transformation of the European Financial System*, 25, 269-310.

PANETTA, F., T. FAEH, G. GRANDE, C. HO, M. KING, A. LEVY, F. M. SIGNORETTI, M. TABOGA, and A. ZAGHINI (2009): "An Assessment of Financial Sector Rescue Programmes," Bank of Italy, Economic Research and International Relations Area.

PAPAIOANNOU, M. G. (2006): *Exchange Rate Risk Measurement and Management: Issues and Approaches for Firms*. International Monetary Fund.

- PASIOURAS, F. (2008): "International Evidence on the Impact of Regulations and Supervision on Banks' Technical Efficiency: An Application of Two-Stage Data Envelopment Analysis," *Review of Quantitative Finance and Accounting*, 30, 187-223.
- PEEK, J., and E. S. ROSENGREN (1995): "Bank Lending and the Transmission of Monetary Policy," Federal Reserve Bank of Boston, 47-68.
- PERIA, M. M. S. M., M. G. MAJNONI, M. M. T. JONES, and M. W. BLASCHKE (2001): *Stress Testing of Financial Systems: An Overview of Issues, Methodologies, and Fsap Experiences*. International Monetary Fund.
- PEROTTI, E., and J. SUAREZ (2009): "Liquidity Insurance for Systemic Crises," *CEPR Policy Insight*, 31, 1-3.
- PESARAN, M. H., T. SCHUERMANN, and L. V. SMITH (2009): "Forecasting Economic and Financial Variables with Global Vars," *International journal of forecasting*, 25, 642-675.
- PESARAN, M. H., T. SCHUERMANN, B.-J. TREUTLER, and S. M. WEINER (2006): "Macroeconomic Dynamics and Credit Risk: A Global Perspective," *Journal of Money, Credit, and Banking*, 38, 1211-1261.
- PESARAN, M. H., T. SCHUERMANN, and S. M. WEINER (2004): "Modeling Regional Interdependencies Using a Global Error-Correcting Macroeconometric Model," *Journal of Business & Economic Statistics*, 22, 129-162.
- PEURA, S., and E. JOKIVUOLLE (2004): "Simulation Based Stress Tests of Banks' Regulatory Capital Adequacy," *Journal of Banking & Finance*, 28, 1801-1824.
- PIERRET, D., and S. STEFFE (2018): "Capital Shortfalls of European Banks Following the 2018 Stress Test ".
- PODPIERA, J., and L. WEILL (2008): "Bad Luck or Bad Management? Emerging Banking Market Experience," *Journal of financial stability*, 4, 135-148.
- QUAGLIARIELLO, M. (2009): *Stress-Testing the Banking System: Methodologies and Applications*. Cambridge University Press.
- RAJAN, R. G. (1994): "Why Bank Credit Policies Fluctuate: A Theory and Some Evidence," *The Quarterly Journal of Economics*, 109, 399-441.

- RAKOTONIRAINY, M., (2021) "La stabilite financiere et stress test macroeconomique du secteur bancaire de Madagascar", universite catholique de madagascar, 2021.
- RAKOTONIRAINY, M., RAZAFINDRAVONONA, J. AND RASOLOMANANA, C. G. D., (2020) "Macro Stress Testing Credit Risak : Case of Madagascar Banking Sector", Journal of Central Banking Theory and Prtaticce, May 2020.
- RASOLOMANANA, C. G. D., (2015): "Concepts et Définitions des Indicateurs de Stabilité Financière (ISF) : Cas de Madagascar". Banky Foiben"i Magadasikara.
- RASOLOMANANA, C. G. D., and IMAM, P. A. (2017): "Renforcement du Cadre de Gestion de Crise Financière : Propositions pour le Cas de Madagascar". Fonds Monétaire International.
- REPULLO, R., and J. SUAREZ (2012): "The Procyclical Effects of Bank Capital Regulation," *The Review of financial studies*, 26, 452-490.
- SALAS, V., and J. SAURINA (2002): "Credit Risk in Two Institutional Regimes: Spanish Commercial and Savings Banks," *Journal of Financial Services Research*, 22, 203-224.
- SAUNDERS, A., E. STROCK, and N. G. TRAVLOS (1990): "Ownership Structure, Deregulation, and Bank Risk Taking," *the Journal of Finance*, 45, 643-654.
- SCHINASI, M. G. J. (2005): *Safeguarding Financial Stability: Theory and Practice*. International Monetary Fund.
- SHEHZAD, C. T., J. DE HAAN, and B. SCHOLTENS (2010): "The Impact of Bank Ownership Concentration on Impaired Loans and Capital Adequacy," *Journal of Banking & Finance*, 34, 399-408.
- SHRIEVES, R. E., and D. DAHL (1992): "The Relationship between Risk and Capital in Commercial Banks," *Journal of Banking & Finance*, 16, 439-457.
- SHU, C. (2002): "The Impact of Macroeconomic Environment on the Asset Quality of Hong Kong's Banking Sector," *Hong Kong Monetary Authority Research Memorandums*, 1-26.
- SINKEY, J. F., and M. B. GREENAWALT (1991): "Loan-Loss Experience and Risk-Taking Behavior at Large Commercial Banks," *Journal of Financial Services Research*, 5, 43-59.
- SORGE, M. (2004): "Stress-Testing Financial Systems: An Overview of Current Methodologies," *BIS Working Papers No 128*.

- SORGE, M., and K. VIROLAINEN (2006): "A Comparative Analysis of Macro Stress-Testing Methodologies with Application to Finland," *Journal of financial stability*, 2, 113-151.
- STAUB, R. B., G. D. S. E SOUZA, and B. M. TABAK (2010): "Evolution of Bank Efficiency in Brazil: A Dea Approach," *European journal of operational research*, 202, 204-213.
- STERN, G. H., and R. J. FELDMAN (2004): *Too Big to Fail: The Hazards of Bank Bailouts*. Brookings Institution Press.
- STOLZ, S., and M. WEDOW (2011): "Banks' Regulatory Capital Buffer and the Business Cycle: Evidence for Germany," *Journal of Financial Stability*, 7, 98-110.
- SUNDARARAJAN, V., C. ENOCH, A. SAN JOSÉ, P. HILBERS, R. KRUEGER, M. MORETTI, and G. SLACK (2002): *Financial Soundness Indicators: Analytical Aspects and Country Practices*. International Monetary Fund Washington, DC.
- SWINBURNE, M. (2008): "The Imf's Experience with Macro Stress Testing<sup>1</sup>," *Simulating Financial Instability*, 58.
- TABAK, B. M., A. C. NORONHA, and D. CAJUEIRO (2011): "Bank Capital Buffers, Lending Growth and Economic Cycle: Empirical Evidence for Brazil," Citeseer.
- TAN, Y. (2016): "The Impacts of Risk and Competition on Bank Profitability in China," *Journal of International Financial Markets, Institutions and Money*, 40, 85-110.
- TAN, Y., and C. FLOROS (2013): "Risk, Capital and Efficiency in Chinese Banking," *Journal of International Financial Markets, Institutions and Money*, 26, 378-393.
- THAKOR, A. V. (2014): "Bank Capital and Financial Stability: An Economic Trade-Off or a Faustian Bargain?," *Annu. Rev. Financ. Econ.*, 6, 185-223.
- TRINNOU, M. G. (2014): "Implementation Du "Stress Test Macroéconomique" Du Risque De Crédit Bancaire Dans L'union Economique Et Monétaire Ouest Africaine (Uemoa)."
- TURAN, H. (2016): "The Weighting of Factors Affecting Credit Risk in Banking," *Procedia Economics and Finance*, 38, 49-53.
- VAN DAN END, J. W., HOEBERICHTS, MARCO, TABBAE, MOSTAFA, ET AL. (2006): "Modelling Scenario Analysis and Macro Stress-Testing," *De Nederlandsche Bank*.

- VAZQUEZ, F., B. M. TABAK, and M. SOUTO (2012): "A Macro Stress Test Model of Credit Risk for the Brazilian Banking Sector," *Journal of Financial Stability*, 8, 69-83.
- VIROLAINEN, K. (2004): "Macro Stress Testing with a Macroeconomic Credit Risk Model for Finland.", *Research Discussion Papers, No 18*, Bank of Finland.
- VU, O. T., Y. H. VU, T. T. NGUYEN, and T. H. BUI (2018): "A Framework for Macro Stress-Testing the Credit Risk of Commercial Banks: The Case of Vietnam," *Asian Social Science*, 14, 1.
- VUKOVIĆ, S. (2014): "Stress Testing of the Montenegrin Banking System with Aggregated and Bank-Specific Data," *Journal of Central Banking Theory and Practice*, 3, 85-119.
- WORRELL, D. (2004): "Quantitative Assessment of the Financial Sector: An Integrated Approach." *Working Papers No. 153*, IMF.
- WU, D., M. FANG, and Q. WANG (2018): "An Empirical Study of Bank Stress Testing for Auto Loans," *Journal of Financial Stability*, 39, 79-89.
- YOUSSEF, A. B. (2018): "Credit Risk Stress Testing of Commercial Banks in Tunisia," *International Journal of Accounting and Finance Studies*, 1, 10.
- YURDAKUL, F. (2014): "Macroeconomic Modelling of Credit Risk for Banks," *Procedia-Social and behavioral sciences*, 109, 784-793.
- ZEMAN, J., and P. JURCA. (2008): "Macro Stress Testing of the Slovak Banking Sector," *National bank of Slovakia working paper vol. 1*.
- ZHENG, C., N. SARKER, and S. NAHAR (2018): "Factors Affecting Bank Credit Risk: An Empirical Insight," *Journal of Applied Finance & Banking*, 8.
- ZRIBI, N., and Y. BOUJELBEGRIVE (2011): "The Factors Influencing Bank Credit Risk: The Case of Tunisia," *Journal of Accounting and Taxation*, 3, 70-78.

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*<https://www.bis.org/bcbs/>*

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<https://www.mfw4a.org/fr/madagascar/le-secteur-financier.html>

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## ANNEXE

### ANNEXE 1- STATISTIQUE DESCRIPTIVE DES VARIABLES MACROECONOMIQUES

**Tableau 11- Statistique descriptive des variables macroéconomiques locales de 2005 à 2015**

Madagascar	Moyenne	Médiane	Maximum	Minimum	Ecart-type
PIB REEL	6,40904977	6,41110627	6,5394053	6,24154789	0,076908
INFLATION	0,00745673	0,00751379	0,0154951	0,00209822	0,0034227
TAUX DE CHANGE EFFECTIF REEL	4,68914997	4,75217801	4,86284643	4,36723311	0,17323668
TAUX D'INTERET NOMINAL A COURT TERME	0,05598991	0,0569465	0,06559107	0,04010418	0,00793737
TAUX D'INTERET NOMINAL A LONG TERME	0,02829425	0,0287782	0,03386208	0,02159029	0,00402731

*Source: calculs de l'auteur*

**Tableau 12- Statistique descriptive des variables extérieures**

PIB REEL	Moyenne	Médiane	Maximum	Minimum	Ecart-type
EURO	5,86529726	5,86523605	5,97155559	5,73367218	0,06013396
JAPON	5,19433445	5,19121909	5,30747227	5,09108655	0,05212463
MADAGASCAR	4,65776493	4,64931475	4,81939753	4,56580683	0,05706847
ROYAUME UNI	4,75487141	4,74610532	4,91564763	4,65625409	0,05836246
ETATS UNIS	5,13962429	5,13491129	5,27897998	5,03551263	0,05544408
INFLATION	Moyenne	Médiane	Maximum	Minimum	Ecart-type
EURO	0,00668867	0,00645063	0,01296664	0,00252321	0,0028193
JAPON	0,00590348	0,00554796	0,01203547	-0,0079079	0,00348208
MADAGASCAR	0,00399479	0,00368443	0,01154183	-0,0059567	0,00288198
ROYAUME UNI	0,00458632	0,0042855	0,01208899	-0,0067436	0,00302845
ETATS UNIS	0,0043942	0,00412455	0,00959335	-0,0014889	0,00222925
TAUX DE CHANGE EFFECTIF REEL	Moyenne	Médiane	Maximum	Minimum	Ecart-type
EURO	2,67607826	2,73723395	2,82990272	2,40787726	0,14412071



JAPON	-0,2919257	-0,2683417	-0,1248867	-0,4569113	0,09726567
MADAGASCAR	-4,2966433	-4,3017109	-4,1155654	-4,4425782	0,07671086
ROYAUME UNI	-4,0511352	-4,0489420	-3,8689942	-4,2077949	0,07446405
ETATS UNIS	-1,3646651	-1,3795113	-1,1937005	-1,4646519	0,06658406
TAUX D'INTERET NOMINAL A COURT TERME	Moyenne	Médiane	Maximum	Minimum	Ecart-type
EURO	0,03869879	0,03866368	0,04409585	0,02966437	0,00449791
JAPON	0,01801331	0,01838443	0,02390787	0,0147352	0,00224252
MADAGASCAR	0,00302831	0,00111002	0,00908673	0,00013584	0,00334131
ROYAUME UNI	0,00603972	0,00415314	0,01224835	0,00293514	0,00313971
ETATS UNIS	0,0170912	0,01706592	0,02126059	0,01416353	0,00204133
TAUX D'INTERET NOMINAL A LONG TERME	Moyenne	Médiane	Maximum	Minimum	Ecart-type
EURO	0,02142697	0,02197557	0,02605663	0,01614143	0,00338116
JAPON	0,01349758	0,01417462	0,01757961	0,00944098	0,00267333
MADAGASCAR	0,00703265	0,00767538	0,0105774	0,00176016	0,00222783
ROYAUME UNI	0,00851689	0,00928233	0,01226491	0,00320214	0,00232677
ETATS UNIS	0,01225408	0,01307522	0,01585499	0,0077961	0,00239173

Source: calculs de l'auteur

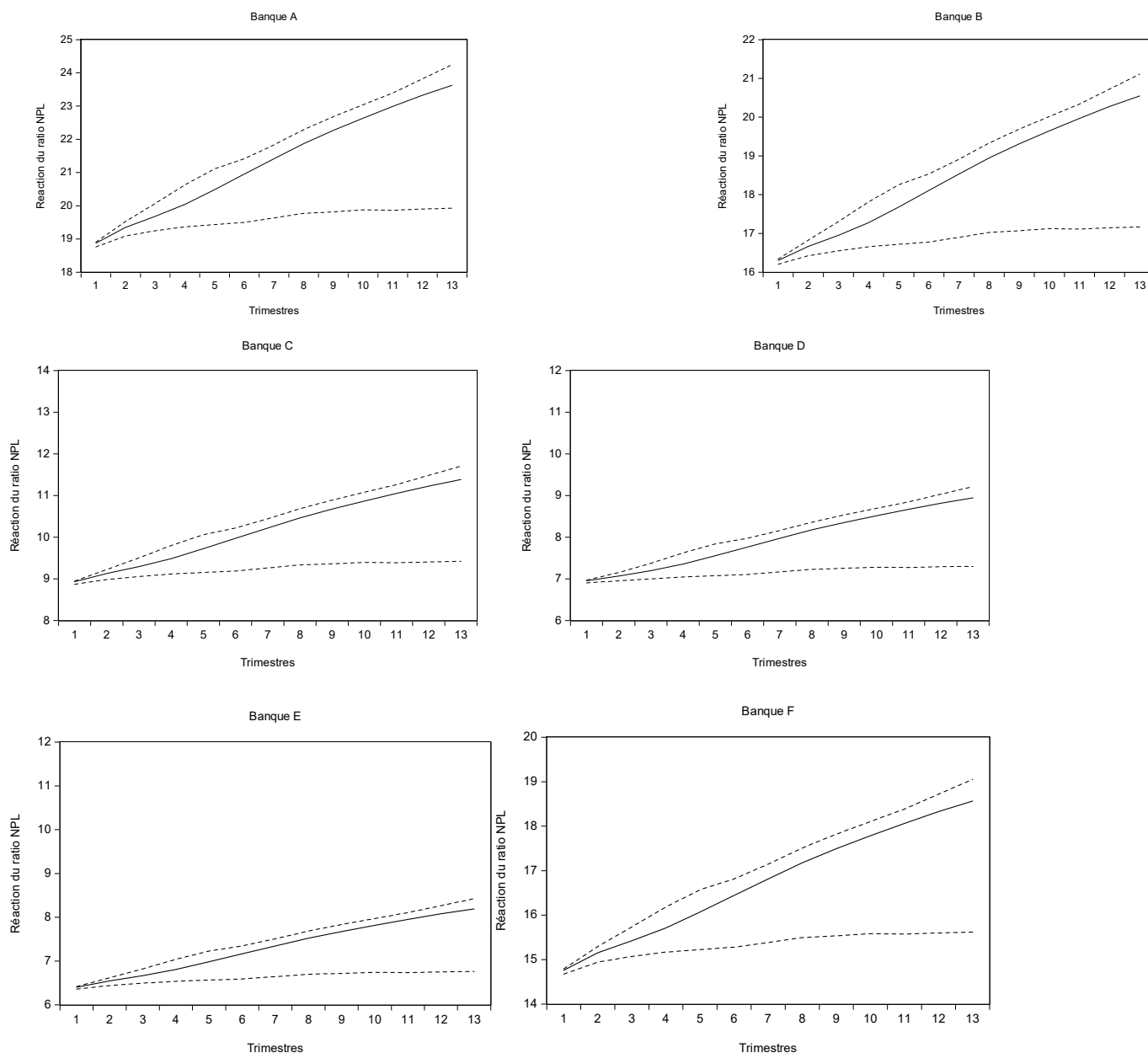
**Tableau 13- Statistique descriptive des variables globales**

Statistiques	Moyenne	Médiane	Maximum	Minimum	Ecart-type
PRIX DU PETROLE	4,97492402	4,95736702	5,41116991	4,40515368	0,28814208
PRIX DES MATIERES PREMIERES	4,78954034	4,77406613	5,10349775	4,44738363	0,15314772
PRIX DES METAUX	5,09167082	5,16673772	5,51601476	4,56659914	0,25045391

Source: calculs de l'auteur

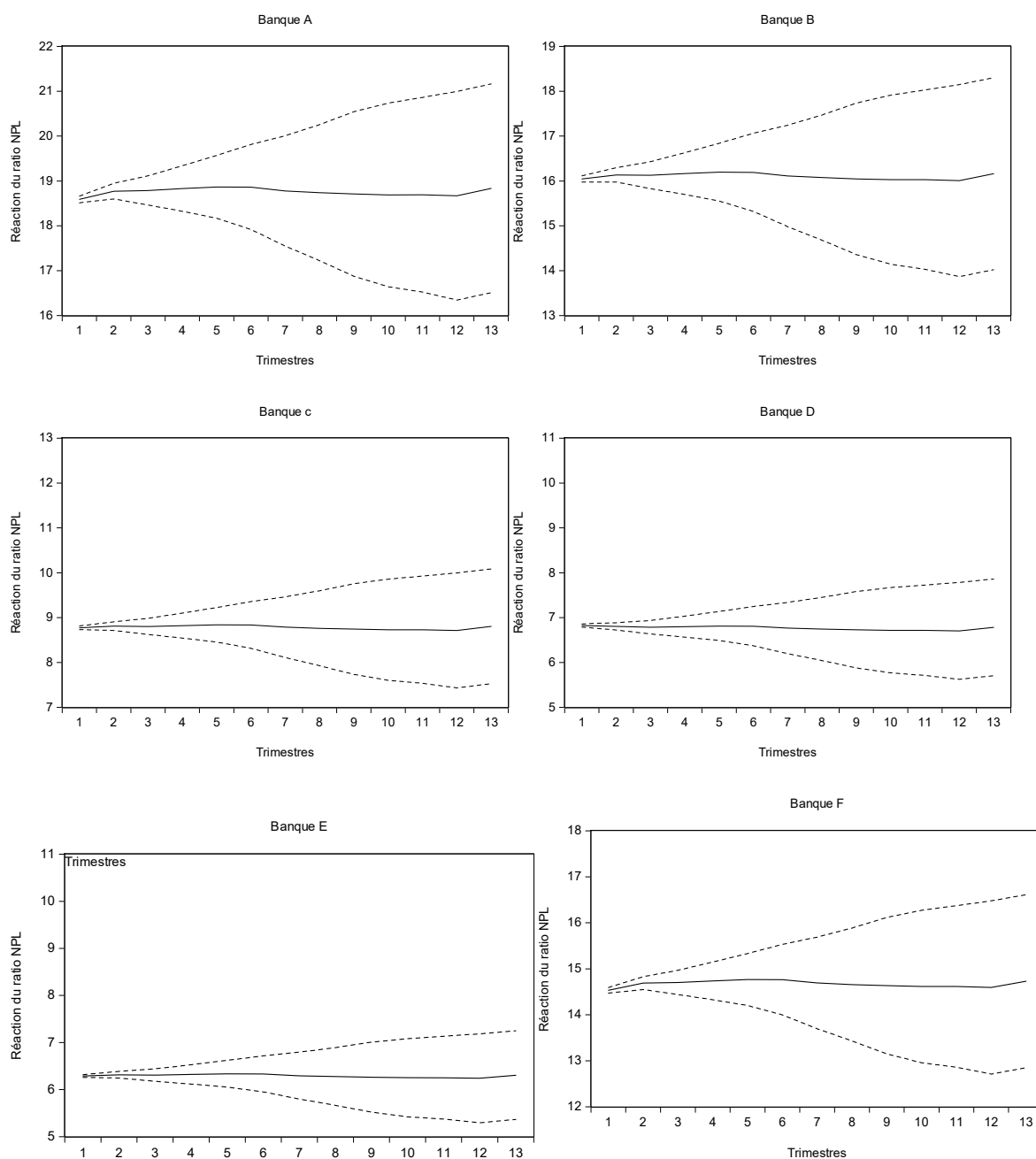
ANNEXE 2- REACTIONS DES RATIOS NPL DES BANQUES

Figure 12- Réaction des ratios NPL des banques face à un choc négatif du PIB



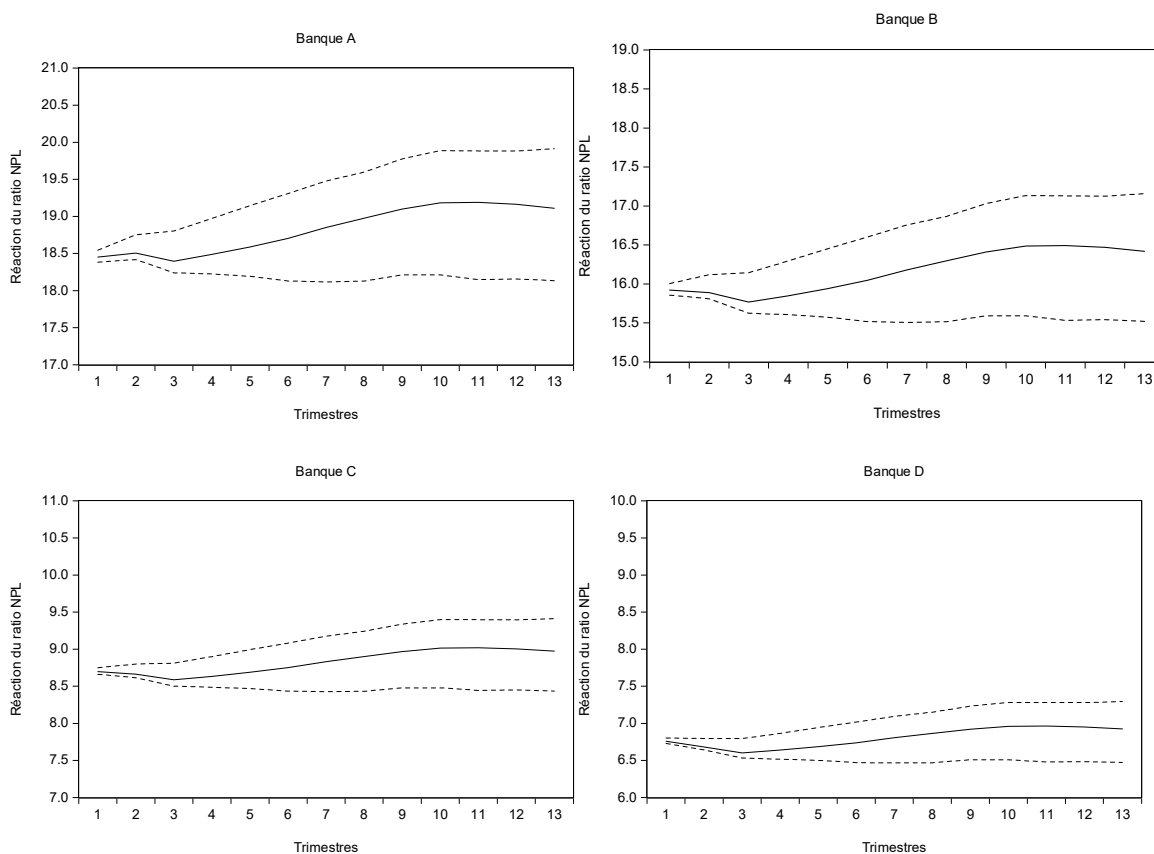
Note : Les chiffres en axe des ordonnées présentent les réactions du ratio NPL, qui sont basées sur la fonction de réponse impulsionnelle généralisée d'un choc d'un écart-type négatif sur le PIB. Les lignes en pointillés sont les intervalles de confiance 5% à 95% de la réaction du ratio NPL. Source : calculs de l'auteur.

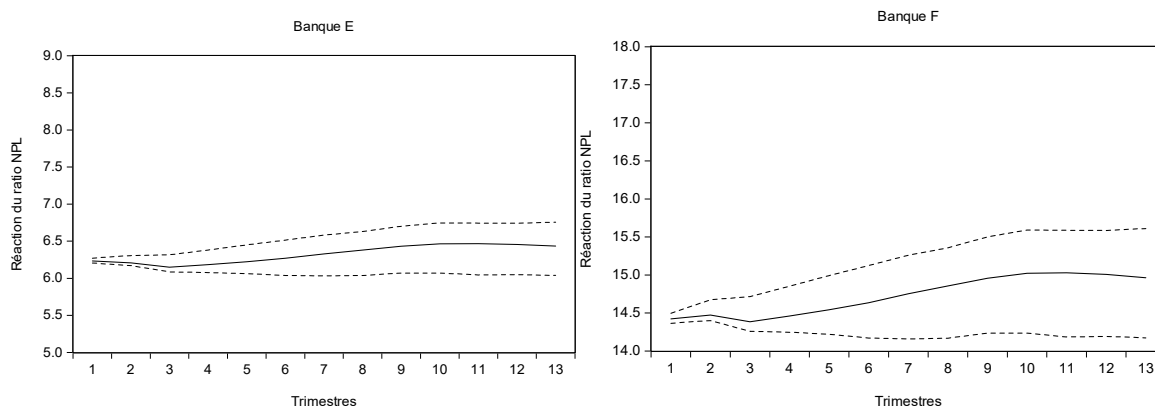
Figure 13- Réaction des ratios NPL des banques face à un choc positif du taux de change



Note : Les chiffres en axe des ordonnées présentent les réactions du ratio NPL, qui sont basées sur la fonction de réponse impulsionnelle généralisée d'un choc d'un écart-type positif sur le taux de change. Les lignes en pointillés sont les intervalles de confiance 5% à 95% de la réaction du ratio NPL. Source : calculs de l'auteur.

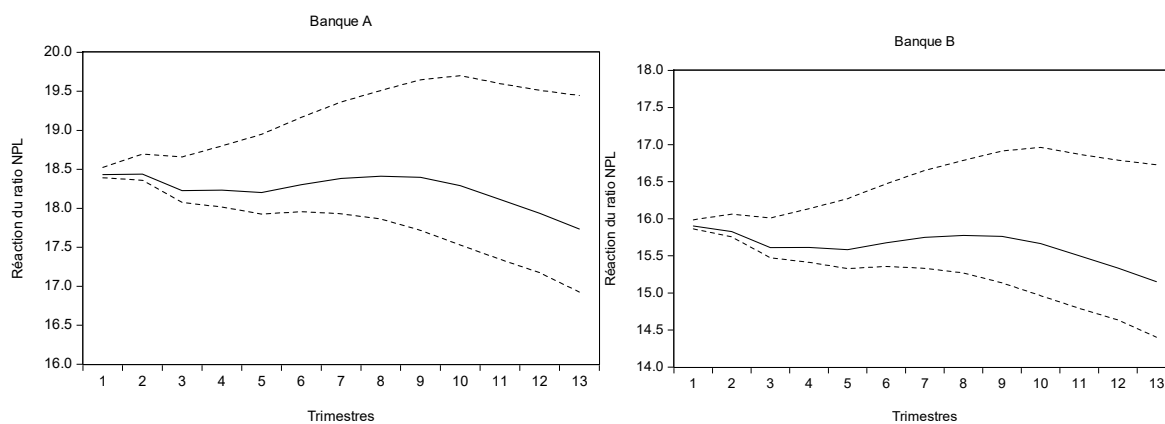
Figure 14- Réaction des ratios NPL des banques face à un choc positif du prix de pétrole

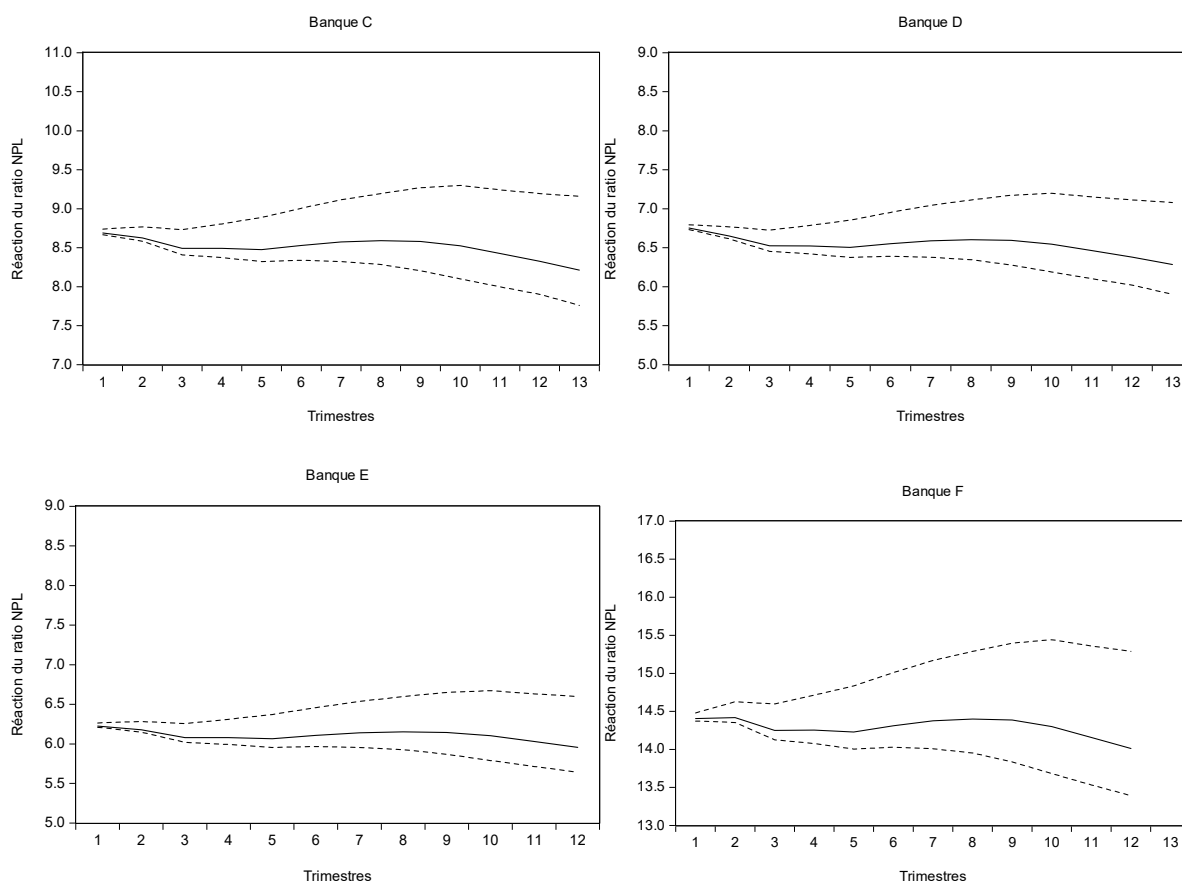




Note : Les chiffres en axe des ordonnées présentent les réactions du ratio NPL, qui sont basées sur la fonction de réponse impulsionnelle généralisée d'un choc d'un écart-type positif sur le prix du pétrole. Les lignes en pointillés sont les intervalles de confiance 5% à 95% de la réaction du ratio NPL. Source : calculs de l'auteur.

Figure 15- Réaction des ratios NPL des banques face à un choc négatif du prix des matières premières





Note : Les chiffres en axe des ordonnées présentent les réactions du ratio NPL, qui sont basées sur la fonction de réponse impulsionnelle généralisée d'un choc d'un écart-type négatif sur le prix des matières premières. Les lignes en pointillés sont les intervalles de confiance 5% à 95% de la réaction du ratio NPL. Source : calculs de l'auteur.

**ANNEXE 3- VARIATION DES RATIOS DE FONDS PROPRES (CAR) DES BANQUES SUITE AUX  
SCENARIOS MACROECONOMIQUES DEFAVORABLES**
**Tableau 14- Banque A- variation des ratios de fonds propres (CAR)**

Chocs macroéconomiques adverses (un écart-type)		Choc négatif du PIB		Choc positif du taux de change Euro/Dollar		Choc positif du prix de pétrole		Choc négatif du prix des matières premières	
Horizon		RWA constant	Hausse 16% RWA	RWA constant	Hausse 16% RWA	RWA constant	Hausse 16% RWA	RWA constant	Hausse 16% RWA
0	CAR de base 2015q2	13,61		13,61		13,61		13,61	
1		12,71	10,95	12,99	11,20	13,04	11,24	13,06	11,26
2		12,33	10,63	12,93	11,14	13,00	11,20	13,05	11,25
3		12,06	10,40	13,03	11,23	13,09	11,28	13,22	11,40
4		11,78	10,15	13,14	11,33	13,01	11,22	13,21	11,39
5		11,43	9,85	13,27	11,44	12,93	11,15	13,24	11,41
6		11,06	9,53	13,47	11,61	12,84	11,07	13,16	11,34
7		10,69	9,21	13,76	11,86	12,72	10,97	13,09	11,29
8		10,33	8,90	14,02	12,08	12,62	10,88	13,07	11,27

Source : Données BCM 2015, Calculs de l'auteur

**Tableau 15- Banque B- variation des ratios de fonds propres (CAR)**

Chocs macroéconomiques adverses (un écart-type)		Choc négatif du PIB		Choc positif du taux de change Euro/Dollar		Choc positif du prix de pétrole		Choc négatif du prix des matières premières	
Horizon		RWA constant	Hausse 16% RWA	RWA constant	Horizon		RWA constant	Hausse 16% RWA	RWA constant
0	Baseline CAR 2015q2	8,59		8,59		8,59		8,59	
1		8,26	7,12	8,42	7,25	8,44	7,28	8,45	7,28
2		8,10	6,98	8,42	7,26	8,46	7,29	8,48	7,31
3		7,97	6,87	8,48	7,31	8,51	7,34	8,58	7,40
4		7,82	6,74	8,54	7,36	8,47	7,31	8,58	7,40
5		7,64	6,58	8,61	7,42	8,43	7,27	8,60	7,41
6		7,44	6,41	8,72	7,51	8,38	7,23	8,55	7,37
7		7,25	6,25	8,87	7,65	8,32	7,17	8,52	7,34

8		7,06	6,08	9,01	7,77	8,27	7,13	8,51	7,33
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Source : Données BCM 2015, Calculs de l'auteur

**Tableau 16- Banque C- variation des ratios de fonds propres (CAR)**

Chocs macroéconomiques adverses (un écart-type)		Choc négatif du PIB		Choc positif du taux de change Euro/Dollar		Choc positif du prix de pétrole		Choc négatif du prix des matières premières	
Horizon		RWA constant	Hausse 16% RWA	RWA constant	Horizon		RWA constant	Hausse 16% RWA	RWA constant
0	Baseline CAR 2015q2	13,62		13,62		13,62		13,62	
1		13,32	11,48	13,48	11,62	13,51	11,65	13,52	11,65
2		13,15	11,34	13,50	11,64	13,54	11,67	13,57	11,70
3		13,02	11,22	13,57	11,70	13,60	11,73	13,68	11,79
4		12,86	11,08	13,64	11,76	13,56	11,69	13,68	11,79
5		12,66	10,91	13,71	11,82	13,52	11,65	13,70	11,81
6		12,45	10,73	13,83	11,92	13,47	11,61	13,65	11,77
7		12,24	10,55	14,00	12,07	13,40	11,55	13,61	11,74
8		12,04	10,38	14,15	12,20	13,34	11,50	13,60	11,73

Source : Données BCM 2015, Calculs de l'auteur

**Tableau 17- Banque D- variation des ratios de fonds propres (CAR)**

Chocs macroéconomiques adverses (un écart-type)		Choc négatif du PIB		Choc positif du taux de change Euro/Dollar		Choc positif du prix de pétrole		Choc négatif du prix des matières premières	
Horizon		RWA constant	Hausse 16% RWA	RWA constant	Horizon		RWA constant	Hausse 16% RWA	RWA constant
0	Baseline CAR 2015q2	36,86		36,86		36,86		36,86	
1		36,74	31,67	36,79	31,71	36,96	31,86	36,97	31,87
2		36,60	31,55	36,71	31,65	37,05	31,94	37,09	31,97
3		36,45	31,43	36,61	31,56	37,14	32,02	37,23	32,10
4		36,27	31,27	36,53	31,49	37,10	31,98	37,24	32,10
5		36,04	31,07	36,44	31,41	37,05	31,94	37,25	32,12



6		35,80	30,86	36,30	31,30	36,98	31,88	37,20	32,07
7		35,56	30,65	36,10	31,12	36,91	31,82	37,16	32,03
8		35,32	30,45	35,92	30,97	36,84	31,76	37,14	32,02

Source : Données BCM 2015, Calculs de l'auteur

**Tableau 18- Banque E- variation des ratios de fonds propres (CAR)**

Chocs macroéconomiques adverses (un écart-type)		Choc négatif du PIB		Choc positif du taux de change Euro/Dollar		Choc positif du prix de pétrole		Choc négatif du prix des matières premières	
Horizon		RWA constant	Hausse 16% RWA	RWA constant	Horizon		RWA constant	Hausse 16% RWA	RWA constant
0	Baseline CAR 2015q2	10,55		10,55		10,55		10,55	
1		10,31	8,89	10,44	9,00	10,47	9,02	10,62	9,16
2		10,18	8,78	10,46	9,02	10,49	9,04	10,58	9,12
3		10,07	8,68	10,52	9,07	10,54	9,09	10,49	9,04
4		9,94	8,57	10,57	9,11	10,51	9,06	10,49	9,04
5		9,78	8,43	10,63	9,17	10,48	9,03	10,48	9,03
6		9,62	8,29	10,73	9,25	10,43	8,99	10,52	9,07
7		9,45	8,15	10,86	9,37	10,38	8,95	10,55	9,09
8		9,29	8,01	10,99	9,47	10,33	8,91	10,56	9,10

Source : Données BCM 2015, Calculs de l'auteur

**Tableau 19- Banque F- variation des ratios de fonds propres (CAR)**

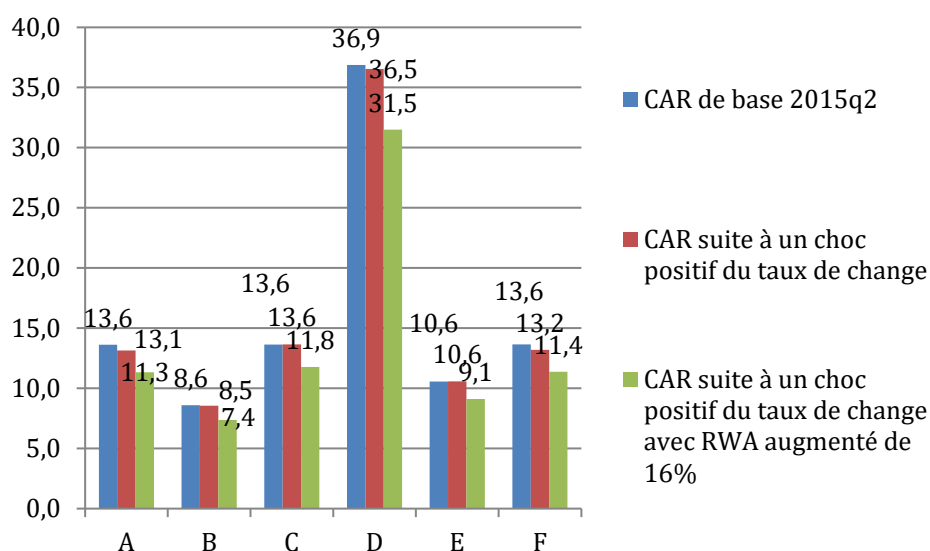
Chocs macroéconomiques adverses (un écart-type)		Choc négatif du PIB		Choc positif du taux de change Euro/Dollar		Choc positif du prix de pétrole		Choc négatif du prix des matières premières	
Horizon		RWA constant	Hausse 16% RWA	RWA constant	Horizon		RWA constant	Hausse 16% RWA	RWA constant
0	Baseline CAR 2015q2	13,64		13,64		13,64		13,64	

1		12,81	11,05	13,07	11,26	13,11	11,30	13,12	11,31
2		12,47	10,75	13,00	11,21	13,07	11,26	13,11	11,31
3		12,24	10,55	13,10	11,29	13,14	11,33	13,26	11,43
4		11,99	10,34	13,19	11,37	13,08	11,27	13,26	11,43
5		11,68	10,07	13,30	11,47	13,01	11,21	13,28	11,45
6		11,36	9,79	13,48	11,62	12,92	11,14	13,21	11,39
7		11,04	9,51	13,74	11,84	12,82	11,05	13,15	11,34
8		10,72	9,24	13,97	12,04	12,73	10,98	13,13	11,32

Source : Données BCM 2015, Calculs de l'auteur

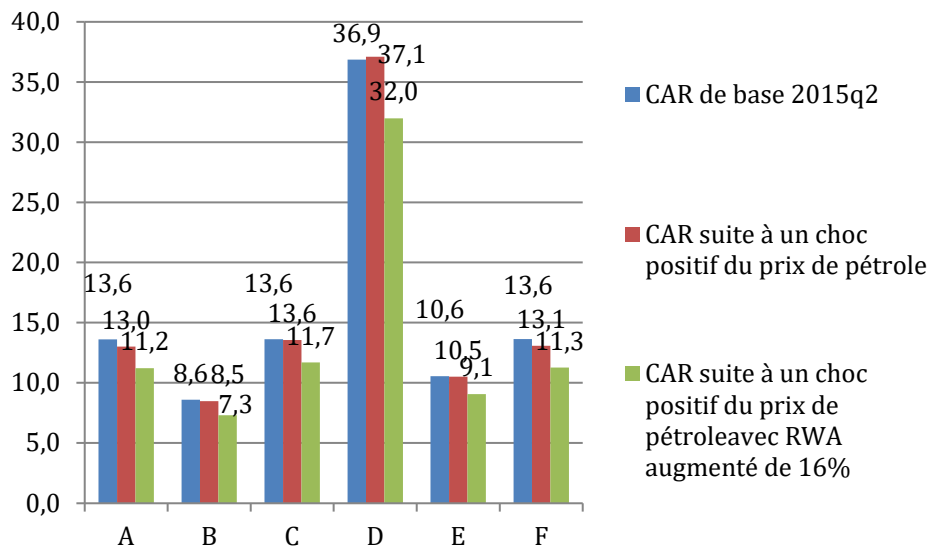
#### ANNEXE 4- PROJECTION DES CAPITAUX PROPRES DES BANQUES SOUS LES SCENARIOS MACROECONOMIQUES

Figure 16- Projection du ratio d'adéquation des capitaux propres (CAR) des banques sous les scénarios macroéconomiques défavorables : choc positif du taux de change



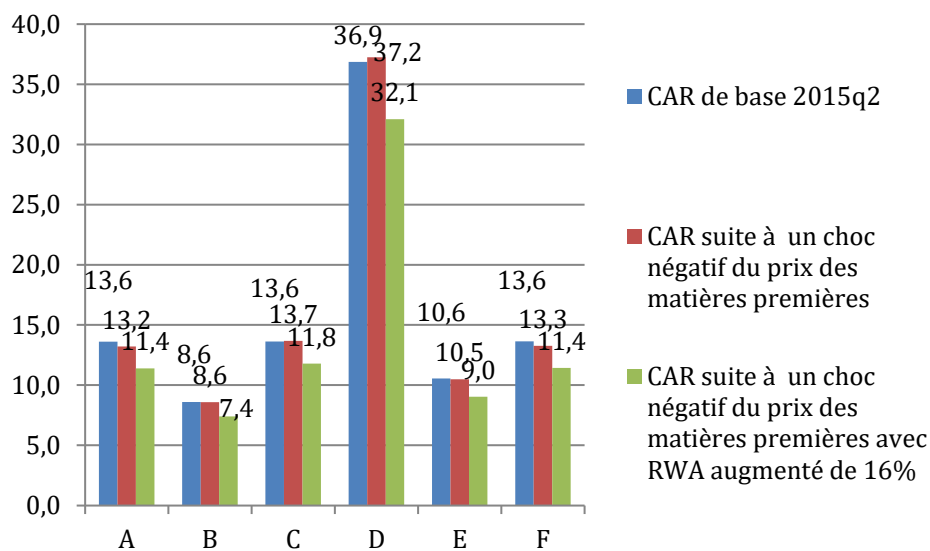
Note : L'axe des ordonnées montre le ratio des capitaux propres des banques après quatre trimestres en pourcentage. L'axe des abscisses présente les banques. Source : calculs de l'auteur.

Figure 17- Projection du ratio d'adéquation des capitaux propres (CAR) des banques sous les scénarios macroéconomiques défavorables : choc positif du prix de pétrole



Note : L'axe des ordonnées montre le ratio des capitaux propres des banques après quatre trimestres en pourcentage. L'axe des abscisses présente les banques. Source : calculs de l'auteur.

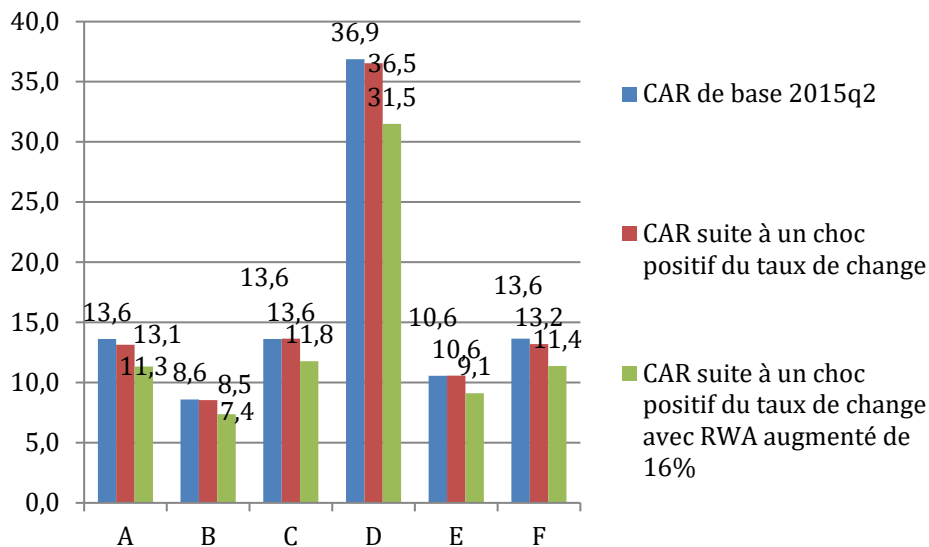
**Figure 18- Projection du ratio d'adéquation des capitaux propres (CAR) des banques sous les scénarios macroéconomiques défavorables : choc négatif du prix des matières premières**



Note : L'axe des ordonnées montre le ratio des capitaux propres des banques après quatre trimestres en pourcentage. L'axe des abscisses présente les banques. Source : calculs de l'auteur.

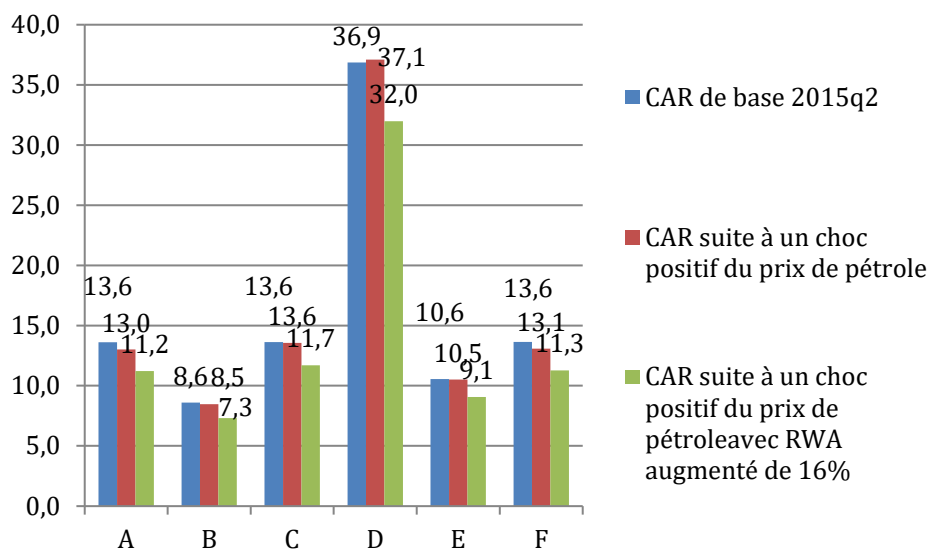
## ANNEXE 5- PROJECTION DES CAPITAUX PROPRES DES BANQUES SOUS LES SCENARIOS MACROECONOMIQUES

**Figure 19- Projection du ratio d'adéquation des capitaux propres (CAR) des banques sous les scénarios macroéconomiques défavorables : choc positif du taux de change**



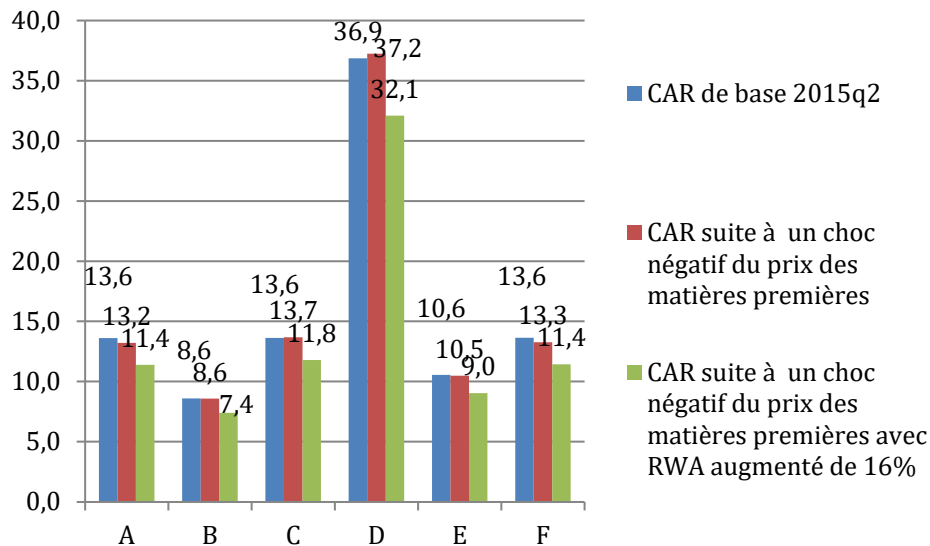
Note : L'axe des ordonnées montre le ratio des capitaux propres des banques après quatre trimestres en pourcentage. L'axe des abscisses présente les banques. Source : calculs de l'auteur.

**Figure 20- Projection du ratio d'adéquation des capitaux propres (CAR) des banques sous les scénarios macroéconomiques défavorables : choc positif du prix de pétrole**



Note : L'axe des ordonnées montre le ratio des capitaux propres des banques après quatre trimestres en pourcentage.  
L'axe des abscisses présente les banques. Source : calculs de l'auteur.

**Figure 21- Projection du ratio d'adéquation des capitaux propres (CAR) des banques sous les scénarios macroéconomiques défavorables : choc négatif du prix des matières premières**



Note : L'axe des ordonnées montre le ratio des capitaux propres des banques après quatre trimestres en pourcentage.  
L'axe des abscisses présente les banques. Source : calculs de l'auteur.



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# *A Comparative Study Of The Effect Of BMI On Labour Outcomes, Delivery Process, And Postpartum Women's Health, At Governmental Hospitals In Two Libyan Cities*

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<sup>4</sup>Al-Zawia Teaching Hospital



**Abstract** – This clinical study was carried out on postpartum women in two public hospitals during mid-2020. Analysis of collected data was done by using Descriptive statistics (frequencies and percentages Inferential statistics (X2-test &t-test), p-value less than 0.05 considered to be statistically significant. The 95% confidence interval was used to estimate a value range for an unknown parameter. The results of comparison between average age, height, weight, and body mass index characteristics of postpartum women for overweight and normal-weight groups in the study areas were addressed, there was no statistical significance at p 0.05 except for the weight and height variables in the normal- weight group, which in turn showed statistically significant differences. On the other hand, the results of labor induction and cesarean delivery were statistically significant in overweight and obese group compared to normal weight in the studied community at Zawia Hospital, where (Chi-square value = 13.52, p <0.00, 95% CI of OR = 3.702 (1.818, 7.541) And (Chi-square value = 63.43, p <0.00, 95% CI of OR = (0.116 (0.054, 0.251)). In the same context, statistical analyzes showed that there is a statistical significance when induction of labor for women with normal weight compared to overweight And obese patients in Al-Galaa Hospital, and their values were (Chi-square value = 8.72, p <0.003, 95% CI of OR = 0.348 (0.171, 0.710).

**Aim:** This study aims to compare and investigate the effect of body mass index on labour outcomes at two Libyan city hospitals in mid-2020.

**Keywords** – BMI, Labour Outcomes, Delivery, Postpartum Women.

## I. INTRODUCTION

The period of pregnancy is a biological complicated process in women's life and related to physiological body changes, and plays an important role in homeostatic of various functional systems in the pregnant body and needs of the embryo [4]. After conception, the growth of the fetus occurs rapidly by each week with changes in several systems to cause adaptation of the maternal body to the growing fetus. All metabolic processes in pregnant women require anatomical and physiological changes, for adaptation mum's body with a new state [14]. The digestive system changes in pregnancy, Pregnant women need to know that they may be suffer increased appetite and consumption of food during pregnancy to meet increased nutritional requirements Women should be informed about trouble digestive system symptoms such as heartburn, vomiting, constipation, and nausea during pregnancy , all these for easy adaption during pregnancy[2].Changes occur in the parameters of physiologic to protect the maternal and support fetal growth only to return to the pre-pregnancy levels after the baby labour[4]. In fact, the female body naturally changes during pregnancy, and in many cases, these changes occur normally; however, there may be imbalances that make a pregnant woman susceptible to physical and psychical problems such as weight gain (gestation weight gain) that can cause complications or

pathologies during pregnancy or postpartum [4, 19]. **Obesity and weight gain** are conditions characterized by increase accumulation of body fat, frequently resulting in significant impairment of health and endurance [23]. It is becoming a general problem affecting health especially in low- and middle-income communities of all ages around the world [3]. World Health Organization (WHO) and the National Institutes of Health determined weight with body mass index ( $BMI = \text{weight}/(\text{height})^2$ ); where BMI of underweight, normal-weight, overweight, and obese are less than 18.5; 18.5-24.9, 25-29.9, and 30 or greater respectively [11]. Obesity is classified into obese class I, obese class II, and class III [10,21]. WHO published about 40% of women have overweight and 15% have obese in women aged 18 years and older in 2016, with a world forecast of about 70 million babies who are overweight under aged 5 years in 2025[10, 26]. Few studies In the united state of America published on the development of mothers obesity and its complication in past years,31.8% of women aged 20–39 years were obese in 2011–2012, and increasing obesity rates, especially class III obesity, have increased significantly between 2005 and 2014[21]. A mother's pre-gestation BMI is known to affect pregnancy and childbirth results. women who have underweight before pregnancy is at increased risk for premature labor, small gestational age(SGA), and low birth weight, also associated with adverse health in adulthood, coronary heart disease, insulin resistance, and hypertension [20]. On the other widespread obesity and weight gain in women childbearing age has reached epidemiological rate around global [18, 27]. Obesity has an impact on short and long-term general health for both maternal and child. Weight gain and obesity before pregnancy, during pregnancy, prenatal and postpartum have negative consequences include menstrual cycle dysfunction, ovulation and infertility before pregnancy, preeclampsia, hypertension and gestational diabetes (GDM) during pregnancy, cesarean delivery [27]. Also in the postpartum period, they are at a higher risk of thromboembolism, postpartum depression, and ineffective breastfeeding.

The inability of physical movement, large breast tissue, and delay in the secretion of lactogenesis II., were the major important obstacles in starting and sustaining breastfeeding for overweight and obese mothers [11, 17]. For newborns, there is an increased risk of Macrosomia, stillbirth, and admission to a neonatal care unit. In the long term, babies of obese mothers suffer from impaired metabolic in utero (fetal programming) and premature death from cardiovascular disease as well as neurocognitive developmental problems [15, 23].

## **II. METHODOLOGY**

### **Study Design and Study Period**

The study consisted of body measurements and a cross-sectional clinical medical condition for each member of the study population, in addition to conducting various statistical analyzes related to those measurements. The study was focusing on the health status of pregnant women during labor, delivery, and postpartum woman, at the government hospitals located in two cities Al-Zawia and Tripoli in the state of Libya. The total duration of the fieldwork for this study was two months in mid-2020.

### **Sampling Technique and Sample Size**

During the study period, an average of eighteen and twenty-one pregnant women attended daily the Al- Zawia and Al-Galaa hospitals, respectively. The samples were taken randomly a week by week shifting between Al-Zawia hospital and Tripoli (Al-Galaa) hospital respectively for a couple of months. Before measuring body weight and height for each patient, his medical file was received to view and transmit the data needed for this study. The sample size was 150 and 168 postpartum women from Al-Zawia and Tripoli Hospitals, respectively. Those who were underweight were few, so their measurement values were excluded, and the sample sizes would be 139 and 155, respectively.

### **Collection of Clinical Information**

The medical files contain all the data related to the health of the pregnant woman, especially during the period of labor, childbearing, and the outset period of postpartum. It is a source of several medical points about the cases of elective and emergent delivery and normal vaginal birth.

### **Anthropometric Measurement**

1. **Bodyweight:** An electronic weight machine was used to measured body weight. The weight was recorded barefooted and the scale was calibrated to zero marking every time before use. The weight was recorded in kilogram.

2. Height: The height of each member of the study population was measure in a standing position hanging by the side and barefooted, relaxed way, the vertebral column touching the scale. Height was measured to the nearest 0.1 cm.
3. BMI: Measurement of Body Mass Index (BMI) as the best way to measure the nutritional and health status of a pregnant woman, an adult BMI chart as shown in figure 1 and an internet calculator were used [7,8].

### **Data Analysis**

The data set was first checked, cleaned, and entered into the computer from the numerical codes on the form. The data was edited if there is any discrepancy and then cleaned. The frequency distributions of the entire variables were checked by using IBM SPSS 22, windows program. For tabular, figures, and a graphical representation, Microsoft word and Microsoft excel 2007 were used.

### **Statistical analysis**

The student's t-test for independent samples was used for the analysis of continuous variables. Heterogeneity chi-square test or Fisher's exact test (if numbers were small) was used to compare categorical variables. A P-value of  $\leq 0.05$  was considered statistically significant. Binary logistic regression was used to evaluate the odds ratio. All the analyses were carried out using was used IBM SPSS Statistics 22 & Microsoft office excel 2007.

## **III. RESULTS**

In the light study, a total of 318 postpartum women were included in Al-Zawia and AL-Galaa Teaching Hospitals. The sample size was 150 and 168 postpartum women from Al-Zawia and Tripoli Hospitals, whereas the distribution of the sample according to body mass index and classified into 11/150 (7.33%) and 13/167 (7.74%) in underweight, 48/150 (32.00%), and 89/168 (52.97%) as normal-weight, 64/168 (42.67%) and 44/168 (26.19%) overweight, 27/150 (18.00%) and 22/ 168 (13.10%) were obese respectively. as shown in table 1. The distribution of our study samples was classified and presented in table 1. Although many classes were presented in underweight, normal-weight, and overweight and obese. However, underweight was the small percentage of the total population of a study area (7.33%), (7.74%), thus they were excluded from the analysis. Also, the obese group percentage (18.00%), (13.10%) was added to the overweight. The association between categorical variables at Al-Zawia and AL-Galaa Hospitals was observed statistically significant in our study by using the Chi-square test ( Chi Square=15.448, p-value =0.000) as shown in table 2. During the study period, the maternal ages ranged from 18- 42 years, and they were divided into five statistical categories : (18-22) 12% of Al-Zawia hospital and 17.27% of AL-Galaa hospital, (27-23), (28-32), (33-37) and ( 38-42) and their percentages were 24%, 21.43%, 26.66%, 32.14%, 20.67%, 18.45%, 16.76%, and 10.17% respectively. The higher proportion of the study population, (26.66%) in Zawia hospital and (32.41%) in AL-Galaa hospital in the age group between 28-32 years as shown in figure 1.

There were no significant differences of Al-zawia hospital postpartum women's parameters of age, weight, Height and BMI values ( $p < 0.064$ ,  $p < 0.128$ ,  $p < 0.743$  and  $p < 0.740$  and 95% CI = (-0.057, 1.951), (-0.241, 1.894), (-1.858, 2.598), and ( -0.675, 0.947) , also AL- galaa hospital postpartum women's values ( $p < 0.870$ ,  $p < 0.162$ ,  $p < 0.712$  and  $p < 0.144$  and 95% CI= ( -0.845, 1.009), (-0.194, 1.563), (-1.456, 2.259), and (-0.176, 1.202), respectively as shown in table 3 . In table 4, there was no significant association between age, height, weight, and BMI in the overweight group, when compared to the normal-weight group. While the normal-weight group shown a significant difference in height and weight parameters ( p-value = 0.000 ,P value= 0.007 ) respectively in both study area as shown table 5. In present study areas, the labour induction in normal-weight group were 27.1% (n=19), overweight & obese were 72.9% (n=51) ,vaginal delivery 96.4% (n=43) normal-weight , 30.6% (n=19) Overweight & obese , while the cesarean section normalweight group were 20.8% (n=16), 79.2% (n=61) Overweight & obese in Al-Zawia hospital . The results of labour induction and caesarean delivery were statistically significant in overweight and obese compared to the normal-weight in the at Al-Zawia Hospital group (chi-square value=13.52, p-value = < 0.00 and (chi-square value=63.43, p-value=< 0.00) for labour induction and caesarean delivery respectively . In Tripoli hospital, among 77.9%(n=53) of women had labour induction in normal weight, 22.1% (n=15) overweight & obese group, vaginal delivery 80.0% (n=56) normal-weight 20.0 % (n=14) Overweight & obese. In the same context, caesarean delivery in the normal weight group were 52.9% (n=45), 47.1%(n=40) overweight & obese group. In the AL-Galaa hospital population, there is a significant increase, there is a significant increase in labour induction and Caesarean section delivery as BMI increases Chi-square: 8.72, P-Value =0.003, Chi- square:12.381, P-Value =0.000 in this study areas

respectively. Statistically, a significant increase has been noticed in labor induction and operative delivery with increasing BMI in both study areas as shown in tables 6,7. In figure 3, the results show an increased percentage of Caesarean section (58.27%, 53.55%) and decreased normal deliveries (41.73%, 64.45) in maternal women who were overweight and obese as compared to normal-weight women at Al-Zawia and Al-Galaa Hospital respectively. Weight gain and obesity were associated with increased risk of emergency and elective cesarean delivery (32.67%, 34.84%) and (25.18%, 27.105) respectively in Al-Zawia and Al-Galaa hospitals higher than normal delivery as shown in figure 4.

Table (1) Distribution of the sample according their BMI.

Category	BMI range kg/m <sup>2</sup> for adults	Percentages Patients BMI			
		postpartum women of Zawia Hospital		postpartum women of Tripoli Hospital	
		Number	Percentage	Number	Percentage
<b>Underweight</b>					
• Severe Thinness	< 16	1	0.67%	1	0.60%
• Moderate Thinness	16 - 17	2	1.33%	2	1.19%
• Mild Thinness	17 - 18.5	8	5.33%	10	5.95%
<b>Normal</b>	18.5 - 25	48	32.00%	89	52.97%
<b>Overweight</b>	25 - 30	64	42.67%	44	26.19%
<b>Obese Class I</b>	30 - 35	15	10.00%	13	7.74%
<b>Obese Class II</b>	35 - 40	10	6.67%	8	4.76%
<b>Obese Class III</b>	> 40	2	1.33%	1	0.60%

Table ( 2 ) Statistical independence for population of two study area.

BMI measure	Over + Obese weight	Normal weight	Under weight	Sum	Chi square	p- value
<b>Location</b>						
Zawia Hospital	<b>91</b>	<b>48</b>	<b>11</b>	<b>150</b>	<b>15.448</b>	<b>0.000</b>
Al-Galaa Hospital	<b>66</b>	<b>89</b>	<b>13</b>	<b>168</b>		
Sum	<b>157</b>	<b>137</b>	<b>24</b>	<b>318</b>		

Table (3) Characteristics of patients the different BMI groups, (over and normalweight).

Characteristic		Overweight Mean(± SD )	Normalweight Mean(± SD )	T -test	P- value	95% CI of Mean difference	
						Lower	Upper
<b>Age</b>	Zawia Hospital	)±5.82(31.24	)±6.40(28.17	1.864	0.064	-0.057	1.951
	Al-Galaa Hospital	)5.65( ±27.15	)5.58(±31.89	0.164	0.870	-0.845	1.009
<b>Body Height</b>	Zawia Hospital	)6.69(±161.13	)6.46(±159.60	1.530	0.128	-0.241	1.894
	Al-Galaa Hospital	163.46(±5.55 )	163.73(±6.21)	1.538	0.162	-0.194	1.563
<b>Body Weight</b>	Zawia Hospital	)9.94(±78.44	70.37(±13.81)	0.328	0.743	-1.858	2.598
	Al-Galaa Hospital	)10.02(± 79.46	)6.21(±63.09	0.370	0.712	-1.456	2.259
<b>BMI</b>	Zawia Hospital	)3.70(± 30.08	)1.69(±23.58	0.332	0.740	-0.675	0.947
	Al-Galaa Hospital	)3.69(±29.77	)1.33(±51.23.	1.470	0.144	-0.176	1.202

Table ( 4 ) A comparison of the characteristics of the overweight group in the two study areas.

Characteristics	Mean( $\pm$ SD )	T test	P - value	95% CI of Mean difference		
				Lower	Upper	
<b>Age</b>	Zawia Hospital	31.24( $\pm$ 5.82 )	0.709	0.479	-2.479	<b>1.169</b>
	Al-Galaa Hospital	31.90( $\pm$ 5.58 )				
<b>Weight</b>	Zawia Hospital	78.44( $\pm$ 9.94 )	-0.634	0.527	-4.196	<b>2.158</b>
	Al-Galaa Hospital	79.46( $\pm$ 10.01)				
<b>Height</b>	Zawia Hospital	161.13( $\pm$ 6.69)	-2.478	0.140	-4.667	<b>-0.529</b>
	Al-Galaa Hospital	163.73( $\pm$ 6.21)				
<b>BMI</b>	Zawia Hospital	30.08( $\pm$ 3.70 )	0.513	0.608	-0.871	<b>1.483</b>
	Al-Galaa Hospital	29.78( $\pm$ 3.69 )				

Table (5) Comparison of patient characteristics with the normalweight group in the two study areas.

Characteristics	Mean( $\pm$ SD )	T test	P- value	95% CI of Mean difference		
				Lower	Upper	
<b>Age</b>	Zawia Hospital	28.17( $\pm$ 6.40)	0.951	0.343	-1.089	<b>3.108</b>
	Al-Galaa Hospital	27.16( $\pm$ 5.65)				
<b>Weight</b>	Zawia Hospital	59.96( $\pm$ 6.69)	-2.741	0.007	-5.386	<b>-0.871</b>
	Al-Galaa Hospital	63.09( $\pm$ 6.02)				
<b>Height</b>	Zawia Hospital	159.60( $\pm$ 6.46)	-3.669	0.000	-5.941	<b>-1.772</b>
	Al-Galaa Hospital	163.46( $\pm$ 5.55)				
<b>BMI</b>	Zawia Hospital	23.51( $\pm$ 1.69)	0.022	0.982	-0.513	<b>0.525</b>
	Al-Galaa Hospital	23.51( $\pm$ 1.33)				

Table ( 6 ) Tripoli hospital : Labour and delivery outcomes

	Normal (BMI = 18.6- 25.0)	Overweight + Obese (BMI $\geq$ 25.1)	Chi square	p-value	Odds Ratio, 95% CI of OR
	N = 101 (65.16%)	N = 54 (34.84%)			
<i>Labour and delivery outcomes</i>					
<i>Labour</i>					
• Spontaneous	48 (52.2%)	39(44.8%)	8.72	0.003	0.348(0.171 , 0.710 )
• Induced	53 (77.9% )	15( 22.1% )			
<i>Delivery</i>					
• Spont. Vaginal	56(80.0%)	14(20.0%)	12.381	0.000	0.281 (0,136, 0.580)
• Caesarean section	45(52.9%)	40(47.1%)			
• Vacuum/forceps					

Table (7) Zawia hospital: Labour and delivery outcomes

	Normal (BMI = 18.6- 25.0)	Overweight + Obese (BMI ≥ 25.1)	Chi square	p-value	Odds Ratio, 95% CI of OR
N = 59 (42.45%)		N = 80 (57.55%)			
<i>Labour and delivery outcomes</i>					
<i>Labour</i>					
• Spontaneous	40(58.0%)	29(42.0%)			
• Induced	19(27.1%)	51(72.9%)	13.52	0.00	3.702(1.818, 7.541)
<i>Delivery</i>					
• Spont. Vaginal	43(96.4%)	19(30.6%)			
• Caesarean section	16(20.8%)	61(79.2%)	63.43	0.00	0.116 ( 0,054 , 0.251)
• Vacuum/forceps					

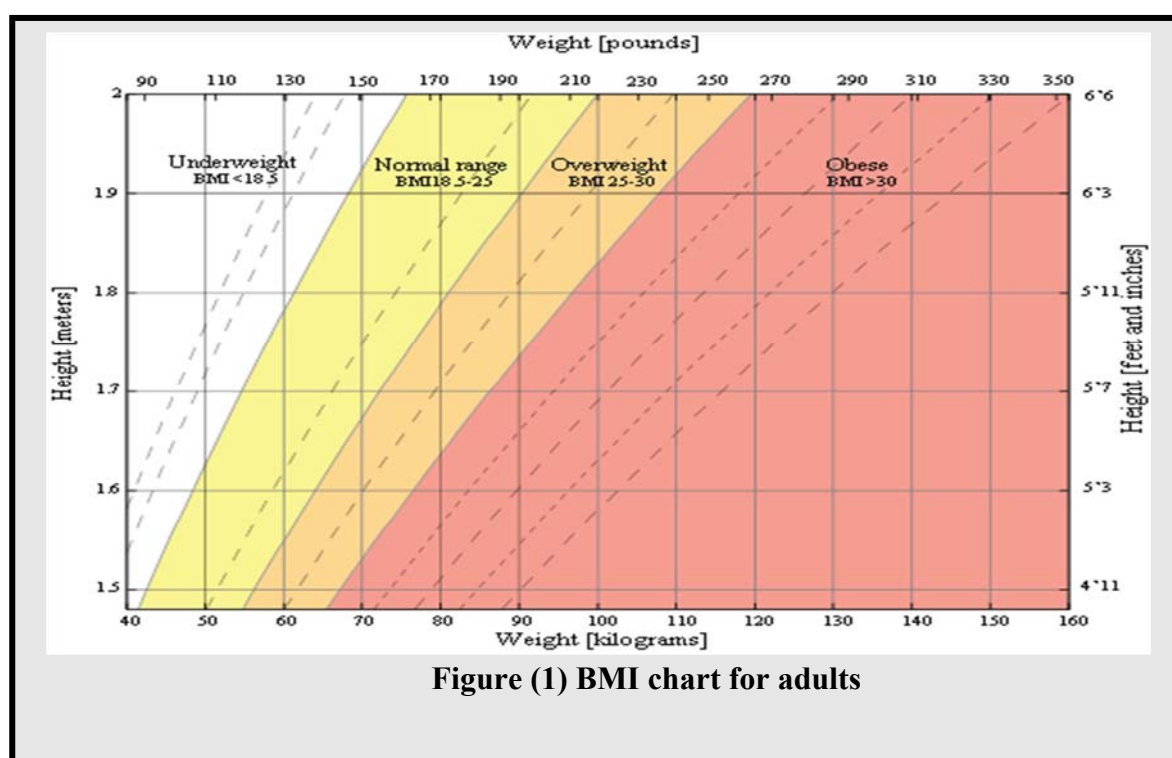
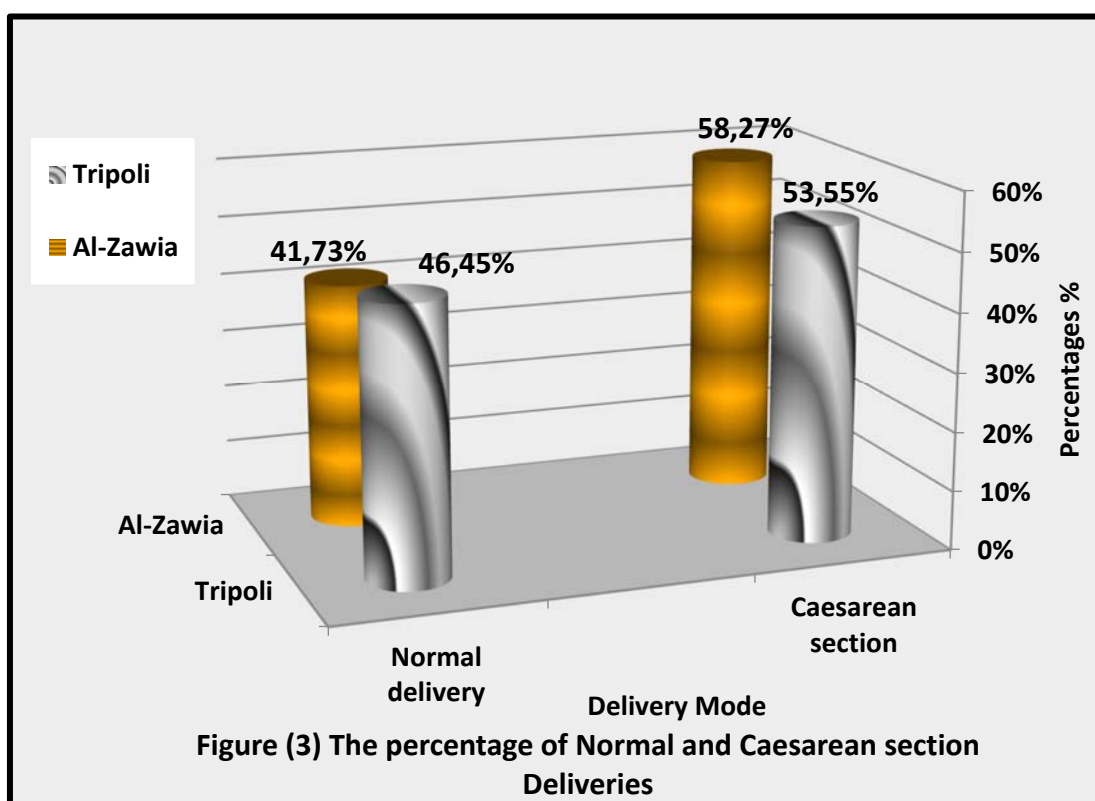
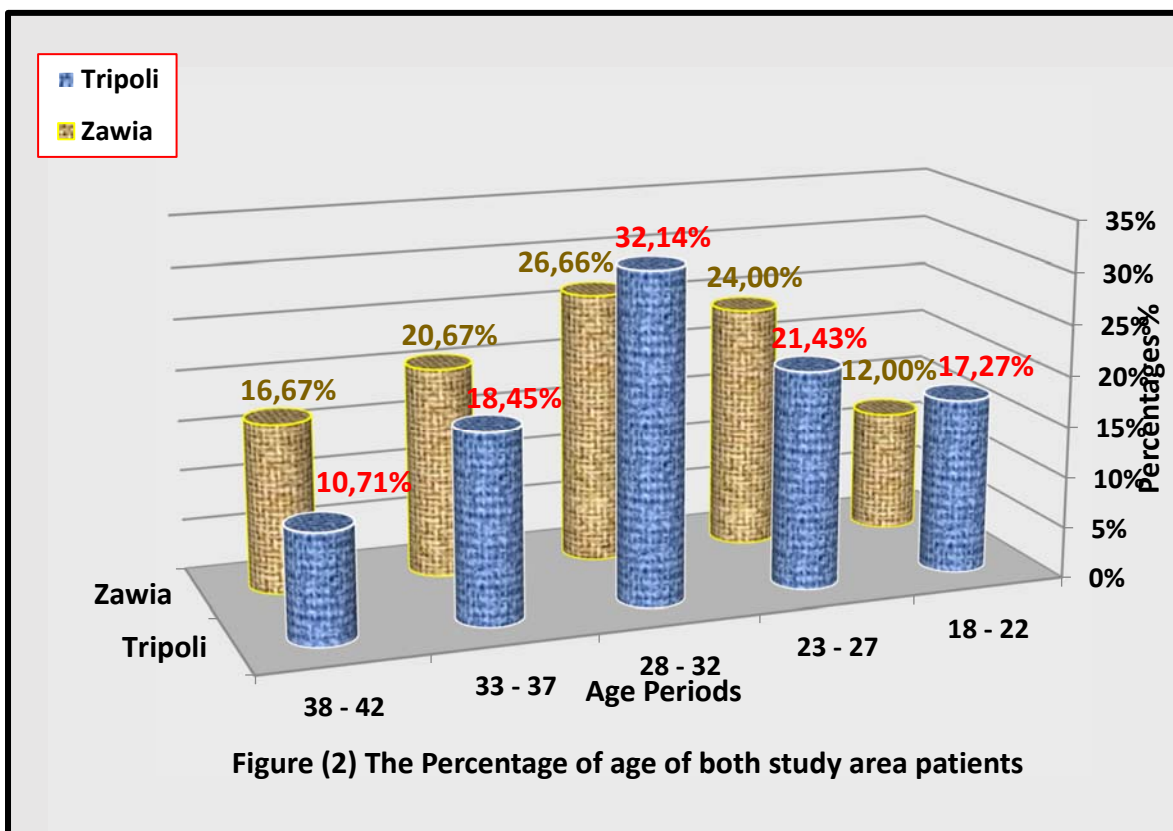
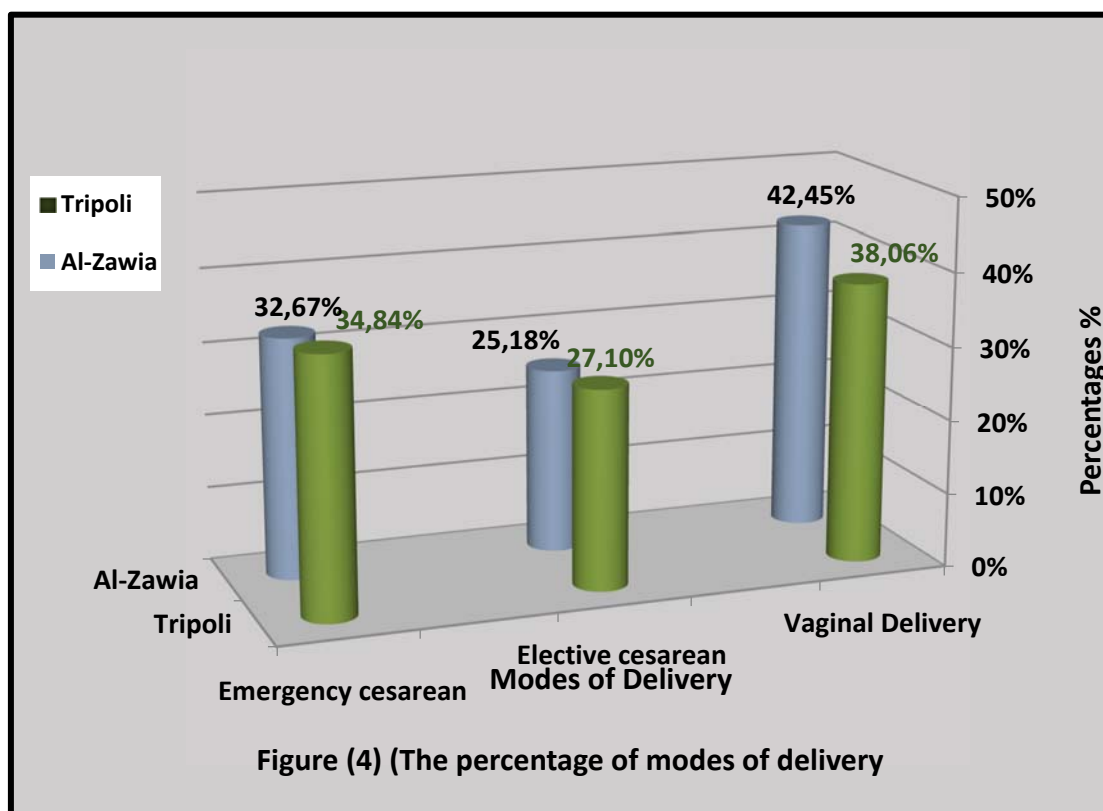


Figure (1) BMI chart for adults

Source [8]





#### IV. Discussion

Obesity is one of the major health problems in the world, it has become a global epidemic. WHO has declared obesity as a major killer disease of the millennium on par such as HIV and malnutrition [13]. BMI anthropometric measurement scale for classifying obesity and overweight in mothers Body Mass index (BMI) is one of the most widely used indicators anthropometric assessment of a pregnant woman [1,25]. According to the Institute of Medicine (IOM) and National Research Council (NRC) guidelines, the optimal weight gains for underweight is 12.7 – 8.1kgs and for obese is 5 – 9.1kgs. Both extremes and excessive or inadequate gestational weight gain can lead to adverse pregnancy outcomes [12].

In the current study, the population BMI was distributed into four groups according to WHO. They were 11/159 (7.33%) and 13/168 (7.74 %) of women are classified as underweight in both hospitals. Also 48/150 (32.00 %) and 89/168 (52.97 %) as normal-weight, 64/150 (42.67 %) and 44/168 (26.19 %) overweight, 15/150 (10.00 %) and 13/168 (7.74 %) as obese I, 10/150 (6.67 %) and 8/168 (4.76 %) as obese II, 2/150 (1.33 %) and 1/168 (0.60 %) obese III as shown in table 1 . The underweight group at Al-Zawia and AL- Galaa Hospitals was a small fraction of the total population of each study area, thus they were excluded from the analysis, also the number of the obese group was added to the overweight in this study. Correlation between categorical variables of the two study areas in table 2, was observed statistically significant difference at  $p \leq 0.05$  by using the Chi-Square test (Chi-square-value = 15.448, and p-value = 0.00). The most significant differences that support our study were the population of two hospitals related to each other. In the same context, Obaid Alwan 2016 showed that the people of northwestern Libya have similar food habits and traditions, and these similarities are the type and quality of food, methods of preparation, and the pattern of consumption [16]. In light of the current study, all the characteristics of the postpartum women groups in Al-Zawia and Al-Galaa hospitals indicate that there was no significant difference between their variables: age, height, body weight, and BMI values ( $p < 0.064$ ,  $p < 0.128$ ,  $p < 0.743$  and  $p < 0.740$  and 95% CI= (-0.057, 1.951), (-0.241, 1.894), (-1.858, 2.598), and (-0.675, 0.947), and for postpartum women of Al-galaa were ( $p < 0.870$ ,  $p < 0.162$ ,  $p < 0.712$  and  $p < 0.144$  and 95% CI= (-0.845, 1.009), (-0.194, 1.563), (-1.456, 2.259), and (-0.176, 1.202), respectively as shown in table 3.



Tables 4 and 5 showed the comparison between the mean characteristics age, height, weight, and BMI, of postpartum women for overweight and normal-weight groups in the study areas. There is no statistical significance at  $p \leq 0.05$  except for the weight and height variables of the normal weight group, which in turn showed significant statistical differences ( $p < 0.007$ ,  $p < 0.000$ ) and 95% CI = (-5.386, -0.871), (-5.941, -1.772), respectively. Furthermore, the current study has been focused to demonstrate the effect of BMI on labour and mode delivery outcomes. The incidence of labour induction and cesarean delivery was increased with an increase in BMI. This observation was obtained by using the chi-square test. The results of labour induction and caesarean delivery were statistically significant in overweight and obese compared to the normal-weight in the studied population of Zawia hospital as shown in table 7 and figure2, where (Chi-square value=13.52,  $p < 0.00$ , 95% CI of OR = 3.702(1.818, 7.541) and (Chi-square value=63.43,  $p < 0.00$ , 95% CI of OR = (0.116 (0,054, 0.251). On the other hand, table 6 and figure2 showed that there is statistical significance, in labor induction for normal-weight women compared to overweight and obese at Al-Galaa Hospital where the values are (Chi-square value=8.72,  $p < 0.003$ , 95% CI of OR = (0.348(0.171, 0.710), while the statistical significance of cesarean delivery in the normal-weight compared to the overweight group was (Chi-square value=12.381,  $p < 0.000$ , 95% CI of OR = [0.281 (0,136, 0.580). Figure 4 shows the increase in the emergency and elective cesarean delivery at Al-Zawia and Al-Galaa hospitals population (32.67%, 34.84%) and (25.18%,27.105) respectively. Meanwhile vaginal delivery was higher in the Al-Zawia hospitals population higher than Al-Galaa hospital group.

According to other research groups [1,5,6,9,22,25], weight gain and obesity were significantly lower in normal vaginal deliveries and more in cesarean sections in overweight and obese women. The increase of emergency and elective cesarean deliveries were similar to what we found in this study, conversely, other studies disagree with our findings [17, 24].

## V. CONCLUSION

Within the limits of this study, an association was found between the maternal body mass index (overweight and obesity) with outcomes of pregnancy complications, such as increased rates of labor induction and cesarean delivery. Although the clinical reproductive problems of pregnant women in the two study areas were not limited to overweight women, they appeared in the normal weight category. Where our study focused on the effect of body mass index on before, during, and after childbirth, so our study is still ongoing to show the effect of body mass index on a pregnant woman after childbirth (postpartum period). This study recommends the necessity of providing adequate counseling and health care for all women to maintain a normal weight, especially in childbearing age, to avoid complicated childbirth outcomes.

## REFERENCES

- [1] Aditi Saini, Syed Masuma Rizvi and Anumodan Gupta.2018 . Body mass index and body adiposity index in maternal obesity and its implication on the mother and her offspring: A hospital-based prospective observational study. *International Journal of Clinical Obstetrics and Gynaecology*; 2(4): 01-05.
- [2] Alkhansa Osama Mohamed, Khalda Mirghani Hamza, Asaad Mohammed Ahmed Babker . 2016. Physiological changes in some hematological and coagulation profiles among Sudanese healthy pregnant women. *International Journal of Medical Science and Public Health*. 5:5.
- [3] Annick Bogaerts, Lieveke Ameye, Evelyne Martens, , and Roland Devlieger: 2015. *Weight Loss in Obese Pregnant Women and Risk for Adverse Perinatal Outcomes* The American College of Obstetricians and Gynecologists. Published by Wolters Kluwer Health 125: 3.
- [4] Ashraf Kazemi, Aazam Dadkhah, Fatemeh Torabi .2020. Changes of Health-Related Quality of Life during Pregnancy based on Pregnancy Context: A prospective study doi.org/10.21203/rs.3.rs-17798/v1.
- [5] Athukorala C, Rumbold AR, Willson KJ, Crowther CA. 2010.The risk of adverse pregnancy outcomes in women who are overweight or adverse pregnancy outcomes in women who are overweight or obese. *BMC Pregnancy Childbirth*.;10. 10-56.
- [6] Bhattacharya S, Campbell MD, Liston WA, Bhattacharya S. 2007. Effect of Body Mass Index on pregnancy outcomes in nulliparous women delivering singleton babies. *BMC Public Health*; 7:168.

- [7] BMI Calculator - Calculator.net <https://www.calculator.net> > fitness & health.
- [8] *Body Mass Index (BMI) Charts* <http://www.vertex42.com/ExcelTemplates/bmi-chart.html> .
- [9] Cedergren M. 2010. Effects of gestational weight gain and body mass index on obstetric outcome in Sweden. *Int J of Obstet Gynecol* 2006; 93:269-74
- [10] Fanny Aldana-Parra<sup>1</sup> , Gilma Olaya<sup>1</sup> and Mary Fewtrell .2020.: Effectiveness of a new approach for exclusive breastfeeding counseling on breastfeeding prevalence, infant growth velocity and postpartum weight loss in overweight or obese women: *International Breastfeeding Journal*. 15:2.
- [11] Feyza Ertop,<sup>1</sup> Nuray Egelioglu Cetisli. 2020. Postpartum depression breastfeeding in overweight/obese and non-obese mothers *JPM* Vol 70, N.2: 219.
- [12] Institute of Medicine, National Research Council Committee. 2009. In *Weight Gain during Pregnancy Reexamining the Guidelines* Washington.
- [13] Islam A, Khan NA, Ehsan A. Complications of raised BMI in pregnancy. *Professor Med J Sep.*; 17(3):498-504.
- [14] Madhuri Taranikanti. 2018. Physiological Changes in Cardiovascular System during Normal Pregnancy. *Cardiovasc Dis Women-WIN CARS* 3:62–67.
- [15] Nathalie J. Farpour-Lambert, Louisa J. Ells, Begoña Martínez de Tejada and Courtney Scott. 2018. Obesity and Weight Gain in Pregnancy and Postpartum: An Evidence Review of Lifestyle Interventions to Inform Maternally and Child Health Policies: *Front. Endocrinol*. DOI: 10.3389.
- [16] Obaid A. Alwan and Amin O. Igwegbe . 2016. Evaluation of the commonly served Meals at Home and Schools to determine their Contributions in Meeting the Nutritional Needs of Pupils enrolled for Morning School Hours in selected Schools in Al-Zawiyya City, Libya. The first scientific conference on food security and food safety. 16 to 17 October 2016. Misrata -Libya.
- [17] Oluoch D, Nyongesa P, Mwaliko E, Odunga J. 2018 . Body Mass Index and Pregnancy Outcomes in Expectant Women at Moi Teaching and Referral Hospital, Eldoret Kenya, *WJMER*, Vol.17: 1.
- [18] Pediredla Ooha, Sri Tanaya ,K. Vandana. 2020. Consequences of maternal body mass index on the pregnancy outcome: *International Journal of Scientific Research* vol - 9:11.
- [19] Priya Soma-Pillay, Catherine Nelson-Piercy, Heli Tolppanen, Alexandre Mebazaa .2016. Physiological changes in pregnancy, *Cardiovascular Africa Journal of Africa*. Volume 27: 2.
- [20] Rathnamma P and Deepika N. 2020. Study of the effect of BMI and maternal weight gain during pregnancy on maternal and fetal outcome. *International journal of clinical Obstetrics and Gynaecology*; 4(3): 16-21.
- [21] Roland.Devlieger ,Lieveke Ameye , Tinne Nuyts ,elat . 2020. Reappraisal of Gestational Weight Gain Recommendations in Obese Pregnant Women of 337,590 Births *Obes Facts*.13:333–348.
- [22] Sahu MT, Agarwal A, Das V, Pandey A. 2007. Impact of maternal body mass index on obstetric outcome. *J Obstet Gynaecol Res.*;33.9-655: (5).
- [23] Santo Monte, Oriana Valenti, Elsa Giorgio. 2011. Maternal weight gain during pregnancy and neonatal birth weight: a review of the literature *J Prenat Med*. 5(2): 27–30
- [24] Scott-Pillai R, Spence D, Cardwell CR, Hunter a., & Holmes VA. 2004-2011. The impact of body mass index on maternal and neonatal outcomes: a retrospective study in a UK obstetric population. *BJOG: An International Journal of Obstetrics and Gynaecology*. 120:932.
- [25] Van Der Linden EL, Browne JL, Vissers KM, et al. 2016 . Maternal body mass index and adverse pregnancy outcomes: a Ghanaian cohort study *index and adverse pregnancy outcomes: a Ghanaian cohort study Obesity*.24:215-222.

[26] World Health Organization: World health statistics .2016. [https://www.who.int/gho/publications/world\\_health\\_statistics/2016/en](https://www.who.int/gho/publications/world_health_statistics/2016/en) Accessed 21 Sept 2018.

[27] Yvon E.G. Kim D.G, Elise O.etal . 2020. The impact of interpregnancy weight change on perinatal outcomes in women and their children: A systematic review. <https://doi.org/10.1002/oby.21210>.

# *Learning-While-Doing Instructional Model and Everyday Arithmetic Performance of Students with Developmental Dyscalculia*

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**Abstract** – This study was on enhancing the performance of junior secondary students with Developmental Dyscalculia (DD) in Everyday Arithmetic through Learning-While-Doing (LWD) instructional model in Ogba/Egbema/Ndoni Local Government Area (LGA) of Rivers State. The quasi-experimental design was adopted. A total of 118 JSS2 students took part in the study. The instruments for data collection were the Developmental Dyscalculia Diagnostic Test (3DT) and the Teacher Made Arithmetic Test (TMAT). The 3DT was a 10-item test to diagnose students with DD, while the TMAT was a 15-item multiple-choice test with four options to measure the performance of the students with DD in Everyday Arithmetic. The instruments were subjected to face and content validation. The reliability coefficients of 0.85 and 0.93 respectively were obtained through the test-retest method. The descriptive statistics and Analysis of Covariance (ANCOVA) were used for data analyses. It was found that the performance of students taught arithmetic using LWD instructional model was better than that of their counterparts taught using problem-solving strategy. Female students taught arithmetic using LWD instructional model performed slightly better than their male counterparts. There was a significant difference between the performance of students with DD taught Everyday Arithmetic using the LWD model and those taught using problem-solving strategy. There was no significant difference in the performance of male and female students with DD taught arithmetic using LWD instructional model. It was recommended among others that Mathematics teachers should employ the use of the LWD instructional model in teaching to improve the performance of students in the subject.

**Keywords** – Everyday arithmetic, Developmental dyscalculia, Learning-while-doing, instructional model, Performance.

## I. INTRODUCTION

The application of mathematical knowledge to solving societal problems dates back to the existence of man. The knowledge of Mathematics plays a significant role in enhancing the country's social and economic systems. Everyone uses Mathematics in solving daily problems and improving the standard of living. Mathematics plays a central role in modern culture. The importance accorded to Mathematics in the school curriculum from the primary to even the tertiary school levels accurately reflect the vital role played by the subject in today's contemporary society. The importance of Mathematics to nation-building has led the Federal Government of Nigeria to make Mathematics a core subject to be offered by all students at the basic and post-basic levels of education in Nigeria (Federal Republic of Nigeria, 2014).

Despite its importance, Mathematics has been considered difficult and boring for many students. Senior secondary students perceived 33% and 88.20% of the General Mathematics and Further Mathematics curriculum content difficult to learn

respectively (Zalmon & George, 2018; Zalmon & George, 2020). Barbeau (1989) as cited in Baykul (1999) indicated that people viewed Mathematics from an absolutist perspective and undoubtedly this is what reflects from the Mathematics they studied in school rather than an insight into the discipline. The absolutists perceived Mathematics as a cold and austere discipline that creates no scope for creativity. Teaching Mathematics with the absolutist view promotes anxiety, mathophobia and under-achievement among students of Mathematics. Students consider Everyday Arithmetic which is a major aspect of Mathematics to be complex, trivial and difficult.

Everyday Arithmetic is a branch of Mathematics that consists of the study of numbers and the properties of the traditional operations on them. The traditional operations are addition, subtraction, division and multiplication. Everyday Arithmetic is the basic calculations we make in our everyday life. Everyday Arithmetic is a critical aspect of Mathematics that is very essential for daily living. The knowledge of Everyday Arithmetic acts as a significant criterion for individual growth and improvement. The importance of Everyday Arithmetic cannot be underestimated. It is through the help of Everyday Arithmetic that humans can solve real-world phenomenon. Meanwhile, students perceived addition, subtraction and multiplication in Everyday Arithmetic, particularly modular arithmetic difficult to learn (Zalmon & George, 2018). This learning difficulty in Everyday Arithmetic is easily noticed among students with developmental dyscalculia.

Dyscalculia is a term used to describe learning difficulty in Mathematics. Shalev (2004) defined dyscalculia as the learning difficulty affecting the normal development and acquisition of arithmetic skills. Dyscalculia is a specific learning difficulty in Mathematics (Wonu & Zalmon, 2017). Dyscalculia is of two types namely: acquired and developmental dyscalculia. According to Munro (2003), dyscalculia which occurs as a result of cerebral trauma is called acquired dyscalculia while dyscalculia without proof of cerebral trauma is known as developmental dyscalculia. Developmental Dyscalculia (DD) is specific dyscalculia that is characterised by impairments in learning basic arithmetic facts, processing numerical magnitude and performing accurate and fluent calculations (Wonu & Zalmon, 2017). Developmental dyscalculia portends great challenge to students' performance in Everyday Arithmetic. Hence, there is a need to render extra support to students who are challenged with the menace of developmental dyscalculia and help to enhance their learning outcomes in Everyday Arithmetic through the use of suitable diagnostic, remedial and learner-centred practical teaching and learning model such as Learning-While-Doing (LWD).

Learning models are particular approaches or techniques employed by teachers for effective instructional delivery. Learning models refer to self-generated thoughts, feelings, and actions, which are systematically oriented toward the attainment of learning goals. Such learning models may consist of mental or behavioural activity that is related to some specific stage in the overall process of the acquisition of arithmetic skills. An effective learning model can determine the outcomes of learning. It is worthy of note that active instructional models like LWD can make learning easier, faster, more enjoyable, more self-directed, more effective, and more transferrable to new situations. Learning-while-doing instructional model is one of the different approaches used to provide educational interventions to students with Mathematics disability (Wonu, 2020). This approach emphasizes the need to effectively teach students with DD in regular education classrooms. To remediate the effects of DD on students' Mathematics learning outcomes require teaching models that engage the students in project development activities during mathematical problem-solving task performance (Wonu, 2020).

The manner in which LWD strategies are displayed depends on information on how individuals learn. The LWD depends on the constructionist theory of Seymour Papert. Any learning climate with satisfactory learning materials for investigation, project development and wealth of interaction openings among students can support LWD process. The LWD model was developed by Schlumberger Excellence in Education Development (SEED) as a contribution to the collection of educational practice ([www.planetseed.com](http://www.planetseed.com)). Some particular highlights of the manner by which learning is coordinated while utilizing LWD in the classroom is summed up by Tempel (2007) as a learning situation where learning is active, collaborative, integrated and learner centered. People of all ages and abilities learn together. Everyone is at once a learner and a teacher.

The Learning-While-Doing instructional model is a form of Project-Based Learning (PBL). The PBL is designed for the engagement of learners in the exploration of the real-world task to create relevant and meaningful experiences (Wonu & Arokoyu, 2016). This instructional model gives children with developmental dyscalculia the chance for the acquisition of knowledge or arithmetical skills through direct experience gained in a practical task. Therefore, this study investigated the effectiveness of the use of LWD instructional model in improving the performance of developmental dyscalculic students in Everyday Arithmetic. The effect of LWD instructional model on the performance of developmental dyscalculic students in Everyday Arithmetic by gender was also investigated.

## **II. STATEMENT OF THE PROBLEM**

There is a nationwide outcry on the poor academic performance of students in Mathematics. The performance of Mathematics students has been worrisome to all ranging from teachers, researchers, government and even the parents of the students. The percentage of junior secondary school leavers that have failed to perform to an acceptable extent remains high because of high failure in Mathematics examinations. Hence the investigation on enhancing the performance of students with developmental dyscalculia in Everyday Arithmetic using LWD instructional model is worthwhile and timely.

## **III. PURPOSE OF THE STUDY**

The purpose of the study was to find out whether there is an enhancement in the performance outcomes of students with developmental dyscalculia in arithmetic when taught using Learning-While-Doing instructional model. The objectives of the study are to:

- i) Determine the effect of LWD instructional model on the performance of students with developmental dyscalculia in Everyday Arithmetic.
- ii) Investigate the effect of gender on the performance of students with developmental dyscalculia in Everyday Arithmetic when taught using LWD instructional model

## **IV. RESEARCH QUESTIONS**

The following research questions guided the study:

- i) What is the difference in the performance mean scores of students with developmental dyscalculia taught Everyday Arithmetic using LWD instructional model, and those taught with problem-solving strategy?
- ii) What is the difference in the performance mean scores of the male and the female students with developmental dyscalculia taught Everyday Arithmetic using LWD instructional model?

## **V. HYPOTHESES**

The following null hypotheses were formulated for the study:

1. There is no significant difference in the performance mean scores of students with developmental dyscalculia taught Everyday Arithmetic through LWD model and problem-solving strategy.
2. There is no significant difference in the performance mean scores of male and female students with developmental dyscalculia taught Everyday Arithmetic using LWD instructional model.

## **VI. RESEARCH DESIGN**

The study adopted a quasi-experimental design with a non-equivalent control-group pretest-posttest approach. The independent variable is the instructional model whereas the response variable is the student performance in Everyday Arithmetic.

## **VII. PARTICIPANTS**

The population of the study comprised 3,854 Junior Secondary School II students (1,885 males & 1,969 females) from the twenty-four (24) public junior secondary schools in Ogba/Egbema/Ndoni LGA of Rivers State (Rivers State Universal Basic Education Board, 2019). The sample of this comprised of 118 Junior Secondary School two (JSS 2) students. A sample of two (2) co-educational public junior secondary schools were drawn from the 24 public Junior Secondary Schools in the study area. One of the schools served as an experimental group while the other school served as the control group. The sample distribution of the JSS 2 students in the schools is tabulated below:

Table 1: Sample Distribution

School	Male	Female	Total
A	34	20	54
B	32	32	64
<b>Total</b>	62	56	118

Source: Fieldwork, 2019

The purposive sampling technique was adopted to ensure that the participants that were chosen (both males and females) had a similar background, experience, and environmental exposure. The selected sample of developmental dyscalculic students was chosen based on their previous terminal performances and results, class teacher's remarks and referral, and the results obtained from the Diagnostic Developmental Dyscalculia Test (3DT) administered to them before the commencement of the study.

### VIII. INSTRUMENTATION

Two instruments were developed and used for the data sourcing; these are the Diagnostic Developmental Dyscalculia Test (3DT), and Teacher Made Arithmetic Test (TMAT). The Diagnostic Developmental Dyscalculia Test (3DT) consisted of ten (10) items designed to diagnose Dyscalculia problems from the students, while the Teacher Made Arithmetic Test (TMAT) consisted of 15 multiple choice questions with four options labelled A-D, used to test and measure the performance of the students before and after exposure to the treatment. The research instruments were subjected to face and content validity check and modified in a way the students would easily understand. The test-retest method was used to establish the stability of the instruments to obtain reliability indices of 0.85 and 0.93 respectively for 3DT and TMAT.

First, consent to carry out the study in the schools was obtained from the administrations of the schools used for the study. The researchers then collected the performance details of the students for the last term from the Mathematics classroom teachers. Students who have been performing poorly in Mathematics were then selected. The researchers then administered the 3DT to the students who have been underachieving mathematically in the two (2) co-educational public junior secondary schools, and thereafter the results were used to discover 54 and 64 developmental dyscalculic students from the sampled schools. These students were identified and their details were taken. Since the researchers used intact classes for the study; sampling was not carried out, however, only the scores of the affected students were used for the study. Consequently, students from school A were used as the experimental group while students from school B were used as the control group.

The Pre-TMAT was then administered to the two groups of students on the first day of classes. The Pretest was administered by the class teachers. All the lessons for teaching were then prepared by the researchers. The topic was prepared for the experimental group and taught with LWD instructional model, while the same topic was also prepared for the control group and taught with a problem-solving strategy. The regular intact class Mathematics instructors carried out the teaching. The regular intact Mathematics teachers of the sampled students were trained by the researchers for two (2) consecutive days on how to carry out the teaching using the researchers' constructed lesson plans. This was then followed by the teaching of the contents of the lesson for two weeks. Each group was taught by their Mathematics teacher, under similar environmental conditions using the same lesson plans. The experiment was not revealed to the partaking learners. The experimental group was instructed using the LWD model, while the benchmark group was taught utilizing the problem-solving model. The Post-TMAT was then administered to both groups of students after a two-week treatment. Both groups of students received identical exercises concerning the amount and level of difficulty.

### IX. DATA ANALYSIS

Descriptive statistics and Analysis of Covariance (ANCOVA) were used for data analysis.

### X. RESULTS

Table 2: Mean and standard deviation of the difference in the performance mean scores of students with developmental dyscalculia taught arithmetic through learning-while-doing instructional model (LWD), and those taught with Problem-Solving Strategy (PSS).

Model	N	Pre-TMAT		Post-TMAT		Mean Gain
		$\bar{x}$	SD	$\bar{x}$	SD	
LWD	54	17.69	9.40	47.78	8.45	30.09
PSS	64	17.34	8.77	35.63	8.52	18.29

Table 2 shows the difference in the performance mean scores of students with developmental dyscalculia taught arithmetic using the LWD instructional model, and those taught with problem-solving strategy. The result indicated that students taught arithmetic through learning-while-doing instructional model performed better (Pre-TMAT:  $\bar{x}$  = 17.69, SD = 9.40, Post-TMAT:  $\bar{x}$  = 47.78, SD = 8.45, mean gain = 30.09) than those taught using problem-solving strategy (Pre-TMAT:  $\bar{x}$  = 17.34, SD = 8.77, Post-TMAT:  $\bar{x}$  = 35.63, SD = 8.52, mean gain = 18.29). The implication of the mean difference of 18.38, in favour of students in the LWD group, is that the performance of students taught arithmetic through LWD instructional model is better than that of those taught using the problem-solving strategy.

Table 3: Mean and standard deviation of the difference in the performance mean scores of male and female students with developmental dyscalculia taught arithmetic using LWD instructional model

Gender	n	Pre-TMAT		Post-TMAT		Mean Gain
		$\bar{x}$	SD	$\bar{x}$	SD	
Male	34	18.38	9.59	46.76	8.43	28.38
Female	20	16.50	9.19	49.50	8.41	33.00

Table 3 shows the difference in the performance mean scores of male and female students with developmental dyscalculia taught arithmetic through LWD instructional model. The result indicated that female students performed better (Pre-TMAT;  $\bar{x}$  = 16.50, SD = 9.19, Post-TMAT:  $\bar{x}$  = 49.50, SD = 8.41, mean gain = 33.00) than their male counterparts (Pre-TMAT;  $\bar{x}$  = 18.38, SD = 9.59, Post-TMAT;  $\bar{x}$  = 46.76, SD = 8.41, mean gain = 28.38). The implication of the mean difference of 4.62, in favour of the female students, is that female students taught arithmetic through LWD instructional model performed better than their male counterparts.

Table 4: Summary of ANCOVA on the difference in the performance mean scores of students with developmental dyscalculia taught arithmetic using learning-while-doing strategy and problem-solving strategy respectively

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	7531.33 <sup>a</sup>	2	3765.66	84.05	0.00	0.59
Intercept	24443.54	1	24443.54	545.55	0.00	0.83
Treatment	4184.28	1	4184.28	93.39	0.00	0.45
Pretest	3205.76	1	3205.76	71.55	0.00	0.38
Error	5152.57	115	44.81			
Total	212850.00	118				
Corrected Total	12683.90	117				

a. R Squared = .594 (Adjusted R Squared = .587)

Table 4 shows that there is a significant difference in the performance mean scores of students with developmental dyscalculia taught arithmetic using the LWD model and problem-solving strategy ( $F_{1, 115} = 93.39$ ,  $p = 0.00$ ). This led to the rejection of the null hypothesis one at the 0.05 alpha level.



Table 5: Summary of Analysis of covariance (ANCOVA) on the difference in the performance mean scores of male and female students with developmental dyscalculia taught arithmetic through learning-while-doing instructional model

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	1055.38 <sup>a</sup>	2	527.69	9.87	0.00	0.28
Intercept	18919.15	1	18919.15	353.70	0.00	0.87
Gender	160.92	1	160.92	3.01	0.09	0.06
Pretest	961.16	1	961.16	17.97	0.00	0.26
Error	2727.95	51	53.49			
Total	127050.00	54				
Corrected Total	3783.33	53				

a. R Squared = .279 (Adjusted R Squared = .251)

Table 5 shows that there is no significant difference in the performance mean scores of male and female students with developmental dyscalculia taught arithmetic using the learning-while-doing instructional strategy ( $F_{1, 51} = 3.01, p = 0.09$ ). Thus, null hypothesis three is rejected at the 0.05 alpha level.

### XI. DISCUSSION OF FINDINGS

The result from Table 2 showed that students taught Everyday Arithmetic using LWD instructional model performed better than those taught arithmetic with PSS. These results agree with earlier finding by Wonu and Ogunkunle (2015) which established that an innovative instructional model is capable of advancing the learning outcome of students with DD. The ANCOVA result in Table 4 showed that there is a significant difference in the performance mean scores of students with developmental dyscalculia taught arithmetic using the LWD model and PSS. This led credence to the rejection of hypothesis one at .05 alpha level. The finding also supported the findings of Ahumaraeze and Ekwueme (2018) who found that students taught with Constructivist-Based Instructional Strategy (CBIS) had higher Mathematics performance than those in the control group. Similarly, the findings agree with Adaramola (2012) who concluded that students with dyscalculia exposed to the teaching of Mathematics with concept mapping performed significantly better and were more interested in Mathematics than their counterparts in the formula group.

The result from Table 3 showed that the female students slightly outperformed their male counterparts in Everyday Arithmetic when taught using the LWD model. The ANCOVA result in Table 5 showed no significant gender difference in the performance of dyscalculic students exposed to the LWD model. Adaramola (2012) found out that gender is not a significant factor regarding student learning outcomes. However, Ahumaraeze and Ekwueme (2018) revealed a significant difference in the mean scores of male and female students taught probability using CBIS, and this gender difference in performance favoured the male more than the female students.

### XII. CONCLUSION

Learning-while-doing instructional model was found capable of advancing the performance of students with developmental dyscalculia in Everyday Arithmetic. There was no significant gender difference in the performance of the students taught Everyday Arithmetic using LWD instructional model. The use of the LWD instructional model enhances the performance of developmental dyscalculic students in Mathematics irrespective of their gender.

### RECOMMENDATIONS

Based on the findings of this study, the following recommendations were made:

- i) Teachers should use LWD instructional model to improve student performance in Mathematics.
- ii) Mathematics teachers should be trained and encouraged to effectively employ LWD instructional model in their lesson delivery to ensure gender parity in Mathematics performance.

REFERENCES

- [1] Adaramola, M. O. (2012). Effect of concept-mapping on performance and interest of students with dyscalculia in secondary school Mathematics in Nigeria. *Abacus: The Journal of Mathematical Association of Nigeria*, 37(1), 195 -207.
- [2] Ahumaraeze, O. U. & Ekwueme, C. O. (2018). Effect of constructivist-based instructional strategy on senior secondary school students' academic performance in Mathematics in Rivers State. *Abacus: The Journal of Mathematical Association of Nigeria*, 44(1), 219-230.
- [3] Baykul, Y. (1999). *MathematikOgretimi*. AniYayincilik.
- [4] Federal Republic of Nigeria (2014). *National policy on education (4<sup>th</sup> ed.)*. NERDC Press.
- [5] Munro, J. (2003). Dyscalculia: A unifying concept in understanding Mathematics learning disabilities. *Australian Journal of Learning Disabilities*, 8, (4).
- [6] Rivers State Universal Basic Education Board (2019). Statistics of enrolment of students.
- [7] Shalev, R. S. (2007). *Why is Mathematics so hard for some children? The nature and origins of mathematical learning difficulties and disabilities*. H. Brooks Publishing.
- [8] Tempel, M. (2007). Learning While Doing (LWD). Schlumberger Excellence in Education Development (SEED). Retrieved from [www.planet.seed.com](http://www.planet.seed.com) on October 26<sup>th</sup> 2015.
- [9] Wonu, N. & Arokoyu, A. A. (2016). Learning while doing model and senior secondary students' learning achievement in solid geometry. *International Journal of Academic Research and Reflection*, 4(7), 80-88. <http://www.idpublications.org/ijarr-vol-4-no-7-2016/>
- [10] Wonu, N. & Ogunkunle, R. A. (2015). Effects of metacognitive strategy on the planning skills in number and numeration of students with developmental dyscalculia. *Abacus: The Journal of Mathematical Association of Nigeria*, 40(1), 22-34.
- [11] Wonu, N. & Zalmon, I. G. (2017). Diagnosis and remediation of senior secondary student common learning difficulties in Mathematics from chief examiners' report. *European Journal of Research and Reflection in Educational Sciences*, 5(1), 2-23.
- [12] Wonu, N. (2020). An educational intervention to improve everyday arithmetic learning outcomes of students with attention deficit hyperactivity disorder and/or developmental dyscalculia. *East Africa Journal of Educational Review and Policy (EAJERP)*, 18(1), 77-100.
- [13] Zalmon, I. G. & George, N. R. (2018). Student and teacher perception of content difficulty in the Nigerian senior secondary Mathematics curriculum. *International Journal of Mathematics Trends and Technology (IJMTT)*, 63(3), 157-168.
- [14] Zalmon, I. G. & George, N. R. (2020). Assessment of students' perception of content difficulty in the Nigerian Further Mathematics curriculum. *International Journal of Innovative Research and Development*, 9(11), 38-48.

# *Renewal Principles And Artical Interpretation In Uzbek Literature*

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**Abstract – During the independence years, various works of Uzbek literature have appeared, it is about the poetessic features that formed the basis of modern literature where the guiding principles of world literature at their core exist. One of the leading representatives of Uzbek literature in recent years, Gozal Begim, commented on the unique poetessic interpretations in her work.**

**Keywords – *Lyrical Hero, Experience, Artistic Expression, Modern Poetry, Interpretation, Creative Skills, Creative Collaboration.***

During the independence years, as in many areas brought many poetessic interpretations to the world of Uzbek literature and art. Development of Uzbek literature it should also be noted that world literature is evolving in close connection with tradition and innovation. There are many unknown aspects of fiction, many young artists of the word, artists who see creativity as destiny.

Literary critic Kazakboy Yuldashev noted:“ The relationship between time and literature is a complex one. Because if the main sign of the times is its constant movement, its change, the main feature of the original literature it is its desire to live longer than the time it created, to be more stable” [1, 15-p]. At the bottom of these ideas is the fact that there is a synchronized truth for the period. Therefore updated fiction, free of ideology and began to interpret the sufferings of the human heart, which marked the beginning of the leading principles incorporation of world literature.

Let's take a look at the views of the literary scholar Ozod Sharafiddinov, who emphasized the literature uniqueness of the independence period: “First of all, I must say that independence literature is not a chronological concept. Simply, when we say independence literature, we should not mean only works created after 1991. The independence literature begins with the works of Cholpon, Fitrat and it has continued to take shape over the last decade. Certainly, it will continue to improve in the coming decades” [3, 191-p]. As rightly pointed out, independence literature, including the early XX century. “ First of all, it should be noted that there are free circumstances for creativity. A free approach to the creation of human character to reflect life is an important feature of the new literature. And when it comes to the literature updating process, of course it is necessary to consider the peculiarities of this field of art. For example: If you water the flowers in the garden today, they will bloom the next morning, its greenness thickens, its body pulls energetically, buds, so it is suddenly renewed. The renewal process in the literature is gradual” [3, 192-p]. Another important aspect of the independence literature is that by this time, Uzbek literature had undergone a comparative analysis with all the world literature traditions. The new principles and trends effect has been significant. One of the currents in the research of our literature today is modernism. It is no coincidence that modernism has a place in Uzbek art, as well as the emergence principles of each literary movement. The term "modernism" has its own peculiarities. “Modernism” (French: modarne-modern) is a variety of

non-realist trends used in the art and literature of the XX century, which is characterized by the fact that it combines the common features of currents.

Modernist writers abandon the traditional style and artistic forms in their work and begin to look for a new modern style, the originality of the need for forms, creative, new principles, poetessic interpretations, which began to adorn the uniformity. In the history of modern world literature and art there are so many nonrealistic currents and groups such as avant-garde, impressionism, freudianism, constructivism, futurism, existentialism, abstractionism, acmeism, imaginism, "absurd theater", "new novel", "genetic art", "ponart", "the stream of consciousness", all of which fall within the modernism realm. Each of the modernist currents and groups has its own characteristics, and at the same time, they all have one thing in common: the adherence to the unrealistic method principles in describing life. Literary critic Tokhta Boboyev noted that "modernism is a very controversial, very complex literary direction" [4, 545-p].

It should be noted that in the last quarter of the XX century, Uzbek literature development has significantly influenced the creative influence of writers who have created rare masterpieces of world literature. The existing literature is a sign that it has been "bored" of uniformity over the years. Therefore, rely on the creative traditions of writers such as Gabriel Garcia Marquez, James Joyce, Y. Kawabasa, F. Kafka, H. Cortasar, T. Wolfe, A. Camus, L. Borges, K. Fuektas, and there are also cases of "feeding" on it. The young writers, who carry out bold research in the artistic creation process, are firmly rooted in the national literary traditions and are mastering the leading principles of world literature. This shows that Uzbek literature is nourished not only in its "shell", but also in the world literature traditions.

Ozod Sharafiddinov, an Uzbek literary scholar, explains the modern literary movement origins as follows: "At the end of the XIX century and the beginning of XX century, the social life development pace in the world accelerated at an unprecedented rate. It has given rise to many new ideas and new views. They also began to demand a new approach to man in the literature. In other words, the long-established method of realism in the literature seemed to be somewhat outdated and narrow in its ability to express new content. And some artists have begun to look for new ways to reflect life in accordance with the time requirements. In this way, various modernist currents began to emerge around the world. Of course, there were some effective ones. And there were those who did it as an experiment, but in practice they didn't have much success" [5, 239-p].

Fiction can awaken the human spirit and free it from the oppression, cruelty, ignorance and apathy habit. However, it does not seem appropriate to apply sacred requirements to every work, such as "the pain of the nation", "the interests of the motherland", and "the struggle for good". It must be acknowledged that it is a writer creation to express his or her pain and desires in a way that does not repeat and affect others in a way that does not repeat and affect others.

Gozal Begim, the poems owner of the same content, the creator who can define the independence poetry features, is one of our poetess who is working effectively today. Speaking of Gozal Begim work we can say "The poetess is the one who carries a candle in the wind" [6, 128-p]. It's not just a pun. This inscription on the real poetess forehead can also be considered as an eternal judgment of destiny. In fact, every word is hidden in the heart of the artist throughout her life and creative activity, she writes about her own views, her own anxieties, which she does not like to show off to anyone, which have become a personal secret. The real pain of the lyrical protagonist becomes the reader pain. She uses a variety of themes and forms to express herself. But it is also more about "private" topics. In modern poetry, the following lines seem to be the root for the poems of Gozal Begim's researches, which are polished in different senses:

Men she'r o'qiyapman (I am reading poetry)  
ko'zlarimga osilgan munglar (tears in my eyes)  
daryo-daryo so'zlar qarshimda (river of words in front of me)  
qum kechadi alp orzularim (the sand will pass my hero dreams)  
tun otyapti qorachig'imda (it's getting dark)  
Men she'r o'qiyapman (I am reading poetry)  
yuragingiz ichida turib (standing in your heart)  
to'kilyapman to'rt tomonimga (I spill all over)  
ovozimda chayqalib borar (my voice is swaying)  
binafsha rang kunlar qismati (the fate of purple days) [7, 24-p].

Everything seems to be clear, the poetess's heart is in the lines. In fact, it is worse then worthless. The river of words, the hero dreams, the night in the dark, the purple days - these are not the only images of pain, new and bubbly meaning that flowed from the poetess's heart. Each of these is a human tragedy that, in its deepest sense, becomes a symbol. In order to understand the poetess secrets planted in the tongue depths, the symbols, metaphors are a key. Outwardly, every expression seems familiar to us. But it is also a sign that they are gaining new and deeply hidden meanings that have never been seen or encountered before.

The words in all of Gozal Begim's poems do not belong to the world without the reader's consciousness. Although the words we use in our daily conversations, it is also important to keep in mind the specifics of the metaphorical interpretations. The perfection of the poetess's poetry is also explained by the fact that it shakes the reader heart. As noted by Russian literary scholars: "Metaphor - a figurative use of a word to describe a person, object or phenomenon based on similarity" [6, 302-p]. The analogies at the heart of the metaphorical interpretation reveal the different experiences of the lyrical protagonist. It has a magical power to express the poetess's ideas and feelings. It is a symbol of beauty that evokes deep, rich, emotional music.

The words power can be seen in such a literary text. When words are weeping, when words are laughing, when words are breaking, when words are silent and anxious, the verses meanings flow into our hearts and resonate with them. From that moment on, the words leave a carefree life.

The words in Gozal Begim poems are like fire; the strings burn like coals. For this reason, the poems of the poetess cannot be read in words or indifferently. It shakes the human heart, encourages the world and man to understand and think. The words role in Gozal Begim poems in the expression of meaning is incomparable. As the poetess constantly seeks to say something new in a new form, she infuses each of us with new and deeper meanings and feelings. In terms of form, the short lines are aimed at drawing the meaning of acute situations, the color of complex conflicting moods and emotions, the landscape. We feel that this is due to the fact that Gozal Begim understands and strives to understand and explain the complex reality of human life, the life relationships, and acquires beauty at the heart of such feelings as man, life, living:

Ey suydiguvchi (O diluent)  
gul bargini yuragimdan olib o'tgan (took a flower petal from my heart)  
tuyg'ularimning billur shaklini (the crystal form of my feelings)  
ovoz xiyobonida erkalaguvchi (petting in the sound alley)  
saksovl iforida raqsga tushgan (danced to the saxaul odore)  
sabo sandig'idan ozod bo'lgancha (until it is free from the box of breeze)  
qushlar qiroatin ko'kka yo'llagan (the birds chirped)  
nigoh kengligiga yo'l olgan ey so'z (oh word going to the width of view)  
tiz cho'kkan tovushlar sening qarshingda (kneeling sounds in front of you)  
va yurak haqidagi ertaklar (and tales about the heart) [7, 23-p].

In these lines, the poetess was able to draw a certain psychological state of a person with the words power. If we consider the thought flower and poetry as its basis, it is emotions tree, a garden of experiences, which awakens the senses in a person's emotions and represents the heart order. He joins the lyrical protagonist and begins to suffer. It is the tree seed, formed from the fire and light of experience, from the water and the soil. The poetess picks it up one by one. This is the seed that will take root in our hearts and bear fruit. There will also be a haven for angel birds. Nestlings will fly. It gives wings to the wings of iron, and the trees begin to live in our hearts.

Indeed, when we analyze the poems of the poetess Gozal Begim, we feel a sense of harmony with the feelings of the lyrical hero, because there is a need to understand the person. Getting acquainted with the poetess poems, talking and arguing with her, also shakes the reader heart. As the poetess opens the love book, burning you too will enter the emotions world, boiling, frying and burning in the emotions cauldron of the poetess's poetry. At this is the poetess's artistic skill, her ability to touch the reader heart. In the contemplation waves, involuntary bowing, pain and suffering in the heart depths can arise. Poetess never and in any case leaves the reader indifferent. That's the decent thing to do, and it should end there. From these original lines of poetry, we see the love tremors for life, the devotion revolts to love, the betrayal hatred of love.

Every person has been imitating nature for a lifetime. Learns from nature; striving to achieve the unique beauties of nature, to create such unique beauties. Nature is not only the physical basis of human life, but also the spiritual life mainstay. The interpretation of person and nature in Gozal Begim lyrics has such a philosophical meaning. The poetess sees the life eternity, the life goodness,

in the changing nature. Life, destiny, goodness, and philosophy come out of nature. Gozal Begim reads the life wisdom from the nature philosophy. In particular, when they see the human life meaning in nature, they acquire a specific meaning for human life:

Kirgim kelaverar (I want to enter)  
ko‘zlarining kengliklariga (to the width of your eyes)  
o‘ ziga o‘ xshamas bironta kecha (a night like no other)  
yaproqlar chayqalgan qayiq misoli (as a boat with leaves swaying)  
urilar umrimning choshgohlariga (hit the corners of my life)  
ketar oyoqlarim o‘ zi bilgancha (as far as my feet go)  
ketib boraverar bilib-bilmasdan (unknowingly going away)  
sochlarim – qahrabo (my hair is amber)  
ko‘ nglig iplariga osilib qolgan (hung on the ropes of the soul ) [7, 20-p]

In her poems, she emphasizes that he feels life eternity and, on this basis, becomes an criterion for human existence, as well as an integral connection with nature. Poetess's poems summarize a series of emotions, such as wonder, amazement, hatred, passion, joy, sorrow, regret, patience, pain, desire, contentment, and pride. We see that person is forced to understand himself, to follow the dictates of his heart, to share his desires.

In particular, whether it is failure or success, the justice determination, or the existence disappearance due to death, we are deeply moved. Poetess poems become our best friends. One of the biggest factors in a poem's ability to be human is its figurative expression. Figurative speech is a cover for any passion, it burns like an eye in the ring. Along with adding beauty to the meaning expression, it also gives an artistic color to the experience. The passions of sweet joy, which lift our spirits to the heights, have a beautiful meaning in bright descriptions and comparisons, in bubble images. However, the deepest feelings of grief are more expressive, sharp when expressed in simple and straightforward, sincere words. The reader compares the desires in the heart to a leaf-throwing tree.

Guzal Begim's lyrics are contemporary poetry that evokes reflection. You can't just read her poems and enjoy them aesthetically. It is necessary to think deeply and analyze it, to try to understand the essence of the philosophical subject. In order to understand the heart, pain, and desires of a woman in her poems, one must be ready for it. As you read these poems written in a modern way, you will come to understand more deeply the power of literature. The poems poetess, at first glance, seem incomprehensible to person, and the rhyme and thoughts eloquence in them do not seem to captivate the reader, but if you pay attention to the essence and content, you will see the complete opposite.

Guzal Begim's poetry consists of heartaches images, dreams tragedies, mental anguish scenes, and is combined with the sorrows and joys of the lyrical hero.

### REFERENCES

- [1] Yuldashev Q. Burning word. - Tashkent, "New Century Generation", 2006. – 548 p.
- [2] Rasulov A. Artistic novelty. - Tashkent, "Sharq", 2007. – 336 p.
- [3] Sharafiddinov O. Happiness to understand creativity. Sharq, Tashkent, 2004. – 640 p.
- [4] Boboev T. Fundamentals of Literary Studies. - Tashkent, "Uzbekistan", 2002. – 560 p.
- [5] Rakhimjonov N. Uzbek poetry of the independence period. –Tashkent, “Fan”, 2007. – 342 p
- [6] Khazagerov G. G., Lobanov I.B. Fundamentals of literary theory. - Moscow, Rostov-on-Don "Phoenix", 2009. – 319 p.
- [7] Youth book. Poems. Prose works. - Tashkent, "Sharq", 2008. – 784 p.
- [8] Beautiful Begim. Majnunsoat. Poems. - Tashkent, Akademnashr, 2012. – 128 p.
- [9] Greenberg R.F. About art. - Moscow, Art, 1971. – 396 p.

# *Perspectives And The Role Of Industrial Potential In The Economy Of The Republic Of Uzbekistan*

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**Abstract** – The development stages of diversified industry of the Republic of Uzbekistan, the results of implementation of government strategy and policy on modernization and diversification of production, as well as the outcome of deep structural changes in the economy, are considered in this article. Significant role of industry in country's economy and direct influence on important factors such as welfare and employment of population, providing people with needed goods, scientific and technical progress, investment inflow, entering world market, increase of export, and economic relationship between countries, was analyzed. Statistical data, which give opportunity to make objective appraisal of current production status were presented.

**Keywords** – Multibranch Industry, Economic Strategy, Diversification Of Production, Industrial Policy, Modernization Of Production, Productive Potential.

## **I. DEVELOPMENT OF INDUSTRY AND ITS ROLE IN THE COUNTRY'S ECONOMY**

During the years of independence in the Republic of Uzbekistan, the industries that determine the development of scientific and technological progress have been intensively developed, namely: mining, fuel and energy, electrical, textile, ferrous and nonferrous metallurgy, chemical, metalworking and others, as well as completely new industries have emerged, such as automotive, motor, spare parts, modern televisions and computers and other household appliances. The measures taken by the country's leadership to improve the sectoral structure of industry made it possible not only to create a powerful industrial and production potential and at the same time eliminate the former one-sided, mainly raw-material orientation of the economy, but also to achieve high rates of its development.

In the modern economy of the country, industry occupies one of the leading places and consists of more than 10 spheres of industry, including specialized industries and sub-industries that produce homogeneous products, as well as industries that are technologically connected with each other by the extraction and processing of raw materials or the production of finished products.

Today Uzbekistan is one of the most dynamically developing, independent country in Central Asia. The unique natural and climatic conditions, rich mineral resources, developed agriculture and powerful labor potential served as the basis for the creation in the Republic of Uzbekistan of a diversified national economy with priority development of not only the agricultural sector, but also a powerful industry.

Since the independence, a new stage of development of the industry can be divided into 3 stages based on the microeconomic situation. Meaning by this the gradual formation of market relations, the improvement of the structure and industrial strategy.

- The first stage (1991-1995) is characterized by the implementation of measures to preserve the existing industrial potential, the extraction of strategically important raw materials and their primary processing, as well as the development of import-substituting industries. At this stage, attention was paid to the creation and development of basic industries, the protection of the domestic market through the use of protectionist instruments, ensuring the increase in the profitability of production by controlling energy prices and the privatization of small industrial enterprises.

- At the second stage (1995-2000), the development of industries constituting economic independence, the large-scale implementation of an industrial strategy aimed at import substitution and an increase in investment flow in the processing industries,

namely in mechanical engineering and light industry, the chemical industry and food production, were envisaged. In this period, budget funds served as the main factor in the development of industrial production.

- At the third stage (from 2000 to the present), attention is paid to the creation and development of industrial sectors in which export-oriented types of products are produced. This stage is characterized by the privatization of large enterprises, limiting the monopoly of state-owned companies, increasing the role of the private sector in industry, accelerating the process of liquidating unprofitable enterprises, introducing an organizational management system and increasing the pace of the localization process.

A logical continuation of the ongoing process of renewal of production and implementation of innovative technologies in the country was the Decree of the President of Uzbekistan dated on February 7, 2017 No.UP-4947 " About the strategy of actions for further development of the Republic of Uzbekistan"<sup>1</sup> and "About the approval of the Strategy for Innovative Development of the Republic of Uzbekistan for 2019-2021"<sup>2</sup>. The main objectives of the Strategy are:

- Improvement of quality and scope education at all levels, development of system of life-long education, ensuring flexibility of system of training, proceeding from requirements of economy;

- Strengthening of scientific potential and efficiency of scientific research and developments, creation of efficient mechanisms of integration of education, science and entrepreneurship for widespread introduction of results of research, developmental and technological works;

- Increase in investment of the public and private funds in innovations, research, developmental and technological works, implementation of modern and effective forms of financing of actions in these spheres;

- Increase in efficiency of activities of public authorities by implementation of modern methods and management tools;

- Ensuring the protection of property rights, creating competitive markets and equal conditions for doing business, developing public-private partnerships;

- Creation of steadily functioning social and economic infrastructure.

Decrees were issued in order to consistently ensure structural transformations, modernization and diversification of production, further development of high-tech industries that can become locomotives of stable economic growth, the fullest use of available reserves in order to reduce the energy intensity of manufactured products, material and labor costs, as well as expand the production of competitive finished goods and semi-finished goods that are in steady demand on the world market, actively attracting foreign investments for this, including through the creation of joint ventures with leading foreign companies on a priority basis.

According to preliminary data, enterprises produced industrial product in the sum of 256.7 trillion soums, volume index of industrial production by the same period in 2019 amounted to 97.3%. In the structure of production, the largest share falls on manufacturing enterprises (82.6%).

The main factors in declining the physical volume of production were the decrease at mining enterprises industry and quarrying - by 26.1%, in water supply, sewerage, collection and disposal of waste - by 7.3%. Meanwhile, it is noted an increase in the production of processing industry by 2.7%, in power supply, gas, steam and air conditioning enterprises - by 13.7%.

On other hand, as a result of the lockdown that brought coronavirus in the first half of the 2020, almost in all countries there was an abrupt increase in unemployment and a decline in production. All of this has led to economic hardships on a global scale. Uzbekistan was no exception. Increase in gold production of and growth in agriculture facilitated offset a sharp drop in industry. World Bank overview on the economy of Uzbekistan stated that the lifting of lockdowns in the third quarter of the year, robust agricultural production, and a partial recovery of remittances would result in stronger economic activity in the second half of 2020 than in the first half<sup>3</sup>.

Today, more than 900 industrial enterprises operate in the republic. Many of them have been merged into joint-stock companies in their areas.

## II. STRUCTURAL ANALYSIS OF THE INDUSTRY

An integral part of the industry of Uzbekistan is the oil and gas industry, since it ensures the production of products without which it is impossible to imagine the functioning of not only various sectors of the economy, but also the arrangement of the entire

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<sup>1</sup> About the strategy of actions for further development of the Republic of Uzbekistan. Decree of the President of Uzbekistan dated on 07.02.2017 No.UP-4947.- <https://lex.uz/docs/3107042>

<sup>2</sup> About the approval of the Strategy for Innovative Development of the Republic of Uzbekistan for 2019-2021. Decree of the President of Uzbekistan dated on 21.09.2018 No.UP-5544.- <https://lex.uz/docs/3913186>

<sup>3</sup> <https://www.worldbank.org/en/country/uzbekistan/overview>



life of the population of Uzbekistan, and also provides the country's energy sector with primary fuel resources by 93%. The oil and gas industry is represented by the national holding company "Uzbekneftgaz". It includes 6 main joint stock companies, uniting more than 190 enterprises of the complex. They carry out geological exploration, exploratory and production drilling of oil and gas wells, development of oil and gas fields, etc. One of the major projects in this industry is the Shurtan Gas Chemical Complex, which was launched in 2001. This complex annually produces 125 thousand tons of polyethylene, 60% of which is exported to Europe, the CIS, and other countries. It was here that the first Uzbek polyethylene was obtained. Prior to this, polyethylene required for the production of various types of products in many industries was imported, in particular, from Russia, China, and the Republic of Korea. Foreign currency was spent on this, manufacturers heavily depended on supplies from outside, and the cost of the final product was naturally affected by the fact that the raw materials were imported. The development of polyethylene production in the republic has brought enormous benefits not only in terms of import substitution, but also in reducing the cost of products made from it. The oil and gas sector of Uzbekistan has been developing for many years. However, over the past 20 years, the growth of its potential has become one of the strategic priorities of the concept of economic and social development of the republic. As a result, Uzbekistan has been recognized as one of the largest producers of fuel and energy resources in the Central Asian region, having entered the top ten major gas producing countries in the world. Every year the republic produces about 65 billion cubic meters of gas, 5.9 million tons of liquid hydrocarbons<sup>4</sup>. The main partners of the republic in the implementation of the largest oil and gas projects are the Russian "Gazprom", "Lukoil", Malaysian "Petronas", the Chinese "CNPC international Ltd", the Korean "Korea National Oil Corporation

The chemical industry with significant production, raw materials and scientific and technical potential is one of the basic sectors of the economy. It includes enterprises producing mineral fertilizers, chemical plant protection products, chemical fibers and threads, synthetic resins, polymer products and other products. This branch of the country is represented by the joint-stock company Uzkimyosanoat, which includes 13 industrial enterprises, 13 territorial distribution organizations involved in the sale of mineral fertilizers to agriculture, research and design institutes, external economic transport and forwarding organizations Kimyotrans and Kimyotrans-logistics", as well as the brokerage company "Hamkor-kimyoservis".

The raw materials for this industry are gas, oil, coal, sulfur, table salt and various wastes from non-ferrous metallurgy, processing of raw cotton and kenaf. Before the republic acquired the independence, the chemical industry of our country was formed based on the role of the main cotton producer assigned to Uzbekistan. Therefore, the enterprises that were part of the chemical industry focused primarily on the production of mineral fertilizers for the intensification of agricultural production. In those days, the chemical industry was largely dependent on the import of raw materials, about 70% of which was imported, in particular phosphorites, caustic soda, hydrochloric acid, chlorine, while the republic had significant reserves for the production of nitrogen fertilizers. In 1996, the the government of the country decided to develop its own base of phosphate rock and a program for the phased commissioning of the Dzheroy-Syrdarya deposit. The launch of the Kyzylkum phosphorite complex in May 1998 with an annual capacity of 400 thousand tons of phosphate rock made it possible to gradually reduce the import of phosphorite raw materials, and since 2005, especially after the commissioning of the second stage of the complex and bringing its annual capacity to 716 tons of phosphate concentrate, it has completely eliminated imports and switch to processing own raw materials.<sup>5</sup>

According to statistical data provided by the state committee of the Republic of Uzbekistan on the statistics, in January - October 2020, chemical production enterprises produced products worth 17.6 trillion soums. The network's physical volume index compared to January-October 2019 was 104.5%. The largest share in the total volume of chemical products produced by enterprises in the Republic was 33.4% of the Republic of Karakalpakstan, 16.4% of the Tashkent region, 13.5% of the Kashkadarya region and 11.2% of the Navoi region.<sup>6</sup>

One of the most reliable reliance of independent development and economic prosperity of the Republic is diversified machine-building complex, which provides the basis for the technical re-equipping of all industries. This industry consists of several sectors such as automotive, tractor and agricultural, instrument making, tooling and others. Specialization in the cultivation and primary processing of raw cotton had a significant impact on the formation of the sectoral structure of mechanical engineering. Therefore, production facilities of equipment for cotton growing, technological equipment for the cotton ginning and textile industries were launched, as a result of which Uzbekistan became the only state in Central Asia producing equipment for sericulture and silk weaving. Currently, a unified system of machines has been formed for all stages of the cultivation, harvesting and industrial processing of cotton, silk cocoons, vegetable growing, horticulture and viticulture, small-scale mechanization tools adapted to foothill-mountainous and semi-desert territories<sup>7</sup>.

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<sup>4</sup> <http://ru.sputniknews-uz.com/economy/20170517/5423576/Uzbekistan-neft-gaz-dobicha.html>

<sup>5</sup> <https://www.ngmk.uz/ru/contact/116-prods/fosfor/168-fosforitnyj-kompleks>

<sup>6</sup> <https://stat.uz/en/press-center/news-of-committee/6844-o-zbekiston-respublikasida-kimyo-mahsulotlari-ishlab-chiqarish-sanoati-3>

<sup>7</sup> <http://www.agro.uz/ru/information/reports/>

Before independence, the machine-building complex developed unilaterally and provided machinery and equipment mainly to agricultural production and cotton processing enterprises. As a result, the machine-building production was concentrated mainly in the Tashkent and Fergana economic regions, which accounted for 84% of production, 8% - in Samarkand-Karshi, in other economic regions, only 8% of production of the machine-building complex. But over time, it was possible to reduce the share of agriculture in the national economy, and to modernize the agricultural sector and overcome the monoculture of cotton. Since gaining independence, the Republic of Uzbekistan has chosen the path of modernization and diversification of the entire industry. And this gave a significant impetus to the expansion of the geography of the location of machine-building plants.

It should be noted that in this industry there is a sector for the processing of metals, which in turn includes the production of products and structures from metals, as well as the maintenance of machinery and equipment. The diversified machine-building complex of the republic is represented by more than 100 joint-stock enterprises united in large associations, holding companies and financial and industrial groups.

For January-September 2020, the republic produced 630 tractors (compared to January-September 2019, the production volume decreased by 42.7%). The largest volume of tractor production was recorded in April 2020, amounting to 234 pcs. For January-September 2020, the republic produced 573 pcs. rippers and cultivators (by the corresponding period of 2019, a decrease in production by 61.2% was recorded). In April 2020, the largest production volume of these products was noted, amounting to 144 units<sup>8</sup>.

Metallurgy occupies a stable position in the structure of the economy and is one of the basic branches of the national industry and one of the few branches that can make a significant contribution to the economic growth of our country. The metallurgical complex of Uzbekistan combines two industries: ferrous and non-ferrous metallurgy. Non-ferrous metallurgy of Uzbekistan stands slightly apart from all other industries. Its importance for the export of Uzbekistan is very high, therefore, the minor decline in production was occurred no more than 5% over the last 10 years<sup>9</sup>. This industry is concentrated mainly in the Angren-Almalyk mining and industrial region, where copper, refractory and heat-resistant metals, and gold are produced. The largest enterprises in the industry are Almalyk, Navoi Mining and Metallurgical Combine and Uzmetskombinat. On the basis of tungsten ores and molybdenum found in the republic operates the Uzbek plant of refractory and heat-resistant metals. JSC "Almalyk Mining and Metallurgical Combine" of Uzbekistan is a one of the leading global manufacturer, which production capacity is based on the reserves of a group of copper-molybdenum, lead-zinc and gold-silver deposits located in the territories of Tashkent, Jizzakh, Namangan, Surkhandarya regions of the Republic of Uzbekistan.

By fulfilling the most important priorities of the socio-economic development program of 2020, the Almalyk MMC ensured the output of marketable products at current prices by 123.8%, and the growth rate of commercial products in comparable prices to the corresponding period of 2019 amounted to 103.8%.<sup>10</sup> The state-owned enterprise Navoi Mining and Metallurgical Combine is engaged in the extraction and development of the gold deposit.

Radical reorganization and development of the food industry was required after acquiring the independence of the Republic. This was required by the socio-economic situation in the country in 1989-1990, where there were interruptions in the provision of the population with essential products, and their needs for meat, dairy and confectionery products were satisfied only by 30-35 percent. And today, the food industry of the Republic of Uzbekistan is considered as a strategically important industry and occupies a leading position in the structure of industrial production. The share of the food industry in the republic's GDP is more than 18%<sup>11</sup>. The food industry of the Republic is based mainly on the processing of local agricultural raw materials and is represented by enterprises of fat and oil, confectionery, processing enterprises, which provide the population of the country with a wide range of consumer food products, such as high-quality flour, cereals, bread, and pasta, confectionery, butter -fat products, meat and dairy products, food concentrates and others.

One of the important subsectors of the food industry is the oil mill, which develops mainly on the basis of processing cotton seeds. The oil is produced in many cities of the republic - Tashkent, Fergana, Kattakurgan, etc. Today, in terms of gross production of vegetable oil, the Republic of Uzbekistan is among the 20 world producers, producing mainly cottonseed oil. Uzbekistan is one of the world's largest producers of tomato paste and is in the top five in the world, and in the top ten producers of raisins, dried fruits, which have unique taste.

The development of the food industry is directly related to the system of production and processing of agricultural products. Currently, the bulk of agricultural products are provided by farmers and dekhkan farms. A radical restructuring of agriculture has

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<sup>8</sup> Source: Quaterly report 2020, the State Committee of the Republic of Uzbekistan on Statistic

<sup>9</sup> <https://knigi.link/sotsialnaya-geografiya-ekonomicheskaya/promyishlennyiy-kompleks-44707.html>

<sup>10</sup> <https://agmk.uz/en/about-us/indicators/7695-executive-summary-following-the-performance-results-of-jsc-ammc-for-the-year-2020>

<sup>11</sup> <http://oziq-ovqat.uz/files/attach/3d80d9d4ce9d4456807e8ebecbd7ab85.pdf>

been achieved thanks to the economic reforms carried out in the country. In this area, an agricultural policy has been developed, based on private property and new forms of management, taking into account the natural and climatic conditions of Uzbekistan and the mental characteristics of the population. It should be noted that much attention is paid to the development of farming. Today there are 67,804 farms in the country. The legislative base has been created and is being improved. In accordance with the norms of the Law "On Farming" and the provisions of the Presidential Decree "On measures to further improve the organization of activities and the development of farming in Uzbekistan", purposeful work is being carried out to reorganize farms as the main producers of agricultural products.

The second in importance and the first in terms of the number of employment of the population is the light industry, specialized in the cleaning of raw cotton, the production of yarn, cotton wool, threads, cotton, natural silk fabrics and products from them. This industry also includes the production of knitted goods, sewing and hosiery, the manufacture of shoes, haberdashery, porcelain, crockery and others. The dominant position in the light industry is occupied by the cotton-cleaning industry. The enterprises of this industry are built mainly in the immediate vicinity of cotton-growing regions.

Another important branch of light industry is textile industry, which today accounts one-fifth part of the gross social product. One-third part of the country's industrial workers are concentrated in it. The share of light industry in the production of consumer goods in Uzbekistan is about 60%, and the income part of the state budget in different years is 25-28%. According to macroeconomic indicators of socio-economic development, the production of textile products for the first half of 2020 amounted to 23769,2 billion soums.<sup>12</sup> In 2020, the export volume of products amounted to 1.9 billion US dollars. Today, textile products of Uzbekistan are supplied to more than 50 countries of the world, the main export countries are Russia (36.8%), Turkey (18.8%), China (16.2), the countries of the European Union (15.3%), South Korea (5%)<sup>13</sup>.

### III. PRECONDITIONS, KEY PROBLEMS AND RISKS OF MEDIUM-TERM DEVELOPMENT OF THE REPUBLIC'S INDUSTRY

The implementation of reforms and comprehensive measures on diversification and modernization of industry sectors in recent years has contributed to the provision of effective structural changes in the development of this sector of the economy. Thus, the increase in industrial production for the period 2018-2020 amounted to 129.3%. This contributed to an increase in the share of industry in GDP from 26.3 to 32.8%. The increase in the output of consumer goods in 2020 was 39.9%.<sup>14</sup>

At the same time, there still remain problems in the development of industry that affect the stability of the dynamics growth of production and the competitiveness of products. Thus, maintaining a low level of efficiency in the use of fuel and energy resources in almost all sectors and spheres of the economy makes in demand the implementation of an active policy of resource efficiency. The low level of processing of raw materials remains due to the absence of an associated technological chain for the production of finished products with high added value.

The problem of a high level of wear and tear of machinery and equipment negatively affects the growth of production competitiveness. Thus, in industry, the wear rate is 45.9%. A negative upward trend and the highest degree of wear and tear of machinery and equipment developed at manufacturing enterprises - 50.5%. The high level of wear and tear of machinery and equipment causes the problem of a low level of labor productivity. Labor productivity in the industries of Uzbekistan is 3-4 times lower than in rapidly developing countries such as China, India, Brazil, etc.

The low level of inter-sectoral cooperation does not allow the maximum involvement of internal resources for the development of industry. This leads to an extremely high level of consumption of imported goods.

There is a problem of high disbursements for entering the foreign markets due to high transport and logistics costs. In turn, this is due to the underdevelopment of the logistics infrastructure, which requires the construction of a unified logistics system, logistics centers in each region of the country.

The problem of ensuring the quality of many types of manufactured goods also prevails. This is mainly due to the lack of unified strict requirements and national quality standards. The non-compliance of many goods with the quality requirements imposed on foreign markets negatively affects the competitiveness of domestic goods and restricts their export.

Practically in all branches of industry there is no base for their own engineering and R&D, respectively, for their own scientific developments and technologies. This is a limitation in the development of innovations in the industry. The share of low-tech industries prevails in the structure of industry (29.8%). Accordingly, the share of high-tech industries remains at a low level (1.2%).

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<sup>12</sup> Source: Quaterly report 2020, the State Committee of the Republic of Uzbekistan on Statistics

<sup>13</sup> <https://stat.uz/en/press-center/news-of-committee/7589-2020-yilda-to-qimachilik-mahsulotlari-eksport-hajmi-295-3-mln-aqsh-dollariga-oshgan-3>

<sup>14</sup> Source: Quaterly report 2020, the State Committee of the Republic of Uzbekistan on Statistics

The export-raw material model of industrial development based on the accelerated increase in fuel and raw materials exports is losing its potential.

The persistence of these problems in the long term may pose a threat to the sustainable and balanced development of the industry. In addition, these problems will intensify under the influence of external risks that can weaken the factors and sources of industrial growth.

In particular, there is an increase in global competition, which encompasses not only the traditional markets for goods, capital, technology and labor, but also the system of public administration, support for innovation and human development.

A new wave of technological changes is expected, which will strengthen the role of innovation in the development of all sectors of the economy and reduce the impact of many traditional growth factors. The lag in the development of new technologies of the last generation can reduce the competitiveness of the national economy, as well as increase its vulnerability in the face of growing geopolitical rivalry.

#### IV. CONCLUSION

It is not surprising that today the industry has begun to occupy one of the leading places in the domestic real sector of the economy. The introduction of new production technologies, the use of high-performance modern equipment in combination with effective management provide high labor productivity at the enterprises of the industry, an increase in industrial production and the quality of products. At the same time, there is an annual increase in absolute indicators, and more than 60 types of new light industry goods have been added to the total assortment.

In conclusion, it should be emphasized that over the years of independence, Uzbekistan has achieved tremendous success, in which industry played an important role. The industrial policy implemented in the country is aimed primarily at liberalizing the economy, strengthening the private sector, eliminating the former raw materials orientation, efficient use of existing natural and labor resources and leveling the economic level of regional development. As a result of a correct and clear policy, progressive science-intensive industries such as the automotive industry, agricultural engineering, the electrical industry, machine building and metalworking, as well as the leading light and food industries, producing consumer goods, received further development.

#### REFERENCES

##### Legal normative documents

- [1] Law of the Republic of Uzbekistan No. 3PY-77-II of May 26, 2000 "On Foreign Economic Activity" // <https://www.lex.uz>
- [2] Decree of the President of the Republic of Uzbekistan No. UP-5544 dated 09.21.2018 "On approval of the Strategy of innovative development of the Republic of Uzbekistan for 2019-2021" // <https://www.lex.uz>
- [3] Decree of the President of the Republic of Uzbekistan No. UP-5308 dated 02.22.2018 "On the state program for the implementation of the strategy of action in five priority areas of development of the Republic of Uzbekistan in 2017-2021" // <https://www.lex.uz>
- [4] Decree of the President of the Republic of Uzbekistan dated February 7, 2017 No. UP-4947 "On the Strategy of Actions for the Further Development of the Republic of Uzbekistan." // [www.Lex.uz](http://www.Lex.uz).
- [5] On measures for the accelerated development of the chemical industry of the Republic of Uzbekistan. Resolution of the President of the Republic of Uzbekistan dated October 25, 2018 No. PP-3983. - <https://lex.uz>

##### Scientific literature:

- [6] Makhmudov E.Kh. "Industry of Uzbekistan". Tashkent-Iktisodiyot, 2013. Pages 26-30
- [7] Ortikov Abdurakhim. "Sanoat itisodiyoti". Sano-standart, Tashkent, 2014, page 40
- [8] Amiro V.B. and Mikheev V.V. China and Globalization - Moscow: IMEMO RAN, 2012.
- [9] Christmann-Budian S. Evaluation and Innovation Cooperation between the EU and China. Study for the European Commission DG RTD by Fraunhofer ISI - Berlin: 2014.

##### Internet sources:

- [10] <https://stat.uz/ru/433-analiticheskie-materialy-ru/2044-statistika-vneshnej-torgovli>
- [11] [https://customs.gov.az/modules/pdf/pdffolder/71/FILE\\_F23921-32F8D7-F8BD2F-CFD586-6A6CE2-F0A3DB.pdf](https://customs.gov.az/modules/pdf/pdffolder/71/FILE_F23921-32F8D7-F8BD2F-CFD586-6A6CE2-F0A3DB.pdf)

- [12] <https://www.belta.by/economics/view/belarus-v-2018-godu-uvelichila-eksport-tovarov-i-uslug-na-149-do-42-mlrd-336189-2019/>
- [13] [https://www.wto.org/english/res\\_e/statis\\_e/wts2018\\_e/wts2018\\_e.pdf](https://www.wto.org/english/res_e/statis_e/wts2018_e/wts2018_e.pdf)
- [14] <https://mift.uz/ru/pages/statistika-tovarooborota>

# *On The Coverage Analysis Of Morphological Issues In Journals In The 1920s*

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**Abstract** – *In the 1920s, the journal “Maorif va Ukitguchi” published articles on morphological issues. During this period, the spelling rules of the new Uzbek alphabet were adopted. Some morphological concepts and theoretical considerations are also stated in these rules elucidation. The article discusses morphological concepts.*

**Keywords** – *Morphology, Word Stem, Word Root, Stem, Root, Core, Names, Adjective, Particle, Mood, Verbal Noun.*

Articles on morphological issues are rare during this period. However, some articles were published in the “Maorif va Ukitguchi” journal at this period.

At the meeting of the new Uzbek alphabet committee on morphology in September 1926, was adopted the "Spelling rules of the new Uzbek alphabet" “Maorif va Ukitguchi” 1926 № 7-8). It is not specified who prepared the text (article) on which this document is based. Some morphological concepts and theoretical considerations have also been described in these rules elucidation.

Here, we first encounter the term **morphological method** of spelling and note that the morphology is referred to as ‘sarf’. However, the use of the word “sarf” in the sense of morphology was also clear to scholars and schoolchildren of the time.<sup>1</sup> However, the word *sarf* was a synonym for the word **etymology**. It is known from the linguistics history that the term **etymology** was used in the pre-revolutionary period in the sense of **morphology** in science.<sup>2</sup> This document also contained the concept of the word stem and was referred to as the **word root**. The **word stem** (it is generally associated with the verb, not the stem) is called the verb root and also uses the word “koren (root)” (given in Russian graphics) in parentheses to add clarity to it. It seems that the stem, root, and core concepts which exist in our linguistics, were in use, albeit under different names. Although these concepts were later discussed, they had their own scientific expressions.<sup>3</sup>

**Noun** parts of speech are called **names** and their variations are given. Noun *declension* refers to "arob" and to make it clear, it cited his Russian translation of "skloninie (declension)". It seems that declension concept had been mastered from Russian

<sup>1</sup> See: Kodirov K.A. From the history of the study of the morphological system of Uzbek language. Candidate's dissertation. – Tashkent, 2007. - p. 4.

<sup>2</sup> See: Ashirboev S. From the history of studying the grammatical structure of the Uzbek language. Candidate's dissertation. – Tashkent, 1975. - p. 20.

<sup>3</sup> See: Usmonov S. Morphological structure of the word. - Tashkent: Tashkent State Pedagogical University named after Nizami, 2010 (1964). - p. 25.

linguistics. Importantly, although the name of the declension of nouns is not mentioned, the existence of 6 cases seems to be recognized and its variation in the two columns (formed on the basis of synharmonic pairs of these words) is given. I column : *tən, tənni, tanni, tangə, təndən; təndə*; II column: *qan, qannə, qannə, qanə, qandan, qanda*. With the order exception in these rows, the cases appear to be close to the current compromise paradigm. Even the cases order is negotiable, it is the exact order in the order recommended by Sh. Shakhobiddinova.

**Adjective.** The term adjective occurs in the 'adjective affix' and - tək, - taq, - dəj/dag, - lik/li affixes are called adjective affixes. At this point, it would be appropriate to draw attention to an issue in this article It is also the semantic loading of these affixes in words formed with the affixes - li and – lik. It is shown that when indicating "relevance" it adds -li / lik, when indicating "ratio" - lik / liq. In our modern literature, it is said that the affix -li does not mean "belonging", but "possession of what is understood from the noun"<sup>4</sup>, but the -lik is considered to be the noun forming<sup>5</sup>. In the article in the *atlb, gylli, samarqandlʙq, atliq* words, we think it would be more correct to think of the affix "-lik" as an adjective forming than a noun forming.

**Postpositions.** Such words are called "semi-independent words" and "postpositions" in parentheses. They are only *uçyn, bilan* words.

**Particle.** It is called "istiforsor" and its -mi format is shown only. Hence, when we say particle, we mean only the interrogative particles, therefore it refers with the word istiforsor, which means to ask in Arabic.

**Verb.** It was recorded in "Spelling rules in the new Uzbek alphabet" (1926, September). The article does not describe the verb, rather its time, inclination, functional forms are enumerated and they are generalized by the term mood<sup>6</sup> and the 8 moods of the verb are determined. Of course, the principles of separation into moods are not mentioned.

*Past tense verbs.* It's called 'past mood'. Its definition is not given, but its 2 semantic groups are given as follows:

1) exact past tense (moziyi shakhdi): keldim, keldi, keldi, keldik, keldiniz, keldilar and its close variant;

2) past tense verb (moziyi naqli): there are 2 types of it a) kelmişmən,<sup>7</sup> kelmişsən, kelmiş va бошқа; ҳамда b) kelibmən, kelibsən, kelibdir and etc. The audible meaning of this form is also recorded in modern literature.

Apparently, this article focused only on the affixed forms of past tense verbs - di, - mish, - ib.

Present tense. It is called "present mood" and it has two semantic types:

a) present-future tense form (it's called «Present – future mood») and keləməh and etc.;

b) Present continuous tense («continuous mood»): kelməkdəməh and etc. Hence, the basic forms of present verbs are shown.

Future tense verbs. It is called the "the future tense mood" and it has 2 types of meanings:

a) Future tense indefinite verbs. it is referred to by the term "ekhtimoli muzore": keləməh and in other and some literatures it is referred to as the verb of the historical past.<sup>8</sup> kelgymdir, kelgynidir («y»- denoting the front row vowel) quotes adverbial verbs and referred to by the term bandi muzore'.

The Arabic naming of the internal forms of future tense verbs is also according to a certain tradition. At the beginning of the 20th century, Mukhammadamin ibn Mukhammad Karimhoja's "Turkish Rule" described the verbs of the future tense as muzore'.<sup>9</sup> It should be noted that in the article the verb form, which is called the kelasi zamon (future tense), is referred to as kelgusi zamon (future tense).

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<sup>4</sup> See: Tursunov U., Mukhtorov J., Rahmatullaev Sh. Modern Uzbek literary language. - Tashkent: Uzbekistan, 1982. - p. 210.

<sup>5</sup> That source. - Б. 211.

<sup>6</sup> The term "siga" does not appear in linguistic works of the 1920s, but it is found in the combination of ( عطا ) in the « Chigatay gurungi» «Bitim yollari». See: Bitim yollari (Ways of agreement). – Tashkent, 1919. - p. 25.

<sup>7</sup> The letter «3» is stands for (ش) nowadays.

<sup>8</sup> See: Tursunov U., Mukhtorov J., Rahmatullaev Sh. Modern Uzbek literary language. - Tashkent: Uzbekistan, 1992, - p.344.

<sup>9</sup> Mukhammadamin ibn Mukhammad Karimhoja. Turkish rule. - Tashkent: 1913 (lithography).

We believe that special attention should be paid to this. In our opinion, the current term is not the norm for the Uzbek language. Because in the current Uzbek language, the word *kelasi* is used only in the compound next year, and the scope of the *kelgusi* word is wider.

Mood of the verb. Such a term does not appear in the article, in general, there is no concept of mood, however the term *amr mood* (imperative form) implies an imperative-desired mood: *kelaj(in)*, *kel(in)*, *kelsin*; *kelajlik*, *keliniz*, *kelsinlar* and etc. In this case, it is appropriate to emphasize in parentheses the affix *-in* in the first person singular and *-ing* in the second person singular. Hence, the authors of the article considered two variants in these forms.

In the article, the term *wish mood* is used to describe the form with the affix *-gaj//qaj* as well as *kelgajmən*, *kelgajsən*, *kelgaj*, *kelgajmiz*, *kelgajsiz*, *kelgajlär*: It is known that such a form is not used in modern Uzbek, but only in some styles that give the speech a historical (formal) spirit. This form is a historical form, and G. Abdurahmanov and A. Rustamov emphasize that this form expresses the verb and desire of the future tense<sup>10</sup>. Sh.Shukurov, along with the meaning of the future tense, gives the usual action, assumption, desire, request, advice, purpose, hope, command and other modal meanings in the execution of the action.<sup>11</sup>

K. Sodikov says that he will directly form the verb of the future tense<sup>12</sup>.

Functional forms of the verb. Such forms are called 'Adverbial mood' and its 5 forms are given. Three of these are related to the gerund and two to the participle.

Gerund with *-v|iv|iv*; *-gac|qac|kac|qac*; *-gəncə|qanca|kəncə|qanca* affix; participle with: *gən|qan|kən|qan* and *kelə turqan*, *qava turqan* forms are listed. The affixed form of the gerund *-ə|aj* is given separately and, although not called "mood", is in the line of moods and its Russian term "Deeprichastie" is given, not its Uzbek name. Hence, Russian linguistics may have served as a theoretical source for the authors of the article, but they also lack the knowledge to translate the terms gerund, participle, which is why the term 'deeprichastie' has been adopted directly.

Verbal noun. It is referred to by the term verbal noun. It is shown that it is formed by the affixes *-mək|maq*, *-yv|uv*, *-z|iz|iz(-sh/ish/ьш)*, *-məklik|maq|iq*. It is known that in most literatures it is not announced that the action name is formed with the affix *-moqlik*, but in the linguistics of the 1920s, the words *bormoqlik* (go) and *kelmaklik* (come) were considered artificial nouns<sup>13</sup>. K. Meliev thinks that the name of the movement is formed in Turkic languages.

It should be noted that in Uzbek linguistics of the 1920s, the name of the movement was not referred to as the verbal noun. It is known that this term actually meant the modern verb base of the word in Persian. The term "verbal noun" is generally found in the works of local authors written in the languages of the Turkic peoples of that time, following the Persian language manuals.<sup>14</sup> "Maorif va Oqitguvchi" 1926 № 7-8 (pp. 41-46).

Morphological structure of the word. Information on word structure is not specifically covered in the press. "Spelling rules in the new Uzbek alphabet" gives the following concepts related to the morphological structure of the word:

Word root. The term is used to mean "word core": "The root of the word is written as it is heard." This implies that the affix is not added. This term is not found in 1920s linguistics.

Root. The term is used in the compound 'verb root' and the word root in parentheses is also given. The occipital base of the root (i.e., the labial vowel core) is also mentioned. This term also means core.

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<sup>10</sup> Abdurahmanov G., Rustamov A., Grammatical features of Navoi language. – Tashkent: Science, 1984. – Б. 132-133.

<sup>11</sup> Shukurov Sh. Inclinations and tenses of the verb in written monuments of the Uzbek language in comparative coverage. ADD, - Tashkent, 1974. - p. 127-128.

<sup>12</sup> Sodiqov.K. History of the Turkish language, T., 2009. - p. 191.

<sup>13</sup> Fitrat A.Sarf.- Samarkand-Tashkent: Uzbekistan State Publishing House, 1927,-p.19. Uzbek language lesson.- Samarkand-Tashkent: Uzdavnashr, 1926. - p. 26.

<sup>14</sup> Ahmad Hodi Maqsudi. Turkish consumption. – Kazan, 1910. - p. 21.



Negative mood. Examples of the formation of verbal nouns are given, the appendix mentions “the negative mood of these forms”, that is, no affix was added to the word, but the condition in which it can be added is referred to by the term ‘negative mood’. So it meant the part of the word where the affix could be added.

Affixes. In the sense of an affix, an additional term is still in active use. There are two types of affixes:

1) affixes in life, i.e. affixes in use;

2) takhajjur affixes, to explain it, the Russian word “cooled” is given in parentheses. They are *yk*, *-uq*, *-oqun* «dead today» affixes in *koryk*, *qoruq*, *turoqun* words. He also gives the affix *-oqun* in the noun *turoqun*. Hence, it is derived from specific concepts in the explanation of an affix that is dead or solid, i.e., whose affix is difficult to determine, that is, they consider affixes to be dead or solidified affixes, even in cases where it is possible to separate them into stems and affixes because the theoretical concepts of division into stems and affixes are narrow.

Suffix. It does not actively use the term, but when it comes to the use of suffixes with a dash in the abbreviated form, occurs in the phrase "has become a suffix".

The term was not used in linguistics in the 1920s<sup>15</sup>.

At this point, we find it necessary to dwell on another issue. The fact that the authors of the article use the abbreviated form (*at-qun* (i.e. for noun)) of suffixes in the phrase "has become a suffix" can be seen in the language development, a good understanding of the possibilities of the use of linguistic phenomena.

No special morphological studies have been published in the journal, *lekin* while thinking about spelling, which is one of the most important issues of the period, allowed to determine the characteristics of the period on morphology and etymology of morphological concepts in journal pages, word root, word stem, names, adjectives, postposition, particle, verb, mood, verbal noun, object, suffix. It is known that many of these terms are successfully used in modern Uzbek linguistics.

#### REFERENCES

- [1] Abdurakhmanov G., Rustamov A., Grammatical features of Navoi language. – Tashkent: Science, 1984. - p. 132-133.
- [2] Ashirboev S. From the history of studying the grammatical structure of the Uzbek language. Candidate's dissertation. - Tashkent, 1975. - p. 20.
- [3] Akhmad Khodi Maksudi. Turkish consumption. - Kazan, 1910. - p. 21.
- [4] Mukhammadamin ibn Mukhammad Karimhoja. Turkish rule. - Tashkent: 1913 (lithography).
- [5] Tursunov U., Mukhtorov J., Rahmatullaev Sh. Modern Uzbek literary language. - Tashkent: Uzbekistan, 1982. - p. 210.
- [6] Tursunov U., Mukhtorov J., Rahmatullaev Sh. Modern Uzbek literary language. - Tashkent: Uzbekistan, 1992, - p.344.
- [7] Usmonov S. Morphological structure of the word. - Tashkent: Tashkent State Pedagogical University named after Nizami, 2010 (1964). - p. 25.
- [8] Fitrat A. Expenditure.- Samarkand-Tashkent: State Publishing House of Uzbekistan, 1927, -P.19. Uzbek language lessons.- Samarkand-Tashkent: Uzdavnashr, 1926. - p. 26.
- [9] Shukurov Sh. Inclinations and tenses of the verb in written monuments of the Uzbek language in comparative coverage. ADD, -Tashkent, 1974. - p. 127.
- [10] Kodirov K.A. From the history of the study of the morphological system of the Uzbek language. Candidate's dissertation. - Tashkent, 2007. - p. 4.

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<sup>15</sup> See Kodirov K. The presented dissertation. – p. 24-25.

## *Cloud - Guaranteed And Secure Access To Your Data*

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**Abstract** – This article gives you a brief overview on cloud technology and its services. Simply put, the cloud is a guaranteed and secure access to our personal information at all times. There is no doubt that cloud technology is one of the most popular and exciting topics in the IT industry today, and more and more interesting solutions are emerging. The future of cloud technology is very bright. Because giants like Microsoft, Apple and Google have done and are doing a lot of work in this area. Today, the benefits of cloud technology can be felt even by people who are not related to software, web technology and other things. The article also provides information about the services of Microsoft and Google. In general, the article provides information on the effective use of various hardware, software, methodologies and tools provided to users of cloud technologies as Internet services to achieve their goals, objectives, projects.

**Keywords** – Storage-as-a-Service, Database-as-a-Service, Process-as-a-Service, Microsoft Project Online, Microsoft Defender for Office 365, Microsoft Power Automate, Google Analytics, Google Classroom, Google Duo

Many modern users of computers and mobile devices cannot imagine without the Internet, which is firmly entrenched in our daily lives. Relatively recently, new cloud technologies have emerged that are very different from the classic models of computer systems.

In fact, the only difference is in the way data is stored and processed. If all the operations are done on your computer (using its power), then it's not "cloud", but if the process is happening on a server on the network, then that's exactly what is called "cloud technology."

In other words, cloud technologies are a variety of hardware, software, methodologies and tools that are provided to the user as Internet services to achieve their goals, tasks, projects.

Everything related to cloud computing is commonly referred to as aaS. This means "as a service" or "in the form of a service".

Currently, the concept of cloud technologies offers its users the following types of services:

### **Storage-as-a-Service**

This is probably the simplest method of cloud computing services, offering the required disk space. Occasionally there will be a warning on the monitor that says, "The logical drive is full. Delete unnecessary programs or data to free up space". As a service, the storage service allows you to store data in external storage, "in the cloud". To you, this looks like an extra logical drive or folder. Examples include Google Drive and other similar services.

### **Database-as-a-Service**

This service allows administrators to work with the database as if the DMS was installed on a local source. It also allows you to "share" projects between different executors, which can save a lot of money on computer equipment and licenses.

### **Information-as-a-Service**

This allows you to use any data remotely, which can change every minute or even every second.

### **Process-as-a-Service**

It is a remote resource that can combine multiple resources (such as services or data from the same cloud or other existing cloud content) to create a single business process.

### **Application-as-a-Service**

It can also be called software as a service. It is hosted as “on-demand software” and is hosted on remote servers so that any user can access it via the Internet. All issues of updates and licenses for this software are regulated by this service provider. Examples include Google Docs, Google Calendar, and more.

### **Platform-as-a-Service**

The user is provided with a computer platform with a built-in operating system and some software.

### **Integration-as-a-Service**

This is an opportunity to get a complete integration package from the “cloud”, including control of programming interfaces between applications and their algorithms. This includes the services and features of the well-known Enterprise Application Centerization, Optimization and Integration (EAI) packages, but is provided as a “cloud” service.

### **Security-as-a-Service**

This type of service allows users to quickly distribute products that allow them to securely use web technologies, email, and local area networks. This allows users of this service to save on the deployment and maintenance of their security systems.

### **Management / Governace-as-a-Service**

Allows you to manage and adjust the settings of one or more "cloud" services. These mainly include parameters such as topology, resource utilization, virtualization.

### **Infrastructure-as-a-Service**

The user is provided with a computer infrastructure. It usually configures networked virtual platforms (computers) independently for its own purposes.

### **Testing-as-a-Service**

Provides the ability to test local or “cloud” systems using software from the cloud (no additional or software required in the enterprise).

Cloud services compete with each other, even offering more convenient and profitable terms for free accounts. With the development of these services, our perception of working with computers may change radically. Let's take a closer look at Microsoft's Office 365 and Google's Apps, which offer a wide range of options to the user today.

Both Office 365 and Google Apps promise to manage the internal tasks of many companies. This, along with providing a cloud service, frees the company from having to hire technical experts and makes a lot of things easier.

Microsoft Office 365 and Google Apps are very diverse products. Office 365 is Microsoft's cloud services system that integrates embedded versions of Lync Server, SharePoint Server, and Exchange Server. Microsoft's office software is great for office use, but Google is trying to challenge Microsoft with Google Docs.

### **Microsoft Office 365**

A set of services for working with office documents, communication and cooperation. Microsoft Office 365 allows organizations of any size to implement software and reduce maintenance costs and optimize IT workload. Office 365 services are easy to use and manage, are reliably protected from viruses and spam, and are characterized by a high level of security and reliability.

### **List of services included in Office 365**

**Microsoft Project Online** is a suite of services that are part of the Microsoft Office 365 family and address project management and project portfolio management issues. The main advantage is that the pre-installed and configured project management environment for project management is fully leased on the Microsoft Project platform for the time required to complete the project.

The **Microsoft Visio Online** cloud service, part of the Microsoft Office 365 family, is a popular Microsoft Visio Online cloud application for creating and editing diagrams, plans, charts, site maps, and network diagrams that allow you to create specialized graphic documents.

The **Microsoft Exchange Online Protection (EOP)** cloud service is designed to protect Microsoft Exchange mail systems from spam, viruses, and malicious attachments. Today, this service is used to protect all Microsoft Office 365 users and checks more than 740 million messages every day. The standalone Microsoft EOP subscription uses email exchange for companies that use Microsoft Exchange on their network to scan for spam, viruses, and malware before connecting to the corporate network.

### **Microsoft Defender for Office 365**

The cloud-based data protection service in Office 365 scans Microsoft Exchange Server / Exchange Online mail messages and suspicious links (phishing, payment programs) and malicious code for files uploaded to Teams, SharePoint Online and OneDrive for Business.

**Microsoft Azure** is a hybrid cloud service (PaaS + IaaS) for software development and deployment of enterprise applications and data. The Azure platform combines the latest development tools and access to SQL Server with the ability to rent virtual machines to deploy their IT resources. Power consumption can be expanded by using it according to the changing requirements of consumers. Although Microsoft Azure is now available to Russian customers, our company is ready to help you master this technology and connect a new service from Microsoft.

### **Microsoft Intune**

A cloud service to perform key tasks for updating operating systems and managing workstations - hardware and software inventory, application management, advanced security features, remote access.

### **Microsoft Yammer**

A social network for corporate customers that is only available to their employees and provides all the features of a social network, as well as additional options for data management and protection. There is a free version of Yammer Basic

### **Microsoft Enterprise Mobility + Security**

The Enterprise Mobility + Security suite of cloud services is based on the well-known Microsoft Intune service and provides additional capabilities for corporate clients to manage information resources and protect corporate data.

### **Microsoft Planner**

The Task and Subproject Management System allows you to create work plans, organize and distribute tasks, share files, discuss current issues, and monitor task performance.

### **Microsoft Teams**

A team business messenger that allows employees to organize joint online meetings, publish emails with news for the team, plan collaborative events, and work in a team on documents and projects created in Microsoft Office.

### **Microsoft Power BI**

A family of online business intelligence services that allows you to link data from almost any data source and create visually automatically updated reports based on that information, reflecting the situation in different sections

### **Microsoft Power Apps**

A set of services and tools for quickly creating mobile business applications.

### **Microsoft Power Automate**

Business process automation service without the involvement of programmers. Thanks to the built-in visual editor, any employee can simplify their usual work, whether they work with mail, portal or cloud storage. For example, you can easily create a register of phone payments received in the mail in Excel format, and the original documents are automatically added to the warehouse (SharePoint folder, OneDrive, Google Docs, etc.). A large number of ready-made components allow even the unprepared user to simplify their work or put things in order in documents. Mobile device support makes the service up-to-date and up-to-date.

### **Microsoft Defender for endpoint**

An effective cloud service to protect workstations from unknown viruses, malicious code, and external threats.

**GOOGLE.** The concept of “cloud service” itself refers to an Internet service. You can save files on the Internet, not on your computer. You can't even install some apps, but you can work with Internet browsers in Chrome, Firefox, Opera or Internet Explorer. For example, Google Docs can replace the Microsoft Office suite. You just need to log in to your account and create a spreadsheet or document to start working with it. Your documents are not linked to a specific computer - you can work with them from anyone: at work, at home or even at an Internet cafe.

Google provides its users with a huge, ever-growing list of services designed to make working on the Internet easier, more convenient, and more versatile.

Let's talk about Google's services. The service is designed to store and edit code. It is based on the Google Cloud Platform, which integrates all of the company's “cloud” services.

### **Gmail**

Free email from Google. Offers access to mailboxes via web interface and POP3, SMTP and IMAP protocols. From there, you can use all Google services.

### **Google Analytics**

An informed marketing and business decision making service using analytics for websites, applications and corporate products.

### **Google Chat**

Business messenger from Google.

### **Google Classroom**

An education management system built into Google Apps for Education

### **Google Duo**

Video chat software from Google

### **Google Drive**

Cloud storage, which gives multiple users access to files and the ability to edit them together.

### **Google Doc**

An online text editor that allows you to create, format, and edit the text of documents together with colleagues and friends in real time.

### **Google Calendar**

Calendar service and organizer functions.

### **Google Presentation**

Creating presentations, wherever you are, is a tool to edit and work on them alone and with colleagues.

### **Google Sheets**

Online spreadsheet software.

### **Google Translate**

One of the most popular search engine services for translating any text into 90 languages as well as web pages and documents.

### **Google Forms**

A service for clients and colleagues to create questionnaires, conduct surveys and further improve the quality of services and business.

So, without a doubt, the future of cloud technology is very bright. Because giants like Microsoft, Apple and Google have done a lot of work in this area. Not so long ago, the concept of “cloud” seemed like just a beautiful idea and a bold experience. Today, the benefits of cloud technology can be felt even by people who are not related to software, web technology and other things. Xbox Live, Windows Live, OnLive, Google Docs are the best examples of this.

Simply put, the cloud is a guaranteed and secure access to our personal information at all times. There is no doubt that cloud technology is one of the most popular and exciting topics in the IT industry today, and more and more interesting solutions are emerging.

From my experience, I can say that Google’s cloud services are widely used today.

### **REFERENCES**

- [1] Ayupov R.H., Tursunov S.Q. Raqamli texnologiyalar: innovatsiyalar va rivojlaniish istikbolлари. Monoqrafiya, Toshkent, TДПУ, Nodirabegim nashriёti, 2020 йил. - 376 bet.
- [2] Gulyamov S.S., Ayupov R.H., Xotamov I. Raqamli iqtisodiyot sohasida kadrlar tayyorlashning dolzarb muammolari. O’zR Prezidenti huzuridagi Davlat boshqaruvi akademiyasining Jamiyat va boshqaruv jurnali, 2020 №2 (88), 76-85 betlar.
- [3] Simon Birk Hartmann, Lotte Qulleq Nygaard Braae and others. The Potentials of Using Cloud Computing in Schools: A Systematic Literature Review. TOJET: The Turkish Online Journal of Educational Technology – January 2017, volume 16 issue 1. 190-202 pages. <http://www.tojet.net/articles/v16i1/16117.pdf>
- [4] Tuncay Ercen. Effective use of cloud computing in educational institutions. Procedia: Social and behavioral sciences. Volume 2, Issue 2, 2010, Pages 938-942. <https://doi.org/10.1016/j.sbspro.2010.03.130>
- [5] Yinghui Shi, Harrison Hao Yang, Zongkay Yang, Di Wu. In book: Hybrid Learning. Theory and Practice (pp.116-128). Trends of Cloud Computing in Education. [https://www.researchgate.net/publication/300398429\\_Trends\\_of\\_Cloud\\_Computing\\_in\\_Education/](https://www.researchgate.net/publication/300398429_Trends_of_Cloud_Computing_in_Education/)
- [6] Z.M. Kurbanov, R.H. Ayupov. Important factors affecting modern cloud technologies using in education. Journal of Contemporary Issues in Business and Government Vol. 27, No. 2, 2021, <https://cibg.org.au/>. P-ISSN: 2204-1990; E-ISSN: 1587-1594, DOI: 10.47750/cibg.2021.27.02.168.
- [7] Kurbanov Z.M. Cloud technologies: review and application. Журнал Вестник науки и образования. №4(58), Часть 1, 2019 г.
- [8] Kurbanov Zafar Mamanazarovich. The role of cloud technologies in life. Academicia: An International Multidisciplinary Research journal. Vol.10, Issue 6, June 2020. Doi:10.5958/2249-7137.2020.00675.8
- [9] Qurbanov Zafar Mamanazarovich. My Drivedan amaliy ishlarda foydalanish. Texnika fanlari jurnali. №6, 2018, 3-son. <http://dx.doi.org/10.26739/2181-9696-2020-6-9>.

# *Innovation In Teaching Mathematics In Higher Education*

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**Abstract – The article discusses one of the sides of the process of informatization of education. The method of using information technology in the educational process. Teaching higher mathematics in universities through the creation and use in practice of new forms of pedagogical, software products using new information technologies, a computer textbook, a computerized textbook, as well as the forms of organization and features of educational activities of university students in the presence of computer textbooks (for example, computer textbooks on the course of higher mathematics).**

**Keywords – Higher Mathematics, Applied Problems, Mathematical Competence, Innovative Teaching, Methodology.**

Previously, a specialist had to correspond only to the workplace and the possession of narrow information that is necessary in a certain area. And the training of students was reduced to standard knowledge, skills and abilities, then "competence" implies the mastery of knowledge not only of a general kind, but also in a certain wide area, the ability and willingness to successfully implement their skills, while increasing the quality and efficiency of their activities.

In the modern period of development of society, characterized by fundamental changes in the socio-economic, political and other spheres, the goal of higher education is the formation of creatively thinking high-level specialists, which requires the creation of a new model of higher education, the development of creative abilities, cooperation of teachers and students in the educational process.

The need to develop new approaches to teaching is dictated by society's dissatisfaction with its quality. Changes in the living conditions of society inevitably lead to the improvement of educational concepts. The current stage of education development is characterized by qualitative changes in its content, structure, and the introduction of new pedagogical technologies into the educational process. At the same time, an important role in the reform of education is assigned to the developing process of informatization, which makes it possible to widely use information technologies.

The use of new information technologies in teaching mathematics involves providing students with methodological and educational materials of a new type - computer textbooks and computerized textbooks and problem books. In this regard, it is necessary to develop new methodological techniques and update the methodological system of teaching mathematics.

This article discusses the methods of teaching mathematics in terms of using the computer mathematical system Mathematics. This computer system, in addition to the colossal capabilities of numerical, symbolic, graphic calculations and an embedded ultra-high-level programming language, contains all the elements of the shell for creating a computer textbook.

The definition of the topic of the article is due to the following significant contradictions:

- Between the social order of society for highly qualified specialists and the insufficient level of information culture of university graduates;
- Between the traditional methodology and technology of education and modern requirements for the level of knowledge, integrative skills, information culture of specialists (engineers, technologists);
- Between the current availability of computer mathematical systems that have the broadest possibilities for solving mathematically formulated problems, combined with the simplicity and accessibility of the user's work with them, and their low demand for educational purposes;
- Between the need for the development and use of computer textbooks (and other pedagogical software products) in teaching mathematics and their lack of availability;
- Between the need of mathematics teachers for applied knowledge on the use of computers in teaching and the lack of development of the methodological foundations of computerization;
- Between the potential diversity of new forms of student learning and the continuation of their training according to the traditional methodology.

University students need to be taught not only according to the traditional methodology, since a future engineer or economist, in addition to knowledge of specialization subjects, must have an information culture and knowledge in the field of using new information technologies in their future professional activities.

The relevance of the article is confirmed by the following factors:

- Insufficient knowledge of the capabilities of computer mathematical systems available to university students;
- Low efficiency of independent work of students in the traditional form of education and the ability to change this situation by organizing student training using computer textbooks.
- The need to equip university graduates with the skills to apply information technologies in their professional activities and to be modern, highly qualified specialists.

The relevance and lack of development of the above problems determine the choice of the topic of the article: "Methods of teaching mathematics with the use of new information technologies (in a technical university)".

The nature of the scientific and pedagogical problem, the degree of elaboration of its various aspects largely predetermined the goals and objectives of the article.

The purpose of the article is to develop and scientifically substantiate the methods of teaching mathematics in a technical university using new information technologies.

This goal led to the allocation of the following tasks facing the author of the article:

1. Analyze the pedagogical and methodological features of the use of information technologies in the process of teaching mathematics to university students.
2. On the basis of theoretical analysis and empirical experience, develop new forms of educational work of students using a computer system.
3. To develop new forms of presentation of educational material in mathematics through the creation of computer textbooks in several sections of the mathematics course of universities and describe the methodology of their application in the educational process.
4. Develop and describe the technology for creating computer textbooks in mathematics using the computer mathematical system Mathematica.

The methodological basis of the article is:



- Psychological and pedagogical aspects of the philosophical concepts of activity (its general structure, psychological structure, the ratio of collective and individual activity), consciousness, categories of the abstract and the concrete, phenomenon and essence, principles of the empirical and theoretical;

- Modern psychological and pedagogical concepts of educational activities, student-centered learning, technological approach to learning;

- the leading principles of the modern education system, including - humanization, humanization, taking into account the level of development and individual psychological characteristics of the individual.

The scientific novelty of the article is as follows: forms and methods of using new information technologies in teaching mathematics at a university have been developed and theoretically substantiated; the elements of the technology for creating computer simulators as part of a computer textbook in the Mathematics environment have been developed and scientifically substantiated.

The theoretical significance of the article is as follows:

1) methods of creating and using pedagogical software products based on the Mathematica system are proposed and substantiated within the framework of an integrated approach to informatization of the process of teaching mathematics in technical universities;

2) developed a methodology for the application of new information technologies in teaching mathematics at a university based on the integrated use of the Mathematica computer system in the educational process.

The practical significance is as follows: a methodology for creating and using computer textbooks as multifunctional pedagogical software products based on the Mathematica environment has been developed and introduced into the educational process of the university, which can be applied both in classroom lessons and in organizing students' independent work, as well as in remote learning.

### CONCLUSION.

Currently, there is a steady tendency for mathematics education in universities to lag behind the development of science itself. This happens due to various objective reasons (first of all - the ramification of the "tree" of mathematics). Overcoming this crisis is possible with a change in goals: from the goal of acquiring knowledge, skills and abilities in material form, that is, in the form of the scientific and theoretical content of science, to the goal of developing a student as a person, his abilities, and creative potential. The specified view of the goals also requires an appropriate attitude to the content of training, respectively - to the means of new information technologies.

The goals of developing the personality of a university student, his abilities and creative potential require a different approach to the selection of training content than the existing one. The systems of knowledge, abilities, skills are not enough for the content of teaching mathematics at a university. In this content, along with the assimilation of information, facts, the search itself, the process of forming knowledge, rules, formulas, algorithms, and the like should be present. Computer mathematics systems are ideal for providing conditions for such a search process, as they lead to a dramatic expansion of mathematical practice.

The intensive improvement of computer algebra systems and the emergence of computer mathematical systems entails an expansion of the scope of their application in scientific, engineering research and education. Currently, it is possible to single out the successfully developing (so far, unfortunately, almost exclusively abroad) direction of using the computer mathematical system Mathematica as a means of new information technologies for teaching and as an environment for the creation and use of educational software products.

### REFERENCES

- [1] Averyanov L. Ya. System of electronic support of the educational process / L. Ya. Averyanov, EL Tsukanova // Distance and virtual education: Digest of Russian and foreign press. 2002. No.- 4. -p. 5-7.
- [2] Agapova O. I. About three generations of computer learning technologies / O. I. Agapova, A. O. Krivosheev, A. S. Ushakov // Informatics and Education. 1994. - No.-2. - p. 34-40.

- [3] Ageev V.N. E-book: A new means of social communication / V.N. Ageev. M.: MSPU, 1997.
- [4] Ageev N.V. Electronic editions: concepts, creation, use: A textbook to help authors and editors / N.V. Ageev, Yu. G. Dreve; under the editorship of Yu. G. Dreve. - Moscow: MSPU, 2003. 236 p.
- [5] Aladiev V. 3. Introduction to the environment of the Mathematica 2.2 package / V. 3. Aladiev, M. L. Shishakov. M.: Information and publishing house "Filin", 1997. - 368 p.
- [6] Aldushonkov V.N. Creation and implementation of multimedia technologies in the educational process / V.N. Aldushonkov // Distance and virtual learning:
- [7] Aleksandrov G.N. Programmed learning and new information technologies of teaching / G. N. Aleksandrov // Informatics and education. 1993. - No.-5. - p. 7-19.

# *Advanced Strategies Against COVID-19*

## *Review*

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**Abstract** – The arising SARS-CoV-2 viral disease (COVID-19) has caused a worldwide health alert because of its high rate of infection and mortality in people with chronic cardiovascular comorbidities, as well as creating complex clinical conditions. This has constrained mainstream researchers to investigate various techniques that permit combating this viral disease just as treating hazardous fundamental impact of the infection on the individual. In this work, we have evaluated the latest logical proof to give an extensive display in regards to the biotechnological techniques that have been proposed to combat this new viral disease. We have focused in our study on vaccine production, nanotechnology applications, repurposing of known drugs for unrelated pathologies, and the search for bioactive molecules acquired from natural products. The objectives incorporate safely use as possible prophylactic or therapeutic treatment, in view of in silico and in vivo studies, including clinical trials around the world for the right and ideal diagnosis of the infection. This study intends to feature the advancement of groundbreaking thoughts that can diminish the time line for research yield and improve research quality while simultaneously, remembering the efficacy and safety of these potential biotechnological strategies.

**Keywords** – COVID-19, Antivirals, Drugs and COVID-19, Vaccines against COVID-19, Nanotechnology against COVID19.

### I. INTRODUCTION

In the late 2019, a group of patients with abnormal pneumonia was analyzed in Wuhan, China [1], and the etiological agent was confined and its genome sequenced, which was discovered to be a rising zoonotic infection, individual from the Corona viridae family, genetically related, Severe acute respiratory disorder Covid (SARS-CoV) [1,2]. The epic developing infection named SARS-CoV-2 displays a fast human-to-human spreading through the respiratory tract, and is responsible of a condition known as Coronavirus disease of 2019 (COVID19) [3]. COVID-19 has become a pandemic episode with more than 72.196 million individuals tested positive for the infection, which has brought about more than 1.6 million deaths around the world by mid-December 2020[4] As per data showed on the World Health Organization (WHO) COVID-19 Dashboard, even in nations where the quantity of every day cases has dropped (e.g., China, Australia), it is beyond the realm of imagination to expect to say that the infection has vanished since active cases are as yet revealed day by day. For example, in districts like Europe and North America, and agreeing with the autumn and winter seasons, an emotional expansion in the quantity of revealed cases has constrained a few nations (for example Italy, France, Germany) to fix clean limitations. In any case, in nations where the circumstance has improved (for example Chile), expansive consistent testing, surveillance and contact tracing are still active.

The SARS-CoV-2 infection clinical manifestation is complex; differing from asymptomatic or gentle manifestations in over 80% of carrier people, to serious respiratory and systemic distress, including obstructive pneumonia, hypoxia, favorable to inflammatory

cytokine storm, coagulopathies, neurocardiovascular issues, and death. The mortality rate ranges from 1 to 3% among symptomatic patients, contingent upon medical infrastructure and early clinical intervention [5 -10]

Disease severity varieties among infected patients are related to the individual vulnerability, principally controlled by the density of the viral cell receptor, angiotensin-converting enzyme II (ACE2). This is fundamentally higher in people more established than 50 years, or patients with constant neurocardiovascular comorbidities, for example, diabetes mellitus, hypertension, and obesity [6,11].

Right up 'til the present time, neither specific prophylactic nor therapeutic treatment, including antiviral medications or molecules to diminish severe symptoms, are accessible, given the novelty of SARSCoV-2, and the absence of regulatory affirmed medicines for other Covid and related diseases. Thusly, and given the requirement for fast improvement of powerful chemotherapeutic mixtures for COVID-19 treatment, the current methodology has been the repurposing of existing medications utilized in disconnected pathologies, particularly those that need significant results before.

These repurposed drugs have been investigated with the expectation to impede or hinder viral disease or to adjust neurotic hyperinflammatory reactions [12,13]. The reapplication of these medications has been upheld by *in silico* approaches, hindrance of SARS-CoV-2 or related Covid infection in tissue culture and animal models, or pharmacological application in SARS-CoV, or random immunopathologies such rheumatoid joint inflammation, lupus, or bacterial sepsis. In a comparable methodology, several current reports propose the utilization of natural substances as complementary prophylactic or therapeutic antiviral against COVID-19 that have shown adequacy against other Covids related with SARS-CoV-2. Another technique for the orderly fight against the novel COVID-19 protective anti- SARS-CoV-2 immunoresponses and long-lasting memory. In this sense, Nanotechnology and new materials are other open fronts in the anticipation, location and immunization approach against COVID19 infection.

Here, we survey the latest biotechnological propels in such manner and assess the most encouraging remedial methodologies for the COVID-19 anticipation and treatment. Simultaneously, we present a portion of the possible current and future challenges affronting effective therapeutic approaches and diagnostics around the world.

## II. GENERALITIES OF THE SARS-COV-2 INFECTION AND PHASES OF THE INFECTION

Coronaviruses are single-stranded RNA (ssRNA) enveloped viruses with a progression of distending glycoproteins, called spike protein (S) [1]. Infection of the susceptible cell infection begins with absorption of the virus through its S-protein to the cell surface ACE2 receptor, followed by proteolytic activation of S-protein fusogenic area by host transmembrane serine protease 2 (TMPRSS-2). On the other hand, the virus can enter the cell by endocytosis and acidification of the endolysosome [14,11,15] Endless supply of viral ssRNA, the 5' locales (orf1a and orf1b) of long genome are made an interpretation of by ribosomes into two enormous covering polyproteins, pp1a and pp1ab, which are then proteolytically handled by two virally encoded proteases, the chymotrypsin-3-like protease (3CLpro) and the papain-like protease (PLpro), bringing about 16 functional non-structural proteins (NSP-1-16)[16,17] . These delivered viral NSPs are responsible for inactivating host cell characteristic antiviral reactions and establishing the environment for viral replication. The replication complex, an RNA-dependent RNA polymerase (RdRNAPol) formed by NS7/8/12, catalyzes both transcription of underlying genes and replication of the viral genome [18].

Essential for virus, RdRNAPol has arisen as the principle antiviral drug target, essentially through wide range incipient chain-eliminator nucleoside analogs. Regardless, NSP14-exonuclease gives resistance from the antiviral Ribavirin, by eliminating it from slowed down replicative chain [19]. Viral replication takes place in double- membrane organelles, where genome is bundled by nucleoproteins (N) shaping a nucleocapsid that leaves the cell by means of the exocytosis pathways, and by maturing through the cell layer gaining the lipid envelop and S-glycoproteins [20].

The noticed natural history of the clinical infection in humans incorporate two phases, (I) a mid 5–7-day post-exposure asymptomatic period, where SARS-CoV-2 infects the upper respiratory epithelium prompting an evident suppression of inflammatory reaction by the host, followed by (ii) an aspiratory disease that can bring about mild or severe pneumonia. A portion in this later group can progress to (iii) a hyperinflammatory phase (> 7 days) that starts with disease of the alveolar epithelium, which has a higher density of ACE2 viral receptor, bringing about an enhanced infection triggering the expression of a wide range of pro-inflammatory cytokines [21,22]. These reactions are responsible for leukocyte invasion, proteinaceous-liquid accumulation, and obstruction of the alveoli, and thus, gas exchange failure and hypoxia [22].

Furthermore, a systemic spread of the infection brings about extra susceptible, ACE2-expressing, tissue infection, including cardiovascular epithelium, heart, liver, kidney and intestinal linings [14]. In such manner, gene expression of ACE2 on the cardiovascular epithelium surface is surprisingly enhanced by interferon-mediated reactions to the SARS-CoV-2 in the lungs; and therefore, expanding systemic scattering of the disease to extrapulmonary tissues [23].

The systemic infection, along with enhanced inflammatory reactions, is most likely capable of the coagulopathies observed in some individuals, just as viral septic shock and multi-organ failure that outcomes in high mortality without clinical intervention [5,24,8,9,10,25,23].

The pathways that actuate incendiary reactions fluctuates altogether among infected patients, notwithstanding, among the most significant cytokines related to serious pathologies are  $\text{INF-}\gamma$ ,  $\text{IL-1}\beta$ ,  $\text{IL-18}$ , while two specific pointers of progression and severity of COVID-19 pathology are  $\text{TNF-}\alpha$  and  $\text{IL-6}$ . These uncontrolled favorable to provocative cytokines are apparently the primary liable for the acute respiratory distress (ARDS), cytokine storm condition, viral sepsis and multiorgan failure, and subsequent death.

### III. VACCINES AGAINST COVID-19: A BIOTECHNOLOGICAL RACE

One of the difficulties during a novel pandemic is the improvement of an effective and safe immunization, to empower an individual's immune system to make its own neutralizing antibodies against a pathogen. This antibody would produce "herd immunity" in a population of susceptible people, without risking their lives. In such manner, in spite of the fact that SARS-CoV-2 was at first seen as a high transmission rate disease, late epidemiological seroconversion information in nations that didn't matter approaches of required population confinement, like the instance of Sweden, shows that only 7.3% of its population carries antibodies against SARS-CoV-2 [26]. Accordingly, natural effective "herd immunity" of over 60% of the Swedish population would require years of continuous spread of the virus, with the related medical challenges. These information feature the significance and earnestness for a powerful immunization improvement, which can produce defensive invulnerability in susceptible people and lessen the spread of the infection, finishing compulsory restriction which can possibly worsen financial issues around the globe, especially in agricultural nations. In like manner, research on a prophylactic COVID-19 immunization has started in numerous organizations and scholastic establishments. The ACTIV (Accelerating COVID-19 Therapeutic Interventions and Vaccines) is a community program that looks to trade all the got data from the turn of events and testing of creating immunizations, to crush the new Covid and the disease it causes [27]. An enormous bunch of immunization engineers, controllers, researchers, and general public health specialists who went to the 11–12 February Global Research and Innovation Forum, expressed that "We will just stop COVID-19 through fortitude," and "Our common responsibility is to guarantee all individuals approach every one of the tools to prevent, identify, treat and defeat COVID-19", as per the World Health Organization (WHO) Director-General [28].

Albeit an antibody against SARS-CoV was developed, the generation of anti- SARS-CoV-2 immunization is on course [29]. Covids share structures, which incorporate spike (S1 and S2), layer (M), envelope (E), and nucleocapsid (N) proteins, that could give applicable antigenic targets [30]. Among these primary proteins, the S-protein contains the determinant structure for virus passage, and subsequently, antibodies coordinated against it, especially the receptor-binding domain (RBD) or the fusogenic area, should effectively block the virus access to susceptible cells. Notwithstanding, the SARS-CoV-2 S-protein amino acid sequences differ from that of SARS-CoV in a several areas basic for protective immunity. These remember three extra short inclusions for the N-terminal space (NTR, area A) and the C-terminal locale (CTR, areas B, C, and D), and four out of five key buildups changes in the RBD receptor-restricting theme [31].

Adjusting the S1. Then again, the S2 subunit shapes the spike protein branch, and contains two heptad rehases areas (HR1 and HR2) [32], like other enveloped viruses. The communication of HR2 found NTR, and HR1 situated CTR, structures a six-helix pack structure in which HR2 districts accumulate into the spaces framed by the trimeric HR1 snaked curl [33].

Existing proof propose that the SARS-CoV-2 S-protein ties human ACE2 with higher proclivity (10–20-overlay) contrasted with the S-protein of SARS-CoV, which is related to an all the more promptly transmission structure human to human [17].

Vaccine development is a prolonged process (development, animal model testing and clinical trials, assessment of safety, regulatory considerations) that regularly requires years with high economic costs. Given the criticalness despite the current pandemic, a sped-up improvement was proposed to deliver a successful vaccine within 12–18 months [34]; consequently, several recently utilized and novel platform advances for quick and safe immunization plan and assembling were picked. These techniques comprise of a platform-based delivery approach that is flexible for the modularization of target pathogens antigenic parts and

upgrade their immunogenicity [35]. For SARS-CoV-2, a several systems previously tried in animals' models for prophylactic protection against related MERS and SARS-CoV seem, by all accounts, to be the main candidates. The principal platforms used are centered around traditional complete however attenuated virus strategy, complete recombinant antigenic viral proteins as subunit antibody (fundamentally the S-protein or specific epitopes from its RBD), or as a component of adenoviral vector, lastly novel nucleic acid (DNA, mRNA) delivery technology.

Other studies indicate that supermolecule vaccines platforms have major benefits, on quickly committal to writing for microorganism proteins expression within the context of human cells, which may induce effective prophylactic host immune responses, albeit, important analysis during this output is required [36].

In terms of progress, Moderna and CanSino Biologics were the primary to start clinical trials for vaccines against COVID-19 [37], however BioNTech has consecutive calculable completion (genus Medicago and Novavax use a virus-like particle (VLP) platform as scaffolds to gift the SARS-CoV-2 S-protein, the second alongside their proprietary adjuvant Matrix-M [38]. Countries like Egypt, Kingdom of The Netherlands, Mexico, Greece, Colombia, US, and Australia, square measure presently developing vaccines supported the Bacillus Calmette–Guerin (BCG),

A method antecedently according to supply broad protection against alternative metabolic process infections. additionally, supporting this repurposing, countries that have a late begin of universal BCG policy had seen high mortality, in keeping with the thought that BCG protects the immunized people, and notably, the aged population [39,40].

The Brazilian National regulatory authority approved Sinovac Biotech Ltd. immunogen generated from attenuated virus, for a phase III clinical trial clinical study [41]. Oxford and Astra Zeneca passed with great ape adenovirus-vectored immunogen (ChAdOx1 nCoV-19) known as AZD1222, which may generate a fast protein and lymph cell responses against SARS-CoV-2 [42]. Biotech's BNT162 immunogen from ribonucleic acid induces positive responses manufacturing antibodies in volunteers [43]. though Moderna (mRNA-1273) was the primary company set into human trials for a COVID-19 immunogen, in 2020, Chinese military approved CanSino Biologics known as Ad5 for phase III clinical trial protocols, results support immunogen effectiveness against a five × 10<sup>10</sup> microorganism load administered to healthy adults [44].

Another way to get a short-lived passive protection is that the administration of specific opposed SARS-CoV-2 antibodies, derived from COVID-19 convalescent patient's plasma. Therapeutic administration of recuperation sera has to this point provided the foremost effective strategy to treat COVID-19 patients, preventing significant pathological damage associated with the infection; an empirical study of 245 patients with advance disease, recommend that the therapy is safe [45]. Moreover, it's been projected that COVID-19 convalescent sera may be used as a prophylactic measure for in close-contact people to stop infection, or to treat people with early or mild symptoms [46]. Currently, there are clinical trials in several countries developing treatments using convalescent plasma (NCT04333355 and NCT04358783, Mexico; NCT04403477, Bangladesh; NCT04344977, NCT04360278, and NCT04418518, US; NCT04342182, Netherlands; NCT04393727, Italy; NCT04292340, China; NCT04348656, Canada; NCT04425915, India; NCT04352751, Pakistan; NCT04375124, Turkey; NCT04347681, Arabia).

#### IV. THE START OF IMMUNIZATIONS

In December 2020, the mRNA-based immunogen developed by Pfizer and BioNTech (BNT162 vaccine) was approved by the Medicines and Health product regulatory authority (MHRA), once showing Associate in efficaciousness larger than ninety fifth in phase III clinical trial. By period of time, the USA Food and Drug (FDA) has approved emerging use authorization of this ribonucleic acid immunogen within the USA for people older than sixteen years, once verification of its safety by a committee of doctors. Similarly, to the current immunogen style, another ribonucleic acid immunogen developed by Moderna (mRNA-1273) offers a ninety-four efficaciousness [47] and is presently underneath review by the agency for licensing and application in immunization of the overall population. though showing terribly promising efficaciousness results, these vaccines, however notably the Pfizer and BioNTech style, needs uninterrupted cold (− seventy °C) chain demand [3], which might limit its implementation in less developed countries that lack the mandatory infrastructure for transportation and storage. additionally, reports of great hypersensitive reactions to the Pfizer and BioNTech immunogen by people with history of robust food allergies would need any investigation.

various vaccines supported animal virus that have shown beyond ninetieth protecting efficaciousness in phase III clinical trial, like those developed by Oxford-Astra Zeneca and Gamaleya Russian Center [48].

#### **V. NANOTECHNOLOGY AS THERAPEUTIC STRATEGY AGAINST COVID-19**

Since the 1980s, nanotechnology and nanoscience are offering a number of approaches to cope with different challenges, including the actual COVID-19 pandemic, based on an abundance of engineered materials identifiable by their useful physicochemical properties through versatile chemical functionalization, in addition to the vaccine development [49]. Furthermore, the development of nanomaterials with antimicrobial properties, called nano antimicrobials, is an ongoing work for the last 16 years [50].

Nanotechnology and new materials are used against COVID-19, as LV SMENP DC vaccine, developed by Shenzhen Geno-Immune Medical Institute which modified dendritic cells with lentivirus vectors expressing SARS-CoV-2, engineering a synthetic vaccine including SARS-CoV-2 minigene and immune modulatory genes [30]. University of Washington, another replicon RNA vaccine is under study, formulated with Lipid Inorganic Nanoparticles (LION/ repRNA-CoV2S) to induce rapid immune protection against SARS-CoV-2 infection, which will enter clinical development under the name HDT-301[51]. Another strategy for vaccine development is the administration of gold nanoparticles (Au NP) conjugated with viral antigens, achieving higher IFN- $\gamma$  concentrations in mice, immunized with Au NPs conjugated with antigens from swine transmissible gastroenteritis virus [52].

#### **VI. NANOMATERIAL-BASED IMMUNE APPROACHES**

Different strategies in which nanomaterials can assist regulating the immune system, in an antigen-specific manner, through immune-targeted nanotherapeutics within the vaccination context, including either direct administration of viral antigens, or molecules such as DNA or RNA [49]. For instance, it has been suggested that the use of nanoparticles coupled with SARS-CoV-2 S-glycoprotein can induce a precise antibody response against this pathogen, using a mouse model [53], nanoparticles protect the antigen's local construction, and improves conveyance and introduction to the antigen-introducing cells. Other strategy studied for COVID-19 treatment is the employment of Mesenchymal Stem Cells (MSCs) derived exosomes, which used for various diseases treatments, such as lung, pancreatic, and breast cancers, Alzheimer's disease, among others, with the advantage that exosomes could prevent cytokines storm, and promote cellular repair [54,55].

Another prophylactic immunization is the aforementioned therapeutic administration of specific neutralizing antibodies (mainly IgG), directed specifically against SARS-CoV-2 RBD of S-protein found in serum from convalescent individuals. several hospitals around the world have started to treat severe cases of COVID-19 with transfusion of convalescent plasma (CP), due to the lack of effective antiviral treatments.

This strategy is not clear, given lack of randomized placebo double-blind studies. Supporting the purposed positive effect of platelet concentrate transfusion, a recent report by Mayo Clinic [56] analyzed the 7-day mortality among 35,370 hospitalized COVID-19 patients receiving this treatment (57% of which were severe patients and 25% where in artificial ventilators), this study observed a mortality reduction depending early post-diagnosis intervention was applied, in addition to the concentration of plasma IgG in platelet concentrate. Patients received platelet concentrate transfusion 3 or 4 days after diagnosis had 8% mortality, and 11.5% mortality, respectively. Similar decrease of mortality was observed among patients that received plasma with high IgG, compared to those that received a lower IgG titer. Given different antibodies concentration present in convalescent patients, an alternative could be the design and development of recombinantly synthesized engineered therapeutic antibodies, commonly known as nanobodies.

Another approach is the use of chimeric nanobodiesFc (where variable region of nanobody is fused to Fc of human immunoglobulin). Two recent reports demonstrated that neutralizing nanobodies applied at low concentration (4–18 nM) significantly decreased the number of viral plaque formation upon infection in tissue culture, by effectively binding to SARS-CoV-2 S-protein RBD (Receptor-Binding Domain) and blocking binding to ACE2 receptor [57,58].

#### **VII. VIRAL INACTIVATION BY NANOMATERIALS**

Different challenges remain using nanomaterials for clinical applications of polymers, oligomers, and small molecules candidates for SARS-CoV-2 clinical application. the resulting dilution upon treatment application to the host, results in efficacy loss as the viral complex dissociates, a limitation that can be overcome by synthesizing nanoparticles, which can irreversibly inhibit viral infectivity, permanently damaging the virion [49].

Several approaches have been studied as viral inactivators, including cellular nano sponges [59], human cell-derived membrane structures created as a medical countermeasure against coronavirus. The nano sponges are coated with receptors (such as ACE2—angiotensin-converting enzyme 2—, TMPRSS-2—transmembrane serine protease 2—and DPP4—dipeptidyl peptidase IV—, expressed on endothelial surfaces) necessary for viral adhesion and cellular entry, and inhibit viral interaction with the cellular surface, and hence, cellular invasion. Results showed a dose-dependent inhibitory effect on viral adhesion to cultured cells, rendering coronaviruses unable to infect their usual cellular targets [59].

This approach takes into account that although SARS-CoV-2 mainly targets the respiratory tract, it can also affect other organs (including gut, kidney), and even, the vascular system [49], ACE2 is a good candidate for this strategy, due to its wide expression in endothelial tissues.

### VIII. NANOMATERIALS AS A PREVENTING STRATEGY TO PREVENT SARS-CoV-2 INFECTION

SARS-CoV-2 can infect new hosts, not just through direct contact with aerosols from infected people, yet additionally through contact with surfaces exposed to the pathogen, where the infection has been appeared to get by for as long as 3 days, contingent upon the surface type [60]. Thus, one of the areas of interest is the prevention of surface viral contamination.

For example, where polyvinyl alcohol (PVA) nanofibers were utilized to channel encompassing mist concentrates [61].

Charged PVDF multi-facet nanofiber channels, as a methodology against the airborne novel (COVID-19) with monodispersed NaCl nano-aerosol, getting up to 99% filtration effectiveness yields (comparative for N98 guidelines), utilizing PVDF 6-layer charged nanofiber channels in contrast with the 70.6% proficiency recently got [62]. Moreover, other than its uses for viral recognition, graphene has end up being a decent possibility to capture the SARS-CoV-2 infection [63].

Albeit restricted, there is work in regards to the treatment of Personal Protective Equipment (PPE) with charged metallic (like Cu, Ag, Fe, Zn among others) nanoparticles, which appears to bring about the arrival of antiviral agents (i.e., reactive oxygen species). For example, Ag-covered nanoparticles repress viral entry in host cells, by means of interactions with cell receptors [50]. Furthermore, nanotechnology has been applied in food safety, utilizing of nanofibers, nano emulsions, nano encapsulated materials among others, by exploiting the benefit of nanomaterials to interact with 60–600 nm particles. It is felt that nanoscale materials, under controlled delivery, could be valuable to prevent SARS-CoV-2contamination of both, food products, and packaging materials [64].

### IX. REPURPOSING OF KNOWN MEDICATIONS AGAINST COVID-19

As to COVID-19 pharmacological treatment, as of recently, just an exceptionally set number of specific anti- SARS-CoV-2 compounds (redesigned or developed) are available. Be that as it may, the most well-known procedure to distinguish useful drugs to reduce severe symptoms has been the repurposing existing drugs against unrelated diseases, particularly those safely utilized previously, regardless of whether not as antiviral. Since the WHO pronounced the COVID-19 as pandemic, numerous studies about the repurposing of known drugs have showed up. The methodologies utilized in silico, in vitro and in vivo contemplates, both in cell culture and animal models, and probably the most encouraging drugs have gone through clinical trials to test efficacy in diminishing viral burden, hospitalization time, severity and mortality of the infection.

These anti- SARS-CoV-2 chose drugs, focuses on a several cell processes or viral chemicals, including viral restricting to the receptor or entry into the susceptible cell and release of the genetic material, M star and PLpro protease activity, and the most promising up until now, inhibitors of the RdRpol, including the two nucleosides-analogs and non-nucleoside analog compounds or immunomodulation of early genetic or cell responses against the infection.

By mid-March, 24 continuous clinical trials were at clinical stages 2–4. In those trials, the following known drugs were considered: arbidol (umifenovir), bevacizumab, bromhexine, carrimycin, chloroquine, cobicistat, danoprevir, darunavir, favipiravir, fingolimod, human immunoglobulin, hydroxychloroquine, interferons, lopinavir, methylprednisolone, oseltamivir, pirfenidone, remdesivir, ritonavir, thalidomide, nutrient C and xiyanning [65].

Right around 12,000 realized drugs were analyzed in a largescale re-purposing overview, in vitro in Vero E6 cells, from which 30 were recognized, including some US Food and Drugs Administration (FDA)- affirmed drugs, which showed antiviral movement against SARS-CoV-2. From these atoms, the most encouraging were acitretin, apilimod, astemizole, clofazimine, hanfangchin A,



pagoclone, tretinoin, zaleplon GR, AL 3151, AQ-13, DL 28,170, MLN-3897 (AVE-9897), ONO 5334, SL-11128, VBY-825, YH-1238, ZK-93426 and Z LVG CHN2 [66].

An underlying in vitro study utilizing just FDA-endorsed drugs showed that amodiaquine, chloroquine, chlorpromazine, hydroxychloroquine, imatinib, and mefloquine have activity against SARS-CoV-2 at non-cytotoxic levels, including the drug  $\beta$ -d-N4-hydroxycytidine, and its orally bioavailable prodrug  $\beta$ -d-N4-hydroxycytidine-5'-isopropyl ester (Molnupiravir), were effective against remdesivir-resistant viruses and other zoonotic CoVs [67,68]. At present there are two going through stage 3 clinical trials in hospitalized and non-hospitalized adult patients to determinate the efficacy and safety of Molnupiravir [69].

Considering the possible synergism between drugs with anti-viral action tried independently (monotherapy), a few studies have been conducted. A primer clinical study conducted in 80 patients brought up that a blend of favipiravir with interferon (IFN)- $\alpha$ , showed preferable reaction and viral clearance than a combination of lopinavir, ritonavir and interferon (IFN)- $\alpha$ , on COVID-19 [70]. Also, a stage II preliminary including 127 adult patients showed that the combination of ribavirin, interferon beta-1b and lopinavir-ritonavir decreased the viral burden, the ideal opportunity for alleviating the symptoms and hospitalization [71]. Be that as it may, the mix of medications not generally builds the action, as it was exhibited in another investigation created in 50 patients where a monotherapy with arbidol was more effective at wiping out the viral burden at day 14 after confirmation, than a consolidated treatment with lopinavir-ritonavir [2]. At last, the preliminaries utilizing the consolidated treatment with lopinavir-ritonavir in hospitalized patients were stopped by WHO at early July. It has as of late been declared by a Japan Chemical Company, that Favipiravir has met the essential end point in stage III clinical preliminary directed in 156 COVID-19-positive patients with non-serious pneumonia, with a shorter time of resolution [72]. In view of this outcomes, the Chilean Ministry of Health has endorsed the importation of this medication, utilized in Russia, Turkey and different nations, at demand from certain Hospitals and the preliminary is in progress. Notwithstanding, it has been called attention to that Favipiravir increment uric acid levels in plasma [73].

An alternate way to deal with treat COVID-19 is to focus on the immediate elimination of the virus, by blocking the virus-host interaction by means of locking some host proteins utilized by the virus to interact with them. Those proteins have become the objective of known drugs, distinguishing, in vitro, just about 70 drugs, some of them FDA endorsed and the rest in clinical or preclinical stage. The last incorporate clemastine, cloperastine, haloperidol, hydroxychloroquine, progesterone, siramesine, ternatin-4, zotatifin, PB28, PD-144418 and PS3061, which were the most extraordinary drugs agreeing with such activities, in spite of the fact that it is essential to underline that PB28 arose as the most encouraging drug. In any case, alert ought to be taken with the utilization of cloperastine and clemastine, because of their possible results. It was additionally brought up that the notable drug dextromethorphan showed favorable to viral action [74].

The utilization of chloroquine for the treatment of COVID19 was in light of an activity of the State Council of China.

In an underlying in vitro study, hydroxychloroquine showed better anti-SARS-CoV-2 activity than chloroquine, and a few preliminaries directed in patients revealed a decrease in the recovery time, however the proof was restricted [75]. The FDA approved the crisis utilization of the chloroquine and hydroxychloroquine drugs before the end of March, in any case, because of the presence of various unfavorable occasions in patients treated with the referenced drugs, a pharmacovigilance reminder was produced by mid-May, as notice, about the unfriendly occasion in the setting of COVID19 [76]. Besides, SARS-CoV-2 passage in the pneumonic determined cell line Calu-3 was not blocked by chloroquine [77], recommending that the viral entry into lung cells can be through activation by TMPRSS-2 and not endocytosis, as it was recently proposed on the Caco-2 intestinal cell line.

A drug that has shown reliable and viable antiviral action, in vitro, against animal (counting human) Covids, even the SARS-CoV-2, is the exploratory, GS-444115 compound or remdesivir. This drug, recently developed to treat Ebola, was approved by the FDA under crisis use (FDA 2020) to treat COVID-19 taking all things together patients with severe disease. This drug has been related to various results, including rectal hemorrhages, diarrhea and liver damages. Besides, remdesivir isn't presently accessible for oral administration, and in this manner, intravenous application requires patient's hospitalization [78], confusing enormous scope utilization of remdesivir, likely mutations on the target viral enzyme, RdRpol complex or the related viral exonuclease, can hinder inhibitory impact by these nucleoside-analogue drugs, prompting the rise of drug resistant SARS-CoV-2 strains [79].

Nonetheless, an early preliminary directed in China with severe disease (normal age 65) showed no statistical differences when remdesivir was intravenously administrated. It ought to be referenced that clinical improvement was accomplished 5 days sooner, in average [22]. This recovery time improvement was likewise seen in a preliminary directed in 1063 patients (average age 59),

from various nations, where the average recovery time in the group of patients that got intravenous remdesivir was 11 days, compared with 15 days in the control group. What's more, death rate among patients getting remdesivir was 8%, against 11% in the standard treatment group, which, albeit not statically large, the study was ended right on time for moral reasons, because of the event of various evaluation unfavorable occasions [80]. Notwithstanding, in the last report of a similar exploration group, including 1062 adult patients (average 58 years) toward the beginning of October, they showed that when remdesivir was utilized in patients with lower respiratory tract infection, the recovery time was more limited. What's more, they called attention to that remdesivir may have prevented the progression to more severe disease and fewer days with oxygen [80].

Before the finish of October 2020, remdesivir was conceded formal endorsement by the FDA to be utilized in patients 12 years, and more established, and weight in any event 40 kg (FDA 2020). Nonetheless, the utilization of remdesivir stays questionable since a between time WHO Solidarity preliminary directed in 11,266 patients (81% under long term) around the world, showed that this drug didn't improve (or very little) patient's mortality, beginning ventilation nor hospitalization time [81].

It is realized that one of the principal difficulties found in patients with COVID-19, is the high incendiary reaction that causes disappointment in various organs, predominantly in the lungs, for which dexamethasone has been remembered for various drugs, with the plan to improve recuperation in patients with intense respiratory trouble. In a 2018 investigation of 277 intensive care unit patients, however distributed as of late, it was tracked down that early utilization of dexamethasone assisted with diminishing both mortality and the quantity of days for ventilator use. During this preliminary, the most well-known antagonistic occasion (around 70% of patients) was hyperglycemia [82].

The RECOVERY Collaborative (Group 2020) revealed comparative outcomes in an investigation with 6425 patients (mean 66 ± 15 years old), where an improvement was seen by day 28 of treatment, in patients utilizing mechanical ventilator. They reasoned that immunopathological issues ruled the underlying phase of the disease. As of late, the NIH proposed in its COVID-19 treatment rules the utilization of dexamethasone, both in hospitalized patients who need mechanical ventilators or oxygen alone, yet not in patients who don't require supplemental oxygen, and for those situations where dexamethasone isn't accessible, the NIH panel recommends the utilization of prednisone, methylprednisolone or hydrocortisone [83]. Comparative ends, lower 28-day mortality, were accomplished in an imminent meta-examination utilizing information structure 7 diverse clinical preliminaries where 1703 patients (middle age 60 years) with serious infection were treated with methylprednisolone, hydrocortisone or dexamethasone. Be that as it may, some unfavorable occasions happened [84].

Man-made reasoning and organization medication have assumed a fascinating part with regards to speeding up repurposing of known drugs against COVID-19. For instance, Mefuparib has been proposed by AI and factual investigation, to show a stronger antiviral movement than remdesivir. Also, Toremifene has been recognized, by network investigation, as great treatment for COVID-19 since it could obstruct the ACE2 and spike protein communication. Furthermore, some in vitro tests have shown the antiviral movement of this atom. Utilizing an organization-based approach, it was feasible to discover a mix of medications that could have likely movement against COVID-19, for example, dactinomycin–sirolimus, melatonin–mercaptapurine, emodin–toremifene and toremifene–melatonin. The last mix has been tried in a clinical preliminary in persistent with early disease [2].

## X. NATURAL PRODUCTS AGAINST COVID-19

Medicinal herbs, just as bioactive substances that were extricated and purified from different plants, are promising sources for antiviral drugs. It is common for antiviral medicines to have accessible plans dependent on natural compound constructions. Among the classic models, we have homoharringtonine and emetine, got from the *Cephalotaxus* and *Psychotria ipecacuanha* plants, separately, which have anti-herpes virus properties and have successfully repressed SARS-CoV replication [85,86]. Quiet, practically 50% of the drugs affirmed somewhere in the range of 1981 and 2014 were determined or imitated a natural compound [87].

Then again, because of the urgency of compelling antiviral medicines against COVID-19, established researchers has been compelled to investigate each item that could safely be administered as prophylactic or therapeutic antiviral mixtures against SARS-CoV-2 disease. Furthermore, the investigation methodologies incorporate those completed not just in vivo with at least one biomolecule together, yet additionally those in silico contemplates. There are a several current reports that propose natural substances against COVID-19, which connect with previous studies revealing demonstrated efficacy against SARS CoV [88,86]. In like manner, given the current pandemic, the medical society is reusing different antiviral drugs, combing and joining them with biomolecules. For instance, the combination of the medication Tenofovir and Glycyrrhizin (natural compound) has been

concentrated as therapeutic or prophylactic mixes against Covid diseases [89]. In this unique circumstance, we gathered data on herbal formulation and mixtures determined and in silico concentrates from natural items that show therapeutic or prophylactic potential, as well as controlling and adding to the successful treatment against SARS-CoV-2.

#### XI. ADEQUACY AND CARE IN THE ADMINISTRATION OF HERBAL FORMULATION AGAINST COVID-19

In the current and real battle for of COVID-19 control, the use of herbal formulation as complementary treatment has been another option; to control this disease, some natural products of ancient uses and generally of Chinese starting point have been as of late assessed and examined. Most herbal formulations are viewed as protected because of their long history of utilization for anticipation, treatment and control of different diseases, be that as it may, there are reports of toxicity, which can generally be because of misidentification and excess. Moreover, alert ought to be taken when there is no documentation of long recorded utilization of herbal mixtures [90].

It is essential to consider that COVID-19 produces distinctive clinical impacts and relies upon the progression of the disease [90], so a comprehensive treatment is important to dispose of disease impacts, like the presence of immune cells detachment, since their presence in blood increases the risk of an excessive immune response, straightforwardly prompting cytokine storms (a few patients create severe cardiovascular and kidney complications). Furthermore, those medicines should keep up intestinal homeostasis and protect intestinal wall barrier [91,92]. Hence, formulations or preparations dependent on medicinal herbs that can inhibit the various impacts and phases of the disease have been studied.

Studies reported formulations made by the progression of the disease that can keep up intestinal homeostasis and, repress IL-1 $\beta$  production mediated by Toll receptors, and improve the expression of IL-10. The details utilized were: for mild disease stage: Pogostemon Cablin (Blanco), Atractylodes Lancea (Tunb.) Dc., Scutellariae Radix, Chaihu Radix Bupleuri, Forsythiae Fructus; for moderate stage: Gypsum, Atractylodes Lancea (Tunb.) Dc., Polygoni Cuspidati Rhizoma Et Radix, Pogostemon Cablin (Blanco), Verbenae Herb; for serious stage: Ephedra Herba, gypsum, Lepidii Semen Descurainiae Semen, buffalo horn; for critical stage: Panax Ginseng C. A. Mey., Aconiti Lateralis Radix Praeparata; and for recovery stage: Hedysarum Multijugum Maxim., Ophiopogon japonicus (Linn. f.) Ker-Gawl, Panacis Quinquefolii Radix. Besides, they show that kaempferol, beta-sitosterol, stigmaterol, quercetin, luteolin, genkwanin, diop, and isorhamnetin took an interest in at least three infection stages. A clinical report on 54 patients with COVID-19, treated with these natural blends tracked down a positive reaction in the recovery and improvement of patients, and recommended the significance of regulating intestinal function and maintaining microenvironmental balance during treatment [91]. This is potentially on the grounds that QFP [92] is incorporated inside the assessed treatment, and as indicated by an unreasonable utilization of this natural blend can cause epigastric distress, diarrhea, and surprisingly hypertension [93].

Another plan contemplated was Ma Xing Shu Gan Decoction. The essential remedy is made out of the accompanying spice species: 6 grams of Herba ephedrae (MH), 9 grams of Semen armeniacae amarum (Ku Xing Ren), 24 grams of Gypsum fibrosum (SSG) and 6 grams of Radix glycyrrhizae (GC). The distinguished dynamic biomolecule was ephedrine glycyrrhizic acid, and the examination proposed that it controls the coagulation framework in the inflammatory storm, caused in the by COVID-19, and the unfavorable responses are not yet characterized [94].

Then again, the Chinese government included TCM (Traditional Chinese Medicine) as one of the suggested restorative alternatives for COVID-19 treatment in the third version of COVID-19 treatment guidelines, which was published on January 23, 2020.

The fundamentally suggested formula was QFP (Qingfei Paidu Decoction) composed of more than 120 biomolecules with significant anti-inflammatory impacts, recognized by UPLC, and identifying as the primary dynamic biomolecules to Hesperidin, Astin J, Zingiberoside A, Glycyrrhizic acid, Pogostone, Senkirkine, Ephedrine, Salkosaponin A, Alisol C monoacetate, Balcalin, Irisflorentin, Dioscin, Synepryne, and Apigenin. QFP is compelling for patients at all stages, and the complete effective rate is 92.09% and, an everyday dose is suggested, once toward the beginning of the day and in the evening (40 min after a supper), drink warm water, three dosages as a course [93].

The plan was affirmed in March 2020 by the Guide for the finding and treatment of pneumonia by COVID-19, from the National Health Commission (NHC) of the People's Republic of China, Additionally, the definition was suggested by the Korean rules since

it expands immunology and lessens irritation by focusing on the lung and spleen, which are the disease pathways of COVID-19. Be that as it may, the herb *Farfarae Flos* was taken out because of safety and toxicity issues [95].

## **XII. ADEQUACY AND ANTAGONISTIC RESPONSE IN THE ADMINISTRATION OF BIOACTIVE SUBSTANCES AGAINST COVID-19**

For the administration of bioactive substances, clinical studies are of vital importance and should be upheld by *in silico* and *in vitro* studies. Absolutely, the FDA has endorsed a wide scope of individual biomolecules that they consider protected, every one of them should have opportune clinical preliminaries to characterize their human utilization in the suitable doses, since even quercetin, which is a promising biomolecule against SARS-CoV-2 has a broad metabolism in blood plasma prompting low plasma concentrations and despite the fact that quercetin in a 10 mL nasal portion of ~ 76 µg has been suggested. The therapy with this biomolecule ought to be cautious on account of existing lung cancer [96].

On the other hand, there are several dynamic rules that have been tried in TCM. Glycyrrhizic acid (GA) is a biomolecule that has been appeared to have an impact *in silico*. Moreover, it has shown anti-inflammatory effects in humans and antiviral effects against SARS and has been proposed to be proposed against COVID-19. GA is viewed as a medication with a good economic and safety profile. Nonetheless, at a dose of 200 mg, it reaches at a greatest level in plasma of 80 µg/mL, which doesn't permit the ideal natural impact. To build its adequacy, primary changes have been thought of, yet may bring about more prominent cytotoxicity [89].

Another normal item that has been proposed for the treatment of COVID-19 is propolis, which is a natural item created by honey bees, formed principally by polyphenolic components. Preclinical investigations have shown that propolis advances the immunoregulation of favorable to inflammatory cytokines, including the decrease of IL-6, IL-1 beta and TNF-α, lessening the risk of cytokine storm disorder, a significant mortality factor in cutting edge COVID-19 [97].

The dosage relies upon the standardization, and normally the propolis may have differences because of the raw material, which relies upon the environment. In any case, there is a patent considered EPP-AF® that has reproducibility and the clinical information so far help doses of 375–500 mg of propolis/day [98,97].

Propolis has additionally been demonstrated to be a safe item, however there are still no reports of clinical trials on its treatment against COVID-19. Be that as it may, a clinical preliminary of Brazilian green propolis extricate (EPP-AF®) for the treatment of patients with COVID-19 was recently began in Brazil [97].

## **XIII. IN SILICO INVESTIGATIONS OF COMPOUND FROM NATURAL PRODUCTS AGAINST COVID-19**

In the requirement for fast reactions to battle the pandemic, numerous studies have been published *in silico*, and the examinations study biomolecules potential, for the most part polyphenolic intensifies disengaged from natural items, which can manage the improvement of new medications. Moreover, these molecular coupling studies have recognized biomolecules that repress natural elements for COVID-19 maturation and, for instance, the research for the inhibition of essential viral enzymes helicase, methyltransferase, RNA polymerase, RNA-subordinate RNA polymerase (RdRp), 3 cysteine protease-like chymotrypsin (3CLpro).

In *in silico* studies on Neoastilbin, a formulation of 14 regular items, just as Astilbin, comprised of 93 common items, have shown inhibit enzymes, for example, helicase, methyltransferase, RNA polymerase, and RNA-subordinate RNA polymerase (RdRp) in COVID-19 [99].

In this sense, most virtual screening studies search for various molecular targets, including the inhibition of the protein-changing over catalyst angiotensin-2 (ACE2), for instance, propolis has likewise been examined and seen *in silico* and its flavanones show inhibition mechanisms with high binding constants and high binding affinity to ACE2 and serine protease Transmembrane protease, serine 2 (TMPRSS-2). This component includes overexpression of Serine/threonine protein kinase (PAK1), which is a kinase that intervenes Covid initiated lung irritation, fibrosis, and immunity system suppression. Moreover, different mixtures present in propolis, for example, rutin, showed an amazing inhibitory potential, trailed by myricetin, phenethyl ester of caffeic acid, hesperetin and pinocembrin [100,97].

Another biomolecule, for example, limonin, quercetin, and kaempferol, normal mixtures in propolis, have been found to repress viral RNA-subordinate RNA polymerase (RdRp) and spike glycoprotein (SGp), and their impact is acting viral inhibitory potential in the segment that clings to the host cell with high binding energy to viral segments from – 9 to – 7.1 kcal/mol [97]. Propolis is a significant helpful alternative, protected, simple to oversee orally and promptly accessible as a characteristic enhancement and

useful food, and thought about GRAS (by and large perceived as protected) by the FDA; just as rutin usually found in food sources like tomatoes and furthermore some *in silico* contemplations show, for example, rutin, have preferable binding energy over the hydroxychloroquine and remdesivir drugs against COVID-19 [101,98]. In any case, albeit *in silico* considerations have recognized the most encouraging biomolecules against SARS-CoV-2, for example, rutin, most researchers reason that *in vitro* and *in vivo* studies are needed to check such antiviral impacts. Then again, numerous herbs, for example, the ones depicted in this audit are not dispersed worldwide and taking into account the direness for a powerful treatment, reciprocal treatments are required, and consequently, today numerous patients use it to complement western medication.

#### **XIV. DIAGNOSTICS AND SURVEILLANCE OF COVID-19**

Because of the high individual to-individual transmission rate of SARS-CoV-2, even from asymptomatic transporters, notwithstanding the complexity of the progression of the disease among suggestive people, the wellbeing area has been compelled to have nonstop indicative conventions that precisely distinguish new cases, with the expectation of setting up satisfactory moderation methodologies trying to hinder or decrease consistent spread. Moreover, early conclusion of viral disease after indications beginning, however before confusions, and opportune antiviral restorative intercession is seen as a basic determinant of the successful result of most medications tried to date [[56]. Then again, surveillance following the prevalence of the current and past SARS-CoV-2 infections through seroconversion is amazingly useful at directing general wellbeing strategy choices. What's more, seroconversion ID of active cases and recovering people through population-wide surveillance additionally gives important information to observing the achievement and restrictions of prospect prophylactic immunization base technique at decreasing susceptibility and transmission, just as assessment of promising antiviral medications with wide reach adequacy and disease progression. In like manner, finding of COVID-19 from upper respiratory track swabs has utilized old style molecular and serological methods, adjusted to identify special SARS-CoV-2 genomic arrangement fingerprints through real-time reverse transcriptase polymerase chain response (RT-PCR) amplification, just as the presence of unique surface exposed molecular distinctive antigens, individually. Early months of the pandemic, active case distinguishing proof and surveillance was performed by Lab-based atomic RT-PCR tests, utilizing a several sets of preliminaries from various arrangements of SARS-CoV-2, contingent upon the country of origin of the test [28]. One significant test for these tests was the ideal opportunity for results return; albeit right now monetarily accessible units, for example, COVID-19 Home Test Kit from Carbon Health or Roche Cepheid EXpert Xpress, offer outcomes as ahead of schedule as 3 h [102]. In the course of the most recent many years, biotechnological progresses in molecular science have made conceivable the advancement of fast tests, for example, loop mediated isothermal enhancement (LAMP), following an underlying RT amplification step. A promising commercial LAMP-based fast detection test, ID NOWTM COVID Test created by Abbot's Binaxx, got emergency use approval by the USA-FDA in July given its quick outcome returns of as ahead of schedule as 5 min for positive outcome and 13 for negative outcomes [103]. A new report by [102] showed that ID NOW test has comparable affectability and particularity of the outcomes as Lab-based RT-PCR tests however just for patients with high viral burden on bodily fluid examples; regardless, the creators contend that infection could in any case be communicated from undetected infected individuals. An elective methodology under investigation are Aptamers, a pool of oligonucleotides, or even small peptide particles, and first revealed in 1990 [104]. Aptamers can be adjusted and blended for various targets, including SARS-CoV-2, they are quick recognition strategies (results inside couple of moments), with no past planning step of tests [105]. Ongoing work is on course, for the advancement of a SARS-CoV-2 aptamer-based point of utilization rapid detection device. At last, Next-Generation Sequencing (NGS), Micro-array, and recently, an assortment of nanotechnology-based techniques is quickly being created, since nanomaterial-based strategies are demonstrated appropriate for fast discovery [106]. New generation of biosensors is in the pipeline. field-effect transistor (FET)- based biosensor, for quick identification of the SARS-CoV-2 infection, thinking about that RT-PCR, the essential technique for COVID-19 finding, takes in any event 3 h to execute, including viral RNA planning, step that can influence analytic precision. Among the benefits of FET-based biosensors, is the capacity to quantify limited quantities of analytes, with high affectability and immediate estimations.

Endeavors to grow high sensitivity and specificity antigen-detection tests incorporate the SARS-CoV-2 anti-S protein antibody response conjugated to a graphene sheet [63] as a detecting region, with no quantifiable cross-reactivity with antigens from MERS-CoV, effectively distinguishing the virus in clinical cases, segregating among patient and normal samples, with no sample preprocessing and high sensitivity. Distinctive Au NP-based nanomaterials are additionally possibility for dynamic case recognition; Au NPs and quantum spots (QDs) are viewed as key segments for the advancement of improved novel nanotechnology-based discovery frameworks [53]. Among these, is the chiral Au NP-quantum spot nanocomposites [107], consolidating viral lipid tails,

which demonstrates to advance wrap accumulation and break. Another procedure under examination are carbon cathodes adjusted with Au NP, utilizing a recombinant spike protein SI as a biomarker [108].

Seroconversion conclusion of active cases suffers from the low sensitivity (30%) detection of IgM and IgG antiviral antivirus present in generally individual < 7 days of symptoms beginning [109]. In any case, a similar report tracked down that 93.1% of COVID-19 patients showed the presence of discernible degree of neutralizing IgM and IgG antibodies 11 and 14 days after manifestations beginning, separately. In this way, despite the fact that identification of antiSARS-CoV-2 antibodies may not be important as a precise demonstrative tool for active cases, checking seroconversion has gotten pertinent for appraisal of disease progression and infection predominance observation among gaining strength people in a populace. Most serological tests are aimed at identifying heterologously communicated viral primary antigens, including nucleocapsid, framework protein, and essentially S-glycoprotein [22]. In any case, it is imperative to specify that epidemiological observation however seroconversion may be little the commonness of SARS-CoV-2 in the individuals, as a new report discovered extremely low steadiness of flowing antiviral antibodies at a perceivable focus following a very long time after virus exposure, particularly on people who didn't need hospitalization [110]. weather re-infection in recovering individual with low antiviral antibody concentration stays to be resolved.

## **XV. CONCLUSION**

Until now, prophylactic and therapeutic intervention on COVID-19 has had restricted achievement. Large numbers of the most encouraging referred to drugs repurposed as antiviral to treat SARS-CoV-2 disease were found to have restricted antiviral activity, and some created critical hazardous cardiovascular issues, which have brought about suspension of administration. Nucleoside-analogs that focus on the viral replication complex, specifically viral RdRpol, have all the earmarks of being the most encouraging other option, which in mix with the exploratory medication remdesivir show a decrease in hospitalization time and severity of side effects related to COVID-19 disease. biological compounds, like plasma from recovering patients, containing neutralizing antibodies which can block viral passage to cells of susceptible patients, show a decrease in mortality even among severe cases, in spite of the fact that viability is still to be resolved given the absence of randomized clinical preliminaries. This promising impact of improving plasma has been empowering, as they could anticipate the adequacy of immunizations being planned against COVID-19, particularly in those stages that can get dependable humoral reactions, particularly antibodies coordinated against the RBD site of SARS-CoV-2 S-protein, in everyone. vaccines have shown higher than 90% viability and next to no results among vaccinated people. These promising outcomes have conceded crisis use approval by the FDA of the Pfizer and BioNTech mRNA immunization. Be that as it may, prerequisite of the freezing transportation and capacity of this antibodies takes steps to restrict organization in nations lacking required framework. Hence, elective stages, for example, those dependent on adenovirus are presently under audit for use in circumstances where mRNA antibodies are unrealistic or contraindicated. Despite the achievement of these current intercessions, it is critical to keep up observation of viral hereditary changes that could adjust the serotype, just as medication focused on viral chemicals, prompting safe new strains. Likewise, a portion of the difficulties of this pandemic are the right and opportune conclusion of the infection. Analysis of seroconversion that has been viewed as significant for dynamic in relief methodologies, in any case, it has been demonstrated that they can be little the pervasiveness, then again, biotechnological propels have made it conceivable to confront these difficulties with the generation of molecular techniques, much offer Home Test with quick and profoundly touchy outcomes. In such manner, it will be imperative to proceed with examination on likely use of natural products, particularly those with few effects that could hinder essential viral replication cycles and proteins, that could prompt the plan and advancement of new classes of antiviral drugs.

## **CONFLICT OF INTEREST**

All authors declare no conflicts of interest.

## **AUTHORS CONTRIBUTION**

Authors have equally participated and shared every item of the work.

## **REFERENCES**

- [1] Shi, Yu, et al. "An overview of COVID-19." *Journal of Zhejiang University. Science. B* (2020): 1.
- [2] Zhu, Na, et al. "A novel coronavirus from patients with pneumonia in China, 2019." *New England journal of medicine* (2020).

- [3] Mahase, Elisabeth. "Coronavirus: covid-19 has killed more people than SARS and MERS combined, despite lower case fatality rate." (2020).
- [4] Chien, Lung-Chang, and Lung-Wen Chen. "Meteorological impacts on the incidence of COVID-19 in the US." *Stochastic Environmental Research and Risk Assessment* 34.10 (2020): 1675-1680.
- [5] Connors, Jean M., and Jerrold H. Levy. "COVID-19 and its implications for thrombosis and anticoagulation." *Blood, The Journal of the American Society of Hematology* 135.23 (2020): 2033-2040.
- [6] Gupta, Aakriti, et al. "Extrapulmonary manifestations of COVID-19." *Nature medicine* 26.7 (2020): 1017-1032.
- [7] Liu, Bingwen, et al. "Can we use interleukin-6 (IL-6) blockade for coronavirus disease 2019 (COVID-19)-induced cytokine release syndrome (CRS)?" *Journal of autoimmunity* (2020): 102452.
- [8] Marietta, Marco, et al. "COVID-19 and haemostasis: a position paper from Italian Society on Thrombosis and Haemostasis (SISSET)." *Blood Transfusion* 18.3 (2020): 167.
- [9] Pelaia, Corrado, et al. "Lung under attack by COVID-19-induced cytokine storm: pathogenic mechanisms and therapeutic implications." *Therapeutic advances in respiratory disease* 14 (2020): 1753466620933508.
- [10] Saha, Abinit, et al. "Tocilizumab: a therapeutic option for the treatment of cytokine storm syndrome in COVID-19." *Archives of medical research* 51.6 (2020): 595-597.
- [11] Lan, Jun, et al. "Structure of the SARS-CoV-2 spike receptor-binding domain bound to the ACE2 receptor." *Nature* 581.7807 (2020): 215-220.
- [12] Lobo-Galo, Naún, et al. "FDA-approved thiol-reacting drugs that potentially bind into the SARS-CoV-2 main protease, essential for viral replication." *Journal of Biomolecular Structure and Dynamics* (2020): 1-9.
- [13] Tu, Yung-Fang, et al. "A review of SARS-CoV-2 and the ongoing clinical trials." *International journal of molecular sciences* 21.7 (2020): 2657.
- [14] Tu, Yung-Fang, et al. "A review of SARS-CoV-2 and the ongoing clinical trials." *International journal of molecular sciences* 21.7 (2020): 2657.
- [15] Wang, Yanqun, et al. "Kinetics of viral load and antibody response in relation to COVID-19 severity." *The Journal of clinical investigation* 130.10 (2020).
- [16] Dai, Wenhao, et al. "Structure-based design of antiviral drug candidates targeting the SARS-CoV-2 main protease." *Science* 368.6497 (2020): 1331-1335.
- [17] Jin, Yuefei, et al. "Virology, epidemiology, pathogenesis, and control of COVID-19." *Viruses* 12.4 (2020): 372.
- [18] Hillen, Hauke S., et al. "Structure of replicating SARS-CoV-2 polymerase." *Nature* 584.7819 (2020): 154-156.
- [19] Agostini, Maria L., et al. "Coronavirus susceptibility to the antiviral remdesivir (GS-5734) is mediated by the viral polymerase and the proofreading exonuclease." *MBio* 9.2 (2018).
- [20] Angelini, Megan M., et al. "Severe acute respiratory syndrome coronavirus nonstructural proteins 3, 4, and 6 induce double-membrane vesicles." *MBio* 4.4 (2013).
- [21] Liu, Kui, et al. "Clinical characteristics of novel coronavirus cases in tertiary hospitals in Hubei Province." *Chin*
- [22] Wang, Manli, et al. "Remdesivir and chloroquine effectively inhibit the recently emerged novel coronavirus (2019-nCoV) in vitro." *Cell research* 30.3 (2020): 269-271.
- [23] Ziegler, Carly GK, et al. "SARS-CoV-2 receptor ACE2 is an interferon-stimulated gene in human airway epithelial cells and is detected in specific cell subsets across tissues." *Cell* 181.5 (2020): 1016-1035.
- [24] Gupta, Suchi, et al. "Mesenchymal stem cell derived exosomes: a nano platform for therapeutics and drug delivery in combating COVID-19." *Stem cell reviews and reports* (2020): 1-11.

- [25] Sun, Xinjuan, et al. "Cytokine storm intervention in the early stages of COVID-19 pneumonia." *Cytokine & growth factor reviews* 53 (2020): 38-42.
- [26] Habib, Heba. "Has Sweden's controversial covid-19 strategy been successful?." *bmj* 369 (2020).
- [27] Corey, Lawrence, et al. "A strategic approach to COVID-19 vaccine R&D." *Science* 368.6494 (2020): 948-950.
- [28] Sullivan, Patrick Sean, et al. "Detection of SARS-CoV-2 RNA and antibodies in diverse samples: protocol to validate the sufficiency of provider-observed, home-collected blood, saliva, and oropharyngeal samples." *JMIR public health and surveillance* 6.2 (2020): e19054.
- [29] Shereen, Muhammad Adnan, et al. "COVID-19 infection: Origin, transmission, and characteristics of human coronaviruses." *Journal of advanced research* 24 (2020): 91-98.
- [30] Zhang, Naru, et al. "Current development of COVID-19 diagnostics, vaccines and therapeutics." *Microbes and infection* 22.6-7 (2020): 231-235.
- [31] Wu, Suh-Chin. "Progress and concept for COVID-19 vaccine development." *Biotechnology journal* (2020).
- [32] Robson, Barry. "Computers and viral diseases. Preliminary bioinformatics studies on the design of a synthetic vaccine and a preventative peptidomimetic antagonist against the SARS-CoV-2 (2019-nCoV, COVID-19) coronavirus." *Computers in biology and medicine* 119 (2020): 103670.
- [33] Yuan, Kehu, et al. "Suppression of SARS-CoV entry by peptides corresponding to heptad regions on spike glycoprotein." *Biochemical and biophysical research communications* 319.3 (2004): 746-752.
- [34] Mahase, Elisabeth. "Covid-19: What do we know so far about a vaccine?" (2020).
- [35] Prompetchara, Eakachai, Chutitorn Ketloy, and Tanapat Palaga. "Immune responses in COVID-19 and potential vaccines: Lessons learned from SARS and MERS epidemic." *Asian Pac J Allergy Immunol* 38.1 (2020): 1-9.
- [36] Cohen, Jon. "Vaccine designers take first shots at COVID-19." (2020): 14-16.
- [37] Liu, Cynthia, et al. "Research and development on therapeutic agents and vaccines for COVID-19 and related human coronavirus diseases." (2020): 315-331.
- [38] Hegarty, Paul K., et al. "BCG vaccination may be protective against Covid-19." preprint (2020).
- [39] Miller, Aaron, et al. "Correlation between universal BCG vaccination policy and reduced mortality for COVID-19." *MedRxiv* (2020).
- [40] Raw, Isaias. "Developing Countries Can Innovate and Produce Vaccines: The Case of Butantan in Brazil." *Vaccines-the History and Future*. IntechOpen, 2019.
- [41] Folegatti, Pedro M., et al. "Safety and immunogenicity of the ChAdOx1 nCoV-19 vaccine against SARS-CoV-2: a preliminary report of a phase 1/2, single-blind, randomised controlled trial." *The Lancet* 396.10249 (2020): 467-478.
- [42] Shin, Matthew D., et al. "COVID-19 vaccine development and a potential nanomaterial path forward." *Nature nanotechnology* 15.8 (2020): 646-655.
- [43] Zhou, Yadi, et al. "Artificial intelligence in COVID-19 drug repurposing." *The Lancet Digital Health* (2020).
- [44] Bloch, Evan M., et al. "Deployment of convalescent plasma for the prevention and treatment of COVID-19." *The Journal of clinical investigation* 130.6 (2020): 2757-2765.
- [45] Casadevall, Arturo, and Liise-anne Pirofski. "The convalescent sera option for containing COVID-19." *The Journal of clinical investigation* 130.4 (2020): 1545-1548.
- [46][47]- Cyranoski, David. "WHY EMERGENCY COVID VACCINE APPROVALS COULD POSE A DILEMMA." (2020): 18-19.
- [47] Mullard, Asher. "COVID-19 vaccines buoy hope." *Nat Rev Drug Discov*. <https://doi.org/10.1038/d4157> (2020): 3-020.



- [48] Weiss, Carsten, et al. "Toward nanotechnology-enabled approaches against the COVID-19 pandemic." *ACS nano* 14.6 (2020): 6383-6406.
- [49] Sportelli, Maria Chiara, et al. "Can nanotechnology and materials science help the fight against SARS-CoV-2?" *Nanomaterials* 10.4 (2020): 802.
- [50] Erasmus, Jesse H., et al. "An Alphavirus-derived replicon RNA vaccine induces SARS-CoV-2 neutralizing antibody and T cell responses in mice and nonhuman primates." *Science translational medicine* 12.555 (2020).
- [51] Staroverov, S. A., et al. "Immunostimulatory effect of gold nanoparticles conjugated with transmissible gastroenteritis virus." *Bulletin of experimental biology and medicine* 151.4 (2011): 436.
- [52] Nasrollahzadeh, Mahmoud, et al. "Nanomaterials and nanotechnology-associated innovations against viral infections with a focus on coronaviruses." *Nanomaterials* 10.6 (2020): 1072.
- [53] Chauhan, Gaurav, et al. "Nanotechnology for COVID-19: therapeutics and vaccine research." *ACS nano* 14.7 (2020): 7760-7782.
- [54] Gupta, Suchi, et al. "Mesenchymal stem cell derived exosomes: a nano platform for therapeutics and drug delivery in combating COVID-19." *Stem cell reviews and reports* (2020): 1-11.
- [55] Joyner, Michael J., et al. "Effect of convalescent plasma on mortality among hospitalized patients with COVID-19: initial three-month experience." *MedRxiv* (2020).
- [56] Huo, Jiangdong, et al. "Neutralizing nanobodies bind SARS-CoV-2 spike RBD and block interaction with ACE2." *Nature structural & molecular biology* 27.9 (2020): 846-854.
- [57] Schoof, Michael, et al. "An ultra-high affinity synthetic nanobody blocks SARS-CoV-2 infection by locking Spike into an inactive conformation." *bioRxiv* (2020).
- [58] Zhang, Qiangzhe, et al. "Cellular nanosponges inhibit SARS-CoV-2 infectivity." *Nano letters* 20.7 (2020): 5570-5574.
- [59] Van Doremalen, Neeltje, et al. "Aerosol and surface stability of SARS-CoV-2 as compared with SARS-CoV-1." *New England journal of medicine* 382.16 (2020): 1564-1567.
- [60] Leung, Wallace Woon-Fong, and Yuen Ting Chau. "Experiments on filtering nano-aerosols from vehicular and atmospheric pollutants under dominant diffusion using nanofiber filter." *Separation and Purification Technology* 213 (2019): 186-198.
- [61] Leung, Wallace Woon-Fong, and Qiangqiang Sun. "Charged PVDF multilayer nanofiber filter in filtering simulated airborne novel coronavirus (COVID-19) using ambient nano-aerosols." *Separation and purification technology* 245 (2020): 116887.
- [62] Palmieri, V., and M. J. N. T. Papi. "Can graphene take part in the fight against COVID-19?" *Nano Today* 33 (2020): 100883.
- [63] Ceylan, Zafer, Raciye Meral, and Turgay Cetinkaya. "Relevance of SARS-CoV-2 in food safety and food hygiene: potential preventive measures, suggestions and nanotechnological approaches." *VirusDisease* 31.2 (2020): 154-160.
- [64] Rosa, Sandro G. Viveiros, and Wilson C. Santos. "Clinical trials on drug repositioning for COVID-19 treatment." *Revista Panamericana de Salud Pública* 44 (2020): e40.
- [65] Riva, Laura, et al. "A large-scale drug repositioning survey for SARS-CoV-2 antivirals." *BioRxiv* (2020).
- [66] Sheahan, Timothy P., et al. "An orally bioavailable broad-spectrum antiviral inhibits SARS-CoV-2 in human airway epithelial cell cultures and multiple coronaviruses in mice." *Science translational medicine* 12.541 (2020).
- [67] Weston, Stuart, et al. "FDA approved drugs with broad anti-coronaviral activity inhibit SARS-CoV-2 in vitro." *BioRxiv* (2020).
- [68] DeVito, Nicholas J., Seb Bacon, and Ben Goldacre. "Compliance with legal requirement to report clinical trial results on ClinicalTrials.gov: a cohort study." *The Lancet* 395.10221 (2020): 361-369.

- [69] Cai, Qingxian, et al. "Experimental treatment with favipiravir for COVID-19: an open-label control study." *Engineering* 6.10 (2020): 1192-1198.
- [70] Hung, Ivan Fan-Ngai, et al. "Triple combination of interferon beta-1b, lopinavir–ritonavir, and ribavirin in the treatment of patients admitted to hospital with COVID-19: an open-label, randomised, phase 2 trial." *The Lancet* 395.10238 (2020): 1695-1704.
- [71] Doi, Yohei, et al. "A prospective, randomized, open-label trial of early versus late favipiravir therapy in hospitalized patients with COVID-19." *Antimicrobial agents and chemotherapy* 64.12 (2020).
- [72] de Salud Pública, Subsecretaría. "Orientaciones para Atención Odontológica en Fase IV COVID-19." Santiago de Chile, Subsecretaría de Salud Pública, Ministerio de Salud, Gobierno de Chile (2020).
- [73] Gordon, David E., et al. "A SARS-CoV-2 protein interaction map reveals targets for drug repurposing." *Nature* 583.7816 (2020): 459-468.
- [74] Alia, Erisa, and Jane M. Grant-Kels. "Does hydroxychloroquine combat COVID-19? A timeline of evidence." *Journal of the American Academy of Dermatology* 83.1 (2020): e33-e34.
- [75] Gupta, Anunay, and Amit Malviya. "Chloroquine and hydroxychloroquine for COVID-19: time to close the chapter." *Postgraduate Medical Journal* (2020).
- [76] Hoffmann, Markus, et al. "Chloroquine does not inhibit infection of human lung cells with SARS-CoV-2." *Nature* 585.7826 (2020): 588-590.
- [77] Ahmed, Mohamed. "Natural compounds from Djiboutian medicinal plants as inhibitors of COVID-19 by in silico investigations." (2020).
- [78] Shannon, Ashleigh, et al. "Remdesivir and SARS-CoV-2: Structural requirements at both nsp12 RdRp and nsp14 Exonuclease active-sites." *Antiviral research* 178 (2020): 104793.
- [79] Orf, Katharine, et al. "Remdesivir during induction chemotherapy for newly diagnosed pediatric acute lymphoblastic leukaemia with concomitant SARS-CoV-2 infection." *British journal of hematology* 190.5 (2020): e274-e276.
- [80] WHO Solidarity Trial Consortium. "Repurposed antiviral drugs for COVID-19—interim WHO SOLIDARITY trial results." *New England Journal of Medicine* 384.6 (2021): 497-511.
- [81] Villar, Jesús, et al. "Dexamethasone treatment for the acute respiratory distress syndrome: a multicenter, randomised controlled trial." *The Lancet Respiratory Medicine* 8.3 (2020): 267-276.
- [82] McMichael, Temet M., et al. "COVID-19 in a long-term care facility—King County, Washington, February 27–March 9, 2020." *Morbidity and Mortality Weekly Report* 69.12 (2020): 339.
- [83] Sterne, Jonathan AC, et al. "Association between administration of systemic corticosteroids and mortality among critically ill patients with COVID-19: a meta-analysis." *Jama* 324.13 (2020): 1330-1341.
- [84] Hassan, Sherif TS. "Shedding light on the effect of natural anti-herpesvirus alkaloids on SARS-CoV-2: a treatment option for COVID-19." (2020): 476.
- [85] Ang, Lin, et al. "Herbal medicine and pattern identification for treating COVID-19: a rapid review of guidelines." *Integrative medicine research* 9.2 (2020): 100407.
- [86] Newman, David J., and Gordon M. Cragg. "Natural products as sources of new drugs from 1981 to 2014." *Journal of natural products* 79.3 (2016): 629-661.
- [87] Ang, Lin, et al. "Herbal medicine and pattern identification for treating COVID-19: a rapid review of guidelines." *Integrative medicine research* 9.2 (2020): 100407.
- [88] Bailly, Christian, and Gérard Vergoten. "Glycyrrhizin: An alternative drug for the treatment of COVID-19 infection and the associated respiratory syndrome?" *Pharmacology & Therapeutics* (2020): 107618.

- [89] Lobo-Galo, Naun, et al. "Recent biotechnological advances as potential intervention strategies against COVID-19." *3 Biotech* 11.2 (2021): 1-21.
- [90] Luo, Erdan, et al. "Treatment efficacy analysis of traditional Chinese medicine for novel coronavirus pneumonia (COVID-19): an empirical study from Wuhan, Hubei Province, China." *Chinese medicine* 15 (2020): 1-13.
- [91] Zhong, Linda Li Dan, et al. "Potential targets for treatment of coronavirus disease 2019 (COVID-19): a review of Qing-Fei-Pai-du-tang and its major herbs." *The American Journal of Chinese Medicine* 48.05 (2020): 1051-1071.
- [92] Pan, Xiaoqi, et al. "Potential drugs for the treatment of the novel coronavirus pneumonia (COVID-19) in China." *Virus research* (2020): 198057.
- [93] Yang, Ruocong, et al. "Chemical composition and pharmacological mechanism of Qingfei Paidu Decoction and Ma Xing Shi Gan Decoction against Coronavirus Disease 2019 (COVID-19): in silico and experimental study." *Pharmacological research* 157 (2020): 104820.
- [94] Ang, Lin, et al. "Herbal medicine and pattern identification for treating COVID-19: a rapid review of guidelines." *Integrative medicine research* 9.2 (2020): 100407.
- [95] Williamson, Gary, and Asimina Kerimi. "Testing of natural products in clinical trials targeting the SARS-CoV-2 (Covid-19) viral spike protein-angiotensin converting enzyme-2 (ACE2) interaction." *Biochemical pharmacology* (2020): 114123.
- [96] Berretta, Andresa Aparecida, et al. "Propolis and its potential against SARS-CoV-2 infection mechanisms and COVID-19 disease." *Biomedicine & Pharmacotherapy* (2020): 110622.
- [97] Sivaraman, Dhanasekaran, and Puspharaj selvadoss Pradeep. "Revealing anti-viral potential of Bio-active therapeutics targeting SARS-CoV2-polymerase (RdRp) in combating COVID-19: Molecular Investigation on Indian traditional medicines." (2020).
- [98] Naik, Biswajit, et al. "High throughput virtual screening reveals SARS-CoV-2 multi-target binding natural compounds to lead instant therapy for COVID-19 treatment." *International Journal of Biological Macromolecules* 160 (2020): 1-17.
- [99][100]- Güler, Halil Ibrahim, et al. "Investigation of potential inhibitor properties of ethanolic propolis extracts against ACE-II receptors for COVID-19 treatment by Molecular Docking Study." *ScienceOpen Preprints* (2020).
- [100] Adem, Sevki, et al. "Identification of potent COVID-19 main protease (Mpro) inhibitors from natural polyphenols: an in-silico strategy unveils a hope against CORONA." (2020).
- [101] Hogan, Catherine A., et al. "Comparison of the Accula SARS-CoV-2 test with a laboratory-developed assay for detection of SARS-CoV-2 RNA in clinical nasopharyngeal specimens." *Journal of clinical microbiology* 58.8 (2020).
- [102] Teoh, T. K., et al. "Outcomes of point-of-care testing for influenza in the emergency department of a tertiary referral hospital in Ireland." *Journal of Hospital Infection* 110 (2021): 45-51.
- [103] O'Sullivan, Ciara K. "Aptasensors—the future of biosensing?" *Analytical and bioanalytical chemistry* 372.1 (2002): 44-48.
- [104] Kumar, Ramesh, et al. "COVID-19 diagnostic approaches: different roads to the same destination." *Virusdisease* 31.2 (2020): 97-105.
- [105] Rabiee, Navid, et al. "Point-of-use rapid detection of sars-cov-2: nanotechnology-enabled solutions for the COVID-19 pandemic." *International journal of molecular sciences* 21.14 (2020): 5126.
- [106] Ahmed, Syed Rahin, Éva Nagy, and Suresh Neethirajan. "Self-assembled star-shaped chiroplasmonic gold nanoparticles for an ultrasensitive chiro-immunosensor for viruses." *RSC advances* 7.65 (2017): 40849-40857.
- [107] Layqah, Laila Ali, and Shima Eissa. "An electrochemical immunosensor for the corona virus associated with the Middle East respiratory syndrome using an array of gold nanoparticle-modified carbon electrodes." *Microchimica Acta* 186.4 (2019): 1-10.

- [108] Zhao, Rongqing, et al. "Early detection of SARS-CoV-2 antibodies in COVID-19 patients as a serologic marker of infection." *Clinical Infectious Diseases* (2020).
- [109] Bruni, Margherita, et al. "Persistence of anti-SARS-CoV-2 antibodies in non-hospitalized COVID-19 convalescent health care workers." *Journal of clinical medicine* 9.10 (2020): 3188.

# *Résilience Des Populations Aux Risques D'inondation Dans La Commune De Dangbo*

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**Résumé** – Cette recherche vise à contribuer à une meilleure connaissance des stratégies de résilience des populations aux risques d'inondation dans la Commune de Dangbo. L'objectif de cette recherche est d'analyser la résilience des populations au risque d'inondation dans la commune de Dangbo. Pour mener cette recherche, les investigations ont été faites à partir de la recherche documentaire, des observations sur le terrain, des entretiens avec les personnes ressources, ensuite le traitement des données quantitatives et qualitatives.

Des différentes investigations il ressort que les inondations sont dues au débordement du fleuve Ouémé en crue (56 % des ménages enquêtés) aux fortes pluies (23 % des ménages enquêtés), aux changements climatiques (12 % des ménages enquêtés) et à l'occupation du sol (9 % des ménages enquêtés). De même, les inondations sont récurrentes dans la Commune de Dangbo sous l'effet conjugué des facteurs naturels (Hydrologie, Hydrographie et Géologie) et anthropiques (mode occupation, Hygiène et assainissement). Les différents impacts des inondations sur les personnes et leur milieu de vie, les moyens de subsistance, le système éducatif et la santé ont des conséquences importantes sur la Commune de Dangbo. Pour lutter contre l'inondation, les populations développent des stratégies endogènes d'adaptation.

**Mots clés** – Commune de Dangbo, résilience, risques d'inondation

**Abstract** – This study contributed to a better understanding of population resilience strategies at the risk of flooding in the commune of Dangbo.

To conduct this study, investigations were made from documentary research, field observations, interviews with resource persons, and then the processing of quantitative and qualitative data.

Of the various investigations it appears that the floods are due to the overflow of the river Ouémé in flood (56% of the households surveyed) to heavy rains (23% of the households surveyed), to climate change (12% of the households surveyed) and to the occupation of the soil (9% of households surveyed). Similarly, the floods are recurrent in the commune of Dangbo under the combined effect of natural factors (hydrology, hydrography and geology) and anthropogenic (mode of occupation, hygiene and sanitation). The different impacts of flooding on people and their living environment, the means of surviving

**Keywords** – Dangbo commune, resilience, flood risk

## I. INTRODUCTION

Les catastrophes naturelles dont principalement les inondations sont des catastrophes naturelles qui causent des pertes en vies humaines et des dommages matériels importants dans le monde (G. White, 1975 ; S. Brüscheiler, 2003). Les crues du Rhône de septembre 2002 et décembre 2003, ont montré une fois encore l'importance du montant des dommages causés aux entreprises et

aux particuliers. Ce coût est d'environ 3 milliards d'euros (Verbiest, 2005). A la fin du 20<sup>e</sup> siècle, l'ampleur des problèmes environnementaux a montré que si rien n'est fait pour conserver la nature et améliorer l'environnement, l'humanité entière court à la catastrophe (PANA, 2006). L'Afrique de l'Ouest est la région qui subit une fluctuation pluviométrique régionale très marquée depuis les années 1970 (G. Beltrando, 2004). En Afrique de l'Ouest, nombre de risque naturel constituent des menaces de catastrophes. Ces catastrophes compromettent l'atteinte des Objectifs du Millénaire pour le Développement (OMD) et ralentissent la marche vers un développement durable. La vulnérabilité aux inondations s'est accrue en Afrique de l'Ouest. Cette vulnérabilité est liée à l'exposition, la sensibilité et la capacité d'adaptation (GIEC, 2007). Les multiples conséquences de ces inondations ne laissent indifférents ni chercheurs ni acteurs au développement (E. Oguwalé et M. Boko, 2005).

Plusieurs régions du monde sont touchées avec des dommages considérables (S. Brüscheweiler, 2003). Les inondations et les sécheresses proviennent en général des événements climatiques extrêmes (OMM, 2011). Selon le GIEC (2007), les projections indiquent que vers l'an 2020, 75 à 250 millions de personnes seront exposées à un stress hydrique accru en raison des changements climatiques. En effet, la forte fréquence des événements pluviométriques extrêmes de ces trois dernières décennies en Afrique de l'Ouest influe le fonctionnement hydrologique des cours d'eau et limite la mise en valeur efficiente de leurs potentialités pour l'agriculture (OMM, 2006).

Les inondations s'imposent comme l'une des catastrophes naturelles récurrentes en Afrique de l'Ouest (A. Sall (1997) cité par H. Allagbé, 2005) qui est l'une des régions du monde les plus vulnérables aux inondations (LACEEDE, 2010). En effet, le diagnostic fait sur les effets du changement climatique au Bénin, montre que la sécheresse, les pluies tardives et violentes et les inondations sont les trois risques climatiques majeurs (D. Agossou *et al.*, 2012). Les risques hydro-climatiques constituent une préoccupation majeure en matière d'aménagement et de gestion du territoire (Kodja, 2013). Ils affectent les systèmes de production de richesses locales. Les impacts sont souvent désastreux face aux extrêmes climatiques surtout au cours des trente dernières années (H.D. Koumassi, 2014).

Le Bénin connaît depuis quelques années des inondations récurrentes de plus en plus importantes et de moins en moins gérables (E. Oguwalé, 2006). Ces inondations sont la conséquence d'une mauvaise ou absence de politique cohérente d'aménagement du territoire et d'une méconnaissance probable du phénomène des inondations (C. Okou, 1989). Au Bénin, les inondations sont des phénomènes récurrents et atteignent un niveau préoccupant notamment dans les centres urbains. Le caractère hydromorphe et marécageux des sols, la position géographique et les actions anthropiques augmentent le degré de vulnérabilité aux risques surtout dans certaines communes comme celle de Dangbo (N. Kouhoundji, 2010).

La dernière grande inondation au Bénin est survenue en 2010. Elle fut la plus grave de cette décennie. Le pays avait alors été frappé par des inondations d'une rare ampleur touchant 55 communes dont 21 sévèrement. Lors de l'inondation, les cultures étaient pour la plupart à l'étape de la floraison. L'eau est restée près de trois semaines dans les champs. La plupart des personnes affectées étaient des petits exploitants agricoles, des pêcheurs vivant en milieu rural et des familles à faible revenu des zones urbaines et périurbaines (Kodja, 2011 et PAM, 2014).

La Commune de Dangbo, faisant partie intégrante de la basse vallée de l'Ouémé, elle subit des inondations dues aux effets conjugués des événements pluviométriques et hydrométriques extrêmes, qui se traduisent par une baisse des rendements agricoles, des dégâts importants au niveau des infrastructures, des habitations, des services de santé et parfois des pertes en vies humaines. Pour faire face à ces problèmes, les populations de la Commune de Dangbo développent un certain nombre de stratégies d'adaptation. Face à cette situation quelles sont les stratégies mises en place par les populations et les autorités pour résister aux risques d'inondations dans la Commune de Dangbo ?

## II. MATÉRIELS ET MÉTHODES

Portant sur résilience des populations aux risques d'inondation dans la commune de Dangbo, cette recherche est de nature mixte. La recherche vise non seulement à avoir une idée globale et donc chiffrée des informations à recueillir, ce qui implique la production de statistiques, et subséquent l'usage de la démarche quantitative ; mais aussi de comprendre en profondeur la problématique investiguée, ce qui nécessite d'en avoir une vue désagrégée et moins condensée, un objectif à réaliser suivant une démarche qualitative. Les données empiriques sont collectées précisément dans la commune de Dangbo. Pour mieux conduire cette recherche, l'option de deux techniques d'échantillonnage est faite. Il s'agit des techniques d'échantillonnage probabiliste et non probabiliste. Spécifiquement dans le cadre de cette étude, les techniques d'échantillonnage dites volontaire et accidentelle ont été appliquées aux ménages et aux chefs traditionnels et la technique dite aléatoire simple est appliquée aux responsables des agents de la Maire de



✓ la vallée basse "WODJI" située le long du fleuve Ouémé complètement inondée pendant les hautes eaux ou crues allant de Juillet à Octobre.

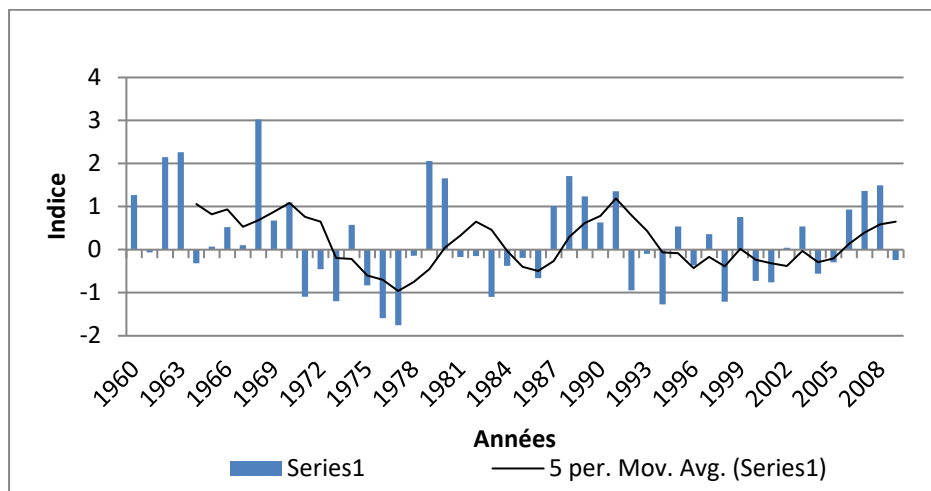
Dès la décrue, des terres fertilisées du fait du dépôt d'alluvions sont progressivement libérées, favorisant ainsi la production de toutes sortes de cultures vivrières de décrue. Ces sols couvrent la majeure partie de la commune de Dangbo ;

✓ le plateau "Aguédji" qui permet de percevoir à plusieurs endroits une vue pittoresque d'aplomb sur toute la vallée basse et ses alentours, offrant ainsi une immense richesse touristique.

Une végétation luxuriante observée en toute saison.

### ▪ Climat

La commune de Dangbo, fait partie d'un ensemble qui jouit d'un climat Subéquatorial humide de type Guinéen (Adam et Boko, 1993). La figure 1 présente indice pluviométrique et la variation interannuelle de 1960 à 2011 à Dangbo.



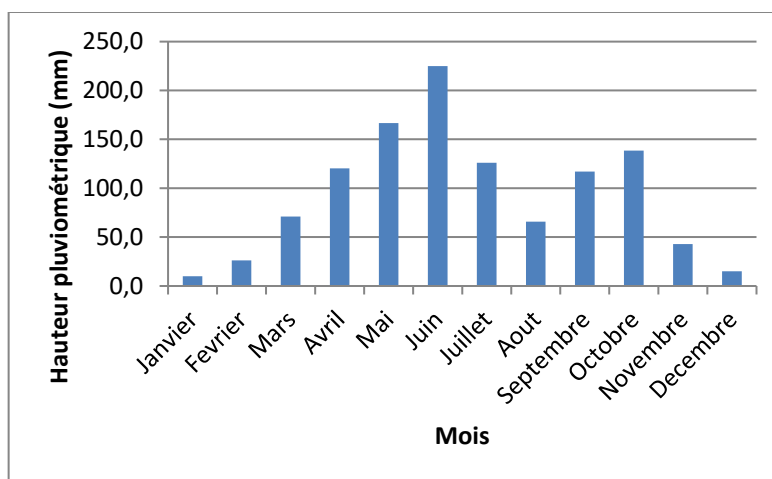
**Figure 1 :** Évolution interannuelles des hauteurs de pluies de 1960 à 2011  
**Source :** ASECNA, 2018, données de terrain, 2020.

Il ressort de l'analyse de la figure 2 qu'au cours de la période d'étude, des années excédentaires (1968, 1970, 1979, 1980, 1987, 1988, 1989, 1991, 2000, 2007, 2008, 2010) et des années déficitaires (1971, 1973, 1975, 1976, 1977, 1983, 1986, 1992, 1994, 1999, 2001, 2002, 2005) de part et d'autre de la normale se dégagent. L'écart-type calculé est de 265 mm de précipitations. Ce qui veut dire que les précipitations annuelles enregistrées à Dangbo de la période de 1965 à 2010 sont de 265 mm en moins ou en plus de la moyenne annuelle. Ainsi donc, les précipitations annuelles se trouvant dans cet intervalle (1965, 1966, 1967, 1969, 1972, 1974, 1978, 1981, 1982, 1984, 1985, 1990, 1993, 1995, 1996, 1997, 1998, 2003, 2004, 2006, 2009) n'ont pas assez d'influences sur les cycles cultureux. Au total, douze années sont perçues comme des années excédentaires, vingt et un sont moyennement arrosées et treize sont les plus sèches.

Ce phénomène est source des différents types de risques inondation qui mine le développement des activités économiques dans la Commune de Dangbo.

Ce type de climat est caractérisé par quatre (04) saisons plus ou moins marquées avec deux (02) saisons de pluie et deux (02) saisons sèches comme l'indique la figure 2.





**Figure 2** : Régime pluviométrique moyen mensuel à Dangbo de 1960 à 2011  
 Source : ASECNA, 2018, données de terrain, 2020

La figure 2 présente les hauteurs de pluies qui indiquent que les mois de décembre, de janvier et de février sont les moins arrosés du secteur d'étude (15,10 mm en moyenne). Ils sont suivis du mois de novembre, mars et avril (78,56 mm en moyenne) et août, octobre, et mai (136,62 mm en moyenne). Les mois de septembre, de juin et de juillet sont les mois les plus arrosés de l'année (159,27).

Après analyse, il ressort que durant la période de 1960 à 2011, le secteur d'étude a un régime pluviométrique bimodal avec les pics centrés sur juillet d'une part et sur septembre d'autre part. Quatre (4) différentes saisons y sont distinguées :

- une grande saison sèche de mi-octobre à mi-mars ;
- une grande saison des pluies de mi-mars à mi-juillet ;
- une petite saison sèche de mi-juillet à mi-août ;
- une petite saison des pluies de mi-août à mi-octobre

Ceci se traduit par le fait que plus il pleut dans la commune plus les cours d'eau débordent dans la commune.

▪ **Sol, végétation et faune**

Le territoire de la commune de Dangbo est caractérisé par deux (02) types de sols :

- ✓ des sols ferrallitiques, argileux-sableux fortement dégradés mais faciles à travailler, profonds avec une faible capacité de rétention et une nappe phréatique profonde ;
- ✓ des sols alluviaux et colluviaux, hydromorphes, fertiles mais inondables par les crues des fleuves, sableux et peu fertiles essentiellement aptes au cocotier et au filao. Ils sont encore appelés des vertisols et sont très propices à la production maraîchère.

La figure 3 présente l'occupation de sol dans la Commune de Dangbo en 2017.

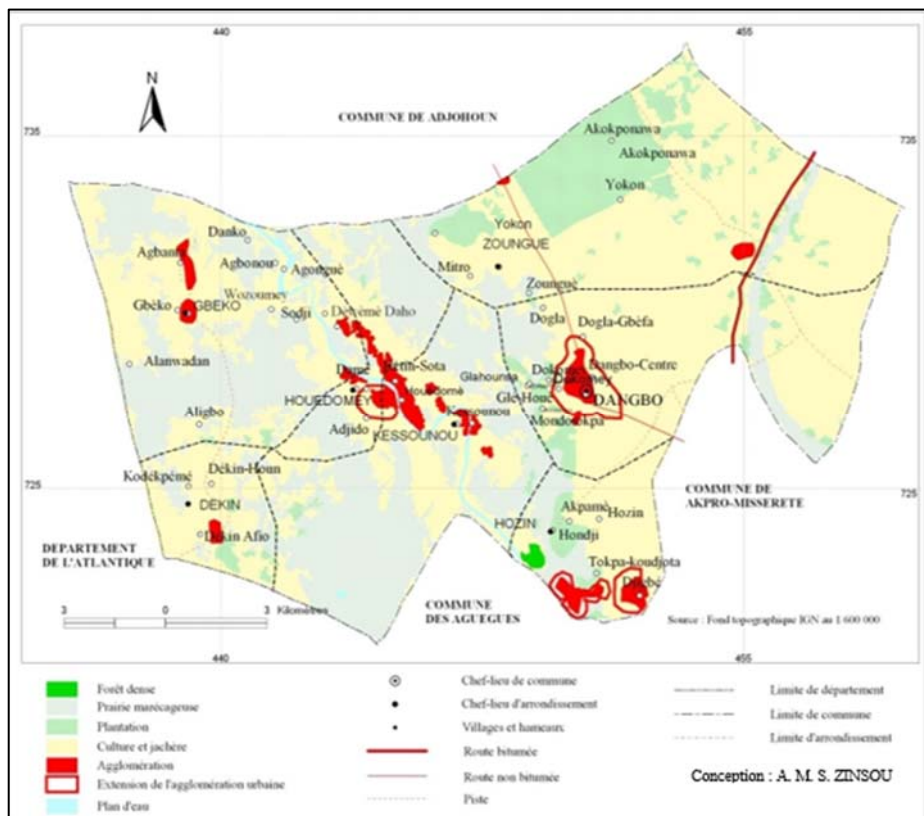


Figure 3 : Occupation de sol dans la commune de Dangbo en 2017

La végétation de la Commune de Dangbo est essentiellement composée d'une savane arborée où prédominent les palmiers à huile (*Elaeis guineensis*) naturels ; On rencontre par ailleurs, une dizaine de formations forestières (forêts, forêts fétiches et autres) estimée à environ 15 hectares. Les forêts sont à dominance de fromagers (*Ceiba pentandra*). Ce couvert végétal est soumis régulièrement à des assauts dévastateurs de l'homme pour des fins de recherche de bois de chauffe, d'acadjas et de bois d'œuvre, ce qui conduit à la déforestation poussée dans la commune. Ainsi, la végétation de la Commune de Dangbo est essentiellement composée des espèces comme : fourrée, arbustive, dense où dominant le palmier à huile (*Elaeis guineensis*) et les graminées avec quelques reliques forestières par endroits. Aussi, s'observe dans la commune une savane herbeuse, des prairies, des formations marécageuses à raphia et quelques mangroves composées essentiellement de *Avicenia africana* et de *Rizophora racemosa*.

### ▪ Réseau hydrographique

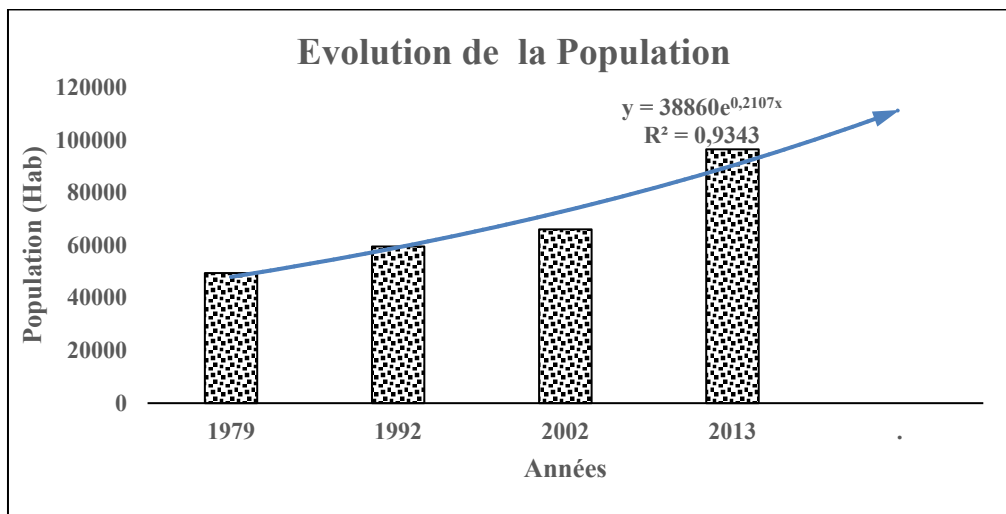
La commune de Dangbo dispose d'un réseau hydrographique non négligeable propice à l'exploitation des ressources halieutiques. L'analyse des données révèle que la commune de Dangbo dispose d'un réseau hydrographique assez dense vu qu'elle est couverte sur plus de la moitié de son territoire (de l'Est jusqu'au centre de la commune) par le fleuve Ouémé et les marécages répartis dans la commune. Cet état expose la commune aux risques d'inondation.

### 3.1.2. Aspects humains et économiques

Les éléments déterminants des traits humains sont constitués par les statistiques démographiques et les activités développées dans le secteur d'étude.

▪ **Evolution de la population**

Selon les statistiques de l'INSAE (2014) les données démographiques des années 1979, 1992, 2002 et 2013 respectivement des RGPH1, RGPH2, RGPH3 et RGPH4 de la Commune de Dangbo a évolué de 49444 à 96 426habitants. Ceci représente un taux d'accroissement de 1,03 % de la population totale du Bénin. La figure 6 indique l'évolution de la population de 1979 à 2013.



**Figure 5 :** Evolution de la population dans la Commune de Dangbo de 1979 à 2013  
*Source :* INSAE, 2013, données de terrain, 2020

L'analyse de la figure 5 révèle une population en pleine évolution de 1979 à 2013 L'augmentation de cette population fait croître l'installation des populations dans les lits du fleuve dans la commune de Dangbo. Ce phénomène augmente la vulnérabilité des populations aux risques d'inondation.

▪ **Activités économiques**

L'agriculture, l'élevage, la pêche et l'artisanat sont les activités pratiquées par la population. Les principales cultures pratiquées par les populations de la commune de Dangbo sont entre autre : les produits maraîchers (oignon, tomate, piment, etc.), le maïs, le riz, etc. La pêche est purement traditionnelle et spécifique aux habitants vivants au bord des marécages.

Dans la commune de Dangbo, l'agriculture, la pêche et la chasse occupent la première place avec 44,1% suivi du commerce, de la restauration et l'hébergement (31,6%) et 1 150 ménages agricoles sont dirigés par les femmes. La population et les ménages agricoles sont respectivement 56 948 et 10 369 ménages. De même plus de 99,7 % des producteurs agricoles utilise des équipements traditionnels (INSAE, 2016)

Le fleuve Ouémé est un facteur et une contrainte pour le développement des différentes activités économiques dans la commune.

**3.2. Manifestions de l'inondation dans la Commune de Dangbo**

Les inondations ont des impacts significatifs sur les populations rurales et urbaines du Bénin de la commune de Dangbo. L'Appréciation de l'ampleur des impacts socioéconomiques et environnementaux des inondations dans la Commune s'est basée sur le cadre de référence pour l'évaluation de l'importance des impacts de l'ABE (1998).Elle a consisté dans un premier temps à définir le degré des perturbations occasionnées (pourcentage de dégâts créés) par ce phénomène dans chacune des communes ciblées, puis dans un deuxième temps à le combiner aux paramètres durée et étendue de la perturbation pour une meilleure appréciation de l'importance.

Dans le cadre de cette évaluation, la durée correspond à la période de temps pendant laquelle le système humain et/ou naturel a subi la perturbation créée par les inondations, alors que l'étendue traduit la dimension spatiale des dégâts rapportée à l'échelle de la commune. Les manifestations de l'inondation dans la Commune de Dangbo est déterminée par l'importance de ces effets pervers sur :

- ✓ les personnes et leur milieu de vie (nombre de vies perdues, de blessés, de déplacés, de cases détruites, de sans-abris);
- ✓ les moyens de subsistance en considérant l'agriculture comme la principale source de revenus des communautés sinistrées (superficies de cultures détruites, récoltes perdues, alimentation/nutrition, etc.);
- ✓ le système éducatif (nombre d'écoles inondées, d'infrastructures scolaires détruites, de routes endommagées, etc.);
- ✓ la santé des populations : variation du taux de prévalence des maladies liées à l'eau (paludisme, diarrhée, vomissement, péril hydro fécal, etc.).

Les inondations fluviales se manifestent par un débordement direct de fleuve Ouémé pendant la grande saison pluvieuse. Le cours d'eau sort de son lit mineur pour occuper son lit majeur. Le niveau de l'eau augmente et le fleuve déborde alors de sa situation habituelle. Le cours d'eau peut alors envahir des surfaces habituellement occupées par les champs et les habitations. L'augmentation du volume d'eau du fleuve s'effectue par l'effet combiné des fortes pluies de la grande saison pluvieuse et la descente des eaux du Nord descendant dans ce dernier, celle la rivière Zou et des autres affluents qui y déversent les eaux Ainsi, dans plusieurs villages de la commune de Dangbo centre, l'eau stagne entre les concessions et tout au long des rues. Dès lors, des villages entiers comme Danko, Agbonou, Agonguè, Sodjo , Adjido , Hétin Sota, Houedomè, Késsounou, Koudonou se trouvent submergés par l'eau. Les différents impacts des inondations sur les personnes et leur milieu de vie, les moyens de subsistance, le système éducatif et la santé ont des conséquences non négligeables sur la Commune de Dangbo.

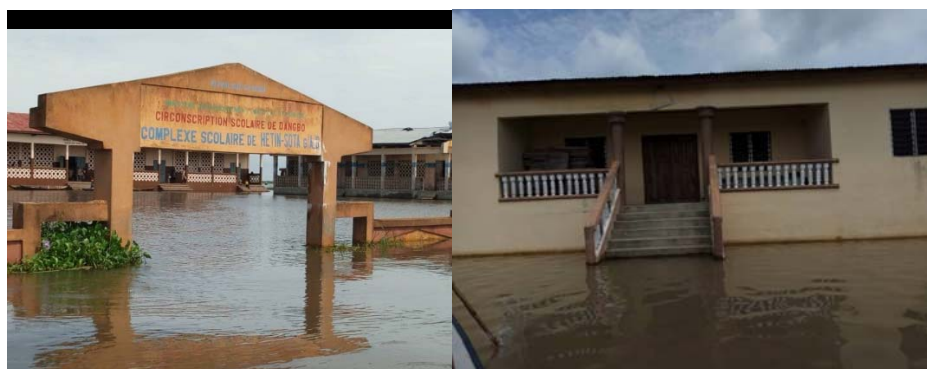
### 3.2.1. Destruction des habitations

Dans la commune, les habitations sont affectées en période d'inondation. Les constructions en matériels précaires sont les plus vulnérables (Planche 1).



**Planche 1 : habitations détruites à Hétin sota**  
**Prise de vue : Babadjidé, 2019**

Mise à part les habitations, d'autres infrastructures sociocommunitaires comme les écoles sont affectés par les eaux en période d'inondation.



**Planche 2: Infrastructures sociocommunitaires affectés**  
**Prise de vue : Babadjidé, 2019**

Les inondations impactent fortement le secteur éducatif. Cette situation expose les apprenants et les enseignants à diverses pathologies et est à la base des mauvaises performances scolaire dû aux retards, aux absences voire abandons, au non-respect du calendrier scolaire etc.

### 3.2.2. Dégradation des voies

Dans les arrondissements les plus affectés, les pistes et les dessertes sont sérieusement dégradées au cours des périodes d'inondations comme c'est le cas en 2018 dans l'arrondissement de Kessounou. La planche Photographique n°3 illustre une voie inondée et une voie dégradée dans la commune de Dangbo.

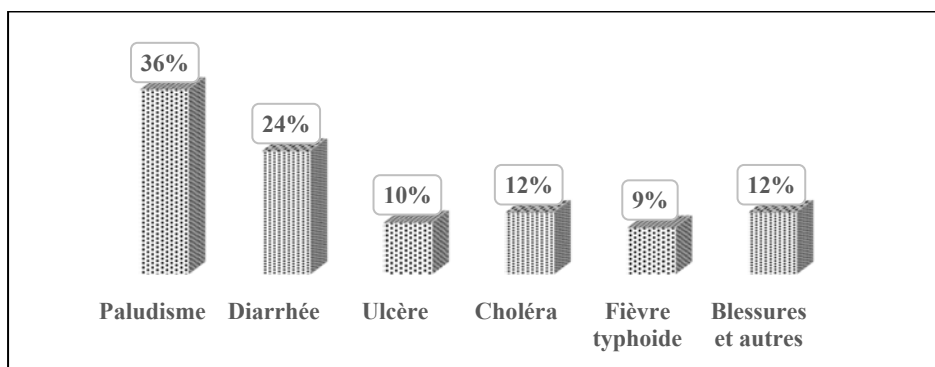


**Planche 3:** voie inondée et dégradée à Tovè (Arrondissement de Kessounou)  
**Prise de vue :** Babadjidé, 2019

En période d'inondation, certaines voies sont inondées pendant que d'autres sont très dégradées. Puisque l'eau de crue se stagne sur les voies rendant ainsi difficile le transport des personnes et des biens dans la commune de Dangbo plus particulièrement les arrondissements (Houédomey et Kessounou) les plus vulnérables.

### 3.2.3. Prolifération des maladies liées à l'eau

Dans la commune de Dangbo plus de 60% des populations font leurs besoins (excréments humains) dans les eaux stagnantes engendrant ainsi de nombreuses maladies. De même 33,33 % des centres de santé de la commune sont inondés rendant l'accès difficile aux populations. Cette situation augmente les taux de prévalences des maladies hydriques dans la commune comme le montre la figure 7.



**Figure 6 :** Maladies liées aux inondations dans la Commune de Dangbo  
**Source :** Enquêtes de terrain, 2020

Il ressort de l'analyse de la figure 10 que le paludisme (36 %) et la diarrhée (24 %) sont en hausse. Ces maladies touchent plus les femmes en état de grossesse et surtout les enfants de 0 à 5 ans dans la commune. La croissance de ces maladies est due également à l'environnement insalubre des habitations et des équipements d'eaux potables des zones inondées (Planche 4)



**Planche 4:** Environnement insalubre des habitations et des équipements d'eaux potables dans le village de Kessounou  
**Prise de vue :** Babadjidé, 2019

Les inondations constituent des facteurs de prolifération des maladies dans les environnements insalubres. Ces inondations ajoutées à l'insalubrité aggravent la pollution de l'eau, et la propagation des maladies hydro fécales. La connaissance des facteurs et manifestations des risques d'inondations ont permis de faire le point des stratégies endogènes et de proposer des mesures de renforcement de la résilience des populations face aux risques d'inondation dans la Commune de Dangbo qui fait l'objet du chapitre IV du présent document.

### **3.3. Stratégies de luttres contre l'inondation dans la Commune de Dangbo**

#### **3.3.1. Migrations temporaires**

Les inondations ont provoqué des migrations temporaires dans la commune de Dangbo. Ainsi, une frange fragile de la population se refuge dans des écoles ou des églises avant de rejoindre leur famille quelques mois plus tard. Le logement chez la parenté (un membre de la famille de la mère ou du père), habiter chez un ami ou membre d'un groupe social dont on fait partie, ou encore un logement (maison des jeunes) proposé par les autorités communales. Les cas diffèrent d'une localité à une autre, selon l'ampleur des inondations et selon le degré de confiance qui règne au sein des populations.

#### **3.3.2. Utilisation des pirogues plus résistantes et barques motorisées**

La fabrication ou l'achat de pirogues plus résistantes et de barques motorisées pour le déplacement des biens et des personnes, nécessite la sollicitation des aides des parents vivants hors du village. La planche 5 montre les pirogues et barques utilisés par les élèves et les bonnes dames pour se déplacer lors des inondations.



**Planche 5:** Usages de pirogues et barques par les élèves et les bonnes dames  
**Prise de vue :** Babadjidé, 2019

Les pirogues et barques motorisées deviennent un moyen indispensable de transport des populations. Ainsi même pour les apprenants et enseignants avant de se rendre sur lieux de formation prennent selon leurs moyens des pirogues ou des barques motorisées. Selon les travaux de terrains les populations affirment à plus de 90 % que nul ne peut résider ici sans les pirogues ou

barques motorisées. Sur ce, elles sollicitent l'apport des autorités à divers niveaux de leur venir à secours en leurs apportant ces moyens de transport (pirogues et barques).

### 2.3.3. Construction des maisons sur pilotis

La construction des maisons en élevant les pilotis en béton compte tenu de l'ampleur des inondations dans le but d'éviter leur effondrement est une des mesures préventives de gestion des risques d'inondations dans la commune (Planche 6)



**Planche 6:** Construction sur pilotis en matériaux modernes et précaires à Hêtin-Sôta (arrondissement de Kessounou).

**Prise de vue :** Babadjidé, 2019

La Planche photographique 6 présentant des constructions sur pilotis en matériaux modernes et précaires qui font partie des mesures préventives. Mais celles-ci trouvent leurs limites dans l'ampleur et l'intensité des inondations.

### 2.3.4. Construction des enclos de protection des animaux

Les éleveurs réalisent des enclos pour garder les animaux particulièrement les bœufs en vue de les mettre à l'abri. (Planche 7).



**Planche 7:** Abri des bœufs en période d'inondation à Hêtin-Sota (arrondissement de Kessounou)

**Prise de vue :** Babadjidé, 2019

Il s'agit des enclos dont les planchers sont constitués d'une quantité importante de touffes d'herbes qui montent au fur et à mesure que le niveau d'eau augmente au cours de la période. Cette stratégie est plus utilisée par les éleveurs des arrondissements de Késsounou et Houédomey. Les planchers ainsi constitués éloignent les pieds des animaux de l'eau.

### 2.3.5. Utilisation des bassines comme moyen de transport

Les bassines sont utilisées comme moyen de transport pour les déminues dans la commune de Dangbo comme l'indique la Photo 2.



**Photo 1:** Usage de bassine comme moyen de transport à Hétin-Houédomey  
**Prise de vue :** Babadjidé, 2019

Dans la commune de Dangbo, certaines populations les plus diminuées font usage des bassines pour le transport des personnes. Sur la photo 2 l'enfant se rend chez les voisins pour faire des achats. Cette stratégie présente des risques de noyade pour ses utilisateurs.

### 2.3.6. Erection des cantines de fortune dans les établissements scolaires

Les populations construisent des paillottes avec des matériaux précaires sur pilotis dans les établissements scolaires en vue d'assurer la restauration des apprenants pendant les périodes d'inondation (photo 3).



**Photo 3 :** cantine de fortune dans une école inondée de Késsounou  
**Prise de vue :** Babadjidé, 2019

Les inondations sont devenues un véritable fléau durant ces dernières années dans la commune. Elles sont de plus en plus fréquentes et de plus en plus dévastatrices. Au Bénin, les inondations de 2010 et les dégâts causés sont encore dans tous les esprits. Généralement, les inondations peuvent être la conséquence de crues ou simplement de fortes pluies. Ainsi, deux composantes majeures sont identifiées qui sont : l'eau qui peut sortir de son lit habituel d'écoulement et l'homme qui s'installe dans l'espace alluvial pour y implanter toutes sortes de constructions, d'équipements et d'activités.

Les inondations peuvent être la conséquence de crues ou simplement de fortes averses. Le plus souvent, trois types d'inondation sont distingués à savoir : les inondations par débordement, les inondations par ruissellement et les inondations par remontée de nappe. Dans le bassin de l'Ouémé à Dangbo, les deux premiers types d'inondation sont identifiés.



La caractérisation du risque d'inondation repose sur deux notions ; l'aléa, qui représente le phénomène physique par son amplitude et sa période retour ; la vulnérabilité, qui représente l'ensemble des biens et des personnes pouvant être touchés par un phénomène naturel (H. Koumassi, 2014). La caractérisation de l'inondation dans la présente étude passe par l'analyse fréquentielle des débits maximaux et des pluies maximales sur le bassin de l'Ouémé à Dangbo. En effet, l'analyse fréquentielle permet de déterminer la probabilité d'occurrence temporelle (estimée par la période de retour) et spatiale (influencée par la climatologie mais également par la topographie, l'occupation du sol et la pédologie qui contrôlent la susceptibilité des territoires à l'inondation) du bassin.

#### IV. CONCLUSION

Il ressort des différentes investigations de façon générale que les communautés sont unanimes sur le fait que les risques d'inondations sont devenus très perceptibles et perturbent les vies humaines et les activités agricoles. Elles sont dues au débordement du fleuve Ouémé en crue (56 % des ménages enquêtés) aux fortes pluies (23 % des ménages enquêtés), aux changements climatiques (12 % des ménages enquêtés) et à l'occupation du sol (9 % des ménages enquêtés). De même, les inondations sont récurrentes dans la Commune de Dangbo sous l'effet conjugué des facteurs naturels (Hydrologie, Hydrographie et Géologie) et anthropiques (mode occupation, Hygiène et assainissement).

Les différents impacts des inondations sur les personnes et leur milieu de vie, les moyens de subsistance, le système éducatif et la santé ont des conséquences importantes sur la Commune de Dangbo. Ainsi, les populations assistent au ralentissement des activités économiques, la destruction des habitations et des infrastructures sociocommunautaires, les pertes en vies humaines, la dégradation des voies, la prolifération des maladies liées à l'eau. Face aux risques d'inondation les populations de la commune de Dangbo opposent des stratégies endogènes d'adaptation comme la migration temporaire, l'utilisation des pirogues plus résistantes et barques motorisées, etc. Les autorités politico-administratives (Mairie, Ministère de l'Intérieur, Ministère de la sante), les institutions internationales (Care internationale Benin, Croix rouges, Unicef) et les ONG interviennent en amont comme en aval dans la prévention des risques d'inondation et la gestion de l'inondation dans la Commune de Dangbo à travers le Plan de Contingence Communal.

#### RÉFÉRENCES

- [1] Allagbé Hyacinthe, 2005, Impacts des inondations sur la santé des populations dans l'arrondissement de Godomey, Mémoire de DEA, Ecole Doctorale Pluridisciplinaire Espace Développement & Culture, UAC/FLASH, Bénin, 74 p.
- [2] Beltrando Gérard, 2004, *Les climats : processus, variabilité et risques*, Ed ArmandColin / Sejer, Paris, 244 p.
- [3] Brüscheiler Sabine, 2003, « Gestion intégrée des Ressources en Eau (GIRE) », *La voie du développement durable Info Ressource Focus* n°1, 16 p.
- [4] Kouhoundji Naboua, 2010, Problématique de maîtrise de l'eau agricole dans la basse vallée de l'Ouémé à Sô-Ava, UAC/FLASH/DGAT, 102 p.
- [5] Koumassi Dègla Hervé, 2014, Risques hydro climatiques et vulnérabilités des écosystèmes dans le bassin versant de la Sota à l'exutoire de Coubéri, Thèse de Géographie de l'Université d'Abomey-Calavi, EDP/UAC, 246 p.
- [6] Ogouwalé Euloge et Boko Michel, 2005, « Inondation dans la ville de Togoudo sur le plateau d'Abomey-Calavi : manifestations, incidences et adaptations humaines », In *Actes de colloque de l'AIC*, pp 125-128.
- [7] Ogouwale Euloge, 2006, Changements climatiques dans le Bénin méridional et central : indicateurs, scénarios et prospective de la sécurité alimentaire, Thèse de Doctorat Unique, LECREDE/ EDP/FLASH/UAC, 302 p.
- [8] Okou Christophe, 1989, « L'urbanisation face aux systèmes naturels: le cas de Cotonou », *Les cahiers d'outre-mer*, vol. 42, no.168, pp. 425-437.
- [9] Sall Abdoulaye, 1997, Inondation à Cotonou : aspects socio-sanitaires du phénomène, IRSP, Cotonou, 53 p.
- [10] White Gilbert, 1975, Flood hazard in the United States: a research reassessment, University of Colorado, Institute of behavioral science, Boulder, 854 p.

# *Using Project-Based Learning To Improve The Students' Speaking Skills: An Action Research Project At Dong Nai Technology University*

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**Abstract** – Nowadays, English becomes more and more important in almost aspects of life. English is a global language, so it is a compulsory subject at schools and universities. Communication is one of the most important skills in study, and work. Being a lecturer at a university, I recognize that we should help our students find the better way to improve their speaking skills and feel confident when talking or speaking in front of the class or the crowded or making a conversation with foreigners. After learning about some methods to help the students improve their speaking skills. We chose Project – based Learning to apply for our speaking classes in experiment. After doing this experiment, we found out two issues: (1) the students' attitudes to using Project – based Learning in speaking classes; (2) the result of students in Speaking classes when applying Project – based Learning. I randomly chose a Class with class code 0070133 to carry out my action research project with the participants: 30 the first-year students a Dong Nai Technology University. We performed this study in 12 weeks and used questionnaires, pre- testing, post-testing and interviews for collecting data instruments. The research findings us that the students has positive attitudes to using Project – based learning in speaking classes and PBL was a good way to help students improve their speaking skills. With the result we got in the findings, both the lecturers and the students could find the own way for teaching and learning to achieve the best result in speaking skills in speaking classes.

**Keywords** – *Project – based Learning, pre-testing, post-testing, Dong Nai Technology University.*

## I. INTRODUCTION

### 1.1. Rationale

Nowadays, with the development of science, technology, education and economy, English becomes more and more important in our modern society. We have to use English in almost every aspect of life and in almost fields of work and study. So English becomes a compulsory subject in primary schools, secondary schools, high schools, especially in universities throughout the country in Vietnam. In almost universities, students learn English as a compulsory subject. They learn listening skill, speaking skill, reading skill and writing skill. And one of skills which students lack the confidence when practicing is speaking skill. After twelve years studying at school, they just focused on grammar and reading comprehension to pass the college entrance exam, they did have lots of chances for practicing speaking. They often lack of confidence in communication. On the other hand, Dong Nai Technology University' outcomes require that the students must speak English well and have enough ability to pass the English interview for trial job interview. One of the reasons leading them to this problem is they lack time and method for learning speaking. Being acknowledged, speaking is one of the most important skills in our modern society, especially at work. Moreover, after teaching for a long time at the University, the speaking abilities of the third-year and final-year students were supposed to be not good. So we should help the first-year student improve their speaking skills to gain the better speaking abilities in the future, especially when

they graduate and apply for work. In each lesson, we should make many different activities so that students have lots of chances to speak English and have an assignment to do as a mini project. To do the mini project, the students have to make a group and divide the task become smaller parts to do. In each group, the students have to share the assignment to do. Each student takes a task, and the leader collects the data and material to make the perfect project. During doing the project, they have the chances to explore the real world, cooperate with their partners, practice searching information, analyze data, prepare and practice speaking for the presentation.

The latest years, Project-based learning (PBL) has been strongly promoted and applied in teaching speaking skills in universities to help the students improve their abilities. PBL makes the students spend more time on using some tools to complete their English assignment. It creates an environment for studying and learning professionally. The students feel very eager to come to class each day when they have English lesson. Moreover, PBL is believed that it will help student feel passionate about learning English, especially speaking skills and feel confident in daily communication, also at work because they have chances to practice in group task and experience in real life.

Having been teaching English at a university for many years and recognizing the main causes for the problem – lack of confidence of students in speaking skills, and the researcher is also motivated by the new approach PBL for teaching speaking skills. The research really desires that the students can have more opportunities to search, study and practice. Also, they can find out that PBL is one of the best ways to help them improve their English day by day. With above reasons, the researcher really aspires to conduct a study on “Using project-based learning to improve the students’ speaking skills: an action research project at Dong Nai Technology University” to find the better way for the teaching and learning English speaking skills and apply suitable techniques and activities in speaking class. With the hope, the students can improve their ability for speaking skills. This study with the objective is to explore the application of the project-based approach to improve speaking skills for the first-year students at Dong Nai Technology University.

### **1.2. Aims of the Study**

There are many reasons to conduct this study, and one of the majority aims of this study is to improve the first-year students’ English speaking skills at Dong Nai Technology University. To gain the aim, the researcher must to reach the following objectives as:

- Learning about the students’ attitudes to Project – based learning applied in speaking classes whether it is positive.
- Finding out the advantages of project – based learning for the students in speaking skills when it is applied in speaking classes.

### **1.3 Research Questions**

To achieve the above aims of the study, the researcher must find out the answers to the following research questions:

1. *What is the first-year students’ attitude to project-based learning at Dong Nai Technology University in speaking lessons?*
2. *What do the first-year students gain from applying project-based learning in speaking skills?*

### **1.4 Scope of the Study**

Studying English language is very large. We have many aspects to do the research. So this study cannot cover all skills in teaching English. We only divide into smaller parts in the skill which we chose to do the research. And in this study, the researcher only focuses on using Project-based Learning to help the students at Dong Nai Technology University improve their English speaking skills. This research only focuses on some typical skills used in project-based learning which could improve the students’ speaking ability and help them feel confident in communication.

In this study, the main subject is the thirty male and female students in English class with class code 0070133. They are the first-year students, and they are non-majored English students. The average age of the students is around 19. They are going to be the main subject to participate in and respond to the survey questionnaires, the trial lessons and the tests.

The action plan is going to last in 3 months from early March 2019 to late May 2019, in third semester of the academic school year 2018-2019 Dong Nai Technology University.

## **II. LITERATURE REVIEW**

The study focuses on the material and definition and theories relevant to Speaking skills and PBL to find out the effective

techniques to help the students at Dong Nai Technology University improve their speaking ability. Besides, previous studies are also mentioned to help the research find the new points in this study as well as good references. This chapter is divided into 4 main parts below:

- Concepts of speaking
- Communicative Language Teaching
- Concepts of Project-based learning
- Previous studies

## 2.1. Concepts of speaking

This part will explain about the theories concerned about speaking field. Almost language learners think that knowing a language is ability that they can speak that language fluently. They appreciate speaking ability as a measure for the knowledge of that language. To them, speaking skill is one of the most important skills in learning a language, especially in a practical language. Speaking is really necessary in daily life, in communication, in getting and exchange direct information. If your speaking skill is good, you can feel confident and have more motivation to learn that language. In the case, learners do not feel excited about speaking lessons. They don't have any motivations to speak. They are no longer able to speak English well. So we need to use new teaching method to motivate the students join in speaking activities. Speak skill is really important so the students should be taught how to improve their speaking in each lesson.

As stated by Freeman (in Risnadedi, 2001, pp. 56-67), speaking skill was one of the most important students' abilities to help them express their ideas by speaking. It can be used to test the students' ability through oral tests or speaking examinations. He also claimed that speaking was much more complicated and difficult than many people thought. It was a process of practicing. It required the learners' ability of pronunciation, vocabulary, grammar and structure.

According to Johnson (1977) this language ability obviously played a vital part in life because of its importance. The first thing, it played an enormous role in language learners in informing and communicating with others in daily communication, work and others. The second thing, if you wanted to become an expert in communication, you had to be professional in dealing with any difficult situations in communication and making any speech effectively. Finally, mastering the public speaking skills was a strong advantage for enhancing career opportunities and got promotion for career, especially for those who have just graduated from colleges or universities.

### 2.1.1. Definitions of speaking

In learning a language, speaking is considered as one of the most important skills. If we know a language, we cannot speak that language smoothly. No one acknowledges that you know that language. So there are many language experts having studied this field. They have tried to find out the best definition for speaking, and many people agree with these definitions.

Brown (1994), Speaking is defined as an interactive process of constructing meaning that involves producing, receiving and processing information.

In Brown and Yule's opinions (1983), spoken language included short, fragmentary utterances in a range of pronunciation. Usually, there was a great deal of repetition and overlap between one speaker and another. Speaker usually uses non-specific references. They also add that spoken language was made to feel less conceptually dense than other types of language such as prose by using the loosely organized syntax, and non-specific words, phrases and filters such as *oh, well, uhuh*.

According to Bygate (1998), speaking skill can be seen as the production of auditory signals to produce differential verbal responses in a listener. In other words, it is regarded as the human's ability to combine sounds in a systematic way so as to form meaningful utterances.

According to Chaney (1998: 13), he claims that speaking is the process of building and sharing meaning through the use of verbal and non-verbal symbols, in a variety of contexts.

Doff (1987:2), he says that in all communication or conversation, two people are getting and exchanging information or they have a communication or conversation need.

Under a top-down view, Eckard and Kearny (1981), Florez (1999) and Howarth (2001) consider speaking as a two-way process relating to a true communication of ideas, information and feelings, cited in the article of Leong & Ahmadi (2017). Besides, taking

its form and meaning into consideration, Burns and Toyce (1997) define speaking as an interactive process of constructing sense that involves receiving, producing and processing collected data.

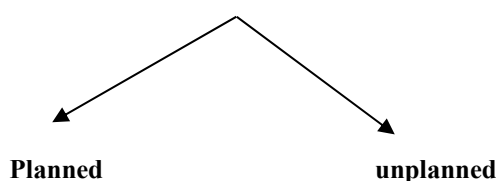
Tarigan (1985), speaking is stated as the ability to produce articulation, sounds or words to express, to say, to show and to think about ideas, thought and feeling.

Basing on the above statements from the language experts, we can get a conclusion that speaking is a process of oral activity used in daily life as a tool of communication in which verbal mainly and non-verbal symbol used in sending and receiving message. In speaking activities, to gain the purpose of communication effectively, the speaker must master in using pronunciation, grammar, vocabulary, fluency, comprehension.

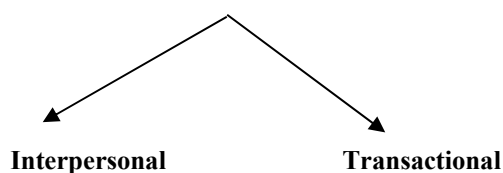
### 2.1.2 Types of Speaking.

In speaking languages, especially in English, there are some kinds of speaking English. Some authors studied this field. One of these authors is Brown. According to Brown (2001:250), he stated that language teaching focused on leading to master English conversation. In his opinion, Oral language was divided into two types:

#### 1. Monologue



#### 2. Dialogue



Monologue's meaning was the oral language. It involved only one person in it. In some cases, there is only one person to do the task speaking such as lectures, news casting, radio broadcast, etc. Monologue can be divided into two types: planned monologue and unplanned monologue. The meaning of planned monologue is the speaker use the materials or notes nor texts prepared already to help him or her speak fluently. The meaning of unplanned monologue is the speaker speak naturally without any materials or notes prepared before starting speaking. All words spoken emerge from the speaker's mind naturally and spontaneously.

In Dialogue, there are two kinds: interpersonal communication and transactional communication. Each type is used in the particular situation to get the purpose of communication.

### 2.1.3. Characteristics of speaking

Speaking has many characteristics. In my opinion, it has these characteristics:

Speaking style' form and meaning are depended on the context of the conversa, including the participants themselves, their collective experiences, the physical environment, and the purposes for speaking. It is often spontaneous, open-ended, and evolving. However, speech is not always unpredictable. Language functions (or patterns) that tend to recur in certain discourse situations can be identified and charted.

Speaking requires that learners not only know how to produce specific points of language such as grammar, pronunciation, or vocabulary, but also that they understand when, why, and in what ways to produce language.

Speech has its own skills, structures, and conventions different from written languages. A good speaker synthesizes this array of skills and knowledge to succeed in a given speech act.

To sum up, it is undeniable that speaking is a key to communication. By considering what good speakers do, what speaking tasks can be used in class, and what specific needs learners report, teachers can help learners improve their speaking and overall oral competency.

**2.1.3. Functions of Speaking**

Richards (2008) states that speakers should consider three functions of speaking to obtain successful communication, including *talk as interaction, talk as transaction, and talk as performance*. These activities are different from each other with regard to form and function. Therefore, they need a variety of teaching approaches.

- “Talk as interaction refers to what we normally mean by “conversation” and describes interaction that serves a primarily social function.”
- “Talk as transaction refers to situations where the focus is on what is said or done. The message and making oneself understood clearly and accurately is the central focus, rather than the participants and how they interact socially with each other.”
- “Talk as performance refers to public talk, that is, talk that transmits information before an audience, such as class room presentations, public announcement, and speeches.”

In short, when making a plan for an English speaking class, it is necessary to put these core issues into considerations. Therefore, PBL can provide learners will great opportunities to be competent in all types of speaking activities.

**2.1.4. The importance of teaching speaking skill**

Teaching speaking is indispensable in the process of teaching and learning a second language. Obtaining great communicative competence brings many benefits for students in not only academic environment but also in their future careers. For that reasons, language teachers should concentrate on facilitating students and guiding them with meaningful communicative situations and active learning environment rather than force them to memorize the structures and rules, which can demotivate them in learning the language. In order to fulfil this objective, it is crystal clear that PBL enables students to achieve the three factors which are interaction, transaction and performance when taking part in speaking activities. Furthermore, students are well equipped with the essential basic life skills and become more interested as well as energetic in their learning. This results in the enjoyment and purposefulness in their learning.

Students’ speaking competence can be evaluated and assessed based on the set of proposed Common Reference Levels in each holistic paragraphs, as displayed below:

*Table 1: Assessing Speaking Performance – Level B1, CEF*

B1	Grammar and Vocabulary	Discourse Management	Pronunciation	Interactive Communication
5	<ul style="list-style-type: none"> <li>Shows a good degree of control of simple grammatical forms, and attempts some complex grammatical forms.</li> <li>Uses a range of appropriate vocabulary to give and exchange views on familiar topics.</li> </ul>	<ul style="list-style-type: none"> <li>Produces extended stretches of language despite some hesitation.</li> <li>Contributions are relevant despite some repetition.</li> <li>Uses a range of cohesive devices.</li> </ul>	<ul style="list-style-type: none"> <li>Is intelligible.</li> <li>Intonation is generally appropriate.</li> <li>Sentence and word stress is generally accurately placed.</li> <li>Individual sounds are generally articulated clearly.</li> </ul>	<ul style="list-style-type: none"> <li>Initiates and responds appropriately.</li> <li>Maintains and develops the interaction and negotiates towards an outcome with very little support.</li> </ul>
4	<i>Performance shares features of Bands 3 and 5.</i>			
3	<ul style="list-style-type: none"> <li>Shows a good degree of control of simple grammatical forms.</li> <li>Uses a range of appropriate vocabulary when talking about familiar topics.</li> </ul>	<ul style="list-style-type: none"> <li>Produces responses which are extended beyond short phrases, despite hesitation.</li> <li>Contributions are mostly relevant, but there may be some repetition.</li> <li>Uses basic cohesive devices.</li> </ul>	<ul style="list-style-type: none"> <li>Is mostly intelligible, and has some control of phonological features at both utterance and word levels.</li> </ul>	<ul style="list-style-type: none"> <li>Initiates and responds appropriately.</li> <li>Keeps the interaction going with very little prompting and support.</li> </ul>
2	<i>Performance shares features of Bands 1 and 3.</i>			
1	<ul style="list-style-type: none"> <li>Shows sufficient control of simple grammatical forms.</li> <li>Uses a limited range of appropriate vocabulary to talk about familiar topics.</li> </ul>	<ul style="list-style-type: none"> <li>Produces responses which are characterised by short phrases and frequent hesitation.</li> <li>Repeats information or digresses from the topic.</li> </ul>	<ul style="list-style-type: none"> <li>Is mostly intelligible, despite limited control of phonological features.</li> </ul>	<ul style="list-style-type: none"> <li>Maintains simple exchanges, despite some difficulty.</li> <li>Requires prompting and support.</li> </ul>
0	<i>Performance below Band 1.</i>			

The scales can be used in the classroom when the speaking activities are conducted to recognize the strengths and weaknesses

of students. Thanks to the results, teachers can know whether they are familiar with the speaking activities and they are efficient enough to attend the speaking test.

### **2.1.5. Principles of Teaching Speaking**

#### **2.1.5.1. Concept of Teaching Speaking**

Thombury (2005) mentioned that teaching speaking was the process of distributing the English language knowledge to learners. The information relating to this concept is presented as follow.

Teaching speaking is fundamentally considered as a long-term progress which teachers instruct learners to convey and articulate their opinions and ideas in the target language and lead them to the concentration on correct novel language pronunciation. Then, teachers introduce learners with a specific criteria used to evaluate learners' ability to produce sounds. Based on this criteria, learners can conduct their self-assessment, which reduces the necessity of teachers correcting their potential mistakes in the classroom. However, teachers still possess a crucial role in the classroom. They contribute to learners' encouragements and motivation. Thanks to this action, teachers can make learners interested in speaking lesson and practice their skills more frequently.

According to Nunan (1991, pp.54 - 56), there were five main principles of teaching speaking. These principles are very important so they will be mentioned and clarified in the next part below:

#### **2.1.5.2. Five main Principles of Teaching Speaking**

- Awareness of Difference:

Teaching and learning a second language and a foreign language are different from each other due to their discrepancies in terms of context and situation. More specifically, teaching and learning a foreign language are set in a non-communicative environment where the target language is not commonly used in daily life and they can be mostly affected by the presence of mother tongue. On the other hand, in a second language context, the target language is widely used in daily conversation together with L1, so teaching and learning a second language is significant to the development of learners. Therefore, teachers should put this factor into consideration to create appropriate communicative tasks in speaking lesson.

- The Importance of Fluency and Accuracy:

Fluency and accuracy are fundamental elements to be considered when speaking. Accuracy shows the ability to produce correct speech which is similar to what the native speakers deliver in their daily speech. Fluency presents learners' competency to be confident in using the target language without hesitations or unnatural way. For this reason, teachers are suggested to concentrate closely on learners' fluency and accuracy in order to help learners communicate effectively.

- Providing Opportunities:

In order to be good at speaking, learners should practice regularly, therefore, in the speaking lessons, it is necessary for learners to be given opportunities to speak and interact with other learners.

- Tasks Planning:

Carefully-prepared lesson plans enable teachers to conduct the activities logically in a limit of time. Besides that, they help teachers anticipate and control the problems which may occur during the lessons in order to have effective lessons.

- Designing classroom activities

In speaking lessons, classroom activities play significant role to get learners involved in learning the target language efficiently and effectively. Classroom activities should be selective and meaningful to help learners achieve their goals in learning the language. Therefore, teachers should carefully select appropriate materials to design various activities for learners

#### **2.1.6. Teacher's Roles in Teaching Speaking**

Harmer (2007), claimed that teachers have fundamental role in the speaking lessons, as follow:

- Applying the language students are learning to deal with the subject matters and besides, stimulate the involvement of students in the class.
- Asking the least amount of display questions. In other words, teachers should encourage students to "display" their background and subject

knowledge by asking questions instead of giving information directly. For instance: "What is the noun form of *communicate*?"

- Building the speaking topic with the students and giving advice and comment to each of their contributions.
- Encouraging students to speak as much as they can by giving some further suggestions basing on what students have just spoken and trying not to use a student's short utterance to be a springboard for another lengthy turn.
- Including a clarification of the intention of what students say by extending your opportunities to another student and trying not to cut off an exchange too early.
- Taking serious notice of the usage of natural feedback rather than assessing or evaluating the utterance of the students and ask them to follow the judgment deliberately.
- Giving an explicit credit to the students by quoting them and trying not to take credit for the contribution that students have made by giving the intention for the content of the conversation that the teacher had prepared previously.

These features clearly show the importance of teachers in the process of teaching and learning a language. With the other extents, Brown (2009) suggested teachers should focus on three characteristics as a prompter, participant, and feedback giver.

- As a prompter, teachers can let learners tackle their problem to encourage them to find out the appropriate solution. Learners can recognize the mistakes with their fluency and pronunciation by self-awareness or from their peers. Moreover, teachers can help learners when they are in shortage of ideas to take part in speaking activities.
- As a participant, teachers play the role of instructors and models for learners to know how to complete the speaking tasks when taking part in the classroom activities.

As a feedback giver, teachers should give immediate feedbacks to stimulate learners when learners express their ideas and opinions or make presentation on some topics. The feedback should be carefully chosen and positive so that learners were not demotivated when learning speaking.

### **2.1.7. Components of Teaching Speaking**

Carrasquillo (1994) presents five components which are considered carefully when teachers teach speaking, namely:

- Pronunciation

It is widely known that pronunciation is a useful technique for pupils to create clearer language during the speaking process. It means that learners can communicate efficiently when they have decent pronunciation and intonation in spite of having inadequate vocabulary and grammar. Pronunciation could be mentioned with the traditional or regular expression of words (Kline, 2001, p.69). Furthermore, according to Gilbert (2008, p.1), English articulation is not a mastery of sounds or isolated words. As an alternative, it is related to learning and applying the way of making a speaker's opinions and feelings become easier for listeners to follow. In addition, pronunciation comprises all those characteristics of speech which is an intelligible flow of speech, including "segmental articulation, rhythm, intonation and phrasing, and more peripherally even gesture, body language and eye contact." (Fraser, 2001, p.6).

- Grammar

Grammar is necessary for the students to create an appropriate expression in conversation, both in written and oral forms. In general, the definition of grammar can be given as an organized way of accounting for and forecasting a model knowledge of the language of both speakers and listeners, which is done by a set of instructions or philosophies that can be used to create all well-formed or grammatical utterances in the language (Purpura, 2004, p.6).

On the other hand, according to Batko (2004, p.24), grammar refers to the fundamental principles and structure of the language, including clear and correct sentence construction and the proper forms of words. Having an agreement with this opinion, Harmer (2001, p.12) noted that the grammar aspect of a language, especially second language, is the portrayal of the techniques in which words can be under a modification in their forms and jointed into sentences in that language. Because of its function, grammar is used to avoid misapprehension among members of a conversation.



- Vocabulary

Vocabulary is considered the most significant thing in a language, especially in speaking because the more words the students know, the easier they get to express their thoughts, emotional states and ideas in both oral or written form. According to Turk (2003, p.87), in spoken language, the vocabulary tends to be familiar and aims at daily-life use. It means that in spoken language, the vocabulary used have to be very acquainted and used in everyday conversation on the purpose of understanding the spoken discourse. In order to use words in speaking proficiently, students need to remember their meanings, spelling and pronunciation. Consequently, when teaching vocabulary, the teachers need to make certain that the explanation of the meaning, as well as the spelling and pronunciation are conveyed correctly.

- Fluency

According to Pollard (2008, p.16), fluency is defined as the capability to speak fluently, confidently and accurately. Generally, it refers to the expression of oral language freely without pause or stoppage. In the process of teaching and learning speaking skills, if the teacher wants to check how fluent his or her student is, he or she can let them express themselves freely and see the level of interruption from the speech. However, the teacher should not fix the mistake immediately; he or she should encourage the students and praise them if necessary.

- Comprehension

Comprehension is a capability to observe and process sections of discourse, to express demonstrations of the meaning of sentences. Comprehension of a second language is harder to study because it must be inferred from obvious verbal and nonverbal answers, by artificial instruments, or by the awareness of the teacher. On the other hand, comprehension also mentions that members can fully comprehend the nature of the educational program, even when processes are complex and entail risks (Cohen, 2005, p.51).

## 2.2. Communicative Language Teaching

The history of language learning and teaching methods has experienced many changes with many approaches such as Grammar - Translation Method, Audio lingual Method, the Total Physical Response, the Natural Approach, and, etc. Communicative Language Teaching (CLT) is the latest influence on teaching methodology which has been put forth around the world as an innovative approach to teach English as a second or foreign language.

\* Nunan's definition of CLT:

“CLT views language as a system for the expression of meaning. Activities involve oral communication, carrying out meaningful tasks and using language that is meaningful to learners. Objectives reflect the need of the learners: they include functional skills as well as linguistic objectives. The learners' role is as a negotiator and integrator. The teachers' role is as a facilitator of the communication process. Materials promote communicative language use; they are task - based and authentic.” (Nunan, D, 1989:194)

\* Characteristics of CLT:

Nunan, D (1991:279) offered five characteristic features of CLT:

- *The introduction of authentic texts into the learning situation.*
- *An emphasis on learning to communicate through interaction in the target language.*
- *The provision of opportunities for learners to focus not only on language but also on the learning process itself.*
- *An enhancement of the learners owns experience as important contributing elements to classroom learning.*
- *An attempt to link classroom language with language activation outside the classroom.*

Communicative Language Teaching is an approach which proposes that language learning should be done in a meaningful setting with authentic language as the input. It is an umbrella term which consists of an array of methods and techniques (Parrish, 2004). According to Lindsay and Knight (2006, p.20), this approach is based on the view that language is learnt in order to communicate effectively “in the world outside the classroom.” It emphasizes on meaningful use of language for communication, rather than on the form and structure; hence the term “real-life” communication in the classroom (Brown, 2000). Savignon (2001, p.13) describes CLT as the “new”, “innovative” way of teaching English as a second or foreign language as it deals with “the interactive nature of communication.” CLT puts an importance on fluency and ability to communicate in a variety of settings and in a variety of ways. Nguyen (2010, p.209) points out that “CLT may currently be considered and accepted as an inclusive approach

to language teaching, which encompasses various approaches and methods, motivations for learning English, types of teachers and the needs of individual classrooms and students themselves; it is learner-centered and emphasizes communication in real-life situations." CLT emphasizes on contextualized, meaning-based instructions and the use of authentic materials, as well as maximum learner interaction (Parrish, 2004).

According to the principles of the CLT, the learners do not study only the linguistic structures and the rules of grammar, but it stressed the importance of using language for communication (Allwright, 1978; Cambell, 1972; Numan, 1991; Richards & Rodgers, 1995; Savignon, 1991). Besides, Johnson (1981) suggested while studying, students must try to communicate with their peers and try to make them understand what they have said. Furthermore, teaching English for communication is to emphasize the language competence for learners and they must try to communicate in real situation (Murphy, 1991). As such, it could be included that in order to teach language for communicative purposes, the teacher must put the emphasis on the students' communicative competence to use it in real communications.

The English text book for grade 10 follows this dominating approach. It was designed with a view to developing students' communicative skills at basic level: speaking, listening, reading and writing as well as providing students with appropriate, systematic and basic knowledge of English. With this approach, the need for communicative proficiency is focused on rather than mere mastery of structures. However, those activities in English 10 did not meet the demand of communicative proficiency. Then, the researcher used PBL, and found that it was really a good teaching practice to help students develop their communicative competence.

### 2.3. Concepts of Project-based Learning

#### 2.3.1. Definitions of project-based learning

Project-based learning approach is a teaching method which is studied by many experts. So it also is defined in many different ways. Each definition shows the underlying theories or perspectives that the authors study and assume. Here are some definitions of project-based learning.

Carter and Thomas (1986, p.196) characterized project work with three features referring to the venue, the inter-disciplined characteristic and student's autonomy:

- i) it takes place outside the classroom
- ii) it is cross-curricular
- iii) it allows learners to set their own targets as they proceed.

Moss, D. and Duzer, V.C. (1998, p.1) defined that "*PBL is an instructional approach that contextualizes learning by presenting learners with problems to solve or products to develop*". Accordingly, the essential feature of project-based approach is a tangible and visible result such as a product or a solution to a defined problem.

There are a range of terms which both refer to project-based learning such as experiential learning and negotiated language learning (Eyring, 2001; Legutke & Thomas, 1991), project method (Kilpatrick, 1926), project approach (Diffily, 1996); and investigative research (Kenny, 1993).

Additionally, many specialists from various countries have afforded to give definitions of this approach.

PBL is defined as an oriented model which requires students to explore matters; ending in authentic results. More specifically, projects can be expanded in terms of scope as well as involved aspects with the aim of increasing learning opportunities at school. The writer also emphasizes that learners should be acted and experienced in some important roles like decision maker, problem solver and investigator (Blumenfeld, 1991).

According to Legutke and Thomas (1991, p.160), PBL is not an available method but an "educational philosophy which aims at providing the direction, and some possible routes, to a more democratic and participatory society". In other words, it is the learners' duty to base on instructional steps to create their own products and deal with troubles by themselves.

Also, Beckett (2002) regards a project work as a lasting activity which consists of both personal and collaborative tasks, namely building up inquiry questions and schedule as well as gathering and analyzing data. He states that students have a choice to report collected information in oral or written form.

In addition, it is claimed by Haines (1989) that projects, multi-competence operations, attach special importance to topics rather than small details. Learners play a vital part in choosing appropriate fields and working approaches so that they can control the "end product". The writer convincingly concludes that project method helps students to "recycle" their existing knowledge by giving them "natural contexts".

Moreover, researchers are advised to consider typical types of projects when defining PBL. The first type named structured project in which teachers give their pupils available and specific methods. Thus, students just follow the indicated way for finding and tackling information. Besides, a semi-structured research method shows both project area and methodology providing that learners must be much more active and responsible for their studying process. In general, not only teacher but also students take charge in this kind of method.

Thirdly, learner-centered language target is the characteristic of an unstructured project. That means they are free to create and manage the learning timetable, content and methodology (Petersen, 2004).

In Petersen's viewpoint, the diverse ways of collecting data and where it is found also produce a number of projects. One of them is correspondence research through which messages are sent between people by using letters, phone calls and email. Another type is survey project that allows students to search for their favorite survey instruments, to gather necessary document and to analyze assembled ones. Last but not least, production project requires learners to work with materials such as boards, chalk, posters, slides and other visual and audible aids. Then, they are also asked to hand in reports, narrative work and brochures or to give a short oral presentation.

A clearer picture of PBL from the above definitions is that Project-Based Learning is engaging learning experiences that involve students in complex, real-world projects through which they develop and apply skills and knowledge. The outcomes can be identified up front but sometimes are only experiences to allocate resources such as time or materials.

### 2.3.2. Types of projects

Sarah North (1990) classifies projects into four categories based on the primary sources of data.

1. *Community projects*, in which students derive their information largely from local community, using methods such as observation, questionnaires, interviews and letter writing.
2. *Case studies*, in which students are provided with specific documents (real or imaginary) relating to a particular problem which has to be solved.
3. *Practical projects*, in which students are required to carry out practical work to reach their objectives, for example, producing a design, building a model or real object, carrying out an experiment, or the form of equipment and material.
4. *Library projects*, in which the main resource base is a library. Typically, students are expected to take a particular topic, read about it, and produce some kinds of written work.

### 2.3.3. Key features of Project-Based Learning

There are 6 key features of PBL offered by *Stoller's* (2007: 4-5). These are as follows:

1. *Project work focuses on content learning rather than on specific language targets. Real-world subject matter and topics of interest to students can become central to projects.*
2. *Project work is student-centered, though the teacher plays a major role in offering support and guidance throughout the process.*
3. *Project work is cooperative rather than competitive. Students can work on their own, in small groups, or as a class to complete a project, sharing resources, ideas, and expertise along the way.*
4. *Project work leads to the authentic integration of skills and processing of information from varied sources, mirroring real-life tasks.*
5. *Project work culminates in an end product (e.g., an oral presentation, a poster session, a bulletin board display, a report, or a stage performance) that can be shared with others, giving the project a real purpose. The value of the project, however, lies not just in the final product but in the process of working towards the end point. Thus, project work has both a process and product orientation, and provides students with opportunities to focus on fluency and accuracy at different project-work stages.*

6. *Project work is potentially motivating, stimulating, empowering, and challenging. It usually results in building student confidence, self-esteem, and autonomy as well as improving students' language skills, content learning, and cognitive abilities.*

From the features of PBL, a wide range of benefits to both students and teachers are further clarified. A growing body of academic research supports the use of project-based learning in school to engage students, cut absenteeism, boost cooperative learning skills, and improve academic performance (George Lucas Educational Foundation, 2001).

For many students, the appeal of this learning style comes from the authenticity of the experience. Students take on the role and behavior of those working in a particular discipline. Whether they are making a documentary video about an environmental concern, designing a travel brochure to highlight sites of historical significance in their community, or developing a multimedia presentation about their interests, students are engaged in real-world activities that have significance beyond the classroom.

For teachers, additional benefits include enhanced professionalism and collaboration among colleagues, and opportunities to build relationships with students (Thomas, 2000). Additionally, many teachers are pleased to find a model that accommodates diverse learners by introducing a wider range of learning opportunities into the classroom.

Furthermore, an author named Bryson (2013) shows that PBL's features can be briefly summarized in the six A<sup>5</sup>s following terms:

❖ *Authenticity: Projects designed at schools are usually practical and applied programs. These approaches put the passion on students and enable them to work with "real world issues". Therefore, learners are likely to get excited with the topic they are caring about.*

❖ *Academic rigor: This feature refers to the basic requirement of PBL that asks students to keep in mind content standards and to think of the topic critically.*

❖ *Adult connections: Projects with adult connections characteristic inspire students through the meaningful involvement of adults beyond the classroom.*

❖ *Active exploration: This vital feature aims at motivating learners' creativity, enthusiasm »and willingness while learning subjects centered projects.*

❖ *Applied learning: Working with projects, pupils have to interact with various circumstances and use the target language immediately as well as apply useful skills to come up with the employer's expectation.*

❖ *Assessment practices: It is considered to be a good chance for students to receive useful evaluations and feedback not only during but also after the process of working with projects.*

Project-based learning owns a wide range of features which support students' learning process. Therefore, *teachers are recommended to master these characteristics and apply them to teaching method efficiently.*

### **2.3.4. Advantages and challenges of project-based learning**

#### **2.3.4.1. Advantages of project-based learning**

The benefits of PBL are numerous and well-documented.

According to Gallacher (2004), PBL has the following advantages:

1. Increased motivation - learners become personally involved in the project.
2. All four skills are integrated.
3. Autonomous learning is promoted as learners become more responsible for their own learning.
4. There are learning outcomes - learners have an end product.
5. Authentic tasks are given to learners.
6. Interpersonal relations are developed through working as a group.
7. Content and methodology can be decided between the learners and the teacher and within the group themselves so it is more learner-centered.
8. Learners can get help from parents for the project work thus involving the parents more in the child's learning.
9. A break from routine and the chance to do something different.

10. A context is established, which balances the need for fluency and accuracy.

Fried-Booth (1997), taking a more practical view of PBL, emphasizes that project work is a bridge between using English in class and using English in real life situations outside of class. From a learner-centered perspective, Thomas et. al. (1999) claim that the PBL can respond effectively to the needs of learners with varying skill levels and learning styles.

#### **2.3.4.2. Challenges of Project-based learning**

Though PBL is considered a profitable learning strategy, its implementation faces several challenges as projects are complex endeavors involving many different activities. In fact, there still exists a lot of criticism concerning the successful use of project-based instruction. Beckett G. H. & Slater T. point out that according to Eyring (1989)'s study, the students from the project class appeared to be "*dissatisfied with the project approach to teaching ESL because they did not think that these tasks were worthwhile pursuits in ESL classes*" (p. 109) A similar finding was also uncovered in Beckett (1999) and Moulton and Holmes (2000). The reasons for student dissatisfaction with the PBL are quite complex, reflecting potentially different philosophical, cultural and linguistic beliefs held by the teacher and the students.

As for the students, a number of difficulties have been reported in Thomas (2000). The first and most prevalent challenge is their *lack of necessary skills to conduct a scientific study* such as initiating inquiry or generating meaningful research questions, managing complexity and time, analyzing data and developing a logical argument to support claims. Another challenge to students is *access to technology and needed materials* and the last difficulty pointed out by those studies reviewed in Thomas (2000) is *ineffective group work*, or the failure to work collaboratively with other members in their groups.

Gallacher (2004) has pointed out that despite its advantages, PBL has some drawbacks, especially in a language class such as the excessive use of the first language, the different speeds of different students and the control on actual learning with lazy students when they have much freedom in doing project.

According to Thomas (2000), there are three kinds of challenges involving students, teachers and school factors. However, the author only focus on the students' problems as it is the centre of discussion in this study. The first challenge encountered by learners is the students' failure to work in a team. The second is the students' lack of skills to conduct a scientific study such as generating meaningful scientific questions, managing complexity and time, transforming data, and developing a logical argument to support claims.

In conclusion, students will face many challenges in doing a project. However, being aware of these challenges will help them minimize the intervention of these challenges to the success of a project.

#### **2.3.5. Process of Project-based Work**

Project work is multi-staged and the division of stages may vary from researcher to researcher. Stoller (2002) divides the process of project work development into five stages: *Selection of topic and idea generation, organisation of ideas and identification of areas of enquiry; research and information gathering; compilation and analysis of information; publication, presentation and evaluation of project.* Hedge (1998) gives very clear guidance on how to carry out a practical project which include six stages: *orientation; preparation and planning; implementation; collation; presentation; and reflection.* Within the context of English language teaching, I take Diana Curtis' view which divides the project into three phases: orientation and planning; research and implementation; sharing results.

##### *Phase 1: Orientation and planning*

According to Curtis (2001), this phase involves initial discussion of a topic in certain groups. All students are involved by brainstorming, sharing ideas related to the topic, making the final decision. During this phase, new issues and topics that are appropriate for language learning may arouse (Moss & Van Duzer, 1998) and it is these ideas that help them to study the language better. Gallacher (n.d) proposes some guidelines that teachers can use to help their students work out their plan:

- What they want to include in the project
- What form it will take
- Who will be responsible for what
- An idea of the time it will take to introduce each part of the project
- Any material or resources they might need

### *Phase 2: Research and implementation*

After making the final decision on the project topic and working out a plan for the project, students move on to the next phase. This phase involves mostly such activities as research, fieldwork, sessions with experts and various aspects of gathering information, reading, writing, drawing, and computing (Curtis, 2001). This is an important stage for language learning and skill development as various skills will be needed for the completion of the project. Although students work mostly on their own or in their group, the teacher must be aware of and perform their role as an instructor, a consultant, a facilitator, and even a group member. He/She must decide on when, where and how much he/she should support the students. This support, in Moss and Van Duzer's view, may take the form of language structures and skills, problem-solving strategies, and methods for developing plans (Moss and Van Duzer, 1998).

### *Phase 3: Sharing results*

This is the final phase occurring when students have accomplished their project and it can be in the form of group presentation or disseminating the results in the larger community (Moss and Van Duzer, 1998). Hedge (1998) uses other terms, *presentation and reflection*, and makes a clear distinction between these two ways of sharing results. Students will 'listen' to others presenting in the former and 'read' other writing in the latter. However, these authors and some others such as Curtis (2001), Gallacher (n.d) share a belief that the most common way of sharing results is the presentation of the project to an audience. This is the last but not least important stage as students, by giving their own presentation, can improve their presentation skills and, by attending other groups' presentation, can learn a lot from others.

The teacher, again, plays an important role as it is he who will make a summary and comment on the presentation. By doing so, he will help enhance students' process of language learning and knowledge widening. What's more, an evaluation will be made by the teacher after the presentation of the project and this is one of the main sources of motivation for students.

## III. METHODOLOGY

This chapter focuses on using the methodology for the study basing on applying Project-based learning to improve the students' speaking skills at Dong Nai Technology University. Besides, this chapter gives the rationale for the choice of the research methods employed by the study. It also clarifies information on the participants, instruments, procedures, and data collection and data analysis instruments.

### 3.1. Research Setting

Dong Nai Technology University is a private school located in Bien Hoa city, Dong Nai Province. It was established by Phan Ngoc Son, Ph.D after the Decision No. 929/ QD – TTG of the Prime Minister, June 16<sup>th</sup>, 2016.

The forerunner of Dong Nai Technology University is Dong Nai College of Technology, established on October 3<sup>rd</sup>, 2005. At present, the university provides training in various fields of science and technology, technology, construction, nursing, automobile technology, English language, including: university and graduate. With fresh and friendly environment and modern technology applied in teaching and learning, a thousand of students are attending at this university with many different majors and more than three hundred lecturers and specialists are working here. And teaching English is a big problem for the university.

At Faculty of foreign languages, there are about 37 lectures being in charge of teaching English for the entire students at the university. To do this, the lecturers must try their best to gain the assignment and purposes of the faculty of foreign languages. As everyone knows that English is important at this school and has been taught as a compulsory subject to all students, they only learn English to pass the exams and they do care much about what level they can get after studying. So when they become the first-year students, their English knowledge and English skills are a big hole. Hence, being an English lecturer, I must find the ways to solve a number of difficulties in teaching skills such as reading, listening, speaking and writing, especially speaking skills. When they were in schools, they just focused on grammar, reading and comprehension, vocabulary, sometimes listening. They did not have much time for speaking, communicating and the environment for speaking practicing is almost zero. With above reasons, they feel scared and unconfident when they speak something in English. Moreover, most of the students live in rural areas so they do not have chance to study at English center and meet native speakers. So speaking English is one of their biggest disadvantages.

To help the students improve Speaking skills, the researcher will carry out the project names applying Project – based learning in the English classroom. This is a project for a trial class. The class applied PBL for the trial project is class code 0070133 at Dong Nai Technology University. And the students are the first-year students. They belong to different faculties at University. They are

non-majored English students..

### **3.2. Participants**

#### **3.2.1. The Researcher**

The researcher attended at University of Social Sciences and Humanities. His major was English Linguistics and Literature. He graduated from the University in 2013. After graduation, he worked for some companies with full time job. In the evening, he has been taught English at Some English centers since 2013. With the passion for teaching, he applied for Lecturer Position. So far, he has been teaching English at Dong Nai Technology University for near 3 years. At present, he is taking an M.A course in English Language in Graduate Academy of Social Sciences.

During carrying the project, the researcher and two other lecturers are observers in the study. During the first two weeks of the third semester of school year 2018-2019, the teacher will teach and observe the class to collect initial data. In the English Division for pre-test, the researcher will identify the weaknesses and difficulties of students in speaking English. In the action stage, he and two supported lecturers will observe the class when applying PBL in learning to elicit data on the effectiveness of the action adopted.

#### **3.2.2. The Teachers**

There are more than 300 lecturers and specialists are working Dong Nai Technology University. In particular, at Faculty of foreign languages, there are about 37 lectures being in charge of teaching English for the entire students at the university. The average age is 30. They are really young. They are enthusiastic in teaching, learning and applying the new methods in teaching English. They always support and learn from each other to improve their teaching quality.

#### **3.2.3. The Students**

Most of students at Dong Nai University come from the countryside and rural province. In the past, when they studied at secondary school and high school, they just focused on grammar and reading comprehension to get marks and pass the exams. They did not have much time for speaking and listening. They also did not have chances to study English at English centers and environment for practicing speaking. On the other hand, they did not know the importance of Speaking English in modern society, especially for work in the future. As a result, they did not spend much time on practicing speaking English. The result of this problem is that their speaking ability is a serious problem, needs to be improved immediately. When they become students at the University, they luckily know the importance of Speaking English. They really desire that they can improve their speaking skills to pass the special exams and have enough ability to speak English to answer the question in the interview but most of them still feel bored with learning it. They think speaking is very difficult and feel unconfident when speaking it. So they do not have motivation in learning speaking lessons. Besides that, some students are really interested in speaking activities when they can speak something. This is a good signal for the researcher to have more motivation to carry out this project.

The students applied PBL for the trial project is class code 0070133 at Dong Nai Technology University. And the students are 30 first-year non-major English students. They belong to different faculties at University.

### **3.3. Data Collection Instruments**

Data collection instruments are the really important part in the study. It plays an important role in collecting exact data. So we should mention clearly the data collection instruments which were used to collect the data, analyze and find out the result of the study. The questionnaire is used to evaluate the students' attitude to the project-based learning and the problems which the students have when PBL applied in speaking lessons. The pre-test, post-test is used to evaluate the improvement of the students' speaking ability after applying PBL in teaching speaking skills. The interview is used to discover the opinion and attitude of the lecturers join in the project, and CEFR speaking skill assessments were used to give students' scores basing on their oral tests. All instruments above support collecting the basic data effectively. Action research is a very good method for this research. It is chose as the main method in collecting data. With these data collection instruments and action research method are used in the study, hopefully we can collect the exact data for analyzing to find out the best result for the study. Each instrument is useful in each stage of the action. They combine and support each other to collect the best data. From that, we have the reliable result for the study from analyzing the best data collected.

#### **3.3.1. Speaking test**

To evaluate students' speaking ability before applying project-based learning and after applying project-based learning, speaking

test really needs to be used in the project as an instrument to collect the data. In this part, speaking tests were divided into two parts: pre-test used before PBL applied in speaking lessons and post-test after PBL applied in speaking lessons. From the scores of the two speaking tests, we can analyze the result to verify PBL is really effective or ineffective in helping the students improve their speaking skills. Besides that we can also find out the advantages and disadvantages of PBL. Then we can make some changes to perfect our speaking lessons and our new method.

Pre-test and post-test were designed as the same model. In each test, there were three parts with different language functions and situations, including greeting, exchanging information and discussing and persuading. The tests were expected to meet the CEFR's demands at B1 level.

The evaluating and giving score were based on the B1 Level Assessment Scales of the CEFR with the appropriate Scoring Rubric for Oral Presentations (see Appendix 4). The components of assessment included Behavior, Fluency - Pronunciation, Grammar, Vocabulary - Ideas. The researcher invited two other English lecturers at DNTU to be examiners. Thirty students were requested to make each pair in speaking test. Each pair of students' speaking ability would be tested by two teachers. The two examiners rated the criteria according to the students' performances with English Speaking Ability Evaluation (see Appendix 5). Each lecturer evaluates and gives scores to each student. After having the scores from the tests, the researcher will calculate the index of the correlation of all items by using Means scores. From the data collected, the researcher will analyze and evaluate the effectiveness of PBL. After the researcher can adjust some points in Project-based learning if it is necessary.

### 3.3.2. Questionnaires

In almost studies, the questionnaire is an integral part in collecting the primary sources of the data in the research. Many experts have studied about the importance of questionnaires in the study. According to Richards & Schmidt (2002) designing questionnaire was very important, they strongly advised that the researcher should ensure that the questionnaire is "valid, reliable and unambiguous" (p. 438). Nevertheless, Salkind (2003), questionnaire is considered as a useful tool in doing the educational research because "individuals can complete them without any direct assistance or intervention from the researchers". Nunan (1999), he has his own opinion about the questionnaire: "The important issue in closed-ended questions is that the responses to these types of questions will more accurately reflect what the respondent wants to say" (p. 143). Besides, Seliger and Shohamy (1989) though that closed-ended questionnaires were more effective than the normal questionnaire because they were easy to get the data for analysis.

To collect and have good data, designing the questionnaire met the objective of study is really important. So the researcher must design the questionnaire so that he can get the necessary information from the students' answer and help save time for the researcher and the participants in this part. In this research, the questionnaire is considered as a primary tool in collecting data. The questionnaire is designed to make the participants find easiest to understand and give the best response to the given question. The answers to the questions are designed by the option(s) A, B, C, D, and E. Options depended on the questions and extent of the answers. The participants just choose one of options. In some cases, they can choose more than one option. All participants must answer all the questions in the questionnaires.

In data collection instruments, the first questionnaire (Appendix 2) in total has seven questions concerning the first - year student' opinions about learning speaking lessons and their feedbacks on the English lecturer's activities. The second questionnaire (Appendix 7) consists of five questions related to the students' attitudes to the activities of projected-based learning applied in the optional lessons and their improvement in speaking skills.

After collecting the answer in the questionnaires for students of the class which has class code 0070133, the researcher should focus on the students' answers to find out the answer to the first research questions: "What is the first-year students' attitude to project-based learning at Dong Nai Technology University in speaking lessons?"

### 3.3.3. Interviews

The next data collection instrument is interviews. Interview is considered one of the useful tools in collecting data. With this tool, we can have reliable data, we can know the attitude of the participants in the interviews. There is much theory from the experts study about the interviews. Burns (1999) said that "Interviews are a popular and widely used means of collecting qualitative data" (p. 118). According to Salkind (2003). Interviews was really good tool to help researchers "get better response and more accurate data". During the process of the study, interviews were applied after the Project-based learning had been applied in the trial lessons and after the post-trying out test. Interview can normally be conducted in two forms: the first one was person-to-person, and the



second one was group or collective formats. Besides, Merriam (1998) stated that both of these forms of interview were a kind of goal-oriented conversation. In the interview part, the interview was conducted by the researcher as the interviewer and two English lecturers as two interviewees at a different convenient time after the trial lessons to get more objective, exact opinions and feedbacks about learning speaking with Project-based learning. With the semi-structured interviews (Appendix 7), the researcher hope to get information about the difficulties, interests, advantages from the students after applying Project-based learning technique and discover their desire. During the interview, all information and the answers are noted carefully.

### 3.4. Research Design

After learning about some kinds of methods used studies, the researcher chose Action Research (AR) approach to use in this study. The researcher hoped that with this kind of research, the researcher could exactly find out the difficulties of the students in speaking skills. Besides, identifying the students' attitude to the project-based learning technique was really important. And the last thing, hopefully, this kind of research could help examine the effectiveness of PBL in improving the students' speaking ability. The research was carried out at class which had class code 0070133 at Dong Nai Technology University.

In doing research, choosing a research method will decide the study get successful or unsuccessful. So choosing the right research method is extreme important thing. The researcher chose an Action research method as a main method used in this study after learning about it carefully. This method has been used in many today's educational studies. Many scholars and experts have studied this method. They have given lots of theory about Action Research, also its application. Here is some theory for references. According to Cohen & Marion (1980), Action research was situational or content-based, collaborative, participatory, and self- evaluative. In this method, each part connects each other to make the process of research. Nunan (1998) believed that Action Research was "problem focused", and mainly "concerned with a single case in a specific situation". It helped find solutions to the main problems. Teachers could compare methods and ideas with a critical eye, and to adopt these ideas in teaching environment by using Action Research. Richards, as cited in Brenner (1993) added that Action Research also engaged teachers in their teaching in a deep way.

According to Burns (1999), in the action research, teachers must perform two functions the primary researchers and practitioners as the same time. Classroom activities were performed to find out the problem and result was based on the classroom activities between the students and teachers. And Richards & Lockhart (1994), they said that action research was a kind of studies which the researcher carried out it in the classroom to evaluate exactly about the classroom and improve classroom activities. Stringer (1996) has indicated that action research is closely linked with theory and practice as well as reflection.

Nunan (1992) defined that AR was a method which focused on find the problems of the study. It connected closely to a single case in the particular situation. It encouraged both teacher and the students in classroom activities. It helped the researcher observe and find out the solution for teaching activities. The research could compare the methods and effectiveness by Action research. From that, teaching activities were adjusted to gain the purposes in teaching. According to Kemmis, McTaggart and Nixon (2014), they supposed that action research was a deliberate research method. It led the researcher to investigate in oriented solution to identify the problem. This method could be conducted by individual or a group. It owned the complex cycles. It helped identify the problem, collect and classify, analyze and give the reflection base on the result, adjust the action base on the result discovered, and redefine the problems. The term "action" and "research" had the particular link. From doing trial activities, then analyzing the result of action research, the solutions were found out to gain the purposes: increasing knowledge, gaining positive teaching and learning results. .

The teacher was individual who derived the action research process. The teacher should also "engaging in meaningful reflection and discussion with colleagues". From these activities, Action research could bring the benefits to the teachers in improving teaching and having useful experiences and to the students in helping them improve their learning and attitude (Arhar et al., 2001; Wallace, 1998). Action research was also considered as a bridge to connect between research theory (the theoretical) and practical action (the empirical) checked the link and effectiveness by the practitioners – researchers (Arhar, Holly & Kasten, 2001). In an action research, an individual or a group of participants could be the researcher. There were many people join in the action activities such as researcher, colleagues as observers, students. All the participants in the project were closely connected to each other to make a cooperative community. During carrying the process of action research, the researcher –teacher should observe, listen to the students to identify their feedbacks, attitude, opinion and improvement to collect reliable data. So action research was considered as teamwork. It was combination among the researcher-as-researcher, the students, and the colleagues (Arhar et al., 2001) to bring the improvement in education. This action at the same time helped improve personal growth, the collective profession for the teachers and students. This

was meaningful to communities, institutions or society. And Reason (2004) defined that action research in the study was a potential instrument in changing the opinion of individual and group during the process of action, helped them improve themselves.

From the definitions of experts above, Action research is a good solution in improving teacher's teaching technique in classroom in education setting. Action research focuses on the action and activities. Action research helps the researcher solve the problems through the steps and detailed plan to find out the ways to get the answer for the research.

In this study, the researcher chooses Action research as the methodology to support in finding the result of the research because it has strong advantages. The first thing, Action research is in general useful to teaching and learning. It is suitable for this research which the subjects and purpose consist of the students and lecturers. Cohen and Marion (1980) stated that action research happened in the classroom when one teacher as the researcher, carried out the project with his classroom since he found that it helped improve his teaching experience and students' learning. So AR was said that it could help improve teaching method. The second thing, AR brings benefit to the researcher – lecturer and the students in the classroom. AR helps the researcher evaluate exactly what is happening in classroom. From that, the research considers the teaching method to change to get the better result if it is necessary. Moreover, the researcher can also identify the attitude and cooperation of the students in lessons. According to Gibbs (1995, p.18), he said that this change was “a change essential for sustained pedagogical development”. Action research is also meaningful to the students in some cases. They have the chance to try on learning with new methods. This thing maybe is useful for them in improve their learning effectively. With two worthy benefits above, AR is surely chosen as the best method to carry out in finding the result of the study. It can help the teacher and students improve the skills which they need, especially teaching and learning speaking English.

After referring the theory about Action research of experts, Action is evaluated as the most suitable type of researches for this study. The stages in Action research are detailed. Each step is planned in the schedule carefully. Action research focuses on the activities and tools to find out the answer to the research questions. Action research can help the researcher recognize the problems. From that, the researcher can use tools in action research to solve the problems. At the result, Action research brings the benefit to the participants. By using survey questionnaire, pre-test, post-test, observation and interview, the researcher can identify the difficulties of the student, the improvement of students' speaking ability, the attitude of students to the project-based learning, the cooperation of the students in the project, the opinion of observers to PBL. From the strong advantages, the researcher is confident to choose the Action research as the main type of research in this study. With the hope, this kind of research can help the students improve their speaking skills and have a positive attitude to speaking lessons.

The researcher finds that the theory of action research of Kemmis and Mc (1988) is suitable to the lecture to carry out the project. They proposed the model in action research with four main steps: Planning, acting, observing, and reflecting. To have the good planning, the researcher adds one step – predicting. This helps save time and directs the researcher on the right way to find the result. The next step, the four phases are detailed. The outline below shows us the action research procedure of the study on detail.

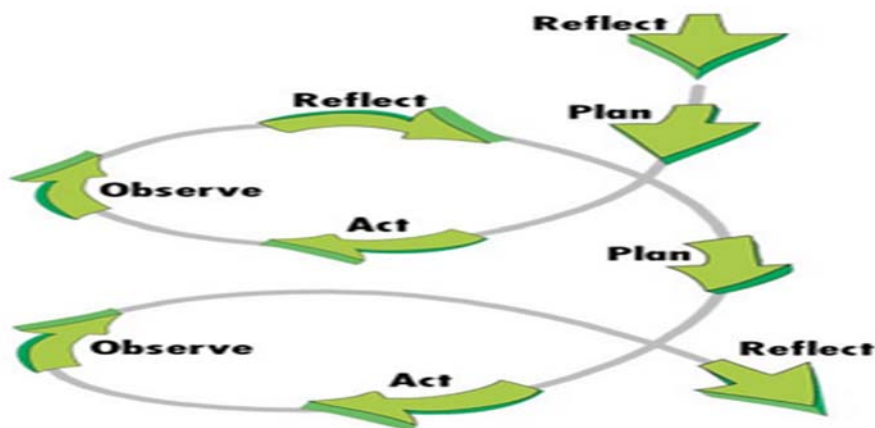


Figure 1: Action research cycle (Kemmis & Mc Taggart, 1988)

### 3.5. Research Procedures

Research procedure shows us steps in each stage, help us gain the purposes when applying action research in the classroom. In this study, the cycle's procedure of action research includes these phases:

### 3.5.1. Phase 1: Planning

Planning plays a very important role in Action Research in the classroom. Planning should be planned clearly. Orientation and detailed plan are extremely important in determine the success of the study. Having good planning, we can do the next step easily. In the project-based learning activity, the students – learners are the center of the classroom. Excepting the activities in the classroom, the students have to learn out lots of out-of-class activities to complete the assignment. The lecturer should carefully prepare necessary things before directing the students to do the steps in their project. Here are the things needs to be prepared:

- Designing the survey questionnaires to evaluate the students' attitudes toward speaking lessons before and after applying Project-based learning in classroom.
- Designing the lesson plan for project.
- Designing the classroom observation sheet in order to take notes the teaching situation when the strategy of the learning process is conducted.
- Preparing Pre-test and post-test, semi-structured interview to test the improvement of the students' speaking ability after PBL applied in speaking lessons.
- Requesting the students to make some groups to carry the project and giving them clear instructions on how to complete, the way to evaluate the contribution on the project of each member in each group.
- Give the students the basic knowledge of project-base learning and things students must do in this project

### 3.5.2. Phase 2: Action

In the second phase of the study, we carry out the steps to find out the answers to the two research questions. In action part, we need to do many things. The first thing, we must design the survey questions which helps the researcher find out the answer to the first question in the research questions of the study. The researcher should make the questions focus on identify the students' attitude to project-based learning. Then, the survey questionnaires are delivered to 30 students of the class which has class code 0070133. The survey questionnaires are written in English, so to make the students feel easy to answer the survey questionnaires, the researcher should translate the survey questionnaire into Vietnamese, guide and clarify some points in case the students are not clear. And the purpose of this survey questionnaire is also told to the students. With that way, we can get the exact data from their answers.

To find out the answer to the second question of the research questions, the researcher must conduct the other steps, involving pre-test, trial lessons and post-test. Designing the pre-test is very important. The researcher must design how to evaluate exactly the 30 student's speaking ability in the class which has class code 0070133 before teaching the trial lessons. In the pre-test, the students are asked to take part in the test in pairs. The examiners are two other English lecturers at Dong Nai Technology University. After the test is completed, the researcher conducts to teach trial lessons with Project-based learning techniques. The lecturer will supply some given topics for each student group choose, and then give the students clear instructions for doing their project.

About the topics for the presentation in front of the class, the lecturer-researcher provides some basic topics based on the themes of the textbook named I-discovery 1. (The kind of hobbies). Then, each group chooses two topics which they think they can do them well. After getting the topic, each group carries out doing the project. The leader in each group will divide the task into smaller parts. Each member in the group will undertake one part. The leader summarizes all the information from each member, then the group discusses and prepares for the presentation. As planned, 30 students are divided into 6 groups. Each two weeks, each group will present their project. Each group will make a presentation in front of the class in about 15 minutes (including asking and answering part). Two or three groups will present their project each week. After each presentation, the lecturer will give the feedback on their presentation and direct them how to get better presentation and speaking skills if it is necessary for the next turn

After all groups complete the presentation, students will take the post-test to evaluate the effective of PBL in teaching speaking skills. and the post-trying out questionnaires are also delivered to the students to evaluate what students gain from PBL. Besides, two lecturers as observers in the class will be interviewed to express their opinions of the effectiveness of project-based learning which is applied in the speaking lessons.

### 3.5.3. Phase 3: Observation

Observation is an important part in Action research. Observation or Field Note is one of the methods which helps the researcher collect data in class directly. When a new teaching method is applied in class, it is necessary to evaluate both students and teachers on their opinion, attitude and cooperation; Another lecturer will evaluate base on the observation sheet and take notes for the important points. The observation sheet focuses on the quality of the lesson, feelings, thoughts, attitude and cooperation of the participants in the lesson. According to Hopkins (1993), Field note was an effective method for reporting observation and reaction to classroom problems.

Table 2: Observation checklist

No.	Statement	Opinion	
		Yes	No
1	Teacher prepares the lessons well.		
2	Teacher can manage classroom conditions well.		
3	Teacher uses time effectively.		
4	The method used by the teacher is interesting.		
5	Teacher is friendly to the students.		
6	Teacher is able to use the technique well.		
7	Teacher explains the instructions clearly.		
8	Teacher anticipates the students' difficulties.		
9	Students pay attention to the teacher's explanations.		
10	Students understand the teacher's explanation.		
11	Students become active in the classroom.		
12	Students are able to present their project confidently.		
13	Students are brave to ask and answer.		
14	Students feel happy during the lessons.		
15	Students get bored during the lesson process.		

### 3.5.4. Phase 4: Reflection

Action Research is a series of activities done to gain the objectives of the study. So it requires the researcher having good preparation. The researcher must set up the detailed plan and make sure to keep a personal schedule during doing each stage of planning, acting, observing, reflecting, planning etc. To have the reliable result, each participant joining the activities must complete the task which is given well. The students are considered as the center of this activity. They are learners. The lecturer is in charge of directing for the students to do the project. Besides, two lecturers are considered as two observers during applying the new trial lessons. This reflection helps evaluate the level of completing the work of each person. The table below shows the action plan as detailed:

Table 3: Procedures of the study

Time	Phases of Action Research	Instruments
Week 1 (1/3- 4/3/2019)	Predicting	- Observing by the lecturer - Questionnaire and in-put test to identify the problems.

<p>Week 2-&gt; 11 (8/3-24/5/2019)</p>	<ul style="list-style-type: none"> <li>- Planning</li> <li>- Acting</li> <li>- Observing</li> </ul>	<ul style="list-style-type: none"> <li>- Listen to lecturer's instruction on how to carry out a project and explanation of assessment and evaluation.</li> <li>- Listen to lecturer's directions for presentation skills.</li> <li>- Sharing and agreeing on an outline</li> <li>- Prepare for the final presentation: editing, designing power point, preparing handouts, designing visual aids, etc.</li> <li>- Making 2 presentations in front of the class.</li> <li>- Lecturers observe students' improvement weekly and give the feedback on the presentations</li> <li>- Post- test for the final assessment.</li> <li>- Students answer post-trying out questionnaire. Two lecturers answer the interview.</li> </ul>
<p>Week 12 (25/05-31/05/2018)</p>	<ul style="list-style-type: none"> <li>- Reflecting</li> </ul>	<ul style="list-style-type: none"> <li>- The researcher analyzes data collected to evaluate the action plan.</li> </ul>

### 3.6. Data Analysis

This part mentions data collected and talks about the methods to analyze to find out the result of the research. In this part, figures, tables, charts, pie chart are used to show the result of each part. All kinds of data were analyzed to meet the requirements of this study. Both qualitative and quantitative methods are used in this action research method. The result from using these methods is more exact and reliable.

The questionnaire used with the aim is to identify the students' attitude to the project-based learning applied in speaking lessons. Each answer of the students will be collected and counted to fill in the statistic. From this data, we can calculate the percentage of each option chosen by students to illustrate in figures, or tables, or charts or pie charts. Next step, the researcher compares the percentage among the choices of the students to find out the attitude of the students to PBL: positive or negative

In giving scores for the pre-test and post-test, the examiners base on the scoring rubric for the speaking. After receiving the score sheet from the two examiners, the researcher computes, calculates and converts into mean scores basing on the total number of students participated. After doing the steps of data analysis process, the researcher finds out the mean scores, and then using that result – the mean score to evaluate the differences between pre-test and post-test to check the effectiveness of applying Project-based learning in improving the students' speaking ability.

To the interview, in this part, the feedback from the two lecturers joining the project is taken notes by citing relevant responses. After that, the researcher will analyze the data to find out the answer.

In summary, the data collected was summarized, analyzed, displayed, and interpreted to find out the findings of the study. After having the data from the students' answers in pre- and post- test scores, feedback from interviews and students' opinions, the researcher uses analysis and interpretations to clarify figures. From the figures of result in analysis, the researcher can evaluate to find out the result of the study.

## IV. CONCLUSION

The research's main purpose was to find out the answers to the two research questions. From the result of the survey questions, pre-test, post-test and interview questions, the study shows us the effectiveness of applying project-based learning in improving

students' speaking skills. The students have only the improvement of their speaking skills but also good attitude to the project-based learning. This is a good signal for both students and teachers. PBL is really good teaching speaking method to the other teacher and lectures. It should be widely applied in speaking lessons.

#### 4.1 Implications

After doing collecting and analyzing the data, the result of using Project-based Learning to improve the first-year students' English speaking skills showed that the researcher was in the right direction in finding the useful and effective teaching speaking method and the result met the aims of the study. So the result of this study suggests some practical implication for not only the English Lecturers and students at Dong Nai Technology University but also other teacher and lecturers and next researchers as follows:

Firstly, to English lecturers at Dong Nai University, English lecturers play an extreme important role in the students' success learning. The attitude and teaching method of the lecturers impact on the students' learning strongly. So using a good method in teaching speaking skills is necessary and needs to be applied to bring the best result for the students. With the positive result, the lecturers can confidently use project-based learning in teaching speaking to help the students improve their speaking abilities. Besides that, the lecturers should design more speaking activities in using Project-based learning to motivate the students and make them feel excited and happy in speaking lessons. Additionally, the lecturers should learn about the theory of PBL and master this method before applying it so that it can bring the best result when using it. One more thing, the lecturers can combine the traditional teaching method and PBL technique in each situation if PBL is supposed to be quite new to the students. In that way, the success of this method is obvious.

Secondly, to students at Dong Nai Technology University:

To students, succeeding in leaning requires that the attitude and awareness of the students are good. Excepting the help and support from the teacher and lecturers, they have to try their best, and have serious view in learning. Besides that, it also requires the right learning method. And the research showed that PLB is very useful and effective in learning speaking skills. It can help the students feel excited about the speaking lessons and help them improve speaking abilities well. To be good at speaking skills, the students must know the importance of English in modern society and take effort in learning it, especially leaning speaking skills because the good speaking ability is one of the strongest advantages in getting success in having a good job in the future. They should be enthusiasm and positive during the lessons. They also need other skills to support speaking skills such as pronunciation skills, listening skills, communication skills, reflection skills in communication so that they can feel confident in communication and speaking. Moreover, Project-based learning technique is not only useful and effective to learning speaking skills, but also good for leaning other skills of English and studying other subjects.

Finally, to the future researchers:

The research in helping improve English speaking skills is one of the practical topics. So there will have many other researchers interested in this topic. With the hope, the researchers who have the same problems in doing the research can get some benefits from the positive result of this study. They can consider this study as useful materials for references. From that, they can study deeply about their topics and bring the good and useful result.

#### 4.2 Limitations

During process of doing the study, some limitations were discovered. The first thing, the number of students participating in trial method – PBL was small and modest, just only one class with 30 students. The result of this study was positive, but it should not be considered as a large scale. The second thing, at the same time applying the trial method – PBL, the research still met the curriculum of Faculty of foreign languages. So the researcher and students did have much time for PBL as we desired. The students must do the test based on the format of the faculty for the final test, following the university's curriculum. The last thing, with the inconsiderable experience, short time for preparation and the limited knowledge of this PBL, doing research got much trouble.

From above limitations, the author hope that these limitations will solve well in the next studies of the future researchers in finding out the importance and effectiveness of using PBL in teaching speaking skills and motivating the students in learning Speaking English. And PBL is considered one of the most effective teaching speaking methods by English teachers and lecturers.

#### AUTHOR'S CONTRIBUTIONS

N.V. Duc, and D.C. Tinh contributed to the design and implementation of the research, to the analysis of the results. All authors discussed the results and commented on the manuscript. The author N. V. Duc edited and revised the final manuscript. All authors have read and agreed to the final manuscript.

#### COMPETING INTERESTS STATEMENT

Authors declare no conflicts of interest regarding the publication of this article.

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#### REFERENCES

- [1] Bailey, K.M. and Savage, L. (1994). *New ways in teaching Speaking*. Teachers of English to speakers of other languages, Inc.
- [2] Bielska, J. (2011). *Action Research in Teacher Development: An Overview of Research Methodology*. Wydawnictwo Uniwersytetu Slaskiego.
- [3] Brown, H.D. (2001) *Teaching by principles: An interactive Approach to language Pedagogy*. New – York: Longman.
- [4] Brown, H.D. (1994). *Teaching by principles: An interactive Approach to language Pedagogy*. New Jersey: Prentice Hall Regents.
- [5] Brown, G. and Yule, G. (1983). *Teaching the spoken language*. Cambridge University Press.
- [6] Chaney, A.L., Burk, T.L. (1998). *Teaching oral communication in Grades K-8*. Boston: Allyn and Bacon.
- [7] Bygate, M. (1998). *Foundations of second Language teaching*. Oxford: Oxford university press.
- [8] Doff, Adrian. (1987). *A training course for teachers: trainer's handbook*. Cambridge; New York: Cambridge University Press in association with the British Council, 1988.
- [9] Diehl, W., Grobe, T., Lopez, H., & Cabral, C. (1999). *Project-based learning: A strategy for teaching and learning*. Boston, MA: Center for Youth Development and Education, Corporation for Business, Work, and Learning
- [10] Donato, R. (1994). *Collective scaffolding in second language learning*. In J.P. Lantolf & G. Appel (Eds). *Vygotskian Approach to Second Language Research*. Norwood, N. J.: Ablex Publishing Corporation.
- [11] Evans, T.D. & St John, M.J. (1998). *Developments in ESP - a multi-disciplinary approach*. Cambridge: Cambridge University Press.
- [12] Felix, U. (1999). Web-based language learning: A window to the authentic world. In: Debski, R. and Levy, M. (eds), *WORLDCALL: Global Perspectives on Computer-Assisted Language Learning*. Amsterdam: Swets & Zeitlinger, 85-98.
- [13] Fried-Booth, D. (1982). Project work with advanced classes. *ELT Journal*. 36/2. 98-131.
- [14] Fried-Booth, D. (1997). *Project work (8th ed.)*. Oxford: Oxford University Press.
- [15] Gallacher, L. (2004). *Project work with teenagers*. Retrieved December 21, 2004, from British Council Teaching English website: <http://www.teachingenglish.org.uk/think/methodology/project-work.shtml>.
- [16] Harmer, J. (1991). *The Practice of English Language Teaching*. Longman.
- [17] Johnson, K. (1982). *Communicative Syllabus Design and Methodology*. Oxford Pergamon Institute of English.
- [18] Krajcik, J.S. et al (1998). Inquiry in project-based science classrooms: Initial attempts by middle school students. *The Journal of the Learning Sciences*, 7, 313-350. In [16] Thomas, J. W. (2000). *A review of research on project-based learning*. Retrieved on
- [19] Moss, D. & Van Duzer, C. (1998). *Project-based Learning for Adult English Language Learners*. National Clearinghouse for ESL Literacy Education Washington D.C.

[20] Nunan, D. (1989). *Designing Tasks for the Communicative Classroom*. Cambridge University Press.

[21] Nunan, D. (1991). *Language Teaching Methodology*. UK: Prentice- Hall International.

[22] Rivers, W. M (1981). *Teaching Foreign Language Skills*. University of Chicago Press.



# *Modes De Gestion Des Eaux De Boisson Dans La Commune De Natitingou*

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**Résumé** – Les offres de services fournis dans les domaines hydrauliques par les institutions étatiques décentralisées et les Organisations Non Gouvernementales sont loin de couvrir les demandes des populations en eau potable. L'objectif de cette étude est d'analyser les modes de gestion des ouvrages hydrauliques dans la commune de Natitingou.

De nature mixte, la démarche méthodologique de cette recherche a consisté à la détermination de la couverture en équipement hydraulique de la Commune de Natitingou et des stratégies de gestion utilisées par les acteurs concernés en s'appuyant sur une approche intégrant les données qualitatives et statistiques qui ont été recueillies à l'aide des outils et techniques de collecte de données empiriques. Elle a porté sur cent cinquante (165) personnes identifiées grâce aux techniques d'échantillonnage de choix raisonné et aléatoire.

L'analyse des résultats a révélé que la commune bien qu'ayant une bonne couverture en équipements hydrauliques, souffre du faible accès des populations rurales à l'eau dû aux modes de gestion dans la commune. Il ressort des analyses que le mode de gestion des ouvrages hydrauliques dans la commune favorise la détérioration et la faible pérennisation des équipements et réduit le taux de desserte dans la commune. En lien, les principaux modes de gestion des eaux de boisson aussi bien au niveau des acteurs directement impliqués et des populations elles-mêmes, participent à la survenue des maladies hydriques.

**Mots clés** – Mode de gestion, eaux de boisson, assainissement, Natitingou.

**Abstract** – Offers of water services provided by decentralized state institutions and non-governmental organizations are far from covering the demands of the population for drinking water. The objective of this study is to analyze the management methods of hydraulic structures in the municipality of Natitingou.

The methodological approach of this research consisted in determining the hydraulic equipment cover of the Municipality of Natitingou and the management strategies used by the actors concerned, based on an approach integrating the qualitative and statistical data that were collected using the tools and techniques of collecting empirical data. It covered one hundred and fifty (165) individuals identified through the use of random and reasoned sampling techniques.

Analysis of the results revealed that the municipality, although it has good water coverage, suffers from the poor access of rural populations to water due to the management methods in the municipality. The analyzes show that the way in which hydraulic works are managed in the municipality promotes the deterioration and the low durability of the equipment and reduces the service rate in the municipality. In connection, the main ways of managing drinking water, both at the level of the actors directly involved and of the populations themselves, participate in the occurrence of water diseases.

**Keywords** – Management, drinking water, sanitation, Natitingou.

## I. INTRODUCTION

L'Afrique est le continent des paradoxes en matière d'eau. Forte variabilité spatio-temporelle des précipitations, sécheresses et inondations qui se suivent ou alternent dans certaines sous-régions, abondance mais aussi pénurie, faible niveau des investissements en matière d'infrastructures et de capacités de services, plus du tiers de la population n'ayant pas accès à des services pérennes et de qualité, tel est le tableau actuel du continent en matière d'eau et d'assainissement (OMS, 2016).

Avec 17 grands fleuves et 160 lacs qui l'irriguent, le continent africain dispose pourtant de ressources en eau renouvelables abondantes estimées à plus de 5 400 milliards de m<sup>3</sup> par an. Malgré cette abondance des ressources en eau brute, l'Afrique fait face au défi de la maîtrise de l'eau pour les besoins essentiels de son développement économique et social. À noter que seuls 4% de ce potentiel sont à ce jour mobilisés pour les usages courants (eau potable, agriculture, énergie, etc.). Plus de 300 millions de personnes manquent d'un accès à l'eau potable et les maladies hydriques sont la première cause de mortalité sur le continent. Selon des estimations récentes, la moitié à peine des 54 pays du continent pourrait atteindre les OMD (Objectifs du Millénaire pour le Développement) en matière d'accès à l'eau potable. Bien que cette cible des OMD soit atteinte depuis 2013 au niveau mondial, l'Afrique subsaharienne abrite 40% des personnes dans le monde qui n'ont pas accès à l'eau potable (B. Jean-Bosco, 2014).

L'analyse de la documentation scientifique montre que les questions relatives à la gestion et à l'assainissement de l'eau en général constituent une préoccupation majeure au niveau international. Au cours de ces vingt-cinq dernières années, de grandes conférences internationales, certaines portant sur l'eau en particulier, ont été organisées. Cette série de conférences s'est poursuivie en 2003 non seulement avec le 3<sup>e</sup> Forum mondial de l'eau au Japon, mais aussi avec l'Année internationale de l'eau douce. Ces conférences, les préparatifs qui les ont précédées et les discussions qui ont suivi, ont modifié les perceptions de la problématique de l'eau et ont élargi les connaissances en ce qui concerne les réponses à rechercher. Ainsi, depuis la conférence de Mar del Plata (Argentine) en 1977 sur les problèmes de l'eau, laquelle conférence qui avait permis de décréter la décennie 1981-1990, la décennie internationale de l'eau potable et de l'assainissement (C. Dégbey et *al.*, 2008), il y eut une extension significative de la fourniture des services de base aux plus démunis (M. C. Vargas, 2011).

Le but de cette rencontre internationale était d'élever le niveau de santé et de production des populations et de faire régresser les maladies infectieuses et parasitaires véhiculées par l'eau (CDTICD, 1999). Il s'agissait de mettre à la disposition de la population, de l'eau potable et des dispositifs adéquats d'assainissement (C. Dégbey et *al.*, 2008). Ce problème a d'ailleurs été réaffirmé lors du Sommet de la Terre tenu à Rio de Janeiro au Brésil en 1992. L'eau est devenue une priorité et une clé pour tout processus de développement durable (T.H. Sadeq, 2002).

À la fin de la décennie 1990, il était devenu clair que le défi consistant à réaliser et maintenir cet accès universel était beaucoup plus conséquent qu'on avait pu le croire dix ans auparavant. Même si quelques progrès avaient été accomplis au niveau de l'amélioration de l'accès à l'eau, l'accès à l'assainissement quant à lui, ne se développait que très lentement (C.D. Faïzoun, 2005). Cela se justifie par le fait que le pourcentage de personnes bénéficiant d'un approvisionnement amélioré est passé de 79% (4,1 milliards) en 1990 à 82% (4,9 milliards) en 2000. D'après l'OMS (2001), pendant cette même période, la proportion de la population mondiale ayant accès à des infrastructures d'élimination des déchets solides est passée de 55% (2,9 milliards de personnes desservies) à 60% (3,6 milliards).

Ces résultats ont été obtenus, par exemple, avec l'appui de la Banque Mondiale qui investit d'importantes sommes dans le financement de projets indépendants, généralement conçus pour fournir uniquement des services d'approvisionnement en eau ou des services d'approvisionnement et d'assainissement dans les zones rurales (E. Benicourt, 2001).

La pluie, le vent, les activités domestiques, médicales, agricoles et industrielles constituent autant de sources de production de déchets que l'assainissement est censé prendre en charge en utilisant une diversité de techniques et de technologies. En effet, drainer, canaliser, collecter, vidanger, réutiliser, recycler, traiter, évacuer, etc. sont autant d'actes faisant appel à une gamme de techniques et de technologies appliquées aux eaux pluviales, aux eaux usées domestiques, médicales, agricoles et industrielles, aux excreta et aux déchets solides (Z. Bouraima, 2017).

La décennie internationale de l'eau potable et de l'assainissement (1981-1990) décrétée par l'Organisation des Nations Unies a insufflé un regain d'intérêt au secteur de l'approvisionnement en eau potable et de l'assainissement (AEPA). Elle s'était donnée pour mission de favoriser l'accès de tous à l'eau potable. Son groupe cible était les communautés rurales et urbaines à faible revenu. Quatre principes directeurs ont été proposés pour permettre un partage équitable de l'eau (CREPA, 2003) : la protection de

l'environnement et la sauvegarde de la santé grâce à la gestion intégrée des ressources en eau et des déchets tant liquides que solides; des réformes institutionnelles visant à promouvoir une approche intégrée, une modification des méthodes, des attitudes, des comportements et la pleine participation des femmes à tous les niveaux; la gestion communautaire des services soutenue par des mesures visant à renforcer la capacité des institutions locales, à mettre en œuvre et à gérer durablement des problèmes d'approvisionnement en eau potable et d'assainissement; et la saine gestion financière, grâce à une meilleure gestion des équipements existants et à la généralisation des technologies appropriées. Ces différents axes évoquent directement que l'Homme est placé au cœur de toutes les activités qui sont menées dans le secteur de l'approvisionnement en eau potable, de l'hygiène et de l'assainissement (AEPHA) puisque l'eau, perçue comme une denrée précieuse, conditionne et motive les interactions humaines.

Malgré les mesures prises et les efforts fournis sur le plan international, l'eau demeure au centre de nombreux débats (A. Dinar, 2000; M. Marino et J. Boland, 1999) puisque près de 1,2 milliard d'êtres humains dans le monde n'ont toujours pas accès à une eau potable et sûre (ONU, 2003) et 2,4 milliards à une forme quelconque d'infrastructure d'assainissement améliorée (UNEP, 2002).

Selon T. KayobolaKangombe (2020), l'accès à l'eau potable et à l'assainissement adéquat est vital pour une réduction significative des risques sanitaires et l'instauration d'un environnement sain. La connaissance de la situation et de l'évolution de l'approvisionnement en eau et de l'assainissement est de ce fait indispensable. L'objectif du suivi est d'informer les décideurs politiques et les acteurs du secteur sur les évolutions observées en vue d'une prise de décision informée. L'eau constitue donc, dans ce sens, un élément important au développement durable, ainsi qu'au bien-être de l'humanité. Se trouvant au cœur du Programme de Développement Durable à l'horizon de 2030, l'Objectif 6 du Développement Durable vise à « garantir l'accès de tous à l'eau et à l'assainissement et assurer une gestion durable des ressources en eau ». Mais d'aucuns n'ignorent que la consommation de celle-ci peut causer de nombreuses maladies, notamment dans la mesure où elle n'est pas bien traitée. De ce fait, la mise en place d'un environnement sain ainsi que la bonne santé des êtres humains dépendent amplement de la bonne qualité de l'eau. De ce fait, le mauvais approvisionnement en eau potable engendre un risque élevé d'infections d'origine hydrique telle que le choléra, l'hépatite A, l'amibiase, la fièvre typhoïde et bien d'autres maladies parasitaires, bactériennes et virales. Chaque année, 4 milliards de cas de diarrhée causent 2,2 % de décès, les enfants de moins de 5 ans sont les plus touchés (T. KayobolaKangombe, 2020).

Dans la plupart des communes du Bénin en particulier dans la commune Natitingou, le problème de l'eau de boisson se pose aussi bien du point de vue de la quantité que de la qualité. Malgré les ambitions affichées pour la décennie de l'eau potable, l'approvisionnement des populations en eau est loin d'être généralisé. Dans les milieux urbains, 66% des populations ont accès à l'eau potable. La situation est plus préoccupante dans les centres ruraux où vivent 6 millions de personnes, soit 83% de la population totale du Bénin qui n'ont pas accès à l'eau potable (AEPHA, 2005). Même si l'eau de boisson est potable à la source, parfois le comportement des hommes contribue à la pollution de l'eau pour la consommation (A. Zonou, 2008). Face à ces constats, il est alors question de savoir : quel est le mode de gestion des eaux de boisson dans la commune de Natitingou ?

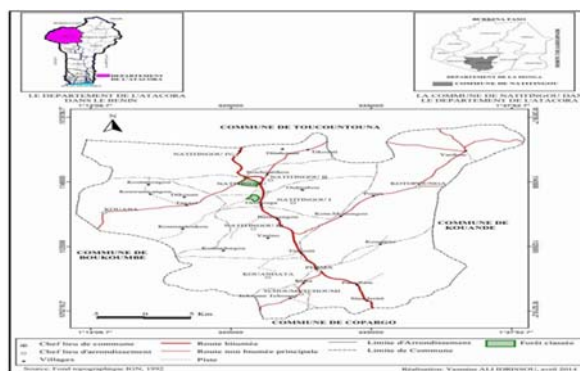
## II. MATÉRIELS ET MÉTHODES

Portant sur la gestion des ouvrages hydrauliques dans la commune de Natitingou, cette recherche est de nature mixte. Cette recherche se propose d'avoir non seulement une idée globale et donc chiffrée des informations à recueillir, ce qui implique la production de statistiques, et subséquent l'usage de la démarche quantitative ; mais aussi de comprendre en profondeur la problématique investiguée, ce qui nécessite d'en avoir une vue désagrégée et moins condensée, un objectif à réaliser suivant une démarche qualitative. Les données empiriques sont collectées précisément dans la commune de Natitingou. Pour mieux conduire cette recherche, l'option de deux techniques d'échantillonnage est faite. Il s'agit des techniques d'échantillonnage probabiliste et non probabiliste. Spécifiquement dans le cadre de cette recherche, les techniques d'échantillonnage dites volontaire et choix raisonné ont été appliquées au groupe des femmes, aux chefs traditionnels et à celui des chefs de ménages et la technique dite aléatoire simple est appliquée aux responsables des services régionaux de l'hydraulique, organisations nationales, internationales et non gouvernementales. Compte tenu de la diversité des connaissances et pratiques en matière d'hygiène, les localités à enquêter ont été choisies de façon raisonnée en tenant compte des villages situés aux centres des arrondissements. Les techniques d'échantillonnage ont permis d'identifier les acteurs directement impliqués dans le cadre de cette recherche. En la matière, il faut en effet que ces divers acteurs, entre autres, aient des expériences en matière de l'approvisionnement en eau, hygiène et assainissement dans la commune. Au total 165 acteurs ont été interviewés dans le cadre de recherche. Cinq techniques de collecte de données ont été employées pour mener à bien la collecte des données empiriques. Il est question de la recherche documentaire, de questionnaire, de l'entretien semi-structuré, de focus group et de l'observation. Les données collectées sont structurées de façon à ce qu'elles puissent être analysées efficacement. La première étape de ce travail consiste à la transcription intégrale des informations

recueillies auprès de chaque personne interrogée dans un logiciel de traitement de texte (Word). Ensuite, a suivi le traitement des données. Pour ce faire, les informations recueillies par le biais des guides d'entretien, ont été soumises à un traitement qui a consisté à rechercher des similitudes dans les descriptions et à faire des catégorisations par axes d'analyse et à en faire une synthèse. La structuration des données qualitatives a paru exigeante en réflexion et a nécessité aussi assez de temps. Par la suite, usage est fait de l'analyse de contenu pour la catégorisation des informations issues du guide d'entretien. Ces analyses ont suivi les axes de la structuration faite lors du traitement ; elle a consisté en un croisement comparatif des informations, soit à l'intérieur de la même catégorie d'acteurs, soit en inter-catégorie ; ensuite à faire une comparaison des éléments dégagés de l'analyse avec les tendances ressorties de la littérature.

Situé au Nord-ouest du Bénin, la commune de Natitingou est au centre du département de l'Atacora. Logée dans un massif montagneux, la commune de Natitingou s'étend des parallèles 10°07 et 10°30 de latitude nord et aux méridiens 1°15 et 1°30 de longitude est.

La Commune de Natitingou couvre une superficie de 3045 Km<sup>2</sup> soit 12,8 % de la superficie totale du département de l'Atacora (LARES, 2006). Elle est limitée au Nord par la commune de Toucountouna, au sud et à l'est par la Commune de Kouandé et à l'ouest par la Commune de Boukombé (Carte 1).



Carte 1 : Situation géographique de la Commune de Natitingou

Source : Conception Ognondoun A., 2021, IGN, 1992.

Selon les résultats du RGPH 4 (2013), la population de la Commune de Natitingou est de 104 010 habitants. Avec l'augmentation de la population, non seulement les besoins d'espace pour la construction d'habitations augmentent, mais aussi les pressions sur les ressources du milieu s'accroissent. Par ailleurs, l'augmentation de la population et la croissance urbaine non maîtrisée accentuent les besoins d'infrastructures et de services socio-collectifs. Cette évolution de la population urbaine explique également la destruction progressive du couvert végétal, la diminution des terres cultivables et certaines conditions de vie des populations urbaines. Les contraintes climatiques viennent aggraver cette situation précaire des populations.

### III. RÉSULTATS ET DISCUSSION

#### 3.1. Caractéristiques sociodémographiques des personnes enquêtées et source d'approvisionnement en eau de consommation

Cette partie met en évidence les caractéristiques des diverses personnes qui ont été enquêtées dans le cadre de cette recherche. La majorité est composée de femmes qui fréquentent au moins une fois par jour un des ouvrages d'approvisionnement en eau de consommation. Le reste est constitué des hommes chefs de ménages enquêtés et des responsables des services régionaux en hydraulique. Le tableau I renseigne au mieux sur ces données et précise les types de points d'eau rencontrés lors des enquêtes ainsi que les principales activités que mènent les chefs de ménages ainsi que les femmes enquêtées.

**Tableau I :** Caractéristiques des acteurs enquêtés, activités et points d'eau fréquemment utilisés

	Femmes de ménages	Chefs de ménages	Responsables des services régionaux en hydraulique
Principales activités	Agriculture, artisanat, commerce	Agriculture, pêche, chasse, élevage	Spécialistes en eau, hygiène et assainissement, services décentralisés de l'Etat et de Commune
Types de points d'eau fréquentés	Forages, puits traditionnel, marigot, Soneb	Forages, puits traditionnel, marigot	Forages et Soneb

Source : données de terrain, 2020

De la lecture de ce tableau il ressort que les responsables des services régionaux en hydraulique et autres services décentralisés utilisent essentiellement l'eau des forages et de la Soneb. Quant aux femmes de ménages de la commune de Natitingou sont majoritairement dans les activités comme l'agriculture, l'artisanat et le commerce, souvent le petit commerce. Quant aux hommes, en plus de ces activités, ils pratiquent la chasse et la pêche. La plupart d'entre eux utilisent les ouvrages tels que les forages, les puits traditionnels et le marigot pour s'approvisionner en eau de consommation. C'est ce que témoignent les propos de B. T., femme de ménage, 35 ans.

*« L'eau qu'on consomme à la maison est prise soit dans nos puits traditionnels soit au marigot. C'est quand les étrangers nous ont apporté forage que nous y allons de temps en temps juste pour changer de goût. Sinon, c'est l'eau de puits nous utilisons fréquemment »* [Extrait d'entretien avec B.T., femme de ménage, 35 ans, Mère de cinq enfants].

De l'analyse de cet extrait, nous pouvons retenir que la majorité des personnes qui vivent à Natitingou, fait recours à l'eau de puits pour la consommation. L'usage de l'eau de forage est relatif à certaines raisons telles que l'envie de changement de goût et les périodes de sécheresse où ils sont contraints d'en faire recours. Dans l'ensemble, les populations rencontrées sont homogènes : hommes (chefs de ménages) et femmes de même génération presque (environ mêmes âges), de mêmes conditions socio-économiques (artisans, agriculteurs, cultivateurs, etc.) et vivant tous dans des milieux régulés par des normes et valeurs.

### 3.1.1. Sources d'approvisionnement en eau de boisson dans la commune de Natitingou

Les sources d'approvisionnement en eau de boisson disponibles dans la zone d'étude sont : les puits (puits à grand diamètre ou puits communautaires ou puits modernes et les puits traditionnels), les adductions d'eau villageoise (les forages hydrauliques avec pompe à motricité humaine), les marigots et la SONEB.

#### ▪ Le puits

Un puits est un ouvrage de captage de l'eau souterraine de diamètre variant généralement de 1,0 à 1,8 mètres. Il existe deux types de puits. Ce sont :

- les puits traditionnels, dont les parois ne sont en général par revêtues ou juste un revêtement peu épais de ciment non armé, ne pénétrant dans la nappe que sur une faible hauteur. Leurs diamètres varient de 1,0 à 1,2 mètres ;

- les puits modernes ou puits communautaires à grands diamètres, dont les parois sont tenues par des buses en béton armé et la hauteur de pénétration dans la nappe est beaucoup plus importante. Leurs diamètres varient de 1,6 à 1,8 mètres. Les puits traditionnels sont entièrement réalisés à la main par des puisatiers locaux, disposant d'un matériel très restreint. Quant aux puits à grand diamètre (photo 1), ils sont creusés soit à la main (sur les terres tendres), au marteau-piqueur (sur les terres plus dures) ou parfois avec de l'explosif dans les zones très dures du socle et sont ensuite cuvelés.



**Photo 1:** Puits moderne à grand diamètre.

**Source :** données de terrain, 2019

▪ **Le forage**

Par rapport au forage, il faut retenir que c'est un ouvrage d'AEV de captage de l'eau souterraine de petit diamètre (en général 15 à 40 centimètres) réalisé à l'aide de moyens matériels importants. Le trou du forage est fait à l'aide de la foreuse. Une fois que le trou a atteint et traversé plusieurs mètres de la zone contenant l'eau, le forage est arrêté. On glisse alors dans le trou un tube de plastique qui comporte des fentes au niveau où se trouve l'eau pour permettre à celle-ci de pénétrer à l'intérieur du tube et d'être pompée. L'espace entre le tube et le trou est rempli par du gravier au niveau de la crépine, puis par les matériaux imperméables comme l'argile et enfin cimenté sur les derniers mètres avant la surface. Les forages observés dans les localités visitées sont: les forages équipés d'une pompe à motricité humaine (photo 2) et les postes d'eau autonomes.



**Photo 2 :** Pompe AFRIDEV

**Source :** données de terrain, 2019

**3.1.2. Acteurs principaux impliqués dans la gestion des ouvrages hydrauliques dans la commune de Natitingou**

Tous les acteurs de la période précédente sont encore présents ici avec l'entrée d'autres acteurs à savoir les Structures d'Intermédiation Sociale (SIS, CGPE, RC). Les ONG d'intermédiation sociale ont joué un rôle capital dans l'appropriation de la démarche par les communautés à travers des séances de communication pour un changement de comportement (CCC), dans le montage du dossier communautaire, dans la mobilisation sociale et financière des bénéficiaires, la formation des structures mises en place et enfin dans le suivi entretien et gestion des points d'eau. Les CGPE quant à eux assurent la gestion sociale et financière des points d'eau et rendent périodiquement compte aux communautés qui les ont élus. Le secrétaire enregistre les recettes de chaque jour. Le point est fait mensuellement au sein du comité qui est chargé de faire les versements dans les deux comptes (fonctionnement et renouvellement) à la CLCAM. S'agissant des RC, ils sont formés pour sensibiliser leurs communautés à observer les règles d'hygiène et d'assainissement dans leur village/localité pendant et après le projet de réalisation des ouvrages : une manière d'assurer la pérennisation des acquis mais pourtant les attentes n'ont pas été comblées.

❖ **L'État**

À travers les ministères techniques, en particulier le Ministère de l'Énergie et de l'Eau, et au sein de celui-ci la DG-Eau et ses services déconcentrés :

- définit la politique nationale du secteur de l'eau et veille à sa mise en œuvre ;
- ajuste et actualise les normes de réalisation, de suivi et de gestion des équipements ;
- assure l'orientation et la coordination des actions de l'État et des partenaires externes dans le secteur de l'eau ;
- accompagne et facilite le processus de transfert des compétences et des ressources nécessaires à l'exercice de ses compétences ;
- apporte un appui conseil aux communes et aux autres intervenants impliqués dans le secteur de l'eau à travers des actions d'information, de formation et d'assistance technique.

❖ **La Commune**

- Elle planifie les réalisations des ouvrages d'alimentation en eau potable à partir des besoins réels des populations et dans une vision de l'aménagement global de son territoire ;
- Elle décide du mode de gestion propre à garantir la durabilité des ouvrages et le met en œuvre ;
- Elle met en place un environnement pour la maintenance des ouvrages ;
- Elle contrôle le bon fonctionnement du service public de l'eau.

❖ **Les usagers**

- Ils utilisent l'eau et paient le service de l'eau ;
- Ils peuvent à la demande de la commune, proposer à celle-ci une personne physique pour prendre en charge la gestion déléguée du ou des points d'eau simples de la localité ;
- Ils suivent la qualité des services de l'eau ;
- Ils peuvent se regrouper en association des consommateurs d'eau potable (ACEP) pour suivre de façon plus globale la gestion de l'eau au niveau d'un village ou d'un arrondissement.

❖ **Le secteur privé**

Il est constitué des différents prestataires de services : bureaux d'études, artisans réparateurs, opérateurs privés exploitant des infrastructures d'alimentation en eau potable dans le cadre d'un contrat de délégation de gestion, entreprises de fournitures et de travaux, fournisseurs de pompes, distributeurs de pièces de rechange des pompes etc. Les structures d'intermédiation sociale (SIS) sont des prestataires sélectionnés par la commune et qui mettent à la disposition de celle-ci des agents qualifiés. Ces agents interviennent à la demande de la commune pour mettre en place un service public de l'eau qui respecte les orientations de la stratégie nationale.

### ❖ Les partenaires du développement

Il s'agit des partenaires techniques et financiers, des ONG nationales et internationales appuyant le développement du secteur au niveau de l'État ou des communes. Dans la commune de Natitingou, la gestion des ouvrages publics d'eau potable est en train d'être contrôlée par la mairie au travers d'une gestion déléguée. Au niveau des AEV, on parle de l'affermage et de la délégation communautaire ou privée au niveau des ouvrages simples.

#### 3.2. Modes de gestion des eaux de boisson dans la commune de Natitingou

La préservation de la sécurité microbiologique des approvisionnements en eau de boisson repose sur l'interposition de barrières multiples, du captage au consommateur, en vue de prévenir la contamination de l'eau ou de limiter celle-ci à un niveau non préjudiciable pour la santé. On parvient à une sécurité d'autant plus poussée que l'on met en place un plus grand nombre de barrières, dont la protection des ressources en eau, la sélection et l'application correctes d'étapes de traitement et la gestion des réseaux de distribution (canalisés ou autres), de manière à maintenir et à préserver la qualité de l'eau traitée. La stratégie privilégiée est une démarche gestionnaire mettant l'accent sur la prévention ou sur la réduction de la pénétration des agents pathogènes dans les sources d'eau et sur un moindre recours aux procédés de traitement visant à éliminer ces agents.

*« Les conséquences potentielles pour la santé de la contamination microbienne sont telles qu'il est crucial de conserver en permanence la maîtrise de celle-ci et de ne jamais la laisser sortir des limites recommandées. Les fèces aussi peuvent être une source de bactéries pathogènes, de virus, de protozoaires et d'helminthes puisque certaines femmes s'assoient sur la terres cimentées qui entourent les ouvrages lors de l'épuisement. Même les fèces des animaux et des oiseaux en font partie des causes de l'eau contaminée. Les fèces de ces animaux ou oiseaux laissent des matières fécales tomber dans l'eau déjà prise et que les femmes laissent ça ouverte jusqu'à la destination ou lieu d'utilisation.. Dans ce cas, ne dites plus que l'eau déjà prise sera encore propre » (Y.U., Agent de GIZ) .*

Il ressort de l'analyse de ce verbatim que plusieurs conséquences sont liées au non respect des limites recommandés et que les risques microbiens les plus importants sont liés à l'ingestion d'eau contaminée par des fèces humaines ou animales (oiseaux, notamment). Les agents pathogènes d'origine fécale constituent une priorité dans la fixation d'objectifs sanitaires destinés à garantir la sécurité microbiologique. La qualité microbienne de l'eau varie souvent rapidement et dans de très larges proportions. Les pics de courte durée de la concentration d'agents pathogènes peuvent accroître considérablement le risque de maladie et déclencher des flambées épidémiques de maladies véhiculées par l'eau. En outre, de nombreuses personnes peuvent avoir été exposées à ces agents avant que la contamination microbienne n'ait été détectée. C'est pourquoi il est impossible de se fier uniquement à l'analyse du produit final, même si elle est réalisée fréquemment pour garantir la sécurité microbiologique de l'eau de boisson. Il convient d'accorder une attention particulière à l'établissement d'un cadre de gestion de la sécurité sanitaire de l'eau et à la mise en œuvre de plans complets de gestion de la sécurité sanitaire de l'eau afin de garantir en permanence la sécurité sanitaire de l'eau de boisson et de protéger ainsi la santé publique

*« Si l'on ne parvient pas à garantir la sécurité sanitaire de l'eau de boisson, la communauté court le risque de subir des flambées épidémiques de maladies intestinales ou autres pathologies infectieuses. Les flambées de maladies véhiculées par l'eau sont à éviter, tout particulièrement en raison de leur capacité à toucher simultanément un grand nombre de personnes et éventuellement une forte proportion de la communauté. Outre les agents pathogènes d'origine fécale, d'autres dangers microbiens, tels que le ver de Guinée (*Dracunculus medinensis*), des cyanobactéries toxiques et *Legionella*, peuvent constituer une menace pour la santé publique dans certaines circonstances » (M.A., Agent de la mairie).*

La lecture de ces propos montre que bien que l'eau de boisson puisse être une source très importante d'organismes infectieux, nombre des maladies susceptibles d'être véhiculées par l'eau peuvent se transmettre par d'autres voies, et notamment le contact entre individus, l'ingestion d'aliments, et avec des gouttelettes et des aérosols. Selon les circonstances et en l'absence de flambées épidémiques de maladies véhiculées par l'eau, ces voies peuvent être plus importantes que la transmission par l'eau de boisson.

##### 3.2.1. Mode de gestion de l'eau dans les ménages enquêtés

Au moment de l'enquête, dans 75% des cas, le délai de traitement des puits était dépassé. Pour 25% des puits, le délai de traitement n'était pas dépassé. Plus de 33 % des ménages interrogés n'ont pas été à l'école. A propos du mode de gestion de l'eau



par les ménages, plus de 80% ménages sur cinq (5) entretiennent mal la puisette après le recueil de l'eau. La puisette est déposée par terre, ou sur la dalle du puits. Dans 41 % des ménages interrogés, le récipient de recueil de l'eau est sale. Au cours du transport de l'eau, plus d'un (1) ménage sur quatre (4) utilise feuilles de branchage, toile cirée, plateau pour stabiliser la surface de l'eau afin de faciliter le transport. 71 % des ménages investigués utilisent la jarre comme matériel de stockage. 81% des ménages enquêtés déposent le récipient de prélèvement de l'eau pour la consommation sur le couvercle de la jarre de stockage après avoir bu l'eau ; près de la moitié des ménages défèquent dans la nature, 3% seulement des ménages enquêtés incinèrent les ordures ménagères, les autres les jettent dans la nature. Il a été constaté sur le terrain des borbiers, d'ordures et d'excréments autour des points d'eau observés sur le terrain.

Selon les acteurs rencontrés, certains utilisent des désinfectants pour réduire le taux des microbes tandis que d'autres ne les utilisent pas. La désinfection revêt une importance incontestable dans la sécurité sanitaire d'un approvisionnement en eau de boisson. La destruction des micro-organismes pathogènes est une opération capitale, qui fait très souvent appel à des réactifs chimiques tels que le chlore. La désinfection constitue une barrière efficace contre de nombreux agents pathogènes (en particulier des bactéries) lors du traitement de l'eau de boisson et doit être pratiquée sur les eaux de surface et les eaux souterraines susceptibles de contamination fécale. Une dose résiduelle de désinfectant est maintenue de façon à assurer une protection partielle contre les contaminations de faible ampleur et le développement bactérien dans les réseaux de distribution. Cependant, Un enquêté dit ceci :

*« La désinfection chimique d'un approvisionnement en eau de boisson contaminée par des matières fécales réduit le risque global de maladie, mais ne suffit pas nécessairement à assainir totalement cet approvisionnement. Par exemple, la désinfection par le chlore de l'eau de boisson n'a qu'une efficacité limitée contre des agents pathogènes du type protozoaire, en particulier Cryptosporidium, et contre certains virus » (Y.C., Agent de santé).*

Un autre affirme :

*« L'utilisation de désinfectants chimiques dans le traitement de l'eau entraîne habituellement la formation de sous-produits chimiques. Cependant, les risques sanitaires liés à ces sous-produits sont extrêmement faibles en comparaison de ceux associés à une désinfection insuffisante, et il importe de ne pas compromettre la désinfection en tentant de limiter les concentrations de ces sous-produits » (M.K., Agent/ONG).*

Il ressort de l'analyse de ces propos recueillis que l'efficacité de la désinfection peut aussi être insuffisante à l'égard d'agents pathogènes présents à l'intérieur de flocons ou de particules, qui les protègent de l'action des désinfectants. Une forte turbidité peut aussi protéger les micro-organismes des effets de la désinfection, stimuler la croissance des bactéries et déclencher une forte demande en chlore. Il importe donc de mettre en œuvre une stratégie de gestion globale efficace prévoyant des barrières multiples, et notamment la protection de l'eau de source et des procédés de traitement appropriés, ainsi que la protection de l'eau pendant le stockage et la distribution, en association avec des mesures de désinfection destinées à prévenir ou à éliminer la contamination microbienne.

Or pour réduire ou enrayer le taux de maladies hydriques et augmenter le taux de la population rurale qui a accès facile à l'eau potable, il faut mettre à la disposition de cette dernière des ouvrages appropriés d'approvisionnement en eau potable, adaptés aux besoins et aux réalités socioculturelles. Ceci signifie que les ouvrages à utiliser doivent être en conformité, d'une part avec les besoins exprimés par la population rurale et d'autre part avec les normes sociales et les réalités culturelles des milieux considérés. Les ouvrages, une fois réalisés, ne sont pas compatibles avec les réalités socioculturelles (normes et valeurs sociales et culturelles) puisque les populations rurales n'y voient pas concrètement l'impact positif, soit la réduction des maladies hydriques. Une telle situation entraîne immédiatement la non appropriation desdits ouvrages. De nombreux projets réalisés ou en cours de réalisation en Afrique dans le domaine de l'hydraulique villageoise connaissent des échecs, car les paramètres socioculturels des milieux ruraux ne sont pas considérés.

Les préoccupations sanitaires associées aux constituants chimiques de l'eau de boisson sont de nature différente de celles suscitées par la contamination microbienne et résultent principalement de la capacité de ces constituants chimiques à provoquer des effets nocifs pour la santé à l'issue de durées d'exposition prolongées. Il existe peu de constituants chimiques de l'eau susceptibles d'entraîner des problèmes de santé après une exposition unique, sauf en cas de contamination accidentelle massive d'un approvisionnement en eau de boisson. En outre, l'expérience montre que, dans une forte proportion des cas d'incidents de ce type, mais non tous, l'eau devient imbuvable en raison d'un goût, d'une odeur ou d'un aspect inacceptables. Dans les situations où il n'existe pas de risque qu'une exposition à court terme conduise à des dommages pour la santé, il est souvent plus efficace de

concentrer les ressources disponibles à des actions correctives visant à déterminer et à éliminer la source de contamination plutôt qu'à mettre en place un traitement coûteux de l'eau de boisson, destiné à éliminer le constituant chimique en question. De nombreux produits chimiques peuvent être présents dans l'eau de boisson. Toutefois, seul un petit nombre d'entre eux est immédiatement préoccupant sur le plan sanitaire en toutes circonstances. Il convient d'organiser les priorités accordées à la surveillance des différents produits chimiques et aux actions pour remédier à leur présence dans l'eau de boisson de manière à éviter que des moyens limités soient inutilement affectés à des produits faiblement ou non préoccupants pour la santé.

Il convient de toujours prendre en considération les risques sanitaires associés à la présence de radionucléides d'origine naturelle dans l'eau de boisson, bien que la contribution de cette eau à l'exposition totale aux radionucléides soit très faible en conditions normales. Il n'a pas été défini de valeurs guides formelles pour les différents radionucléides présents dans l'eau de boisson. On applique plutôt une approche reposant sur la détection dans cette eau des radioactivités alpha et bêta brutes. Bien que la détection de niveaux d'activité supérieurs aux limites de détection n'indique pas un risque immédiat pour la santé, un tel résultat doit déclencher des investigations plus poussées, visant à déterminer les radionucléides en cause et les risques potentiels, compte tenu des conditions locales.

### ***3.2.2. Rôles et responsabilités dans la gestion de la sécurité sanitaire de l'eau de boisson***

Pour garantir la sécurité sanitaire de l'eau de boisson, on privilégiera une démarche de gestion préventive et on prendra en compte les caractéristiques de l'approvisionnement en eau de boisson, depuis le captage et la source jusqu'au consommateur. De nombreux aspects de la gestion de la qualité de l'eau de boisson ne relevant pas directement de la responsabilité des fournisseurs d'eau, il est essentiel d'adopter une approche collaborative multi-organismes, de manière à s'assurer que les organismes chargés des différents domaines du cycle de l'eau participent à la gestion de la qualité de ce produit. Comme exemple d'une telle situation, on peut citer le cas où les captages et les sources se situent en dehors de la juridiction du fournisseur d'eau de boisson. Il sera généralement nécessaire de consulter d'autres autorités concernant d'autres questions ayant trait à l'eau de boisson, telles que les exigences en matière de surveillance et de notification, les plans d'intervention en cas de crise et les stratégies de communication.

Il convient d'inciter les principales parties prenantes susceptibles d'affecter ou d'être affectées par les décisions ou les activités des fournisseurs d'eau de boisson à coordonner, si besoin est, leurs efforts de planification et de gestion. Il peut s'agir par exemple des agences de gestion de la santé et des ressources, des consommateurs, de l'industrie et des plombiers. Il convient d'établir des mécanismes et d'élaborer des documents d'appui permettant aux parties prenantes de s'impliquer dans le processus.

#### **❖ Surveillance et contrôle de la qualité**

Pour protéger la santé de la collectivité, une approche duale, accordant des rôles et des responsabilités distincts aux prestataires de services et à une autorité indépendante de protection et de surveillance de la santé publique (surveillance des approvisionnements en eau de boisson), s'est révélée efficace (ISO, 2013, par Ph. Hartemann, 2013). Les dispositions organisationnelles visant à maintenir et à améliorer les services d'approvisionnement en eau de boisson doivent prendre en compte les rôles essentiels et complémentaires de l'organisme de surveillance et des fournisseurs d'eau. Il est préférable que les deux fonctions de surveillance et de contrôle de la qualité soient assurées par des entités séparées et indépendantes en raison des conflits d'intérêts qui interviennent lorsqu'on les combine. Dans ces conditions :

- les agences nationales fournissent un cadre composé d'objectifs, de normes et de réglementations permettant et imposant aux fournisseurs d'eau de remplir les obligations définies ;
- en aucun cas, les organismes intervenant dans la fourniture d'eau destinée à la consommation ne doivent être chargés de garantir et de vérifier l'aptitude des réseaux qu'ils administrent à assurer en permanence un approvisionnement en eau sans risque sanitaire ;
- un organisme de surveillance est chargé de surveiller de manière indépendante (externe) la qualité de l'eau à travers des inspections périodiques de tous les aspects de la sécurité sanitaire et/ou d'analyses de contrôle.

Dans la pratique, il peut ne pas exister de répartition claire des responsabilités entre les organismes de surveillance et ceux impliqués dans l'approvisionnement en eau de boisson.

Dans certains cas, l'éventail des organisations professionnelles, gouvernementales, non gouvernementales et privées impliquées peut être plus large et plus complexe que celui évoqué plus haut. Quel que soit le cadre existant, il importe de mettre au point des

stratégies et des structures claires pour mettre en place les plans de gestion de la sécurité sanitaire de l'eau, le contrôle et la surveillance de la qualité, la confrontation et la récapitulation des données, la notification et la diffusion des résultats et les mesures correctives. Il est indispensable de définir des lignes de conduite claires en matière de responsabilité et de communication. La surveillance de la qualité de l'eau de boisson peut être définie selon les spécialistes de l'eau enquêtés comme l'évaluation et l'examen permanents et vigilants sous l'angle de la sécurité sanitaire et de l'acceptabilité de l'eau de boisson. Les propos de cet enquêté confirment :

*« La surveillance est une activité investigatrice visant à identifier et à évaluer les risques potentiels pour la santé associés à l'eau de boisson. La surveillance contribue à la protection de la santé publique en favorisant l'amélioration de la qualité, de la quantité, de l'accessibilité, de la couverture (c'est-à-dire les populations disposant d'un accès fiable), de l'accessibilité économique et de la continuité des approvisionnements en eau de boisson. L'autorité de surveillance doit avoir le pouvoir de déterminer si un fournisseur d'eau s'acquitte de ses obligations. Ce qui n'est pas le cas dans cette commune » (I.A., Fonctionnaire retraité, 75ans).*

Il est à retenir de l'analyse de ces propos que la surveillance exige un programme d'enquêtes systématiques, pouvant comprendre des inspections, des analyses, une inspection sanitaire et des aspects institutionnels et communautaires. Elle doit couvrir l'ensemble du réseau de distribution d'eau de boisson, y compris les sources et les activités de captage, les infrastructures de transport, les usines de traitement (sonob), les réservoirs de stockage et les réseaux de distribution (canalisés ou non).

### ❖ Autorités de santé publique

Pour fournir un soutien efficace, une entité nationale chargée de la protection de la santé publique devra normalement intervenir dans quatre domaines :

- La surveillance de l'état et des tendances sanitaires, et notamment la détection et l'investigation des flambées épidémiques, en général de manière directe ou par l'intermédiaire d'un organe décentralisé dans certains cas ;
- L'établissement de normes et de critères pour l'eau de boisson. Les autorités nationales de santé publique ont souvent une responsabilité de premier plan dans la fixation de normes sur l'approvisionnement en eau de boisson, qui peuvent inclure des objectifs en matière de qualité de l'eau, de performances et de sécurité sanitaire, ainsi que des exigences directement spécifiées (traitement, par exemple).

L'activité de normalisation ne porte pas uniquement sur la qualité de l'eau, mais couvre aussi la réglementation et l'autorisation de matériaux et de produits chimiques utilisés dans la production et la distribution de l'eau de boisson et l'établissement de normes minimales dans des domaines tels que la plomberie domestique. Il ne s'agit pas non plus d'une activité statique, car les changements intervenant dans la pratique de la distribution d'eau de boisson ainsi que dans les technologies et les matériaux disponibles (matériaux employés en plomberie et procédés de traitement, par exemple) entraînent une évolution des priorités en matière de santé et des réponses à apporter à ces priorités ;

La mise en avant des préoccupations sanitaires dans le développement de politiques de grande portée, et notamment d'une politique de santé et d'une gestion intégrée des ressources en eau. Ces préoccupations incitent souvent à soutenir sur le plan financier les personnes concernées par le développement et l'amélioration de l'approvisionnement en eau de boisson ainsi que des activités militantes en faveur de la satisfaction des besoins en eau de boisson prioritairement par rapport à d'autres nécessités. Elles peuvent exiger une implication dans la résolution de certains conflits ; Une action directe, généralement par l'intermédiaire d'organes auxiliaires (administrations régionales et locales chargées de l'hygiène de l'environnement, par exemple) ou à travers l'apport de recommandations à d'autres entités locales (gouvernement local, par exemple) concernant la surveillance des approvisionnements en eau de boisson. Ces différents rôles prennent un aspect très variable selon les structures et les responsabilités nationales et locales et incluent fréquemment une fonction d'assistance auprès des fournisseurs de la collectivité, dans laquelle les autorités locales interviennent souvent directement.

La surveillance de la santé publique (c'est-à-dire la surveillance de l'état et des tendances sanitaires) participe au contrôle de la sécurité sanitaire de l'eau de boisson. Elle prend en compte les maladies survenant dans l'ensemble de la population, qui peut être exposée à diverses sources de micro-organismes pathogènes ne se limitant pas à l'eau de boisson. Les autorités nationales de santé publique ont aussi la capacité d'entreprendre ou de commanditer des recherches visant à évaluer le rôle de l'eau comme facteur de

risque dans l'apparition de maladies, à travers des études cas-témoins, des études de cohorte ou des études d'intervention, par exemple. Les équipes de surveillance de la santé publique opèrent habituellement au niveau national, régional ou local, ainsi que dans les grandes villes et les centres de santé ruraux. Sur une base régulière, la surveillance de la santé publique comprend :

- la surveillance permanente des maladies faisant l'objet d'une notification, dont un grand nombre peuvent être provoquées par des agents pathogènes véhiculés par l'eau ;
- la détection des flambées épidémiques ;
- l'analyse des tendances à long terme ;
- l'analyse géographique et démographique ;
- le retour d'informations à l'intention des autorités dans le domaine de l'eau.

La surveillance de la santé publique peut être renforcée de diverses façons en vue d'identifier d'éventuelles flambées épidémiques de maladies véhiculées par l'eau en réponse à une suspicion motivée par l'incidence inhabituelle d'une maladie ou à une détérioration de la qualité de l'eau. Les investigations épidémiologiques comprennent :

- des enquêtes sur les flambées ;
- des études d'intervention destinées à évaluer les options d'intervention ;
- des études cas-témoins ou des études de cohorte visant à évaluer le rôle de l'eau comme facteur de risque dans l'apparition des maladies.

Néanmoins, il est impossible de se fier à la surveillance de la santé publique pour disposer en temps utile d'informations permettant une réponse opérationnelle à court terme pour maîtriser une maladie véhiculée par l'eau. La capacité de la surveillance sanitaire à fournir de telles informations se heurte à diverses limites : les flambées de maladies ne faisant pas l'objet d'une notification ; l'intervalle de temps entre l'exposition et l'apparition de la maladie ; l'intervalle de temps entre l'apparition de la maladie et sa notification ; le faible taux de notification ; les difficultés pour identifier les agents pathogènes et les sources responsables.

L'autorité de santé publique intervient de manière réactive, mais également proactive, dans le cadre d'une politique de santé publique globale et en interaction avec l'ensemble des parties prenantes. Selon le contexte de santé publique, la priorité sera normalement accordée aux groupes défavorisés. Ces interventions supposeront généralement de trouver un compromis entre la gestion et l'amélioration de la sécurité sanitaire de l'eau de boisson et la nécessité d'assurer l'accès à des approvisionnements fiables et quantitativement suffisants en eau de boisson saine. Pour bien comprendre la situation du pays en termes d'eau de boisson, l'autorité nationale de santé publique devra établir périodiquement des rapports décrivant l'état de la qualité de l'eau au niveau national et attirant l'attention sur les problèmes de santé publique et les points à traiter d'urgence parmi les priorités générales de santé publique. Cette compréhension exige un échange d'informations efficace entre les organismes locaux, régionaux et nationaux. Les autorités sanitaires nationales devront diriger la formulation et la mise en œuvre de mesures destinées à garantir l'accès à une forme d'approvisionnement fiable en eau de boisson saine, ou tout au moins contribuer à ces opérations. Lorsque ce résultat n'est pas atteint, il convient de diffuser des outils et une formation permettant la mise en place de moyens de traitement et de stockage sans risque à l'échelle de l'individu ou du foyer.

### ❖ Autorités locales

Les autorités locales en matière d'hygiène de l'environnement jouent souvent un rôle majeur dans la gestion des ressources en eau et des approvisionnements en eau de boisson. Ce rôle couvre notamment l'inspection des captages et l'autorisation des activités au voisinage de ceux-ci susceptibles d'influer sur la qualité de l'eau de la source. Il inclut également le contrôle et l'audit (surveillance) de la gestion des réseaux d'eau de boisson proprement dits. Les autorités locales en matière d'hygiène de l'environnement formuleront également des recommandations spécifiques à l'intention des communautés ou des personnes concernant la conception et la mise en place des réseaux d'eau de boisson alimentant les collectivités et les foyers, ainsi que la correction des déficiences. Elles peuvent aussi être responsables de la surveillance des approvisionnements en eau de boisson des collectivités et des ménages. Elles ont un rôle important à jouer dans l'éducation des consommateurs lorsqu'un traitement de l'eau à domicile s'impose.

En général, la gestion de l'approvisionnement en eau de boisson des ménages et des petites communautés nécessite un programme d'éducation sur l'approvisionnement en eau de boisson et la qualité de celle-ci. Les programmes de ce type devront normalement comporter :

- une sensibilisation à l'hygiène de l'eau ;
- un transfert d'informations et de techniques relatives à la technologie de base de l'approvisionnement en eau de boisson et de la gestion de cette eau ;
- une prise en compte des obstacles socioculturels à l'acceptation des interventions en faveur de la qualité de l'eau et des stratégies pour surmonter ces obstacles ;
- des actions de motivation, de mobilisation et de marketing social ;
- un système d'appui, de suivi et de diffusion continu du programme en faveur de la qualité de l'eau afin d'obtenir et préserver des résultats durables.

Ces programmes peuvent être administrés au niveau de la communauté par les autorités sanitaires locales ou d'autres entités, telles que des organisations non gouvernementales et le secteur privé. Si le programme d'éducation et de formation à la qualité de l'eau est à l'initiative d'autres entités, l'implication de l'autorité sanitaire locale dans le développement et la mise en œuvre du programme est fortement encouragée.

#### IV. DISCUSSION

Une eau potable est une eau à boire sans risque pour la santé. Selon le Centre national de recherche scientifique de la France (2004), il s'agit d'une eau « exempte de germes pathogènes (bactéries, virus) et d'organismes parasites, car les risques sanitaires liés à ces micro-organismes sont grands ». L'eau potable doit aussi être une eau agréable à boire: elle doit être claire, avoir une bonne odeur et un bon goût. Toutefois, s'il faut s'en tenir à la recommandation de l'Organisation Mondiale de la Santé, à savoir qu'une eau devrait être condamnée s'il y retrouve à plusieurs reprises un *Escherichia coli* par 100 millilitres, cela signifierait qu'il faudrait abandonner un fort pourcentage des sources d'eau existant dans les pays en voie de développement. Quant à l'ouvrage d'adduction d'eau villageoise, c'est un dispositif techniquement ou technologiquement réalisé en vue de faciliter l'accès à une eau potable. Souvent, il se présente sous la forme de forage, de borne-fontaine dans les milieux ruraux et périurbains. Cet ouvrage est supposé remplir des conditions qui garantissent une eau potable si de bonnes pratiques sociales ou mesures d'hygiène sont adoptées. Les enquêtes de cette recherche révèlent que du point de vue de recueil et du transport de l'eau, 41 % des ménages enquêtés utilisent un récipient sale pour recueillir l'eau, 29% des ménages investigués des branchages, de feuilles, toiles cirées pour créer l'équilibre et limiter le mouvement de l'eau dans la bassine pour transporter de l'eau. Toutes ces pratiques montrent que l'eau présumée potable, recueillie et transportée dans ces conditions est exposée à un risque très élevé de contamination. Certains auteurs dans d'autres régions ont eux aussi fait les mêmes constatations.

F. Charlet et D. Bamory (1985) dans une étude faite dans les villages de Côte d'Ivoire, ont trouvé que 20 à 40 % des ouvrages hydrauliques modernes sont l'objet de pollution biologique. Selon A. Diallo (2000), « pour réduire ou enrayer le taux de maladies hydriques et augmenter le taux de la population rurale qui a accès facile à l'eau potable, il faut mettre à la disposition de cette dernière des ouvrages appropriés d'approvisionnement en eau potable, adaptés aux besoins et aux réalités socioculturelles ». Ceci signifie que les ouvrages à utiliser doivent être en conformité, d'une part avec les besoins exprimés par la population rurale et d'autre part avec les normes sociales et les réalités culturelles des milieux considérés. Par ailleurs, même si l'eau est potable à la pompe, elle est polluée au cours du transport et du stockage. Dans une autre étude, P. Empereur-Bissonnet *et al.* (1992) dans le village de Boassa au Burkina-Faso, a constaté que l'eau potable recueillie à la pompe par cette population est contaminée durant le transport, le stockage et les manipulations à domicile. Les causes évoquées étaient la méconnaissance des règles d'hygiène et l'usage de récipients inadaptés, ouverts et sans protection. Dans cette recherche, l'enquête a révélé que la plupart des ménages enquêtés utilise un récipient (jarre) pour stocker l'eau recueillie, ce qui fait appel à des règles d'hygiène pour maintenir ces récipients propres. Devant ces constatations, nous pouvons dire que la potabilité de l'eau garantie à la source n'est pas suffisante pour consommer l'eau potable car, cette potabilité peut être compromise lors de sa gestion en aval. P. Empereur-Bissonnet *et al.* (1992) ont trouvé dans leur recherche que l'eau potable à la source, est souillée dans 38 % des canaris de transport, dans 62 % des jarres de stockage et dans la totalité desalebasses de prélèvement. Pour Y.J.E. Georges(2020), le mode de gestion de l'AEV de Toui dans la commune

de Ouèssè fondé sur l'affermage a mis en exergue les stratégies développées par chaque acteur pour contrôler au mieux la ressource, en fonction du pouvoir conquis ou dont il a été investi. En effet, la gestion de cette AEV est caractérisée par des dysfonctionnements qui tirent leurs racines du fonctionnement institutionnel mis en place. Ce fonctionnement ne garantit pas un engagement réel et total des acteurs communautaires, en raison d'une mission totalement bénévole assignée aux membres des comités de gestion. Cette mission contraste dans ses modalités avec la nature des ressources à gérer (infrastructures génératrices de revenus) et la position socio-économiques des acteurs. Dans son analyse, A. Afouda (2007) a mis un accent particulier sur la gestion intégrée des ressources en eau (La GIRE) qui implique le dialogue, la concertation et action entre les acteurs pour mieux gérer les ressources en eau. Pour cet auteur, il faut faire de l'eau l'affaire de tous. Le partenariat National de l'eau du Bénin (PNE-Bénin) est une ONG qui fait la promotion de la GIRE depuis sa création en Septembre 2001. La GIRE est aujourd'hui adoptée dans la politique sectorielle d'eau et d'assainissement du Bénin. La gestion durable des ressources en eau suppose la concertation et l'implication de tous.

### V. CONCLUSION

La commune de Natitingou est l'une des communes du Bénin où la population est majoritairement rurale. Ainsi, l'agriculture, principale activité socio-économique pourrait jouer un rôle considérable sur la qualité de l'eau. Diverses autres activités menées par les populations urbaine et rurale, ne respectent pas les normes environnementales requises. En conséquence, fournir de l'eau saine pour la consommation humaine devient de plus en plus un problème dans la Commune de Natitingou en l'occurrence, du fait de la contamination chimique des nappes. Ainsi, la prévention systématique est de loin préférable à celui qui consiste à traiter les eaux pour l'alimentation en eau potable lorsque leur qualité est détériorée. Les populations de Natitingou utilisent l'eau dans diverses activités telles que l'utilisation domestique, l'approvisionnement en eau potable, les besoins des petites unités de transformation et l'irrigation des cultures. Les difficultés rencontrées en matière de réalisation, de maintenance et de gestion des infrastructures hydrauliques, ainsi que l'inefficacité des structures de gestion de ces ouvrages hydrauliques et la mauvaise gouvernance de l'eau sont des problèmes que vit la population du Département de l'Atacora.

Les questions liées à l'amélioration des conditions d'accès à une eau de boisson potable dans les milieux ruraux doivent être résolues dans une perspective durable. Cela suppose que les facteurs sociologiques, culturels, environnementaux, politiques et économiques qui pourraient entraver à la réussite desdits projets doivent être analysés et étudiés minutieusement en impliquant en amont et en aval tous les acteurs de développement, à savoir les populations rurales qui sont les véritables concernées et les décideurs politiques ou promoteurs des projets. Cette démarche s'avère utile en vue de sensibiliser et d'informer les différents acteurs sur l'importance de la bonne gestion des ouvrages hydrauliques. Ainsi, seul l'affermage permet de pérenniser la gouvernance durable des Adductions d'Eau Villageoises dans la commune de Natitingou.

### RÉFÉRENCES

- [1] Afouda Abel, 2007, Faire de l'eau l'affaire de tous, Cotonou, 19 p.
- [2] Bazie Jean-Bosco, 2014, Accès à l'eau : l'Afrique entre abondance et pénurie, *Après-demain*, N° 31-32, pp.28-29
- [3] Benicourt, Emmanuelle, 2011, La pauvreté selon le PNUD et la Banque mondiale. *Études rurales*, 2001, no 159-160, p. 35-54.
- [4] Charlet Frédéric et Bamory Dembele, 1985, Expérimentation de solution en vue d'améliorer la qualité de l'eau à domicile en milieu rural, VILLOUD M. C. - Eau et Santé. - Abidjan : INSP - SNES, pp. 85-88
- [5] Dégbey, Cyriaque, Makoutode, Michel, Ouendo, Edgard-Marius, 2008, La qualité de l'eau de puits dans la commune d'Abomey-Calavi au Bénin. *Environnement, Risques & Santé*, vol. 7, no 4, p. 279-283.
- [6] Diallo Arouna, 2000. Essais de purification de l'eau de consommation en milieu rural et périurbain à l'aide de graines de Moringa oleifera et des argiles locales. Mémoire de maîtrise, Université de Conakry, Guinée, 87p.
- [7] Dinar Ariel, 2000, *The political economy of water pricing reforms*, New-York: Oxford University Press, 405p.
- [8] Empereur-Bissonet Pascal et Monjour Loïc, 1992, Application d'un nouveau matériel de transport de stockage pour l'amélioration de la qualité de l'eau de boisson en milieu rural africain, dans *Bulletin de la société de pathologie exotique*, N°85, pp. 390-394.
- [9] Faïzoun Constantine Dovey, 2005, Étude de la performance de produits naturels (argile et moringa oleifera) pour l'élimination de la turbidité et des nitrates des eaux de surface, Université du Québec à Montréal, Canada, 87p.

- [10] Georges Yetongnon Judith Eric, 2020, Sustainable Management Of Village Water Adductions In The Couffo Department Of Benin : What Gouvernance ?
- [11] Hartemann Philippe, 2013, Eau de consommation, risque, santé. Sciences Eaux Territoires, no 1, p. 14-21.
- [12] KayobolaKangombe Thomas, 2020, Approvisionnement en eau potable en milieu rural en République Démocratique du Congo face à l'Objectif 6 de Développement Durable, Exemple de la province du Maniema, Thèse de Doctorat, 161p.
- [13] Marino Manuel et BOLAND John, 1999, An integrated approach to waster water management: Deciding where, when and how much to invest, Washington, DC: World Bank, Directions in development, 56p.
- [14] Organisation Mondiale de la Santé, 2015, L'eau, l'assainissement et l'hygiène pour accélérer et pérenniser les progrès dans la lutte contre les maladies tropicales négligées : stratégie mondiale 2015-2020. Organisation mondiale de la Santé.
- [15] Organisation Mondiale de la Santé, 2016, L'eau, l'assainissement et l'hygiène dans les établissements de soins de santé : état des lieux et perspectives dans les pays à revenu faible ou intermédiaire.
- [16] Organisation Mondiale de la Santé, 2020, Systèmes nationaux d'appui à l'eau potable, l'assainissement et l'hygiène : rapport sur la situation mondiale en 2019 : analyse et évaluation mondiales de l'ONU-Eau sur l'assainissement et l'eau potable : rapport GLAAS 2019. 2020.
- [17] Sadeqe Houria Tazi, 2002, L'incontournable question de l'eau, *Liaison énergie francophonie*, no 55-57, pp.150-160.
- [18] Vargas, Marcelo Coutinho, 2011, La gestion privée des services d'eau et d'assainissement en Amérique latine : que reste-t-il des politiques pro-marché de la dernière décennie ? Cahiers des Amériques latines, vol. 2011, no 66, p. 155-175.
- [19] Zakari Bouraima, 2017, Sociologie de l'assainissement : latrinisation, représentations sociales et logiques d'action dans les villes moyennes au Burkina Faso, Sociologie, Université Toulouse le Mirail-Toulouse II, Français, 431p.
- [20] Zonou Amos, 2008, Environnement et santé dans la commune de Lokossa, Mémoire de Maîtrise, FLASH, UAC, 83 p.

# *Rethrombosis in Covid-19 Patients*

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**Abstract** – SARS-CoV-2 infection is associated with arterial and venous thrombotic complications. Autopsy findings revealed microthrombi in multiple organ systems, that may contribute to multisystem organ dysfunction in severe COVID-19. Thrombosis in patients with COVID-19 is due to a cytokine storm, hypoxic injury, endothelial dysfunction and increased platelet activity. Many difficult mechanisms contribute formation clots in vasculature of multi organs,

We presented two different cases of pulmonary artery thrombosis complicated by severe ARDS and rethrombosis in the branches of the pulmonary artery. Both patient was treated according PE (pulmonary embolism) management protocol (ESC)

**Conclusion:** The multisystem mechanisms: The complement system, part of the innate immune response, capable of activating the coagulation cascade, endothelial inflammation, loss of ACE2 and alteration of PAI/tPA balance, cytokine storm, high levels of the blood clotting protein factor, decreased concentrations of endogenous anticoagulant proteins increase probability of new thrombosis, despite suitable treatment and prevention.

**Keywords** – Covid-19, PE, Rethrombosis.

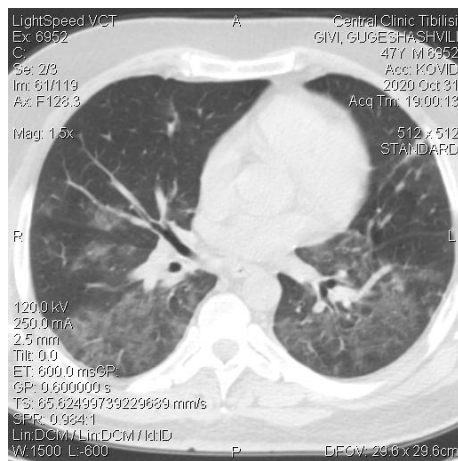
## I. INTRODUCTION

SARS-CoV-2 infection is associated with arterial and venous thrombotic complications. Autopsy findings revealed microthrombi in multiple organ systems, that may contribute to multisystem organ dysfunction in severe COVID-19. Thrombosis in patients with COVID-19 is due to a cytokine storm, hypoxic injury, endothelial dysfunction and increased platelet activity. Many difficult mechanisms contribute formation clots in vasculature of multi organs ,

We presented two different cases of pulmonary artery thrombosis complicated by severe ARDS and rethrombosis in the branches of the pulmonary artery. Both patient was treated according PE (pulmonary embolism) management protocol (ESC)

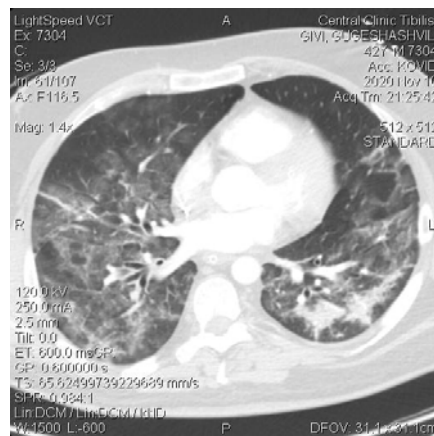
Patient N 1 .





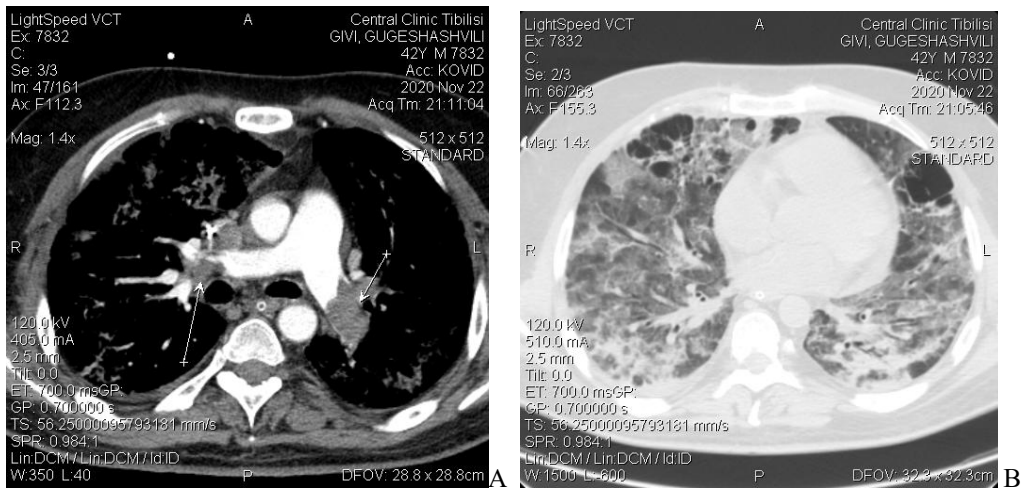
Pict 1. Computed tomography of the chest, axial section, pulmonary window.

On all sides, all fields are covered with foci of ground glass type infiltration and interstitial consolidation. Free fluid and air are not reflected in the bilateral pleural space. On semi-quantitative analysis of computed tomography data, the lung injury index was 18 points (0-24).[pict.1]



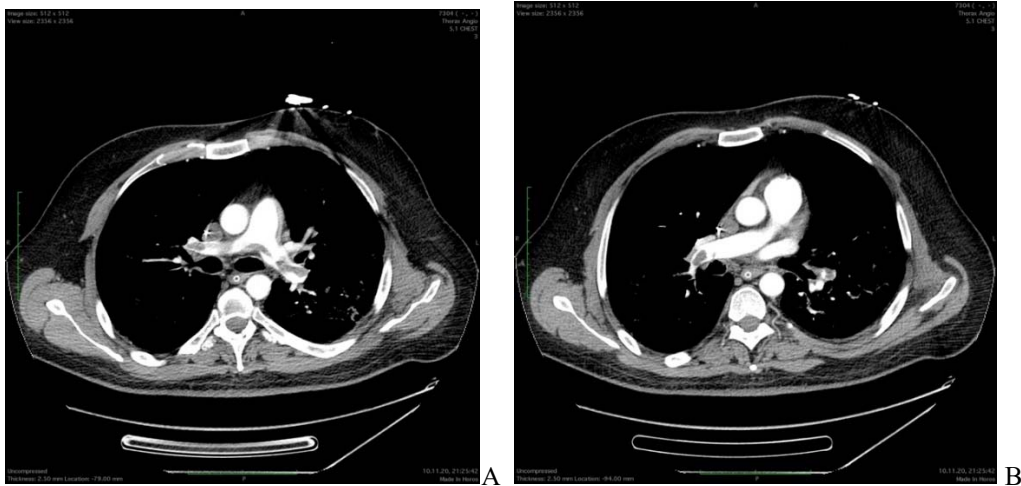
Pict. 2 Computed tomography of the chest, axial section of the pulmonary window.

The volume and intensity of infiltrative changes increased in all bilateral lung fields. Areas of consolidation have been identified. In a semi-quantitative analysis of computed tomography data, the lung injury index was 21 points (0-24).[pict2]



Pict 3 Computed tomography of the chest, axial section of the mediastinal window

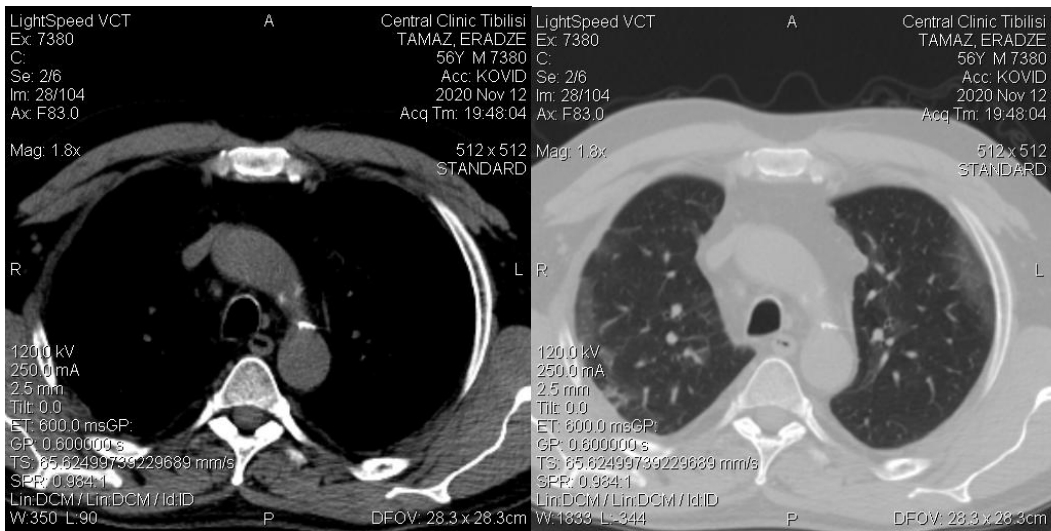
- A. On both sides, thrombotic formations are observed in the right and left main arteries of the lung, in the lumen of the parietal and segmental branches.
- B. The volume and intensity of the infiltration increase. In the ventral segments, areas of lung tissue rupture were revealed. Semi-quantitative methodological analysis of computed tomography data, lung lesion index - 24 points (0-24).[pict.3]



Picture 4

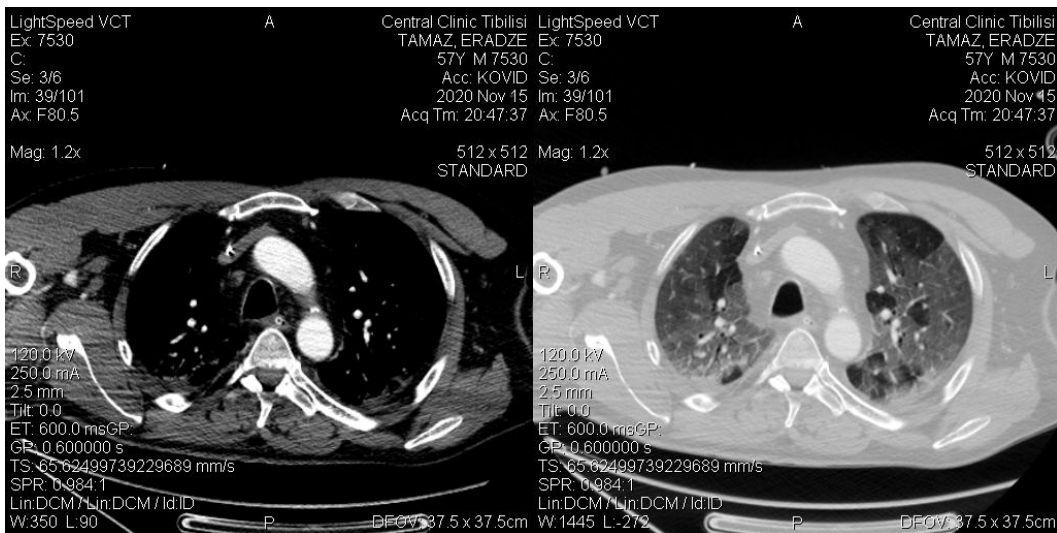
- C. Angiographic examination does not reveal reliable signs of thrombosis of the lung trunk. Spreading from the level of the lung trunk bifurcation, thrombotic masses are reflected in the lumen of both large bronchi. Saddle thrombus. Thrombotic formations are reflected in the bilateral lobal and segmental arteries.

Patient N 2



Pict 1.

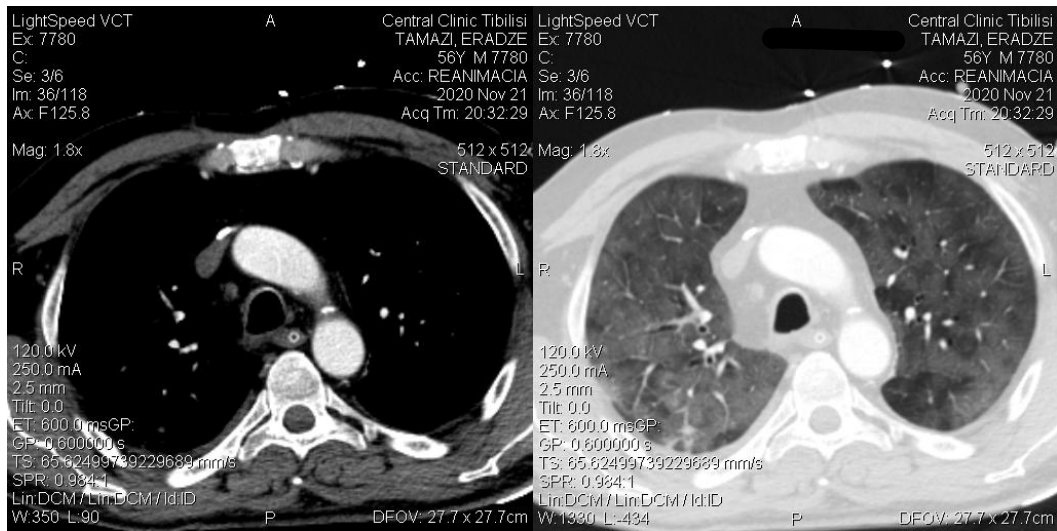
On both sides, there is an infiltrative change in the lungs in the form of a ground glass phenomenon without fluid in the pleural cavity. Semi-quantitative methodological analysis of computed tomography data, lung lesion index - 17 points (0-24).[pict1]



Pict .2

Angiographic examination does not reveal pulmonary thrombosis. The lumen of small arteries in the lower left corner is not completely contrasted, which suggests the presence of thrombotic masses. On both sides of the lung, there is a typical phenomenon of total ground glass, consolidation dorsally in the lower fields. Free fluid and air on both sides of the pleura are not detected

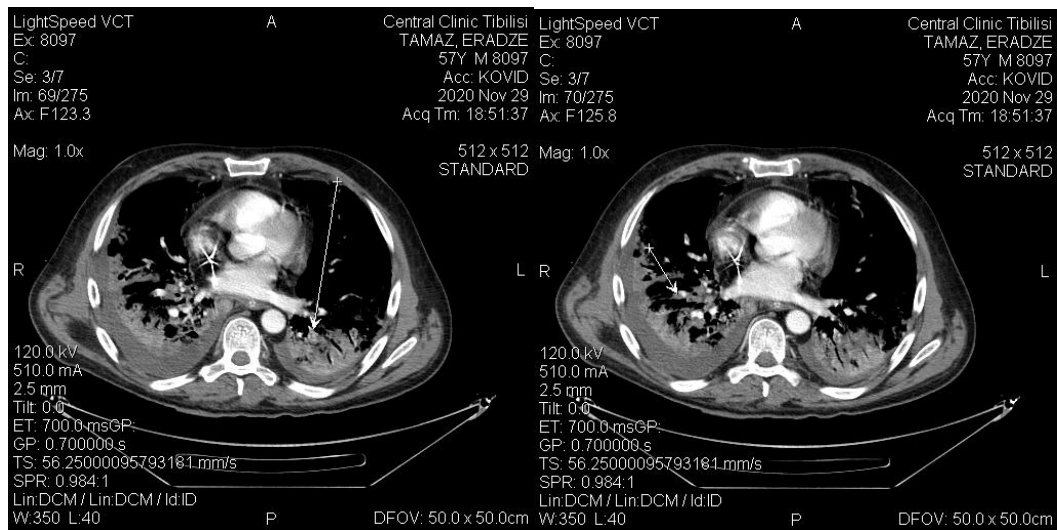
In a semi-quantitative analysis of computed tomography data, the lung injury index was 23 points (0-24).[pict.2]



Pict 3.

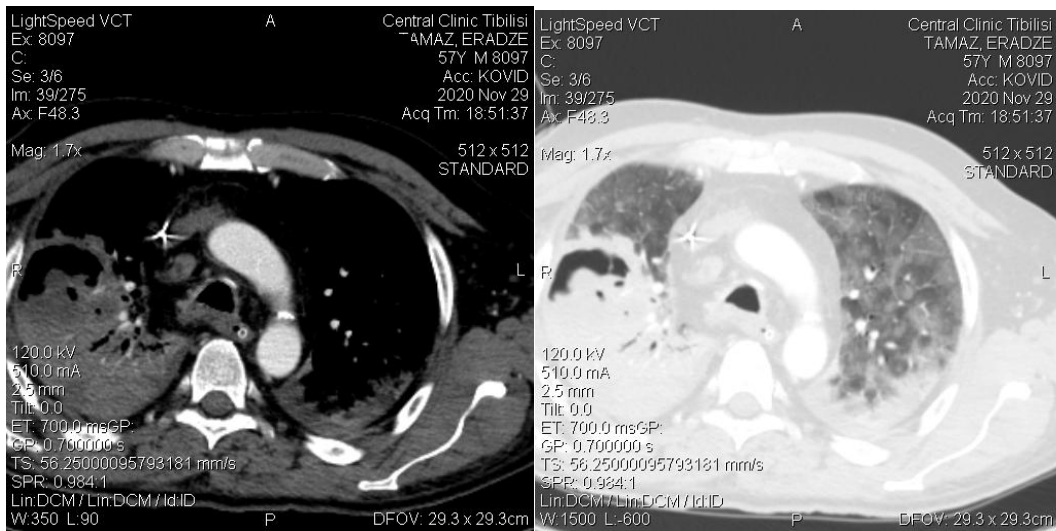
There is still lesion on both sides of the lungs, an almost entirely common ground glass phenomenon, although there is a relative decrease in intensity.

In the bilateral pleural cavity, a small liquid discharge, free air is not reflected. In a semi-quantitative analysis of computed tomography data, the lung injury index was 23 points (0-24).[pict.3]



Pict. 4

Angiographic examination showed no filling defect in the lung trunk and bilateral main artery. Thrombosis in the right lower artery is increased, in the left basal thrombus masses are reduced and reflected in the lumen of the segmental arteries. Shown by arrows.[pict.4]



Pict . 5

The intensity of the lesion was increased according to the type of ground glass phenomenon, which is totally widespread in both lungs; in the lower fields, extensive areas of consolidation appeared, against the background of which zones of avascular infarction pneumonia are revealed. Foci of destruction - 5.2 cm laterally in the right middle field.

The fluid is detected in the bilateral pleural cavity, the separation on the right is 2.2 cm, on the left is 1.0 cm, free air is not reflected.

In a semi-quantitative analysis of computed tomography data, the lung injury index was 24 points (0-24).[pict.5]

## II. DISCUSSION

The pathophysiology of thromboembolism in COVID-19 related to endothelial inflammation, hypercoagulability associated with increased concentrations of coagulation factors, acquired antiphospholipid antibodies, and decreased concentrations of endogenous anticoagulant proteins. loss of ACE2 alters PAI/tPA balance High levels of the blood clotting protein factor V is at elevated risk from blood clots such as deep vein thrombosis to pulmonary embolism. Immune complex vasculitis is pathological mechanism of covid-19 pumonary artery thromboembolism , venous sinus thrombosis , cytokine storm. SARS-CoV-2 invasion of ACE-2 receptor expressing cells (airway epithelial cells, vascular endothelial cells, circulating monocytes), causes cellular damage, release of pro-inflammatory chemokines and chemoattractants (including C3a and C5a). The complement system is part of the innate immune response [1.2.], the complement system is an important host mediator of SARS-CoV-induced disease and that complement activation regulates a systemic proinflammatory response to SARS-CoV infection, complement system is overactivated and contributes to the dysregulated host immune response [3.4.5.]. the complement system activates the coagulation cascade, increases tissue factor activity [6.7.8.9.], increases platelet activity and aggregation [10.11.12.13.], as well as stimulate endothelial cells to release von Willebrand factor and express P-selectin [14.15.16]. Complement also regulates fibrinolysis, with complement cascade inhibitors [17], and activates the fibrinolysis inhibitors PAI-1(plasminogen activator inhibitor-1) and TAFI [Thrombin Activatable Fibrinolysis Inhibitor].

Such difficult and multisystem mechanisms contribute formation clots in vasculature of multi organs, Increases probability of new thrombosis, despite suitable treatment and prevention.

## III. CONCLUSION

The multisystem mechanisms: The complement system, part of the innate immune response and capable of activating the coagulation cascade, endothelial inflammation, loss of ACE2 and alteration of PAI/tPA balance ,cytokine storm, high levels of the blood clotting protein factor, decreased concentrations of endogenous anticoagulant proteins increasis probability of new thrombosis , despite suitable treatment and prevention.

Abbreviation :

ARDS -Adult respiratory distress syndrome

ESC ----European society of cardiology

PAI-1----Plasminogen activator inhibitor-1

TAFI ---Thrombin Activatable Fibrinolysis Inhibitor.

ACE2 ---- Angiotensin-converting enzyme

t-PA-----Tissue plasminogen activator

PE----pulmonary embolism

**REFERENCES**

- [1] Hammad A., Westacott L., Zaben M. The role of the complement system in traumatic brain injury: a review. *J. Neuroinflammation*. 2018;15 doi: 10.1186/s12974-018-1066-z. [PMC free article] [PubMed] [CrossRef] [Google Scholar]
- [2] Huber-Lang M., Lambris J.D., Ward P.A. Innate immune responses to trauma review-article. *Nat. Immunol.* 2018;19:327–341. doi: 10.1038/s41590-018-0064-8. [PMC free article] [PubMed] [CrossRef] [Google Scholar]
- [3] Gralinski L.E., Sheahan T.P., Morrison T.E., Menachery V.D., Jensen K., Leist S.R., Whitmore A., Heise M.T., Baric R.S. Complement activation contributes to severe acute respiratory syndrome coronavirus pathogenesis. *MBio*. 2018;9 doi: 10.1128/mBio.01753-18. [PMC free article] [PubMed] [CrossRef] [Google Scholar]
- [4] Jiang Y., Zhao G., Song N., Li P., Chen Y., Guo Y., Li J., Du L., Jiang S., Guo R., Sun S., Zhou Y. Blockade of the C5a-C5aR axis alleviates lung damage in hDPP4-transgenic mice infected with MERS-CoV. *Emerg. Microbes Infect.* 2018;7:77. doi: 10.1038/s41426-018-0063-8. [PMC free article] [PubMed] [CrossRef] [Google Scholar]
- [5] Magro C., Mulvey J.J., Berlin D., Nuovo G., Salvatore S., Harp J., Baxter-Stoltzfus A., Laurence J. Complement associated microvascular injury and thrombosis in the pathogenesis of severe COVID-19 infection: a report of five cases. *Transl. Res.* 2020 doi: 10.1016/j.trsl.2020.04.007. [PMC free article] [PubMed] [CrossRef] [Google Scholar]
- [6] Ritis K., Doumas M., Mastellos D., Micheli A., Giaglis S., Magotti P., Rafail S., Kartalis G., Sideras P., Lambris J.D. A novel C5a receptor-tissue factor cross-talk in neutrophils links innate immunity to coagulation pathways. *J. Immunol.* 2006;177:4794–4802. doi: 10.4049/jimmunol.177.7.4794. [PubMed] [CrossRef] [Google Scholar]
- [7] Ikeda K., Nagasawa K., Horiuchi T., Tsuru T., Nishizaka H., Niho Y. C5a induces tissue factor activity on endothelial cells. *Thromb. Haemost.* 1997;77:394–398. doi: 10.1055/s-0038-1655974. [PubMed] [CrossRef] [Google Scholar]
- [8] Landsem A., Fure H., Christiansen D., Nielsen E.W., Østerud B., Mollnes T.E., Brekke O.L. The key roles of complement and tissue factor in Escherichia coli-induced coagulation in human whole blood. *Clin. Exp. Immunol.* 2015;182:81–89. doi: 10.1111/cei.12663. [PMC free article] [PubMed] [CrossRef] [Google Scholar]7. Øvstebø R., Hellum M., Aass H.C.D., Trøseid A.M., Brandtzaeg P., Mollnes T.E., Henriksson C.E. Microparticle-associated tissue factor activity is reduced by inhibition of the complement protein 5 in Neisseria meningitidis-exposed whole blood. *Innate Immun.* 2014;20:552–560. doi: 10.1177/1753425913502099. [PubMed] [CrossRef] [Google Scholar]
- [9] Wojta J., Huber K., Valent P. New aspects in thrombotic research: complement induced switch in mast cells from a profibrinolytic to a prothrombotic phenotype. *Pathophysiol. Haemost. Thromb.* 2003;33:438–441. doi: 10.1159/000083842. [PubMed] [CrossRef] [Google Scholar]
- [10] Polley M.J., Nachman R.L. Human complement in thrombin-mediated platelet function: uptake of the C5b-9 complex. *J. Exp. Med.* 1979;150:633–645. [PMC free article] [PubMed] [Google Scholar]
- [11] Sims P.J., Faioni E.M., Wiedmer T., Shattil S.J. Complement proteins C5b-9 cause release of membrane vesicles from the platelet surface that are enriched in the membrane receptor for coagulation factor Va and express prothrombinase activity. *J. Biol. Chem.* 1988;263:18205–18212. [PubMed] [Google Scholar]

- [12] Polley M.J., Nachman R. The human complement system in thrombin-mediated platelet function. *J. Exp. Med.* 1978;147:1713–1726. [PMC free article] [PubMed] [Google Scholar]
- [13] Subramaniam S., Jurk K., Hobohm L., Jackel S., Saffarzadeh M., Schwierczek K., Wenzel P., Langer F., Reinhardt C., Ruf W. Distinct contributions of complement factors to platelet activation and fibrin formation in venous thrombus development. *Blood.* 2017;129:2291–2302. doi: 10.1182/blood-2016-11-749879. [PMC free article] [PubMed] [CrossRef] [Google Scholar]
- [14] Hattori R., Hamilton K.K., McEver R.P., Sims P.J. Complement proteins C5b-9 induce secretion of high molecular weight multimers of endothelial von Willebrand factor and translocation of granule membrane protein GMP-140 to the cell surface. *J. Biol. Chem.* 1989;264:9053–9060. [PubMed] [Google Scholar]
- [15] Hamilton K.K., Hattori R., Esmon C.T., Sims P.J. Complement proteins C5b-9 induce vesiculation of the endothelial plasma membrane and expose catalytic surface for assembly of the prothrombinase enzyme complex. *J. Biol. Chem.* 1990;265:3809–3814. [PubMed] [Google Scholar]
- [16] Foreman K.E., Vaporciyan A.A., Bonish B.K., Jones M.L., Johnson K.J., Glovsky M.M., Eddy S.M., Ward P.A. C5a-induced expression of P-selectin in endothelial cells. *J. Clin. Invest.* 1994;94:1147–1155. doi: 10.1172/JCI117430. [PMC free article] [PubMed] [CrossRef] [Google Scholar]
- [17] Brown E.W., Ravindran S., Patston P.A. The reaction between plasmin and C1-inhibitor results in plasmin inhibition by the serpin mechanism. *Blood Coagul. Fibrinolysis.* 2002;13:711–714. doi: 10.1097/00001721-200212000-00007. [PubMed] [CrossRef] [Google Scholar]
- [18] Sakir Ahmed, Olena Zimba. Thrombosis in coronavirus disease 2019 (COVID-19) through the prism of Virchow's triad. *Clinical Rheumatology*, review article, 30 June 2020
- [19] Alexander Fletcher-Sandersjö<sup>1</sup>, Bo-Michael Bellander<sup>2</sup> Is COVID-19 associated thrombosis caused by overactivation of the complement cascade? A literature review, *Thrombosis research*. review article. vol 194, P 36-41. October 01, 2020
- [20] Abe T., Sasaki A., Ueda T., Miyakawa Y., Ochiai H. Complement-mediated thrombotic microangiopathy secondary to sepsis-induced disseminated intravascular coagulation successfully treated with eculizumab a case report. *Med. (United States)* 2017;96 doi: 10.1097/MD.0000000000006056. [PMC free article] [PubMed] [CrossRef] [Google Scholar]
- [21] Kollias A., Kyriakoulis K.G., Dimakakos E., Poulakou G., Stergiou G.S., Syrigos K. Thromboembolic risk and anticoagulant therapy in COVID-19 patients: emerging evidence and call for action. *Br. J. Haematol.* 2020 doi: 10.1111/bjh.16727. [PMC free article] [PubMed] [CrossRef] [Google Scholar]
- [22] Cui S., Chen S., Li X., Liu S., Wang F. Prevalence of venous thromboembolism in patients with severe novel coronavirus pneumonia. *J. Thromb. Haemost.* 2020 doi: 10.1111/jth.14830. [PMC free article] [PubMed] [CrossRef] [Google Scholar]
- [23] Klok F.A., Kruip M.J.H.A., van der Meer N.J.M., Arbous M.S., Gommers D.A.M.P.J., Kant K.M., Kaptein F.H.J., van Paassen J., Stals M.A.M., Huisman M.V., Endeman H. Incidence of thrombotic complications in critically ill ICU patients with COVID-19. *Thromb. Res.* 2020 doi: 10.1016/j.thromres.2020.04.013. [PMC free article] [PubMed] [CrossRef] [Google Scholar]

## *Alisher Navoi And Pahlavon Muhammad*

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**Abstract** – The article highlights the special character traits of Alisher Navai and his literary hero Pakhlavan Mukhammad. The author of an artistic ideological analysis of one letter and one mesnavi relating to the creativity of the figure and his attention to the special qualities of a perfect person on the example of historical personalities.

**Keywords** – Alisher Navai, Pakhlavan Mukhammad, poem, poet, talent, mesnavi, autobiography, sensitivity, mastership, father, child, operation, grey hairs, untruth, rubai, Mir Ibrahim, Piri, andour, devil, person, accomplishments, upbringing, humanity, virtue, charity, love, destiny, soul.

### I. INTRODUCTION

According to Alisher Navoi, poetry is a child of the poet's talent. Poetry is a translation of the creative heart. It is a poem, not a poem that did not burst from the depths of the poet's heart that did not reveal the hidden meanings in his heart. A poet, not a poet, who does not have a "cup of sorrow" in his nature. Poetry without "Dardu hol choshnisi" is a lifeless body, a flowerless garden, a lightless candle, an odorless musk. Such a poem cannot give light and enlightenment to the spiritual world of mankind. The poem "Dardu hol choshnisi" turns the thorns of sad hearts into flowers, gives light to sad hearts. It puts the song of life in the hearts. It makes dry eyes, frozen eyes cry, melts stone slopes.

### II. LITERATURE REVIEW

Alisher Navoi in his memoir "The Case of Pahlavon Muhammad" commented on the poetic talent of his teacher and friend Pahlavon: There is a sense of pain" [3, 111]. The great thinker quoted eight bytes from that masnavi in manaqib. Literary text begins with the following byte:

Chu ba charx ravshan shavad holi man,

Ba sad dida giriyad ba ahvoli man [3,110].



From the very beginning, it is considered that the hasn of the masnavi was written in the spirit of the case. In the poetic lines the real image is mixed with the poet's inner feeling (lyrical expression). From the first verses, the riotous, sad and melancholy mood in the hero's soul shakes the reader's heart. The eagle stays in such a state of agony that he cries bitterly if he finds out about his condition. It is clear from the next verse that the poet is suffering from hijrah and separation:

Maro bor budy guli navshukuft,  
Dareg'o ki bodi xazonash biruft [3,110].

Kushtigir lost the most precious thing in his life, the pure flower that opened in his flower garden, and lost it to the wind. In the byte, the idea is expressed very impressively with metaphorical expressions. The art of tanosub also helped to create a figurative plate, to reflect the inner experiences of the protagonist in an attractive way. The next verse recalls the tragic fate of Alisher Navoi's poetic and prose works: The same logic is reflected in the Pahlavon Masnavi in a unique style, through very vivid parables:

Hama umr tuxmi behi koshtam,  
Chu vaqti baromad nabardoshtam [3,110].

There is no greater pain for a farmer than to plow the land, so the seed in the ground, work for three hundred and sixty days, cultivate the crop, and lose it when the crop is ripe. The fate of the wrestler is even heavier; his level of tragedy is even higher. Because he had shown the seed of goodness all his life, not a year, and when it sprouted, he was deprived of the harvest.

### III. ANALYSIS

There is no poison bitterer to man than the poison of grief. Grief can make a person's life miserable and break his heart. In particular, the grief that comes when a coin faces the exhaustion of old age makes a person fall to the ground. Hope destroys the crop. The elephant turns into a fly, the light into a dark dungeon:

Zi on talx shud zindogony maro,  
Ki piry fikand az javony maro.  
Kunun man na on sheri zanjiriyam,  
Badar burda ham zi g'am piriyam.  
Ba xurdi padar tiftl az on parvarad,  
Ki to dar buzurgi g'am naxo'rad [3,110].

The last byte of the quoted reveals the secret of the event that drowned Pahlavon in an ocean of deep sorrow. It is known that Kushtigir suffered the loss of a child. The child is the fruit of the tree of life. He devotes all his life and pleasure to the human child. He hopes it will ease my pain as I get older, ease my pain. As he grows older, he sees it as strength in his waist, light in his dim eyes, health in his limbs, and health in his limbs in general:

Zi on dar javony bor oyadash,  
Ki dar ahdi piri ba kor oyadash [3,110].

It is difficult to raise a fallen person to old age, to repair a broken heart in old age, to idolize. It is impossible to find an ointment to cure a heart attack in old age (especially because of a birthmark). Because the flowers of joy bloom in the garden of youth. The child is a monument to the youth of the human race. Every job is good in its own right. The spring of life does not return with the dream. It is impossible to put an ointment on the defects of old age by longing for youth:

Maro piri on nav oxir fikand,  
Ki hecham javony nashud sudmand [3,111].

The philosopher is right. The old woman does not become an angel in the form of an angel. The old man only makes fun of himself in front of his hands by dyeing his hair. When a person is young, young, and healthy, it is natural to have a child instead of

a lost one, which is a great comfort. Those who suffer the loss of Kibar at a young age will not be disappointed. That is why our wise elders pray to God: "Do not show the stain of a child in old age."

Alisher Navoi showed skill in choosing a quote. He took the essence of Masnavi and referred it to the judgment of the reader. While reading the passage from the Masnavi, the reader will not be indifferent to the inner experiences of the wise old man, who is trapped on all sides, between two grasses (child spot and old age), in a state of mourning. It is as if the reader has found a piece of Pahlavon's life, a piece of his heart, not a poem from Manojib's heart. The inner pains and spiritual sufferings that haunt Kushtigir, holding the pen, also move into the psyche of the reader, forcing him to think about a life full of talismans, riddles. Masnavi Pahlavon Muhammad also plays an important scientific and enlightenment role as a small tablet from his old age.

There are rare records in the history of the creation of Pahlavon Masnavi in Manojib, which add to the scientific and enlightenment value of the work: "... Sultan Sahibkiran became the meeting of the press tabu nadimi and the meeting of the munis and sham'i of the son of Pahlavon, and he betrayed Pahlavonidin" [3,110].

#### **IV. DISCUSSION**

Pahlavon Muhammad puts a lot of effort into the physical and spiritual upbringing of his adopted son Piri, bringing him to the status of a leading figure in his field. And he wants to have more noble dreams through him, but as a result of Piri's instability and unfaithfulness, Kushtigir's dreams are shattered. Masnavi was born on the basis of this event. Alisher Navoi, quoting from this historical record and masnavi, has mistakenly aimed at two great goals:

He artistically substantiated the poetic potential of the wrestler;

Kushtigir subtly emphasized an important aspect of human beauty: "Pahlavon was a man of honor and zeal, and Anduhdin had words in his heart and body, but he did not express them to anyone" [3,110].

A person who looks at everything in life with a sincere eye, when he sees injustice and carelessness from his relatives, outwardly and inwardly, he is deeply saddened. But it is impossible to know from the surface that such people are overwhelmed with grief, suffering, and suffering. There is no moaning, no desire, no suffering, the behavior of this category, in relation to people. They bravely carry the mountain-like burden of grief and walk as if they saw nothing in front of their eyes. They do not want to infect others with their passions. In such people, the sense of honor is extraordinarily high. For them, aria is a matter of life and death, and they are ready to die in this way.

By nature, the sanctification of honor is a characteristic of the wrestler. There are many rumors among our people that a wrestler who did not touch the ground once fell from his opponent and left his house in a cloak, saying, "The water of this place is now unclean for me." Strict adherence to the human race has become a pillar of the life of our ancestors, which should be an example for today's generation.

Alisher Navoi skillfully used the meaning of the words "honor", "zeal", "greed" in the depiction of human beauties, each step of which is an example, an example of courage, some of which we feel in the nature of Kushtigir.

The heart is not the tablecloth. It cannot be revealed to everyone. But in life, every owner of the heart agrees with his "mahram": "But I did not have any kind of secret and consent; let it be hidden from the poor. And this is the oath of the poor." [3,110]. That's why Kushtigir told his sympathetic brother Alisher Navoi a sad story about the birthmark. And at the same time there is harmony in the fate of Pahlavon Muhammad and Alisher Navoi. The 89th letter of Alisher Navoi "Munshaot" was sent to his adopted son, who left the great writer in his old age. The letter did not go unnoticed by researchers. The diligent Navoi scholar A. Hayitmetov carefully studied the manuscripts of Majolisun-nafois and determined that Navoi's adopted son was Mir Ibrahim, the grandson of the writer's brother Sheikh Bahlulbek (son of Sultan Hussein) [7,193]. The ideological analysis of the letter is contained in the works of S. Ganieva [6, 414-416]. But this letter is not addressed in terms of the problem we are studying. The letter begins with a rubai and ends with a rubai.

It is clear from the gestures in the letter that Mir Ibrahim sent a letter to the great thinker with the desire to justify himself and prove his innocence after Alisher Navoi left. It was that letter that prompted the writer's letter to be written.

In Alisher Navoi's prose works, the interpretations of nafs and satan, zuhd and fisk often go hand in hand. According to the great writer, a person who is saved from the fulfillment of lusts, who is able to save himself from the snares of lust, can lower the devil

and sink him to the ground. He who is in the will of the self is a servant who is always tested and trusted at the door of the devil. As in the case of the "master", so in the case of the servant who serves his interests. That is why those who are in the control of lust are the most despised, the most misguided, the most inferior creatures in the world.

Zuhd is pleasing if it occurs on the basis of the relationship between the external and the internal. But asceticism, which is not cleansed of the pleasures of deception and hypocrisy, does great harm to the spirituality of the people. Fiqh is a disgusting, disgusting evil in all cases, but wickedness, wrapped in the veil of zuhd (purity, abstinence), is even more dangerous.

He is superior to the sheikh, who is aware of his rebellion and enters the path of guidance through repentance. In this sense, repentance is a great happiness. Indeed, the wicked man is spiritually weak, helpless, and humble. He is always hesitant, hesitant, and living in a whirlpool of flawed emotions. He sees a curve in everything that is right. And with the same features, he insults his own identity. It burns both worlds.

The rubai at the beginning of Alisher Navoi's letter to his adopted son discusses the same ethical and philosophical issues:

Ey nafs havosig'a giriftor o'lg'on,  
Shayton ishiga ishing namudor o'lg'on,  
Ham zuhd ila izzatqa sazovor o'lg'on,  
Ham fisq ila olam eliga xor o'lg'on [2, 215].

The human body matures as a result of upbringing. The child needs long-term physical and moral upbringing until adulthood. Parents work tirelessly to strengthen the child's body, to bring its unstable nature into a certain order. Forming a child accustomed to physically strong, spiritually beautiful behaviors requires an iron will from them. In the first sentence of the letter, the same vital truth becomes the pearl of the word, and like Alisher Navoi, the enlightened father of the East flows from the heart: "Ey sargashtai xudroy va ey baxti bargashtai besarupoy, ul vaqtdin berikim, mazallat tufrog'idin ro'zg'oring chehrasin supurdim va mehnat dashti sargardonlig'idin parishon xilqatingni yig'ishturdim" [2,215].

The spirit of anger and regret, sorrow and grief that existed in the rubai continued in the first sentence as well.

It is clear from the words "if you were a little boy" and "if you were a child" in the next sentence that Alisher Navoi took care of this child from a very young age. He suffered a lot along the way. He was not unaware of his upbringing for a moment. Concerned for the health and well-being of the child.

As we read the next sentence of the letter, the loving and compassionate image of the devoted father of the East, whose heart is filled with compassion for the child, comes to mind: "I was not unaware of your condition one day a year, maybe an hour at night, during the day" [2,215]. Such heartbreaking words can flow from the heart of a father who has raised his child without even the wind, who has devoted all his pleasures to him.

There is no doubt that a person like Alisher Navoi, who has infinite sincerity, devotion and love, is devoted to the upbringing of children with all his consciousness.

If the father is so concerned with the protection of the child that the child does not justify the trust, it is only natural that the letter should be preceded by a bitter rebuke. After all, the joys and sorrows of all people, feelings of kindness and anger were not alien to Alisher Navoi.

According to the school of our wise forefathers, a person is not perfect only by outward upbringing. Outward upbringing is necessary for a person's external behavior, service to society, and purity of human relations. "But as long as the sincerity of the heart is real and the heart is completely cleansed of spiritual filth, external purity is of no use. Because the dirt inside is more harmful and dangerous than the dirt outside" [5, 24]. Therefore, first of all, it is necessary to reform the heart, to give the patient a cure for anger from the inside (Abdullah Avloni).

The child, who enjoys the ball of Orifona's truths and qualities, is humble and restrained (resilient, heavy, calm), patient, contented, and emanates the fragrant scent of humanity. The light of religion shines from his enlightened heart and pure face.

We read from the letter of Alisher Navoi: "Zohiringni ahli zohir fununi fazoyili bila orosta va botiningni ahli botin haqoyiqu maorifi bila piyrosta bo'lurg'a sa'y qildim" [2,215].

The sincere efforts of the great thinker seem to have yielded results. The child begins to attract the attention of the people with his intelligence and taste. Alisher Navoi is proud of his potential and will take part in the meetings of the country's ruler Hussein Boykaro. He will receive the king's gift. As a great poet, writer, scholar, son of a statesman, he is respected by princes and other saints of the capital. It was revealed to the people that the writer's sincerity towards the child, his love was "embossed in the middle of his soul like an alphabet", and the people of his heart, who had a heart full of love for him, saw great meaning in him.

#### **V. CONCLUSION**

After all, kindness is the jewel of the eye of society, it illuminates social life. Without it, society is shrouded in darkness. But there are also such bitter truths that have been tested in the life experience of the people for thousands of years that cannot be ignored. He who ignores them will eventually bite his finger in astonishment. Strong compassionate love, sincerity and sincerity sometimes blind the eyes and ears of pure people. In such situations, when a person is awake, the friendly enemy acts in unison. Friends benefit "with the bitter medicine of admonition" (Sheikh Saadi), enemies with slander and irony. In this case, everything depends on the pure person himself. He either wakes up or goes on his way. For a pure man, whose nature is full of goodness, there is no more difficult task than to break the rope of love, to tie a stone to the heart. The same vital problems are presented in the letter to the reader in the Navoi style, with beautiful proverbs and parables in the heart of the writer.

#### **REFERENCES**

- [1] Alisher Navoi. Beloved slave. A perfect collection of works. 20 vols., 14 vols. –Tashkent: "Fan", 1998. –304 pages.
- [2] Alisher Navoi. Munshaot. A perfect collection of works. 20 vols., 14 vols. –Tashkent: "Fan", 1998. –304 pages.
- [3] Alisher Navoi. Holoti Pahlavon Muhammad. A perfect collection of works. 20 vols., 15 vols. –Tashkent: "Fan", 1999. –236 pages.
- [4] Jalaliddin Rumi. Inside is inside. –Tashkent: "Writer", 1997, –192 pages.
- [5] Muhammad Nurullah Saydo al-Jazari. Secrets of Sufism. –Tashkent: "Movarounnahr", 1999. –100 pages.
- [6] History of Uzbek literature. 5 vols., 2 vols. –Tashkent: "Fan", 1977. - 447 pages.
- [7] Hayitmetov A. Own commentaries on the history of our literature. // Star of the East. 1971, No. 12, p.193.
- [8] Ahmadova U.Sh. Types of periphrases according to social-professional classification // The American Journal of Social Science and Education Innovations, ISSN: 2689-100X. Volume 02 Issue 08, 2020. – Pp. 318-325. Impact Factor 5,525.
- [9] Hayitov Sh. The genre of manokib and the problem of a perfect human being // International Journal of Psychosocial Rehabilitation. ISSN: 1475-7192. (SCOPUS) – 2020. – Pp. 10 – 16.
- [10] Hayitov Sh. Depiction of king and great leaders in classic literature // International Journal on Integrated Education. – USA. – 2020. – Pp. 161–164.
- [11] Hayitov Sh. Dream of a perfect ruler // International Scientific Journal. «Theoretical & Applied Science». – USA. – 2020. – Pp. 459 – 463.

# *Sergei Esenin In The Mirror Of American Periodicals, 1922–1925*

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**Abstract** – Despite a vast amount of the studies by American critics, memoirists and scholars devoted to the analysis of Sergei Esenin's works, not all the pieces of the American press on the life and work of the Russian poet have been introduced into scientific use. The article considers materials on Esenin in Yiddish, English and Spanish, published in the United States in 1922–1925. Most often the American press wrote about Esenin in the following periods: during his trip with Isadora Duncan to the United States (October 1922 — February 1923), during their stay in Europe (February — July 1923), just after Esenin's tragic death (December 1925), and after Isadora Duncan's death (September 1927). The article *Some Bolshevistic Troubadours* by a well-known American translator, editor and journalist Nathan Dole is of a special interest, and is introduced into scientific use. Dole included in his review large fragments of Esenin's poems, translated into English and called Esenin's book *Triptych* "a red rhapsody".

**Keywords** – Sergei Esenin, Isadora Duncan, Nathan Haskell Dole, John Clayton, George Seldes, US periodicals, biography, creativity.

## I. INTRODUCTION

S.A. Yesenin, together with his wife, the famous dancer Isadora Duncan, spent about four months in America - on October 1, 1922, the ocean liner "Paris" (the time of the ship's departure from Europe was recently clarified - see: [Skorokhodov 2013]), on board which they traveled, entered American territorial waters, and on February 3, 1923, their journey from New York to Europe began. These months were the period of the most intensive publication of materials with a mention of the poet, who was considered as the young Russian husband of a talented American woman.

Subsequent periods of frequent mentions of Yesenin fall on the time of his stay in Europe in February - July 1923, in the days after his tragic death in December 1925, and are also associated with numerous responses to Duncan's death in September 1927. However, the poet has been written about in the United States in other years as well. A considerable number of studies have appeared that examine the perception of Yesenin by Americans. First of all, it is necessary to mention the work of Gordon McVay "Isadora & Esenin" [McVay 1980], in which a significant layer of periodical materials was introduced into scientific circulation. Recently McVeigh donated his most valuable archive of Russia to the State Museum-Reserve of S.A. Yesenin in the poet's homeland.

## II. LITERATURE REVIEW

To date, a general description of the materials received has been completed [Ioganson 2017], the archive requires further study. Some materials about Yesenin in English, including those published in the United States, were characterized in the works of O.I. Yushina, including in her dissertation [Yushina 1981]. A short review "Yesenin in English-language literary criticism" was made in 2008 by A.Y. Bolshakova [Bolshakova 2008]. Translations of fragments of publications of American periodicals about Yesenin

were included in the “Chronicle of the life and work of S.A. Yesenin”, they refer both to the time of the poet's life in America and to later years [Chronicle 2008; Chronicle 2010; Chronicle 2013].

A significant layer of materials will be introduced into scientific circulation in the "Supplements" section of the second book of the fifth volume "Chronicles of the life and work of S.A. Yesenin ", the release of which is scheduled for 2018. A characteristic of the reception of Yesenin's life and work in different countries, including the United States, is contained in the monograph by N.I. Shubnikova-Guseva [Shubnikova-Guseva 2012]. The American contexts of Yesenin's creativity are considered in N.A. Eremenko [Eremenko 2015]. Among the recent publications that introduced the materials of the American press of the 1920s into scientific circulation, we note the work of E.Y. Kolomiitseva [Kolomiitseva 2014].

### III. ANALYSIS

The Russian émigré press published in the United States, which wrote about the poet, has been studied much better [Rusское izmirie 1993; Skorokhodov, Kolomiitseva 2015; Skorokhodov, Kolomiitseva 2016] than publications in other languages. The researchers of the English-language American editions who gave estimates of Yesenin's work were named above. However, newspapers published in other languages also wrote about Yesenin. Unfortunately, not all of them have been reviewed. The search work is greatly facilitated by the availability of electronic copies of publications; however, due to the poor preservation of newspapers and magazines, not all scanned texts are correctly recognized. In addition, not all periodicals have yet been digitized and available to researchers.

The following is a description of a number of materials published in the United States on Yesenin, which were previously only briefly mentioned or not at all introduced into scientific circulation. A number of them, translated into Russian, will be cited in the above-mentioned second book of the fifth volume “Chronicles of the life and work of S.A. Yesenin ”. For researchers of the life and work of the poet, the most interesting are the critical articles and reviews, the authors of which consider Yesenin in the context of the development of Russian and world literature. Such materials are recorded in the volumes of the Yesenin chronicle.

Among the recently identified American materials of this kind is an article by E. Izvolskaya, first published in French [Kolomiitseva, Skorokhodov 2014]. One of the earliest references to Yesenin in the articles of the English-language American periodicals devoted to the examination of Russian literature is contained in the New York magazine "The Living Age" for March 11, 1922. The section “Life, letters, and the arts” contains the material “A Russian on Russian literature”, which opens with a paragraph mentioning Yesenin and his co-authors from the collection “Scythians” - A.A. Blok and Andrey Bely:

Criticism of the morbidity and gloom of Russian literature has long been familiar in America, nor have the literary developments of the Bolshevik regime — striking as they have been — overcome the critics. The wild mysticism of Byelii and Essenin, the “Scythian” doctrine of Blok, seem to the American mind almost as morbid as the profound gloom of the earlier novelists. Particularly noteworthy is the belated review of Nathan Haskell Dole, published in the New York Times on February 25, 1923, *Some Bolshevistic Troubadours*, a response to those published in 1920–1921. In Berlin, the books of the Scythians publishing house, including Yesenin's *Triptych*, as well as the collection “Towards new distances. Lyrics of gentle accords ”. Nathan Dole (1852-1935) - famous American poet, editor, journalist, active member of various creative associations.

He had a wide circle of contacts, including famous writers of his time (and he lived a long, eventful life): Henry W. Longfellow, W. Cullen Bryant, Walt Whitman, William Dean Howells, John G. Whittier, Thomas Wentworth Higgins, Edward Everett et al. Dole's house in Boston, where he lived from 1892 to 1928, has long been a meeting place for musicians and writers. Dole probably attended the performances of A. Duncan at the Boston Symphony Hall in October 1922, which was attended by Yesenin. Information about their meetings and communication has not been revealed. Note that Dole turned to the consideration of books by Russian authors two years after their publication, and precisely at the time when the American press was actively publishing materials about Yesenin: in early February 1923, American newspapers reported on the departure of Duncan and her young husband from America to Europe, and then printed notes related to their family quarrels, and messages about the likely separation of the spouses. It is possible that such an informational background attracted Dole's attention to Yesenin's work. In his rather lengthy review, more than a third of the total volume is devoted to the analysis of Yesenin's texts, although other striking works of the turn of the 1910-1920s are also in the critic's field of view: "Scythians" and "Twelve" by A.A. Blok, "Christ is Risen" by Andrey Bely, "Beloved Songs" by N.A. Klyuev. Dole is widely recognized as a translator from Spanish and French. He also translated Russian writers, including L.N. Tolstoy. So, in 1886 he made the first English translation of Anna Karenina. In the preface to the translation,

Dole claimed to be translating from the Russian original, only occasionally correlating his version with the French translation already available at the time.

However, the first reviewers noted some abbreviations of the text of the novel made by Dole, which, in their opinion, testified to his orientation towards the French source<sup>1</sup>. For us, in this case, it is important that already in the mid-1880s, Dole knew Russian so well that he translated Tolstoy's voluminous novel. Dole's books include *Young Folks History of Russia* (1881), *The Latin Poets* (1905), *The Greek Poets* (1907), *Life of Count Tolstoy* (1911). Dole has worked for such publications as *The Boston Evening Transcript*, *The Portland News*, *The Independent*, *The New York Times*. Dole's review begins with an inaccurate account of the founder E.A. Lyatsky Joint-Stock Publishing Company Ogni, which was later reopened in Stockholm as *Severnye Ogni* publishing house.

#### IV. DISCUSSION

Calling the names of K.D. Balmont, F.K. Sologub and A.A. Blok, Dole notes:

But what makes them particularly interesting is that several of the authors represented have become notorious for their emergence into the arena of futurism. It is much the same as if gentle, pensive painters of the Hudson River school suddenly kicked over the traces and joined the ranks of F.T. Marinetti, or as it quiet Mendelssobnians became imbued with the vibrations of the *Intonarumori* futuristi or Luigi Russolo, Alexander Blok, for instance.

Dole's review contains many verse texts translated into English. So, after the quoted reasoning, he gives a complete translation of Blok's poem "Leave me in my distance ...». Noting: "That, and a vivid picture of soldiers departing for the front and dated September, 1914, will be found in a later collection of Russian poetry entitled " *Russky Parnass*" "rain ...». The reviewer highly appreciates the two poems given, considering them important for understanding Blok's later work:

These two poems, even in the slag-form of a literal translation, mark an advance from the sentimental outpourings of Blok's twenties; but the latest manifestations of his genius — for it was genius — are certain to elicit quite opposite judgments, Ivanof-Razumnik, for instance, in a long and somewhat repetitions introduction to the little volume containing Blok's "Scythians" and "The Twelve" declares that they "will live for decades and decades in Russian literature"...

In the context of the analysis of the works of the literary group "Scythians" formed in 1917 and the collections of the same name, Dole for the first time in his review mentions Yesenin:

Conservatives, on the other hand, do not spare epithets in condemning what seems to them gross vulgarity, outrageous blasphemy. Take the symbolism that characterizes not only these later poems of Blok, but many of the others contained in the volumes above noted; it is the symbolism of the Church, but diverted or perverted entirely from its historic import. It seems singular that these three revolutionary poets, Blok, Byely and Yesenin, should with one accord take the Resurrection of Christ to stand for the restoration of the Russian people after its crucifixion and temporary entombment.

Dole characterizes the figurative system and symbolism of the poem "The Twelve", cites a small quotation and shows that attention to the image of Christ brings together the creative searches of 1917-1918 by Blok, Bely and Yesenin. However, each of these authors has peculiarities in understanding both this image and the ways of development of Christianity in the revolutionary years. The reviewer illustrates the movement of the West to the East with a lengthy quote from Blok's "Scythians", which ends with the last stanza: For the last time - come to your senses, old world! To a fraternal feast of labor and peace, for the last time to a bright fraternal feast, the barbaric lyre is calling!

Then, without any transition, Dole turns to Yesenin, whom he characterizes as Isadora's husband Duncan, who, together with his wife, has just visited America and is now heading to his Inonia. The reviewer notes that Yesenin's poetics is characterized by "pseudo-Christian or parody-Christian (?) Symbolism" ("pseudo-Christian, mock-Christian -? - symbolism"). Dole considers the evolution of Yesenin's creativity in the context of the events taking place in Russia:

It would undoubtedly shock conservatism. But, if one is willing to admit that Russian Communism may be seriously accepted not as a mere belief but as a matter of life and death Orthodox Christianity, especially as developed in Russia, may in the eyes of such persons deserve to be pilloried.

## V. CONCLUSION

Yesenin's references in the articles that appeared in the first days after Duncan's death do not contain significantly new information about the poet, in this regard; we do not consider them in this work. An appeal to the materials of periodicals makes it possible to clarify which aspects of the life and work of the Russian poet were of greater interest to readers. This material is relevant in connection with the preparation of the second book of the fifth volume "Chronicles of the life and work of S.A. Yesenin" - fundamental scientific research, which notes the main references to Yesenin in various publications in Russian and foreign languages.

## REFERENCES

- [1] Bolshakova A.Y. Yesenin in English-language literary criticism // Yesenin and world culture. M. – Konstantinovo – Ryazan: Press, 2008. Pp. 118–136.
- [2] Paper Bridges: Five Jewish Poets: Mani Leib, M.-L. Galpern, G. Leivik, Z. Landau, I. Munger. Saint Petersburg: Publishing House of the European University in Saint Petersburg, 2012.
- [3] Dymshits V.A. Money Leib. Nezhin // New literary review. 2010. No. 102, pp. 183–194.
- [4] Eremenko N.A. The American theme in the works of S.A. Yesenin: poetics and context: Dis. ... Cand. philol. sciences. M., 2015.
- [5] Esenin S.A. Complete works: In 7 volumes (9 books). T. 5.M.: Science; Vote. 1997.
- [6] Ioganson B.I. World Yeseniniana in the funds of the State Museum-Reserve of S.A. Esenin (archives of Y.L. Prokushev and G. McVeigh) // Sergei Yesenin. Personality. Creation. Epoch. Part II. M. - Konstantinovo - Ryazan: GMZ S.A. Yesenin, 2017. pp. 31–42.
- [7] Kolomiytseva E.Y. Isadora Duncan and Sergei Yesenin in Boston (based on the materials of The Boston Herald) // Modern Yeseninovedenie. 2014. No. 28, pp. 28–37.
- [8] Kolomiytseva E.Y., Skorokhodov M.V. From the heritage of E. Izvolskaya (France). Bolshevik mystic poets // Modern Yeseninovedenie. 2014. No. 28, pp. 7–28.
- [9] Chronicle of the life and work of S.A. Yesenin: In 5 volumes (7 books). T. 3. Book. 2. Moscow: IMLI RAN, 2008. [Chronicle 2010] - Chronicle of the life and work of S.A. Yesenin: In 5 volumes (7 books). T. 4.M.: IMLI RAN, 2010.
- [10] Chronicle of the life and work of S.A. Yesenin: In 5 volumes (7 books). T. 5. Book. 1.M.: IMLI RAN, 2013.
- [11] Russian Diaspora about Yesenin: Memories, essays, reviews, articles / Vstup. Art., comp. and comments. N.I. Shubnikova-Guseva, Moscow: INCON, 1993. T. pp. 1–2.
- [12] Skorokhodov M.V. Arrival of S.A. Yesenin and A. Duncan to America (based on archival materials) // Modern Yeseninovedenie. 2013. No. 27, pp. 16–23.
- [13] Skorokhodov M.V., Kolomiytseva E.Y. Yeseninian of the Russian Diaspora: the émigré newspaper "New Russian Word" - to the 25th anniversary of Yesenin's death // Modern Yeseninovedenie. 2015. No. 4 (35). pp. 10–20.
- [14] Skorokhodov M.V., Kolomiytseva E.Y. New York newspaper "Russian Voice" (1922-1923) about S.A. Yesenin and A. Duncan // Modern Yeseninology. 2016. No. 1 (36). pp. 17–26.
- [15] Shubnikova-Guseva N.I. "Combines the Sound of Russian Song": Yesenin and World Literature. Moscow: IMLI RAN, 2012.
- [16] Yushina O.I. Poetry of S. Yesenin in the assessment of contemporary foreign literary criticism and criticism (USA, Great Britain, Canada, New Zealand). Dis. ... Cand. philol. sciences. M., 1981.
- [17] Birdwood-Hedger, M. Tension between Domestication and Foreignization In English-language translations of Anna Karenina. Dissertation ... of Doctor of Philosophy. Edinburgh, 2006.
- [18] McVay, G. Isadora and Esenin. Ann Arbor, MI: Ardis, 1980.



# *Sadri Ziya's Roles And His Personal Library In The Distribution Of Enlightenment In Bukhara*

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**Abstract** – Bukhara has always fascinated the people of the West and the East as a city where science, enlightenment, trade and handicrafts flourished. The scientific heritage created by our great ancestors and amazed the whole enlightened world today is the spiritual property of not only one nation or people, but of all mankind, this priceless wealth is a source of wisdom and knowledge for new and new generations, and most importantly, a solid foundation for new discoveries will undoubtedly serve as.

**Keywords** – Science, Enlightenment, Trade And Handicrafts, Scientific Heritage, Historical Sources, Historical Works.

## I. INTRODUCTION

Sadri Ziyov's contribution to the formation and development of the literary environment of Bukhara in the early twentieth century is invaluable. In particular, his personal library is the most necessary and necessary place for the enlighteners of Bukhara. Although the enlighteners of Bukhara studied in a madrasah, the books in Sadri Ziyov's library served as a program (Program - L.P.) for them in the promotion of science and enlightenment in Bukhara.

Indeed, some representatives of the Bukhara cultural environment have made a great contribution to world civilization with their scientific work and activities. Ahmad Donish (1827-1897) can be remembered as one of the great figures of this cultural and enlightenment circle.

Ahmad Dnish was a writer, philosopher, enlightener, thinker, poet, and scholar, as well as a statesman. He was also called the "father of serious ideas" [1, p. 3]. Judge Muhammad Muhammad Sharifjon Mahdum Sadr Bukhari - Ziya (Ziya Sadr), nicknamed Sadri Ziyov, was brought up in this environment under the influence of Ahmad Donish and was a supporter of progressive ideas. In historical sources, his name can be found in the form of Mirzo Muhammad-Sharif, Sharif Mahdum, Qazi Sharifjon [2, p. 39]. He was known as one of the great men of his time, poet, and historian, author of prose and poetry, bibliophile, calligrapher.

## II. LITERATURE REVIEW

Sadri Ziyov was born on February 24, 1867 (Hijri 1281) (some sources indicate that he was born on February 27, 1865 - L.M.) in the Ziyuddin district of the Pakhtachi district of the Samarkand region. Because he was born in Ziyuddin, his father named him Ziyuddin because his date of birth coincided with the Friday of Ramadan. The information about Sadr Ziya in a number of scientific and artistic works gives a certain idea about his life and activity. But he is often known as Sadri Ziyov.

A lot of research has been done on this person's life path, the works he has written, and the manuscripts in his personal collection. Among European historians, Anke von K ugelgen noted the historical works of Sadri Ziyov, listed him among the latest historians of the Bukhara Emirate and used them in his research in his historical works [4, p. 4]. Another European researcher (Wennberg F.)

points to his role in linking the relationship between Ahmad Donish and Sadridin Aini, as a supporter of progressive ideas among them, and quotes from the work of this judge in his scholarly work.

### III. ANALYSIS

Sadri Ziya's explanatory dictionary (fixristi - L.P.) and his work in this field, his collection of manuscripts and his fate have also been researched by local scholars, the results of which have been published in Europe. His ancestors and ancestors were from a dynasty of artisans.

Sadri Zia writes that after receiving his primary education from his father, he studied for some time under the tutelage of the poet Isa Mahdum (1829-1898), who was considered a friend and follower of Ahmad Donish.

Back in his student years, Sadr Ziya's house became a venue for literary conferences three days a week: Tuesdays, Wednesdays and Thursdays. Qori Abdulkarim Ofarin - "Do'zaxiy (Hell)", poets, writers, literary critics and anecdotes such as Mirzo Azim Somi. According to S. Ayni, the mood of opposition was much stronger than the existing procedures. Ahmad Kalla, that is, Donish, was also discussed at these meetings. However, those gathered did not insult him like the madrassa mullahs, but spoke his name with respect. In 1900, Sadr Ziya found the manuscript of the scholar's work "Navodir-ul-vaqo'e" with great difficulty and entrusted its copying to Mirza Abdulvahid (Munzim), while the task of comparing the two copies was performed by S. Ayni and the poet Hayrat. Sharifjon Mahdum's greatest merit is that as a result of his efforts, this rare work, which is wanted by the Emir's spies and banned from reading in the Emirate, has been preserved for future generations.

The meetings at the House of Sadr Ziya had a positive impact on the creativity and development of social thought, and had a great impact on the future work and activities of emerging young poets, especially S. Ayni, A. Munzim, Hayrat (Jadids) and others. Among the Jadids, mature scholars, modern specialists in industry and agriculture, and cultural figures dreamed of a prosperous and independent homeland and fought for it. He has been a judge in Gijduvan, Karshi and Shakhrisabz. But his term of office did not last long, and it was due to his honesty, fairness, and purity of conscience. Therefore, like other judges, Amir Qazikalon, his failure to meet and serve them when the chairman arrived, also prevented him from remaining in office for long. Because he was a man of high intellect, a man of strict observance of religious precepts and the Shari'a, a man whose conscience did not allow such humility. He was relieved of his post and, after a certain period of time, was called again and transferred to the post of judge.

The role of Sadr Ziya in the literary life of Bukhara in the XX century and his contribution to its development can be seen in the example of his kindness to S. Ayni and his attitude to him. During a trip to Gijduvan, Sadr Ziya met 12-year-old Sadridin, noticed his rare talent, and advised him to go to Bukhara to study. The young Ayni, who came to the city, will stay at Sharifjon Mahdum's house for a few months and will have the opportunity to enjoy the literary meetings held there and the books in Sadr's rich library. For the first time in his life, he meets people who are opposed to the Emir. These dialogues play a major role in shaping the writer as a person. That is why S. Ayni always spoke warmly about the time he spent at Sadr Ziya's house.

### IV. DISCUSSION

Sadri Ziya in his book "Zikri asomii madorisi dokhalai Bukharai sharif" gives information about 204 madrasahs in Bukhara. In this work, the author provides excellent information about madrasahs and mosques built from the tenth century to the early twentieth century. This work is already written not in the form of a brochure, but in the form of a table of contents, consisting of a five-digit table. Sadri Ziya not only cites the number and name of the madrasahs, but also notes in which neighborhood they are located and how many rooms they consist of. In the Bukhara emirate in the early twentieth century, tens of thousands of manuscripts were stored in the libraries of major madrasahs. There are separate foundation properties for libraries.

In addition to storing books in libraries, foundations have been established to enrich them with new books. The libraries had a lot of literature from Muslim countries. Libraries have also been replenished by collecting rare books, at least by copying them.

Libraries in Bukhara madrasahs are located in special buildings, where temperature and humidity are monitored, books are written on high quality paper, protected by leather covers and stored in special leather boxes.

Sadri Ziya's literary and scientific heritage consists of an 11-volume "Asarlar majmuasi (Collection of Works)" and separate books. His most important works are "Navodiri Ziyaiya" (Unique Sciences- L.P.), "Ro'znoma", "Tazkirat ul-hattotin", "Ta'rix" and "Tazkirai ash'or".

At present, Sadri Ziyov's personal books in the funds of the Institute of Oriental Studies of the Russian Academy of Sciences, consisting of 307 volumes, contain more than 800 works. About 200 volumes within his personal library have been lost for various reasons. They have not yet been found [5, p. 26]. According to Sadri Ziyov, at the beginning of the XX century in Bukhara alone there were 13 libraries and 96 reading rooms.

Manuscripts in Chinese, Uyghur, Pashto, Persian, Arabic and other languages are stored in the library of the ruler's palace in Bukhara. Librarians, mushrifs, pamphlets and mirzas served in the library. The palace library houses 47,500 volumes of manuscripts and lithographs in various languages, along with the personal collections of the emirs. In 1915, Professor AA Semenov got acquainted with the emirate's library and managed to organize and partially describe it. AA Semenov noted that the Emir's library was full of miniature manuscripts.

Doctor of Historical Sciences D.Ziyoeva in her article "The role of modern enlighteners in the development of urban libraries in the early twentieth century" provides valuable information about the personal library of Sadri Ziyov: "There were several other large private libraries in the country (Bukhara - L.M.). Among them were the libraries of Qaziul-quzzot Abdurahid Sadr Balkhi and Muhammad Sharif-Sadri Ziyov. About 300 manuscripts (some sources say 200) belonging to the library of Muhammad Sharif Sadri Ziyov, who created valuable scientific works on the literary, cultural and political situation of Bukhara, are now stored in the Oriental Manuscripts Fund.

It is known that Sadri Ziyov was also engaged in scientific work during his tenure as a judge, and there are several works belonging to his pen. It was mentioned above that during his trial in Karshi, his own handwritten works were burned. From 1920 until the end of his life, he tried to restore his lost works by using all his talent. Navodiri Ziyaiya has a special place among his books. This work was written in 1904-1905, but in 1920, like other books, burned in the fire. After his release from public service in 1924-1925, Sadri Ziyov adapted, replenished and turned the work into a book.

The work actually consists of 5 parts. It contains interesting and rare information. Important information includes the translation of Abdushukur Ayat and related events, the events that took place in Bukhara during the last emirs of the Bukhara Mangit dynasty (Muzaffar, Abdulahad and Sayyid Alimkhan), the causes of the revolution, the destruction of the country, the weakening of the emirate, the lack of scientific and religious work in Bukhara, analyzed that it happened because of greedy and immoral rulers, illiterate, ignorant, tyrannical and corrupt judges who were obsessed with gold and wealth.

The book contains legends and stories about famous teachers of the second half of the XIX century and the beginning of the XX century - domullo Shermuhammad, Abulkhay Khoja, domullo Hasanyidjon mahdum Nazmi, Mirzi Nazrullo Lutfi and others. The book also contains verses, rubais and poems of Sultan Khojai Ado, Junaydilloh Haziq, Shavqi, Taslvim, Dilkash, Muztarib, Afsar, Mukhtaram, Munzim and other poets of the second half of the 19th and the beginning of the 20th centuries, as well as their questions and answers.

### V. CONCLUSION

When we think of Zia Sadr's book-loving nature, the following thoughts never leave our minds: The book-loving Ziya Sadr bought almost all manuscripts with his own money, that is, gold and silver.

Or he influenced a prince like Mir Siddiq-Hashmat, who was forced to go abroad, and made a great contribution to their preservation in our country, as he also acquired valuable manuscripts from his book treasury. Ziya Sadr donated all these manuscripts to the Bukhara library, and thanks to the generosity and generosity of an intellectual like Ziya Sadr, all this great spiritual and material wealth is kept in the treasury of the Institute of Oriental Studies of the Uzbek Academy of Sciences.

Sometimes one wonders if Ziya Sadr could have used the gold and silver money spent on those books for his own needs, or sold some of these books and left them to his descendants as a material legacy. But Sadri Zia did not. He bequeathed his entire golden legacy to the next generation. Today's young generation of Bukhara enlighteners, such as Sadri Ziyov, will definitely read and study their works and pass them on to the next generation. We look forward to it!

REFERENCES

- [1] Мухамеджанова Лола Полвоновна. Общественно-политическая ситуация в Бухаре в начале XX века и развитие демократического движения (1908-1920гг.) Автореферат. Диссертации на соискание ученой степени кандидата исторических наук. Ташкент. 1999. 32 с..
- [2] Sadri Ziyο. Navodiri ziyoiya. T. 2019. Page 3.
- [3] L.P.Muxamedjanova. From the history of the Jadid movement in Bukhara. B.2019. Page 39.
- [4] B.B.Aminov. Navodiri ziyoiya. Sadri Ziyο. Tashkent. 2019. Page 4.
- [5] Vohidov Sh., Choriev Z. Sadr-i Ziyai his library. P.26.
- [6] Мухамеджанова Л.П. Демократическое движение в Бухаре. Ташкент. 2001. 123 с.
- [7] Мухамеджанова Л.П. История о джадидской движение в Бухаре. Бухара Издания “Дурдона”. 2019. 151 с.
- [8] Л.П.Мухамеджанова, Ю.А.Шукруллаевв, Т.Т.Сафаров. Бухара в конце XVIII и в начале XX века. Бухара Издания “Дурдона”. 2020. 426 с.
- [9] Мухамеджанова Л.П., Наимов С. Жизнь, творчество Ахмада Дониша и задачи управления государством в произведение «Редкостные события» (Наводир-ул вақоъе). (На узбекском языке.) Развитие науки и технологий. Научно-технический журнал. Бухара. №4. 2017. с.160-169.
- [10] Мухамеджанова Л.П. Вопросы реформы государственной власти Бухарского эмира в произведениях Ахмада Дониша. Достижения науки и образования. Ежемесячный научно-методический журнал. Москва. 2017. с.17-19
- [11] Мухамеджанова Л.П., Алимова М.М. Сотрудничество с зарубежными странами в развитии науки в Бухаре в начале XX века. (на узб.языке). . Развитие науки и технологий. Научно-технический журнал. Бухара. №3. 2017. с. 119-125.
- [12] Ахмад Дониш – государственнй и общественный деятель, просветитель и философ. Сборник статей на научно-международной конференции “Великий энциклопедист Абу Исо Термизий и изучение его богатый научно-духовной наследие. Ташкент. 2017. с.185-188.
- [13] Жизнь, творчества Ахмада Дониша .и о его произведени «Редкостные события» (Наводир-ул вақоъе). Развитие науки и технологий. Научно-технический журнал. Бухара. №1. 2019. с.156-161.

# *Areas Of Application Of Content Marketing In The Sale Of Goods And Services*

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**Abstract – The article provides information on trade in goods and services. It also provides insights into the application of content marketing, and their impact on sales of goods and services, and analyzes those using examples.**

**Keywords – Trade, Goods, Services, Marketing, Price, B2B, Sales Management, Pricing Strategies, Discounts, Marketing Communications.**

## I. INTRODUCTION

In industrial marketing, the main means of communication is personal sales, while in consumer marketing; the main focus is on advertising and sales promotion. This is due to the nature of the customer's purchasing decisions and the nature of the "seller-buyer" relationship. The ability of a business to solve a customer's problems depends on the sales representative. There are three distinct groups of problems associated with the development of industrial sales management software. First, the role of individual sales in the marketing mix needs to be defined. Second, it is necessary to make a number of decisions related to the organization and management of sales staff, including determining the size and structure of the sales department, recruitment, selection, training, motivation, compensation, monitoring and evaluation of activities. Third, vendors need to focus their efforts on specific areas - sales areas, product lines, and customers.

## II. LITERATURE REVIEW

The goal of all marketing activities is to meet the needs of the customer, and the sales representative is directly responsible for the level of customer satisfaction. Unlike consumer marketing, industrial marketing is characterized by a different degree of influence of the sales representative on the overall ability of the enterprise to solve customer problems and meet their needs. This aspect of industrial sales is related to the relationship between buyer and seller - one of the four indicators of the uniqueness of industrial marketing. In other words, the sales representative is part of the enterprise brand offer. The role of individual sales should be defined in this context.

First of all, one of the most important responsibilities of a sales representative is to help the customer identify the purchase problem. It should show exactly how the purchase of a particular product / service affects the achievement of the customer's goals.

Secondly, the sales representative may be responsible for the installation and maintenance of the product, as in the case of the purchase of capital equipment, for example. When purchasing materials and OEM products, the sales representative assists the customer in organizing the customer's production process and integrating the purchased materials and parts into his production

system, including controlling and planning inventory levels. All of these aspects - installation, consulting, maintenance, repair, as well as inventory level planning and control - can be combined under the general name of "after-sales customer service".

Thirdly, in a marketing-oriented enterprise (as opposed to a transaction-oriented enterprise), the sales representative is responsible for representing the customer's interests in the manufacturing enterprise. That's the basic premise of a customer-centric marketing concept. It is a source of competitive advantage in the context of the need to adapt an industrial product to the specific needs of the customer.

### III. ANALYSIS

When it comes to B2B content marketing, you are entering a huge world. You can't imagine how much B2B content marketing there is. There can probably be thousands of guidelines on brand voice, writing techniques, market segmentation and much more.

But, forget it all. Because here you will learn how the biggest companies in the world do it. 4 successful applied research B2B content marketing programs.

#### *1 HubSpot*

HubSpot can be a great example of how to do this right in B2B content marketing.

First, the HubSpot blog is divided into two separate paths: marketing and sales. A few other blogs often mix and match the two. The two sciences are often closely related to each other, and it makes sense for them to overlap on multiple topics.

However, HubSpot understands that interesting and in-depth content is what its listeners need. Thus, HubSpot offers content that is both more focused, comprehensive, and relevant to the needs of the audience.

The content of HubSpot is very high quality, from very detailed guides to free resources. HubSpot ranks first for many marketers of all disciplines because the content offered is very high quality and its benefits can be felt.

HubSpot provides its readers with original data, research, and new insights. This makes it one of the best examples of B2B content marketing.

#### *2. General Electric*

While General Electric (GE) may be known for its microwave oven television broadcast division led by Alec Baldwin, GE is one of the best B2B content publications in the world.

GE is a large company with dozens of divisions, hundreds of products and thousands of physical locations. GE of this size publishes a lot of great content to appeal to decision makers in various industries. However, the most glaring of the many types of content is the online journal Technologist.

The composition of the technologists is focused on the development of the latest technologies. This will allow other businesses to see the benefits of the technologies being offered and how this technology can shape the world in a broader sense. Overall, GE proves that B2B content marketing shouldn't be boring or rigid.

#### *3. Buffer*

Buffer is not only a great social media tool, but it is also one of the best B2B marketing blogs on the Internet. Launched in 2010, Buffer has always been committed to creating quality content from the start, and that's what sets it apart from several other blogs.

The buffer embodies an indigenous culture of transparency in a unique way - a move that has evolved rapidly as the buffer has made every aspect of the company visible to everyone.

The structure of the buffers not only displays a lot of data and research, but also processes data and research in an interesting way. Often they combine marketing information with concepts about psychology and other interesting topics.

This has led to thousands of back links and a great impact on the brand, and has helped the buffer achieve higher growth rates than ever before.

### 4. Institute of Content Marketing (CMI)

CMI is the world's leading authority in all areas of content marketing. While the recommendations and strategies provided by CMI are more useful for individuals with personal blogs, CMI stands out as an invaluable resource for B2B content marketers.

Like some of the names mentioned above, CMI also offers a variety of interesting content in the form of writing, info graphics, or other data visualization based on self-conducted research.

This is a discussion of 2 case studies of successful B4B content marketing programs. Remember to advertise through the Froggy Ads service to grow your business; you can start advertising your product so that later you will increase the number of visitors on your online business portal. Froggy Ads is an online advertising service that helps you manage all your advertising companies, helps you set the marketing goal you want and gives you many opportunities to sell your product.

## IV. DISCUSSION

The influence of the sales representative is not limited to the definition of product performance in the technical sense, but may be related to aspects of the full supply of goods and services, such as lending terms, various clauses of the contract, supply planning and implementation. This feature can be especially important in situations where an industrial marketer considers a distributor as his or her customer. The sales representative is responsible for delivering the business message to the customer, increasing sales, and placing orders. This means that the sales representative must be able to deal with people. Personal sales are very effective as a type of communication because the sales representative can make corrections to the business message based on the response received during the interaction. Empathy is the ability to feel the other person's reaction, and the ability to grieve with it is a very important aspect of a salesperson's character.

In industrial marketing, the main means of communication is personal sales, while in consumer marketing; the main focus is on advertising and sales promotion. This is due to the nature of the customer's purchasing decisions and the nature of the "seller-buyer" relationship. The ability of a company to solve a customer's problems depends on the sales representative. There are three distinct groups of problems associated with the development of industrial sales management software. First, the role of personal sales in the marketing mix should be determined. Second, it is necessary to make a number of decisions related to the organization and management of sales staff, including determining the size and structure of the sales department, recruitment, selection, training, motivation, compensation, monitoring and evaluation of activities. Third, vendors need to focus on specific areas - sales areas, product lines, and customers.

*The role of personal sales.* The purpose of marketing activities is to meet the needs of the customer and the sales representative is directly responsible for their level of satisfaction. Unlike consumer marketing, industrial marketing is characterized by a different degree of influence of the sales representative on the overall ability of the enterprise to solve customer problems and meet their needs.

This aspect of industrial sales is related to the relationship between buyer and seller - one of the four indicators of the uniqueness of industrial marketing. In other words, the sales representative is part of the enterprise brand offer. The role of individual sales should be defined in this context.

*Sales representative as part of the brand offer.* First of all, one of the most important responsibilities of a sales representative is to help the customer identify the purchase problem. It should show exactly how the purchase of a particular product / service affects the achievement of the customer's goals. Second, the sales representative may be responsible for the installation and maintenance of the product, as in the case of the purchase of capital equipment, for example. When purchasing materials and OEMs, the sales representative assists the customer in organizing the customer's production process and integrating the purchased materials and parts into his or her production system, including controlling and planning inventory levels. All of these aspects - installation, consulting, maintenance, repair, as well as inventory level planning and control - can be combined under the general name of "after-sales customer service".

Third, in a marketing-oriented enterprise (as opposed to a transaction-oriented enterprise), the sales representative is responsible for representing the customer's interests in the manufacturing enterprise. This is the basic principle of the marketing concept that really ensures that the company is customer oriented. It is a source of competitive advantage in the context of the need to adapt an industrial product to the specific needs of the customer. The influence of the sales representative may not be limited to the definition

of product performance in a narrow technical sense, but may be related to aspects of the full supply of goods and services, such as lending terms, various clauses of the contract, supply planning and implementation. This feature can be especially important in situations where an industrial marketer considers a distributor as his or her customer.

*Sales representative as part of the communication mix.* The sales representative is responsible for delivering the business message to the customer, increasing sales, and placing orders. This means that the sales representative must be able to deal with people. Personal sales are very effective as a type of communication because the sales representative can make corrections to the business message based on the response received during the interaction. Empathy is the ability to feel the other person's reaction, and the ability to grieve with it is a very important aspect of a salesperson's character. It is also a good idea to use sales management software in B2B. Examples of such software systems are ERP and DRP systems.

### V. CONCLUSION

In industrial marketing, the main means of communication is personal sales, while in consumer marketing; the main focus is on advertising and sales promotion. This is due to the nature of the customer's purchasing decisions and the nature of the "seller-buyer" relationship. The ability of a business to solve a customer's problems depends on the sales representative. The purpose of marketing activities is to meet the needs of the customer, and the sales representative is directly responsible for the level of customer satisfaction. Unlike consumer marketing, industrial marketing is characterized by a different degree of influence of the sales representative on the overall ability of the enterprise to solve customer problems and meet their needs. The influence of the sales representative is not limited to the definition of product performance in the technical sense, but may be related to aspects of the full supply of goods and services, such as lending terms, various clauses of the contract, supply planning and implementation. The organization of sales services on the principle of product specialization allows sellers to focus on a small group of products of the entire product line of the enterprise. At the heart of the problem that the sales manager needs to address is the need to establish a link between the seller's actions (almost always link measured by the number of business visits made) and the sales results. It takes a lot of ingenuity to effectively distribute customers among sales representatives.

Careful analysis helps to determine the possible consequences of the decisions made. Other types of automation of sales and marketing activities include systems to support sales representatives and sales managers, such as business meeting and expense reports, order recording, inventory level control, and storage of potential customer information. Personal sales are the main means of communication in industrial marketing, while in consumer marketing the main focus is on advertising and sales promotion.

### REFERENCES

- [1] Rakhmonova D.M. Introducing innovations in The Preschool Education System With Talented Children. 300 middle european scientific bulletin issn 2694-9970.
- [2] Actual problems of modern science, education and training Rakhmonova D.M. Psychological basis of working with talented children 2/101.
- [3] Raxmonova D.M. Technology of preparing children for school "Improving the quality of education: problems, solutions and prospects" (Bukhara experience) Republican scientific-practical conference VXTB and Bukhara State University in May 2020Page 454.
- [4] Raxmonova D.M. Interdisciplinary consistency and connection is an important factor in the development of cognitive processes of students Republican scientific-practical conference "Educational innovations in the development of pedagogical skills, the use of foreign experience and assessment systems: problems and solutions"BVXTXQTMOHM April 24, 2020 p.120.
- [5] Russia-Uzbekistan International educational, scientific and socio-cultural technologies: vectors of development: Distance education as an innovative form of teaching students with disabilities 1/353 110 pp.
- [6] ISSN: 2249-7137 Vol. 10, Issue 11, November 2020 Impact Factor: SJIF 2020 = 7. Rakhmonova D.M. *Academicia*: issn: 2249-7137 vol. 10, issue 11, november 2020 impact factor: sjif 2020 = 7.13 ways to determine talented children in preschool education 10.5958/2249-7137.2020.01534.7
- [7] Rajabboyevna A. N. Individualization in education and methods of improving teaching the english language //International Journal of Psychosocial Rehabilitation. – 2020. – T. 24. – №. 1. – pp. 91-96.



- [8] Alimova N., Radjabova M. THE ROLE AND IMPORTANCE OF INDIVIDUAL EDUCATION IN THE SYSTEM OF ORGANIZATION //Theoretical & Applied Science. – 2020. – №. 4. – pp. 401-404.
- [9] Alimova N. R. IMPROVING TECHNOLOGY OF INDIVIDUALIZATION ON EDUCATION FOR STUDENTS OF TECHNICAL SPECIALTIES IN TEACHING ENGLISH //Theoretical & Applied Science. – 2019. – №. 12. – pp. 352-355
- [10] Rajabboyevna A. N. Organization of English Lessons Based on Advanced Pedagogical Techniques //International Journal on Integrated Education. – T. 3. – №. 3. – pp. 41-45.

# *The Issue Of Words Formal And Semantic Valence In Uzbek Language*

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**Abstract – The article reveals the lexemes semantics manifestation at the linguistic and verbal levels, their formal and semantic valence, subordinative and coordinative relations.**

**Keywords – Valence, Subject, Dominant, Linguistic Unit, Lexeme, Seme, Syntactic Connection, Actant.**

Valence is actually a chemical term, in linguistics it is applied to a linguistic phenomenon that linguistic units study as a non-emergent cohesiveness- adhesion possibility [6:286]. The phrase is formed by revealing the dominant word valence, filling its vacancies in the opportunity form. There are three types of valence - syntactic, semantic and lexical. The valence required by the grammatical form of the dominant word is syntactic, the semantic connection possibility of words is semantic, the connection possibility of words with different nominative meanings is lexical valence [1:31-36]

It is well known that the valence theory was one of the subsequent achievements of linguistics, which came into being as an interconnection possibility of linguistic units in form and meaning. Initially, the term valence was used in L. Tenier's research on the French language example in the 1930s. He divides the French verbs into 4 groups according to how many actants the verbs can attach to their surroundings: non-valent verbs, such as monovalent, bivalent, and trivalent [9:7-17].

Later in Russian linguistics, issues such as phonetic, lexical, grammatical, and stylistic valence began to be studied extensively by S.D. Katsenelson and other scholars [3:21].

In Uzbek linguistics, professors such as Prof. I. Kochkartoev, Prof. Kh. Nematov, Prof. R. Rasulov, Prof. R. Sayfullaeva conducted research in the lexical, syntactic, semantic and grammatical form valence areas [5;7:286-291]. Also, within syntactic units, valence is divided into formal and semantic valence. While semantic valence forms the intra-semantic side of word combinations, formal valence forms its expressive side. Hence, syntactic valence is a particular independent word ability to combine with another independent word. Semantic valence reveals different syntagmatic relationships between lexemes [7].

Philosophers liken the words tendency state to combine with another word in a certain grammatical form according to their intrinsic meaning, i.e., valence, to the gravitational action of iron and melody pieces. In the composition of word combinations, according to the dominant word requirement, the subordinate word can be combined in different forms on the basis of valence. In fact, for two or more independent words to enter into a syntactic relationship with each other, both semes must be semantically compatible with each other. In other words, there is a common seme in both of the two independent words in the correct combination of content in speech. For example: *the singing* lexeme represents the seme of the bird's pleasant sound. In fact, the singing feature is unique to birds. But not all birds have the ability to sing. This means that only bird names such as nightingale and quail can be

combined with the singing seme. That is: as the nightingale's singing, the singing nightingale, the nightingale's beautiful wailing voice.

There is also a second portable meaning of the seme of *signing*, which is also used for people who *talk a lot, who speak fast*. This is why the *fast and multi-talk* seme can be combined with the *human* seme. See: *The chairman sang (spoke a lot) at the meeting*. In this sentence, the second seme of the *singing* lexeme creates a semantic tension with the seme of *the chairman speaking a lot in the meeting*, [1].

The valence division into types such as semantic and syntactic began much earlier in general linguistics and this phenomenon was first described in Uzbek linguistics at the beginning of the last century by prof. R.Rasulov showed on the example of case verbs [8]. Prof. Kh. Nematov states that «prof. R.Rasulov studied this issue in originality, opportunity, reality, language and speech, the ability to combine with other words and forms (linguistic valence), which is embodied as a hidden possibility in the spiritual structure of the word, is one of the noun qualities (word, lexeme), and the specific occurrence of these possibilities in speech (i.e., speech valence) revealed it as a manifestation, a material occurrence»[8].

It is known that valence is a phenomenon specific to various branches of linguistic units, and so far in Uzbek linguistics, mainly the formal and semantic valence of lexical and syntactic units has been widely covered. Formal valence is a way of expressing semantic valence. In formal valence, a particular word is formally connected and expressed using the syntactic, morphological elements of a particular language.

Semantic valence, on the other hand, is related to the word meaning and arises from the semantic connection possibilities of the words that make up the word combinations. The semantic scope of semantic valence is very wide, as it sometimes realizes syntactic valence even in a figurative sense. For example, some verbs that serve to express human characteristics are also used figuratively in relation to *birds, animals, and poultry*. As a result, the phrases expressed in such a linguistic pattern form the following valences semantically:

The nightingale *reads* a book,  
the worms *weave* silk.  
Bees bring honey.  
the birds will *find* luck (Kh.O).

In the above examples, verbs such as *read, weave, find* are used in a figurative sense, and semantic valence is formed in speech. The syntactic pattern of these phrases is twofold, that is, they are connected by a syntactic form and a syntactic meaning. In this case, the morphological structure of the dominant word is not important for the word combination. However, the morphological formation of the subordinate word plays an important role in determining the formal grammatical aspect of word combinations. In addition to grammatical devices, logical devices such as word order and tone are involved in the syntactic connection of compounds.

«It has long been known that grammatical forms, while expressing a particular meaning, perform a syntactic function specific to certain forms. Only in linguistics have these aspects been studied in isolation from each other in grammatical forms. Some forms (e.g., number, degree, voice, sometimes possessive categories) were classified as purely spiritual, while some categories (e.g., case, mood, tense, personal number) were classified as purely syntactic. The inherent approach to grammatical forms allows the dialectical unity of the spiritual (semantic) and syntactic (functional) aspects in these matters, to correctly identify and understand the weakness of the other side when one side is exaggerated. As a result, it was found that the meanings are hidden in the forms of number, degree, voice, possession, as well as specific syntactic possibilities, and, conversely, in the forms of case, mood, tense, personal number, defined as non-semantic» [2].

This raised the question of the spiritual ability and syntactic possibility of the grammatical form, i.e. the grammatical form valence. For example, let's take *kitobim (my book)* word form and *kitob(book)* lexemes. In the *kitob(book)* lexeme, neither the spiritual nor the syntactic need, i.e., valence, caused the necessary connection with my word form. But *kitobim (my book)* has such a need in word form. Hence, this necessity (**-im**) depends on the possessive suffix. In fact **-im** has the necessary valence to bind to the first person singular. As mening *kitobim (my book)*, for example. Such a feature can be found not only in person-number or possession, but also in other types of affixes. The grammatical forms themselves either expand or limit the linguistic (spiritual and syntactic) valence of the lexeme to which they are added. For example, possessive suffixes allow words belonging to the noun

category to which it is added to enter into a subordinate clause with another noun in the accusative case. That is, it expands the syntactic capacity of the word to which it is added. The semantic and syntactic valence of a word-form is broader than the linguistic valence of a lexeme, which is the basis for that word-form[1].

A similar phenomenon can be observed in other compounds valences. It is well known that valence is a phenomenon that requires a two-way bond. So, valence is a means of providing live speech, the connection between words, the words interconnectedness. In syntactic communication, valence is realized, it becomes an influencing force. Valence is a language unit; syntactic communication is a speech unit. Valence is not formed from a syntactic bond; on the contrary, a syntactic bond emerges from a valence.

In the modern Uzbek literary language there are three methods of syntactic communication: adjoining, control, adaptation, in which the laws of dominant and subordinate words combination on the basis of mutual formal and semantic valence are different. Because syntactic valence creates different syntactic relationships between lexemes. For example, an attributive (beautiful city), relativistic (slow-speaking) relationship between phrases connected by the adjoining method; an objective (love of country) or relational (message from the village) attitude from managerial communication and from a adaptive relationship emerges an attributive (school garden) and a coordinative relationship.

Simple word combinations in an attributive relationship that enter into a syntactic relationship with Adjoi's method can form a valence by one or both. For example:



The simple phrases valence formed by the above adjoining method can be continued again according to the semantic relation.

In the speech process, one of them is necessary to form an attributive relation by combining according to the dominant word demand. The two or more independent words combination in the composition of word combinations - valence is also manifested in different forms, depending on the account of synonymous or antonymous words. For example, it is natural for it to form valences both at the expense of synonyms such as the street lexeme (*beautiful, pretty, attractive*) mentioned above, and at the expense of contradictory words such as (*ugly, dirty*). But they cannot be combined on the basis of valence with words such as *barno, khushroy (handsome), suluv (beauty)*, which form a synonymous series of the *beautiful* lexeme. The reason is that the semantic factor that forms the word combinations does not allow this. That is why such phrases as *barno street, khushroy street* are not found in our speech. Hence, their semantic aspect is of great importance in the adjoining connection of a particular independent word at the request of the dominant word.

The dominant word plays an important role in phrases that enter into syntactic communication through the method of control. Therefore, the verb or noun in the dominant word function (in the broadest sense) forms a variety of formal and semantic valences. The fact that the subordinate word enters the form required by the dominant word, i.e., is dependent on the dominant word, creates a subordinate one-way connected relationship. For example, like *to love the homeland, the country, the job, the*

*profession, the study; respect for homeland, people, friend, teacher.* In such word combinations, the verb or noun combination in the dominant word function with the control forms method a one-way connected relationship.

In adaptive (coordinative) communication, the independent words in a compound sentence correspond to each other in person and number. For example, as *my friend, your friend, his friend.* In this case, the grammatically subordinate word according to the dominant word demand takes the accusative form, the dominant word takes the possessive suffixes and forms a two-way equal relationship from left to right and from right to left. Therefore, prof. I.Rasulov and F.Abdullaev suggest that terms such as *relationship, coordination* should be applied to such adaptive relationships as control on the one hand and adaptive communication on the other[2].

Thus, the two-way (coordinative) relationship is used in the word combinations context in relation to the definite article, as well as in relation to the cut-off indicators that provide prediction in the sentence structure: *as I came, he wrote.* That is why we have chosen to study the two-way - left-to-right and right-to-left tabular relationship as one of the adaptive communication methods while preserving tradition in word combinations.

### REFERENCES

- [1] Mahmudov N., Nurmonov A. Theoretical grammar of the Uzbek language. Toshkent, "Ukituvchi"1995
- [2] Madaminov A. Formal and semantic valence of word combinations. Collection No. 4 of TSPU named after Nizami. Tashkent, 2010, 92-94 p
- [3] Katsnelson S.D. On the concept of valence types. Linguistics issues 1987. №3 p 21
- [4] Katsnelson S.D. On the grammatical category. Leningrad State University Bulletin 1948. № 2 p 132
- [5] Nematov Kh., Sayfullaeva R., Kurbonova M. Fundamentals of structural syntax of Uzbek language. 1-p Tashkent, 1999
- [6] Sayfullaeva R., Mengliev B and others. Modern Uzbek literary language. Tashkent, 2010. 286-291 p
- [7] Kochkortaev I. The meaning of the word and its valence. Tashkent "Fan"1977
- [8] Rasulov R. Lexical-semantic groups of state verbs and their valence. Tashkent 1991
- [9] Kunnazarov E. The linguistic concept of valence and the role of its development in the process of teaching the German language in the Karakalpak audience. Nukus 1979. p 7-17

# *Patient's Satisfaction On Service Quality In Mental Hospital Of Riau Province*

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**Abstract – Background :** The ability of the hospital in fulfilling the needs of patients can be measured by level of patients satisfaction. The satisfaction of starting with an acceptance of the patient from first came, until that patient left the hospital. There are still some indicators services must be increased in order to give maximum satisfaction to customers a mental hospital.

**Purpose :** to known the customer satisfaction and dimension services had to be defended and corrected in a mental hospital.

**Method :** This study using a quantitative approach with cross-sectional design and various variables such as tangibles, reliability, responsiveness, assurance, and empathy. Analysis of the value of satisfaction using servqual methods (service quality) and mapping diagram cartesius to determine the quadrant of health services. The population is all the customers who did health services in a mental hospital with 100 customers of mental hospital. **Results :** The results showed that average conformity level between services provided by Tampan Mental Hospital of Riau Province and patient's expectations was 92,08% with average service of 4,3 and average expectation of 4,4. There are 10 variables that must be maintained, they are room's cleanliness and tidiness, complete equipment set, registration officer and cashier's accuracy, pharmacy officer's skills, nurse's alertness, doctor's responsiveness in dealing with patient complaints, nurse's attention and politeness and equal treatment for patients regardless of social status. While there are 3 variables that must be improved, they are doctor's late attendance and parking attendant's responsiveness and other general stuffs.

**Conclusions :** The patients feel very satisfied with services provided by Mental Hospital of Riau Province, although there are several service dimension variables that need to be improved

**Keywords –** Patient satisfaction, Service quality, ServQual, Cartesian diagram.

## I. INTRODUCTION

According to Azwar in (Aprilia, 2008), quality health services are health services that can satisfy every user according to customer satisfaction level and its implementation is in accordance with the established code of ethics and service standards. Two important elements of efforts to improve health services are patient satisfaction level as service users and fulfillment of established service standards. The hospital ability as a health service is measured by patient satisfaction level. Satisfaction starts from patient's admission until the patient leaves the hospital. The hospital's ability to produce good quality health services is the community expectation when they visit to consult on health problems they have (Laila, 2007).

The Household Mental Health Survey (SKMRT) in 2001, it was estimated that 264 per 1000 household members experienced mental disorders. Riau Province has high rate of mental disorders. Tampan Mental Hospital of Riau Province develops comprehensive health services that support mental health services. A hospital is declared qualified if it prioritizes patients (client oriented), and always tries to give its best to patients without exception because quality is a description of professional ethics

implementation in interacting with patients to avoid complaints or criticism and prevent patient pretense and create patient satisfaction.

This study aims to determine customer satisfaction value and service dimensions that must be maintained or improved in a mental hospital. One approach to measure service quality that is widely used as reference in marketing research is *ServQual* (Service Quality) method. Direct evidence/palpable/physical facilities (tangible), service reliability, service responsiveness, assurance, empathy (Parasuraman, Zeithmal and Berry, 1998) in Hafizurarahcman (2009).

**II. METHODS**

This research is a survey research using quantitative approach. The design uses cross-sectional study. Analysis of satisfaction value uses "ServQual" (Service Quality) method, which is a measurement approach to determine whether a patient is satisfied or dissatisfied with the service by comparing the expected to the perceived values on tangibles, reliability, responsiveness, assurance, and empathy variables as well as Important Performance Analysis (Cartesian analysis) to determine the priority of improvement and present what attributes need to be maintained and need to be improved by the mental hospital management.

The population is all patients and the families of inpatients and outpatients in Tampan Mental Hospital of Riau Province. The samples in this evaluation and analysis are 3 service units in the Mental Hospital including: Mental Outpatient Clinic, Inpatient Unit, and Non-Psychiatric Specialist Outpatient Clinic. Sample selection uses purposive sampling. The calculation of sample size in this survey uses the formula of sample quantity for proportion estimation (Notoadtmojo, 2010) with total of 97 people. The sample selection was taken based on inclusion criteria, including: willingness to be respondent, the patient/family is in a conscious condition, able to communicate well, and have made 2 or more visits. Exclusion criteria, including: patient who are not accompanied by their family, suffer from serious illness.

The instrument used is questionnaire with closed questions distributed to patients in inpatient rooms in VIP, I, II, and III classes. The questionnaire model used is closed questionnaire model with likert scale. The questionnaire consists of several questions adopted from survey by Rahayu (2008). The measurement of questionnaire on dependent variable uses likert scale format with five criteria, scale of 1-5 values (Ramadhani, 2008). Data analysis and data processing uses univariate analysis to see the description of patient characteristic frequency distribution including age, gender, occupation, income and education; and also *ServQual* analysis to analyze patient satisfaction level by comparing satisfaction of perceived service to expected service on each dimension of Service Quality. If perceived service is not in accordance with expected service, it will cause disappointment. The difference between perceptions and expectations is called "gap" or "service gap", with the formula:

$$\text{Perception} - \text{Expectation} = \text{Gap}$$

If the gap is positive (P>E) then the service is of great quality and satisfying. If the gap is zero (K=H) then the service is of good quality and satisfying. If the gap is negative (K<H) then the service is of poor quality and unsatisfying. The range of categories for assessing patient's expectation level and perception level

Table 4.1 Assessment Categories of Expectation and Perception Level

Scale	Average Weight Value	Rating Category
1	1.00 - 1.80	Very not important
2	1.81 - 2.60	Not important
3	2.61 - 3.40	Quite important

4	3.41 - 4.20	Important
5	4.21- 5.00	Very important

### III. RESULTS AND DISCUSSION

#### 1. Description of respondent characteristics

Out of 97 respondents, the average age was 39,45 years old with the youngest of 18 years old and the oldest of 69 years old with standard deviation of 11,63. Male respondents are the majority of 58,8%. These results are in accordance with outpatient visit survey at Prof. H.B. Saanin Mental Hospital of Padang totaling 24.551 visits. Most of them were male at 14.849 (65,1%) and female at 9.662 (34,9%). And in contrast to the statements of Anderson (1963) and Lumenta (1989) in Ramdhani (2008) that women are more likely to prevent disease from recognizing the early onset of the disease and treating it immediately also having high attention to their health. Women will go to the hospital more often so they feel and assess the quality of health services more often.

Most respondents were high school graduates of 43,3% and the least was not finishing elementary school of 2,1% and the occupation of most respondents was housewives and the least was civil servants. This can be accepted because housewives are not tied to work so they are able to accompany family members for treatment at Mental Hospital of Riau Province.

#### 2. Patient satisfaction

Patient satisfaction in this survey is indicated by the value of Conformity Level (TKi), which is the gap or difference between expectations and services.

##### a. Description of Respondent Satisfaction on Physical Evidence of Service Dimension

Physical evidence of service is shown by the cleanliness, tidiness, comfort and serenity of treatment room, the tidiness and cleanliness of pharmacy room, the complete equipment set and cleanliness of tools used and neatness of officer's appearance, as well as the width of hospital building, strategic location and adequate parking. The patient's expectation is greater with average of 4,6 than the service with average value of 4,44, resulting in conformity level of 96,31%. Based on these values, it can be concluded that cleanliness, tidiness, comfort and serenity of Mental Hospital of Riau Province is not in accordance with patient expectations, so the hospital must improve cleanliness, tidiness, comfort and serenity of treatment room to make patients feel satisfied.

Hermanto (2010) states that facility support is very important in indirectly determining patient's health condition, because unclean environment will trigger new diseases (nosocomial infections) for patients. Petersdorf (1991) in Hermanto (2010) states that out of all patients treated at the hospital, 5% of them have nosocomial infections and have mortality rate between 40-90%.

On cleanliness, tidiness, comfort and serenity in treatment room, it is clear that average expectation (4,61) is greater than average service (4,44) with conformity level of 96,31%, it can be concluded that the services provided are not satisfying enough for the patients.

##### b. Description of Respondent Satisfaction on Service Reliability Dimension

Service reliability is shown by registration officer and cashier's accuracy, regular doctor attendance and punctuality of patient examinations, doctor's accuracy in examining patients, and nurse's skills and service accuracy, as well as pharmacy officer's skill.

The analysis results of the description of respondent satisfaction regarding inpatient service reliability showed that patient satisfaction to service reliability of Tampan Mental Hospital of Riau Province was 92,90% with average service value of 4,32 and average expectation value of 4,65. The satisfaction of reliability variables in hospital services can be seen from registration



officer and cashier's accuracy, regular doctor attendance and punctuality of patient examinations, doctor's skill and accuracy in examining patients, and nurse's skill and service accuracy, as well as pharmacy officer's skill.

Based on the comparison results between patient's expectation and perception (implementation) level by Tampan Mental Hospital of Riau Province on reliability dimension, there is one thing that still does not match patient's expectations, which is regular patient examinations by doctors, attendance and arrival punctuality (doctor visit).

According to Yohana (2009), doctor's service has the greatest influence in determining service quality to patients because essentially patients need doctor's consultation, who will be sufficiently informed about their illness. The patient's expectations in this case are influenced by personal needs which depend on patient's characteristics and personal circumstances. The need of the patients themselves is the need to recover from the illness they're suffering from by going through the stages of doctor's examination, diagnosis and continuous treatment. So patients have high expectation for punctuality and regular examinations or treatment according to service standard continuously carried out by doctors every day for their illness, which is an effort for the patient to recover soon and go home to do activities as usual.

### **c. Description of Respondent Satisfaction on Service Responsiveness Dimension**

Service responsiveness is shown by responsiveness of parking attendants, security guards and other officers, providing clear information by registration officers and cashiers as well as agile and fast patient service, alertness and responsiveness of nurses in assisting patient needs, and the responsiveness of doctors in resolving any complaints from patients, as well as nutrition officer services in providing and assisting patient's food needs.

Based on the results, it is known that respondent satisfaction regarding service responsiveness at Tampan Mental Hospital of Riau Province is 90,21% with average service value of 4,24 and average expectation value of 4,70. The comparison results between patient's expectation and perception (implementation) level by this hospital in responsiveness dimension, there is still one thing that does not match patient's expectations, that is the speed of doctor's response in resolving each patient's complaint.

Hermanto (2010) suggests that the willingness to help customers (patients) and provide services quickly and accurately is associated with customer satisfaction, in this case the patient. Because patient satisfaction and dissatisfaction with a service will affect subsequent behavior. Hermanto (2010) explains that the function of a hospital which requires immediate assistance and treatment without asking for assurance first, the obligation of doctors to provide immediate assistance as humanitarian task, there is a problem solving priority in medical care or nursing care without differentiating the care by class.

### **d. Description of Patient Satisfaction on Service Assurance Dimension**

Service assurance at Tampan Mental Hospital of Riau Province in this survey are shown by patient's trust (security assurance) towards inpatient services, the nurse's attitude in meeting patient needs and politeness, and doctor's politeness in examining and diagnosing diseases. Based on the results, it is known that patient satisfaction regarding service assurance at the Mental Hospital is 92,82% with average service value of 4,27 and average expectation value of 4,6.

Satisfaction to service assurance dimension at Tampan Mental Hospital of Riau Province can be seen from the hospital which gave security assurance (trust) to their patients in provided services, the nurse's ability to understand patients and be friendly, polite and speak softly to them and doctor's ability to diagnose diseases with correct and polite examination. Out of the three things, respondent service value regarding service assurance is 92,82% with average service value of 4,27 and average expectation value of 4,6, meaning that respondents are not satisfied with health service assurance.

### **e. Description of Respondent Satisfaction on Service Empathy Dimension**

Service empathy at Tampan Mental Hospital of Riau Province in this survey is shown by equal service to all patients regardless of social status, friendliness of registration officers in service, nurse's attention to patient needs, doctor's presentation or explanation of patient's illness, nutrition officer's attention to differentiate food taste, and the friendliness of pharmacy staff and cashier.

Based on the results, it is known that patient satisfaction about service assurance at Tampan Mental Hospital of Riau Province is 93,3% with average service value of 4,32 and average expectation value of 4,63. The service quality dimension which include

friendliness of service providers (officers) and their ability to generate trust and confidence, politeness and trustworthiness are closely related to customer satisfaction (Yohana, 2009).

Muninjaya (2011) states that empathy is an individual effort of attention that is given by service providers to customers sincerely, such as the ease of contacting service providers, officer's ability to communicate with customers and service provider's efforts to understand what their customers want and need. Pohan (2007) explains that the aspects that might affect inpatients satisfaction include the officers serving politely, friendly, responsive, room cleanliness and the complete equipment set used.

Based on comparison results between patient's expectation and perception (implementation) level on empathy dimension, there is still one thing that does not match patient's expectations, it is the friendliness of registration officer in service. It means that T Mental Hospital patients are not satisfied with the friendliness of registration officers.

**3. Results of Conformity Level Analysis (Importance Performance Analysis)**

Based on the results of conformity level analysis, it can be seen the description of suitability between expectations and services. If the conformity level value is high, it can be assumed that the service has met expectations and vice versa if the conformity level value is low, it can be assumed that there is a difference between expectations and service.

Judging from the five dimensions of quality from the entire table above which is stated on patient's expectation (importance) and perception (performance) level by the hospital, also the conformity level achieved, the average value is obtained:

Table 2. Results of Conformity Level Analysis (Importance Performance Analysis)

<b>Determinants of Service Quality</b>	<b>Reality / Service (x)</b>	<b>Expectation (y)</b>	<b>Conformity Level (%)</b>
Physical Evidence	4,44	4,61	96,31
Reliability	4,32	4,65	92,90
Responsiveness	4,24	4,70	90,21
Assurance	4,27	4,60	92,82
Empathy	4,32	4,63	93,30
<b>Average</b>	<b>X= 4,31</b>	<b>Y= 4,63</b>	<b>92,08 %</b>

Based on the table above, from the five quality dimensions (*ServQual*) it is known that the satisfaction score at Tampan Mental Hospital of Riau Province is 92,08% with average service value (x) of 4,31 and average expectation value (y) of 4,63.

**4. Factors that need to be improved and need to be maintained (Results of Cartesian Analysis)**

Cartesian diagram illustration of variables distribution in the four quadrant diagrams is interpreted as follows:

- (1) Quadrant A is a quadrant which shows that the service (performance) in this quadrant is far below from average patient's expectation or unsatisfactory whereas patient's expectation level is very high while the perceived service is still considered very low by the patients so they feel unsatisfied or disappointed. This quadrant is a quadrant that must become the main priority for improvements in order to increase patient satisfaction, because these variables are considered very important

by patients. The picture in the Cartesian diagram is described by numbers in picture showing the number of the questions on questionnaire sheet.

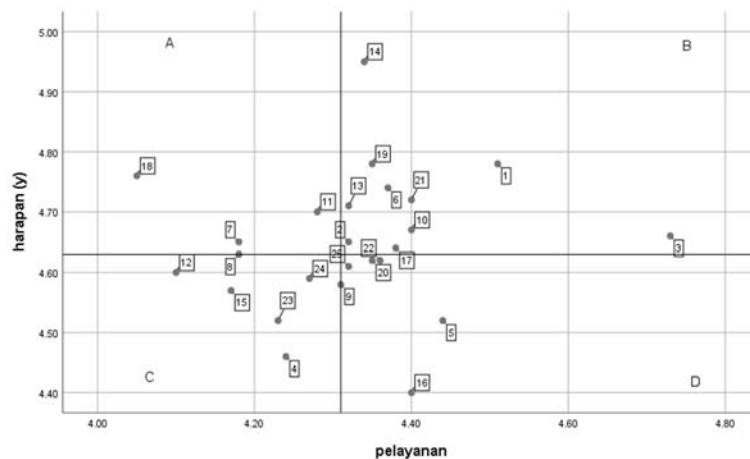


Figure 3 Cartesian diagram

The variables included in this quadrant are:

- a) At point 7 (regular doctor attendance and punctuality in patient examination) reliability indicators: average service value of 4,18 and average expectation value of 4,65.
- b) At point 11 (responsiveness of parking attendants, security guards and other public officers) responsiveness indicators: average service value of 4,28 and average expectation value of 4,70.
- c) At point 18 (doctor's politeness in examining and diagnosing the disease correctly) assurance indicator: average service value of 4,05 and average expectation value of 4,76.

(2). Quadrant B is a quadrant which shows that the service (performance) in this quadrant and patient high expectation level (importance) are felt to satisfy the patient so the variables in this quadrant must be managed and maintained because they become a strength for the hospital. The variables included in this quadrant are:

- a. At point 1 (cleanliness, tidiness, comfort and serenity of treatment room) physical evidence indicators: average service value of 4,51 and average expectation value of 4,78
- b. At point 2 (tidiness and cleanliness of pharmacy room) physical evidence indicators: average service value of 4,32 and average expectation value of 4,65.
- c. At point 3 (complete equipment set and cleanliness of the tools used) physical evidence indicator: average service value of 4,73 and average expectation value of 4,66.
- d. At point 6 (registration officer and cashier's accuracy) reliability indicators: average service value of 4,37 and average expectation value of 4,74.
- e. At point 10 (pharmacy staff's skill) reliability indicator: average service value of 4,40 and average expectation value of 4,67.
- f. At point 13 (nurse's alertness and responsiveness in assisting patient needs) responsiveness indicators: average service value of 4,32 and average expectation value of 4,95.
- g. At point 14 (doctor's responsiveness in resolving any complaints from patients) responsiveness indicators: average service value of 4,34 and average expectation value of 4,95.
- h. At point 17 (nurse's attitude in meeting patient's needs and politeness) assurance indicator: average service value of 4,38 and average expectation value of 4,64.

- i. At point 19 (equal service to all patients regardless of social status) empathy indicator: average service value of 4,35 and average expectation value of 4,78.
- j. At point 21 (nurse's attention to patient needs) empathy indicator: average service value of 4,40 and average expectation value of 4,72.

(3) Quadrant C is a quadrant which shows that the variables included in this quadrant are considered less important to patients and in fact the services provided are not satisfactory by the hospital so this factor is not a priority for improvement in order to increase patient satisfaction. The understanding above needs to be altered into increasing management's attention to the outlined variables in this quadrant and then managed it very seriously.

(4) Quadrant D shows that the variables included in this quadrant when viewed from patient's expectations, these attributes are not considered important but when viewed from satisfaction level, the patient is satisfied so for service provider (hospital) this factor is considered to have excessive service. The variables included in this quadrant are:

- a. At point 5 (the width of hospital building, strategic location and adequate parking space) physical evidence indicator: average service value of 4,44 and average expectation value of 4,52.
- b. At point 9 (nurse's ability in service accuracy) reliability indicator: average service value of 4,31 and average expectation value of 4,58.
- c. At point 16 (patient trust or safety assurance for inpatient services) assurance indicator: average service value of 4,40 and average expectation value of 4,40.
- d. At point 20 (friendliness of registration officers in service) empathy indicator: average service value of 4,35 and average expectation value of 4,62.
- e. At point 22 (doctor's presentation or explanation of patient's illness) empathy indicator: average service value of 4,36 and average expectation value of 4,62.
- f. At point 25 (friendliness of cashier in service) empathy indicator: average service value of 4,32 and average expectation value of 4,61.

#### **IV. CONCLUSION**

Based on the results of the conducted survey and data processing, the following conclusions can be drawn:

##### **Description of Respondent Characteristics in Mental Hospital of Riau Province**

1. The average age of respondents was 39,45 years old with the youngest being 18 years old and the oldest being 69 years old.
2. Most respondents are male of 58,8%.
3. Most respondents' education is high school graduate of 43,3% and the least is not finishing elementary school of 2,1%.
4. Most respondents' occupation is housewives of 28,9% and the least is civil servants of 7.2%.

##### **A. Description of Respondents Satisfaction on Service Quality of Tampan Mental Hospital of Riau Province**

1. In physical evidence dimension (physical facilities appearance and equipment completeness), the average service value is 4,44 and the average expectation value is 4,61.
2. In reliability dimension (officer's ability and skills to provide accurate services): the average service value is 4,32 and the average expectation value is 4,65.
3. In responsiveness dimension (willingness to help patients and provide appropriate services), the average service value is 4,24 and the average expectation value is 4,70.
4. In assurance dimension (knowledge and skills of service providers as well as the ability to inspire patients to feel assured in the services provided), the average service value is 4,25 and the average expectation value is 4,23.

5. In empathy dimension (special attention to patients), the average service value is 4,32 and the average expectation value is 4,63.

**B. Conformity Level Analysis (Importance Performance Analysis)**

The average conformity level between the services provided by Tampan Mental Hospital of Riau Province and patient's expectations is 92,08% (Excellent), meaning that patients are very satisfied with the services provided by Tampan Mental Hospital of Riau Province in 2019.

**C. Health Service Dimensions that Need to be Improved and Maintained by Tampan Mental Hospital of Riau Province**

1. Dimension variables that need to be improved in order to increase patient satisfaction, because these variables are considered very important by patients. The variables included in this quadrant are:
  - a. Regular doctor attendance and punctuality of patient examinations.
  - b. The responsiveness of parking attendants, security guards and other public officers
  - c. The doctor's politeness in examining and diagnosing diseases correctly
2. Service dimension variables that must be managed and maintained because they are a strength for the hospital include:
  - a. Cleanliness, tidiness, comfort and serenity of treatment room.
  - b. Tidiness and cleanliness of pharmacy room
  - c. Complete equipment set and cleanliness of the tools used.
  - d. Accuracy of registration officers and cashiers
  - e. Pharmacy officer's skill
  - f. Nurse's alertness and responsiveness in helping patient's needs
  - g. Doctor's responsiveness in resolving any complaints from patients.
  - h. Nurse's attitude in meeting patient's needs and politeness
  - i. Equal service to all patients regardless of social status.
  - j. Nurse's attention to the patient's needs

**REFERENCES**

- [1] Azwar, Azrul. Pengantar Administrasi Kesehatan. Tangerang: Binarupa Aksara. 2010.
- [2] Hafizurrachman. Kepuasan Pasien dan Kunjungan Rumah Sakit. Jurnal Kesehatan Masyarakat Nasional. 2009;4(1).
- [3] Hermanto, Dadang. *Pengaruh Persepsi Mutu Pelayanan Kebidanan terhadap Kepuasan Pasien Rawat Inap Kebidanan di RSUD Dr. H. Soemarno Sosroatmodjo Bulungan Kalimantan Timur*. Tesis Program Studi Magister Ilmu Kesehatan Masyarakat Konsentrasi Administrasi dan Kebijakan Universitas Diponegoro. Semarang: 2010.
- [4] Keputusan Menteri Kesehatan Republik Indonesia Nomor : 129/Menkes/SK/II/2008 Tentang Standar Pelayanan Minimal RumahSakit.
- [5] Keputusan Menteri Kesehatan Republik Indonesia Nomor : 983/Menkes/SK/XI/1992 tentang Pedoman Organisasi Rumah Sakit.
- [6] Laila, Khaerani. *Faktor Faktor yang Mempengaruhi Kepuasan Pasien Rawat Jalan RSUD Pasaman Barat*. Jurnal Kajian Administrasi Rumah Sakit Universitas Andalas. Padang: 2007.
- [7] Muninjaya, Gde. *Manajemen Kesehatan*. Jakarta: Penerbit Buku Kedokteran EGC. 2006.
- [8] Notoatmojo, Soekidjo. *Metodologi Penelitian Kesehatan*. Jakarta: PT Rineka Cipta. 2005.

- [9] Pohan, Imbalo. *Jaminan Mutu Pelayanan Kesehatan: Dasar-dasar pengertian dan Penerapan*. Jakarta: Penerbit Buku Kedokteran EGC. 2006.
- [10] Rahayu, Fitri. *Hubungan antara Karakteristik Pasien dengan Kepuasan terhadap Mutu Layanan Rawat Inap Kelas III di Rumah Sakit Pirngadi Medan Tahun 2008*. Tesis Fakultas Kesehatan Masyarakat Program Studi Kajian Administrasi Rumah Sakit Universitas Indonesia. Depok: 2008.
- [11] Ramadhani, Susi. *Analisa Kinerja Pelayanan dan Hubungannya dengan Tingkat Kepuasan Pasien Instalasi Rawat Inap Kelas Satu (VVIP Dan VIP) Sanatorium Dharmawangsa Tahun 2008*. Tesis Program Studi Administrasi Rumah Sakit Pasca Sarjana Fakultas Kesehatan Masyarakat Universitas Respati Indonesia. 2008.
- [12] Satrianegara, M. Faiz. *Buku Ajar Organisasi dan Manajemen Pelayanan Kesehatan serta Kebidanan*. Jakarta: Salemba Medika. 2009.
- [13] Undang-Undang Republik Indonesia nomor 44 tahun 2009 tentang Rumah Sakit.
- [14] Yohana, Antin. *Analisis Harapan Dan Kepuasan Pasien Rawat Inap Penyakit Dalam Terhadap Mutu Pelayanan Dokter Spesialis di RSI Sunan Kudus*. Program Pascasarjana Universitas Diponegoro. Semarang: 2009.

# *Challenges of Teaching Academic Writing Skills in EFL Classroom*

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**Abstract** – Writing is one of the compulsory modules in the program of English linguistic training which students have to take at any university. In fact, students have many difficulties in understanding and writing all kinds of documents in English, making their learning results not as expected. Writing skills include conceptual development, language expression, and experience in a wide range of writing topics and the fact that each student has his own ideas, language proficiency makes teaching writing skills become a big challenge for English lecturers. To properly assess the current situation, the author has conducted an investigation in which students are surveyed and taught in a writing class and found that students had difficulties with vocabulary, grammar and writing skills. The cause of these difficulties stems from both subjective and objective reasons. Through that, the author proposes a number of solutions that teachers can apply to help students improve their writing skills through describing and contrasting two popular, yet very different approaches – a product approach and a process approach: advantages, disadvantages and some recommendations in the hope that teachers can find the most effective direction and method of teaching writing skills, contributing to successful completion of the subject as well as the need to use in future work.

**Keywords** – Writing skills, teaching and learning situations, problems, solutions, process-oriented teaching.

## I. INTRODUCTION

In the trend of labor mobility between countries in the period of globalization today, the need for human resources who can use English fluently is more urgent than ever. Facing that fact, Dong Nai Technology University where the author has been working has implemented a bachelor's degree programs in English linguistic training. This training program is rated as a standard training program, in which freshmen and sophomores must be proficient with the modules of Listening, Speaking, Reading and Writing. In fact, in the process of learning any language, writing skill is usually the last skill learned after listening, speaking, reading and this is also the most difficult skill for learners. Therefore, students, especially freshmen, often have difficulty in learning how to write right. Overcoming these obstacles requires time and persistent practice, which sometimes discourages students. This leads to unexpected learning results and students lose confidence in the writing process.

In this article, the author presents the difficulties of teachers in the process of teaching writing skills, and proposes two popular, yet very different approaches – a product approach and a process approach for teachers to motivate students and better their writing skills, contributing to improving learning outcomes and improving effectiveness of training programs. Both approaches mentioned are implemented to teach students to find out how students react to the program. This study examines the following research question: What are students' perspectives on learning writing skills through the application of product approach and a process approach?

## II. DIFFICULTIES THAT TEACHERS ENCOUNTER WHEN TEACHING WRITING

Lecturers assigned to teach writing module are those who have experience in teaching writing skills to students in previous courses of the university. During the teaching process, in order to motivate and engage students in the learning activities of the

subject, the lecturers always try to develop the appropriate teaching materials to create opportunities for students to access with rich and varied writing activities. However, teachers encounter many obstacles that make teaching effectiveness not as expected. Some of the contents in the textbooks are not attractive enough to attract learners to participate. Besides that, students' limitations of vocabulary and grammar make teachers spend a lot of time explaining how to use the necessary grammar structures according to the requirements of the lessons. It influences the amount of time spent on teaching and practicing writing. Moreover, students' self-consciousness is not good enough, along with the nature of writing is often "static" and somewhat dull, so students easily become unwilling to take part in the lessons. Along with that, the ability of students to work in groups is still limited, making the writing and correcting in groups not really effective.

In the history of teaching English Writing, there are two main directions that are commonly applied by educators as well as researchers, namely the product approach and the process approach. The two directions of teaching Writing skills above are two completely different methods of guiding learners to approach and practice writing skills. If the direction of teaching Writing skills by product focuses on the accuracy of the language, the direction of teaching Writing skills in the process focuses on how to deploy, organize ideas as well as evaluate learners' progress in writing. Applying the direction of teaching Writing skills depends on each student's object as well as the type of writing. So, the author implements two ways of teaching to explore the most effective one for her students.

### III. LITERATURE REVIEW

#### Product Based Approaches to Teaching Writing

Product Based Approaches to Teaching Writing has appeared since the mid-1960s. The purpose of this method is to develop model-based accuracy in academic writing. Product-oriented teaching is a traditional tendency in which learners are encouraged to imitate a sample passage / text used by the teacher for analysis earlier. Thus, during the lesson in which writing skills are taught by product-oriented style, learners are provided with a sample lesson / paragraph; From there, learners consider it a standard lesson and learn to write in the same way as the model.

According to [4], product-based teaching includes four stages:

Stage 1: Students are provided with sample paragraphs / articles with stylistic characteristics, writing style of the article format. For example, during a class on formal letter writing, the teacher will focus on the introduction, letter structure, sentence structure, and formal vocabulary for students to apply in their letter writing.

Stage 2: This phase includes a "controlled" practice of the structure and characteristics of the writing. During a letter writing lesson, the teacher might ask learners to write formal sentences and structures like "I would be grateful if ..."

Stage 3: In this stage, it is important for writers to arrange ideas to form the writing using the language, the structure which has been provided in the steps above

Stage 4: The stage eventually forms the "product" of the writing. Learners use provided skills, language, and structure to write independently, individually.

#### Process oriented Approaches to Teaching Writing

The teaching method according to the process is the method used to teach different types of writing. In the course of process teaching, learners write through a cyclic approach, rather than an individualized approach. The teacher does not hope that learners can create a perfect product in terms of language and structure without having to go through the stages from drafting to getting feedback from classmates and teachers about the article. Then learners will edit the article to complete it.

Accordingly, the process of teaching Writing in the process focuses on diverse activities in the classroom to enhance the ability to use language such as: "brainstorming" (brain activity); Group discussion and rewrite activities to complete articles.

According to [4] the process of teaching in a process consists of eight stages:

Stage 1: "Brainstorming" - (Brainstorming). This is the first stage to form an article concept, during which learners will write down any ideas related to the topic's requirements.



Stage 2: "Planning": is the period when learners exchange ideas with each other, then assess which ideas are suitable and which ideas are not suitable to the requirements of the topic.

Stage 3: "Mind-mapping": Learners arrange ideas according to mind maps. This method helps the writer to determine what the main idea is, what the secondary idea is, thereby determining how to develop the idea in the article

Stage 4: "Writing the first draft": learn to write your first draft. Usually, this stage is done in class and learners may be asked to write in pairs or in groups.

Stage 5: "Peer feedback": The draft is exchanged for the first time among groups, whereby learners can comment on and give feedback to each other.

Stage 6: "Editing": The first draft is sent back to groups / individuals and the writer is then asked to edit the draft based on feedback from classmates.

Stage 7: "Final Draft": Participants are asked to complete their writing.

Stage 8: "Evaluation and feedback from the teacher". The teacher evaluates and responds to the student's writing.

It can be seen that the path of teaching Writing skills in the process is a cyclic method, in which the stages are related, interacting with each other.

### **Advantages- Disadvantages of the Product Based Approaches and Process oriented Approaches**

Thus, it can be seen that, in the direction of teaching Product-based Writing skills, teachers often focus on accuracy and perfect language structure required in student's writing. Teachers often pay little attention to the writing style of learners. In other words, product oriented articles are evaluated on the basis of grammar, grammar or structure in which learners create sample articles with the same language and structure as sample articles. Thus, learners merely imitate the sentences in the sample and from there convert the sample into their own writing. Therefore, teachers as well as learners do not take much time to achieve their product writing. The product-based writing approach is considered to be quite effective for learners who are not good at English level because learners can create a fairly accurate article in terms of language by imitating the writing. Thus, the direction of product-based Writing is the traditional writing teaching method, whereby the article focuses more on the form rather than the meaning. Furthermore, a complete essay in all aspects when submitted to the instructor is more important than the writing process and the author's progress. The article is thus marked by the instructor instead of evaluating the learner's writing process. Accordingly, the article focuses more on the form rather than the meaning.

In contrast, in the process oriented approaches, teachers often encourage learners to use resources to write from their own abilities. Teachers support learners in developing draft writing skills, with clear ideas in expressing ideas rather than the linguistic accuracy of the writing. According to [1] and [3] the Process of Writing Teaching focuses on "brainstorming" to form and develop ideas. According to writing is the result of using multiple strategies to control the writing process, thereby gradually developing the writing, including many activities during writing hours such as setting writing goals ( setting goals); generating ideas; organizing information; selecting appropriate language (selecting appropriate language); writing the first draft; reading and reviewing it; and revising and editing. Besides, also argues that the process of developing ideas and expressing emotions in the article is also more important for the development of the article than focusing on a perfect article in the first place.

According to [1] in the classroom, both learners and teachers are learners because both learners and teachers can read texts and ask suggestions and support in terms of ideas, words, help writers know how to make their writing clearer, their ideas are arranged more coherently and logically; sentences are used more accurately. The teacher not only evaluates the article in the final version but evaluates based on the progress of the learner. The teaching path of Writing follows the process, so it is quite suitable for learners with pre-intermediate English proficiency or higher.

However, according to researchers and teachers, teachers who use the process of writing teaching approach face many difficulties in teaching Writing. One of the problems is that this method is time consuming. Scholars say that this writing approach requires learners to draft more than once before completing the completed writing. Therefore, with limited classroom instruction, many teachers cannot complete their teaching in an hour or two of writing lessons per week. In addition, the teacher may need to spend a lot of time reading and editing student drafts, which creates quite a lot of work for the teacher. The teacher's failure to promptly

respond to learners' drafts for learners to edit and rewrite makes drafting of learners useless. Besides that, according to the researchers, the articles on the writing direction of the process have many errors in terms of grammar, words, and structure. These errors can become systemic errors if the learner is not corrected in time. Besides, it is argued that teachers sometimes do not agree between writing assessment method and writing direction. Some teachers apply the teaching path according to the process, and at the same time evaluate the writing according to the criteria of the writer's progress in the process, but in fact, when evaluating, the teacher focuses on the structure and language used in the article - one of the characteristics of the product-based article. That situation leads to inadequacies in teaching and assessment.

#### IV. METHODOLOGY

##### *Data collection tool*

The study used questionnaire to collect quantitative data from the participants. In this study, questionnaire which consists of 2 closed-ended Likert scale statements was designed and delivered to all sophomores in the academic year 2020-2021. This questionnaire had the partakers respond to each items in a five point Likert scale which descend the meaning respectively from strongly agree, agree, neutral, disagree to strongly disagree. This design is helpful to figure out students' reaction, attitude, and ideas towards the application of a product approach and a process approach to learn writing skills.

##### *Participants*

The questionnaire was sent via email to 100 sophomore English majored students from Faculty of Foreign Languages at Dong Nai Technology University. Totally, there are 70 questionnaires were completed by participants and returned. Actually, 70% return rate was large enough to ensure the validity and reliability of the results of the study.

##### *Data Analysis*

After gathering and grouping information from questionnaire, all quantitative data was analyzed using Microsoft Excel Program in which the responses of participants were displayed by graphs and tables.

#### V. RESULTS AND DISCUSSION

Participants were asked to express whether they feel engaged in the utilization of product-based approach in the first question. It can be seen clearly in the below pie chart that the minority of the students revealed their agreement including 5% of strong agreement and 40% of agreement. It is assumed that they are interested in learning writing with the style of controlled practice. On the other hand, only 10% of the students disagreed with this statement and 15% of the responses were strong disagreement. However, there was a large amount of neutral feedback (30%), these figures show that some students are still passive in the classroom

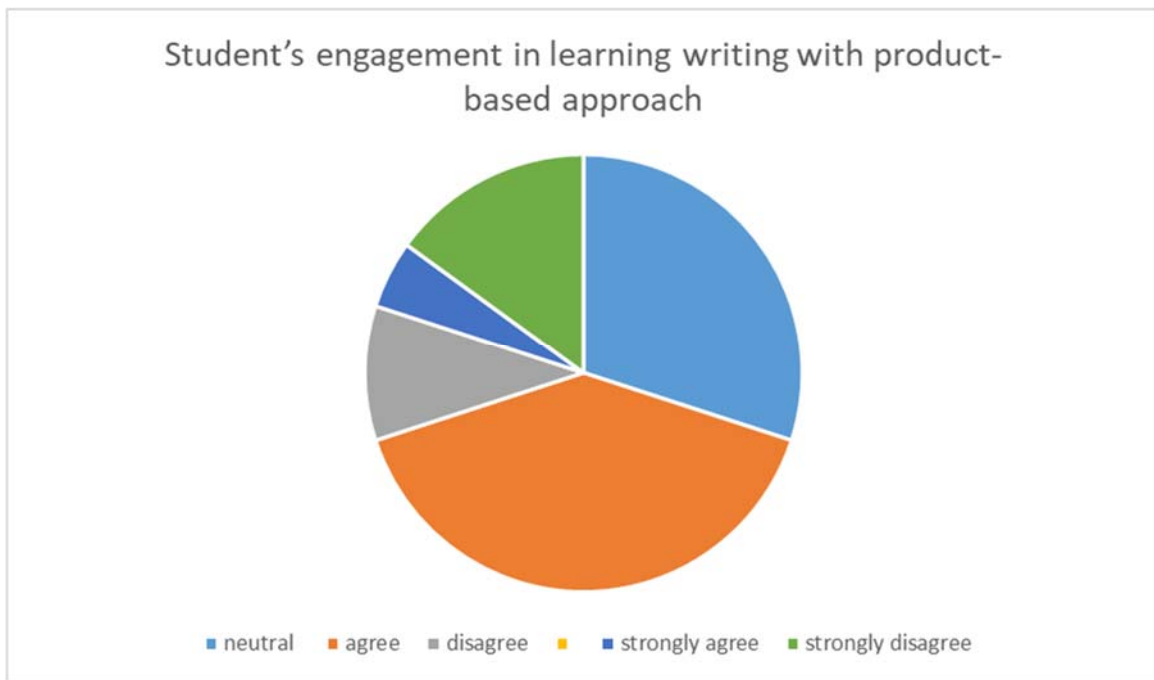


Figure 1. Student's engagement in learning writing with product-based approach

From the below pie chart, it is indicated that the highest rate of the students agreed (70%) and strongly agreed (10%) with the idea that process-oriented writing classroom is engaging. This is no doubt that students have experienced a totally different type of learning environment in comparison to traditional teaching and learning approaches. In addition students have countless new learning experiences with this style. Nevertheless, the total number of students expressed disagreement and strong disagreement was 10 out of 70 participants occupied 10%. Anyway, there are 10% of students showed their neutral opinion which means that students become more interested in learning writing.

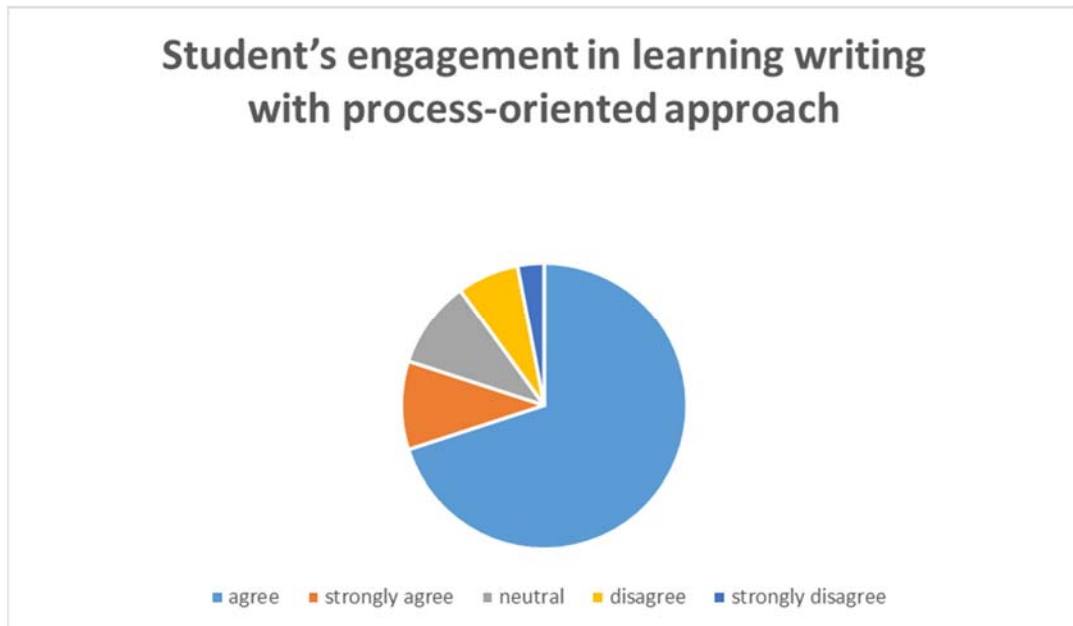


Figure 2. Student's engagement in learning writing with process-oriented approach

## VI. CONCLUSION

It can be seen that the direction of teaching writing skills by product and process have certain advantages and disadvantages. Choosing which direction depends on the teacher, the student's interests and the type of writing. For example, for letter-writing or report-writing lessons, the product-based approach to writing is preferred because these types of articles often use paradigms in the use of structure, language, etc. . On the contrary, for writing lessons about the essay or descriptive genre, the process-oriented writing instruction takes precedence. [2] has pointed out the simultaneous application of the product-based writing approach for learners to "control the language of the writing" and the process-oriented writing direction for learners to "use the language as a creative way in writing" is essential. For English language students at Dong Nai Technology University, both directions should be employed at the same time for students to improve their accuracy in writing and arouse their engagement in learning.

According to [3] and [5] teachers can apply a combination of product-based Writing with process-oriented writing patterns.

## REFERENCES

- [1] Hedge, T. (2002). Teaching and learning in the language classroom. Oxford: Oxford University Press.
- [2] Kim, Y. & Kim, J. (2005). Teaching Korean university writing class: balancing the process and the genre approach. Asian EFL Journal Online, 7 (2),69- 90. Retrieved on 25th Jan. 2010 from [http://www.asian-efl-journal.com/June\\_05\\_yk&jk.php](http://www.asian-efl-journal.com/June_05_yk&jk.php)
- [3] Hyland, K. (2003). Second Language Writing. Cambridge: Cambridge University Press.
- [4] Hyland, K. (2003). Genre-based pedagogies: A social response to process. Journal of Second Language Writing
- [5] Steele, V. (2004). Product and process writing. Retrieved on 5th Sept. 2010 from <http://www.englishonline.org.cn/en/teachers/workshops/teaching-writing/teaching-tips/product-process>
- [6] Hyland, K. (2002). Teaching and Researching Writing. Essex: Longman.

# *Soil Thermophysics In Comb Growing Of Cotton With Targeted And Uniform Moistening Of The Root System*

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**Abstract** – The article presents the results of research on the development of technology for growing cotton on the ridge of the bed with targeted and uniform moistening of the root system of plants, which together contributed to the creation of optimal conditions for machine harvesting of raw cotton by ensuring early maturation (for 2-3 weeks) and high yield.

**Keywords** – Soil Thermophysics, Comb Growing Of Cotton, Targeted, Uniform Moistening , Root System.

## I. INTRODUCTION

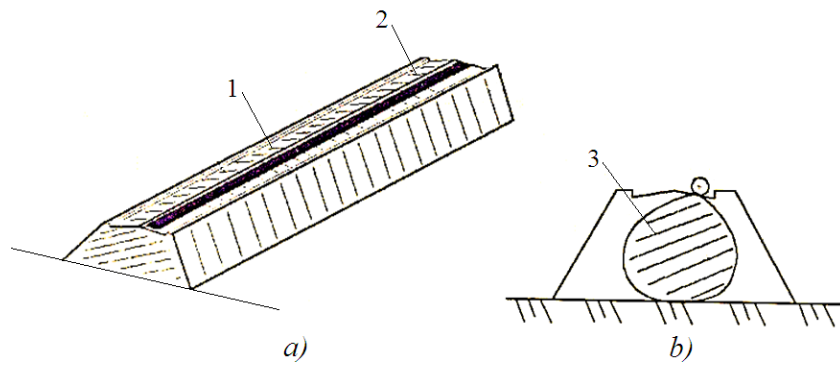
In the conditions of irrigated agriculture in Central Asia, in the spring, due to low air temperatures and often precipitation, the warming of the soil is always insufficient, as a result of which the germination of cotton seeds is significantly delayed. Therefore, agricultural techniques that contribute to at least some increase in soil temperature in the spring are very appropriate and deserve attention.

Research has established [1, 2, 3, 4-8], that when cultivating cotton on the ridge of the bed, in accordance with the theoretical foundations of tillage, a favorable condition is provided for the addition of the arable layer for a long growing season of cotton. This contributes to the production of friendly shoots, good plant development and a high yield of raw cotton with early maturation.

The differences in the soil temperature observed on the smooth floor and on the crops on the ridges show that in all periods of observations the temperature is higher on the ridges. Studies have found that the soil temperature at a depth of 5 cm on the ridges is always higher than when sowing on a smooth field by 1.5-4 ° C. The same thing was observed at a depth of 10 and 15 cm. In recent years, the so-called "drip irrigation system" has become widespread [5, 6, 9-16], which allows you to provide plants with water and fertilizers where necessary, at the right time and in the right amount. The use of "drip irrigation" guarantees higher yields, as well as provides savings in labor, water and energy resources [17-20].

With changing weather conditions, it is possible to harvest raw cotton with more than 90 % of the opening of the boxes [4]. Knowing the technologies of comb cultivation of cotton with targeted and uniform moistening of the root system of the plant, it is possible to create an even more favorable microclimate of the root system of cotton and conditions for machine harvesting of raw cotton by ensuring early maturation (for 2-3 weeks) and high yield and technical means for their implementation [13]. When using a drip irrigation system [7, 8], cotton seeds are sown along the comb by laying perforated tapes on the comb (Fig. 1, a).

It is very important to establish reasonable parameters of ridges, conditions of pre-sowing and post-sowing treatment, schemes and norms of irrigation; to develop on their basis agrotechnical requirements for the designed machines and tools [21-25].



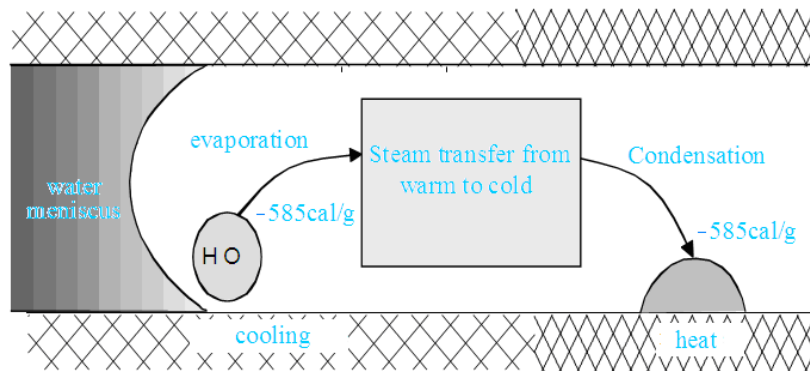
**Figure 1.** Arrangement of irrigation hoses on the ridges:

- a) the type of location of the irrigation hose on the ridge; b) the cross-section of the ridge: 1-irrigation hose; 2-ridge; 3-the bow-shaped shape of the wet soil layer

**Methods.** For the growth and development of plants, the most important among the physical factors of the environment are water, air, solar energy and heat. Including soil heat, soil temperature. In connection with the importance of the physical properties of soil soils in relation to the formation of the temperature of the soil layer, we will focus in detail on the main mechanisms and thermophysical properties of soils.

The phenomenon of thermal conductivity of soils has several internal mechanisms. Conduction – heat transfer in direct contact of soil particles with each other. Since soil particles are almost always in contact with each other, this mechanism prevails in all mineral soils [23-25].

The transfer of "latent heat" (heat – heat transfer) is the transfer of heat together with water vapors formed (with heat loss) at one point of the soil and condensed (with heat release) at another. The expression "latent heat" is related to the term "latent heat of vaporization", which is 585 cal/g. If there is a temperature gradient in the soil, then water vapor moves from a point with a higher temperature to a point with a lower temperature. Therefore, if 1 g of water evaporates in the warm part of the soil pore (Fig. 1), then in this part the soil will cool by 585 cal. This gram of vaporous water, condensing in the cold part, will emit the same 585 cal. Due to this heat transfer with water vapor, temperature equality is also achieved.



**Figure 1.** Latent heat transfer – heat and steam transfer.

Convection-warming up due to the jet mixing of the liquid and gaseous phases. In soils, the manifestation of this mechanism is noticeable only at high humidity, rapid mixing of free water.

Heat transfer due to direct infrared radiation. In soils, it is represented to a small extent.

If there are several mechanisms of heat transfer in the soil, it is possible that when its humidity changes, these mechanisms will form the thermal conductivity of the soil as a whole in different ways. Initially, in dry soil, the particles lie freely relative to each other (Fig. 2, Stage 1).

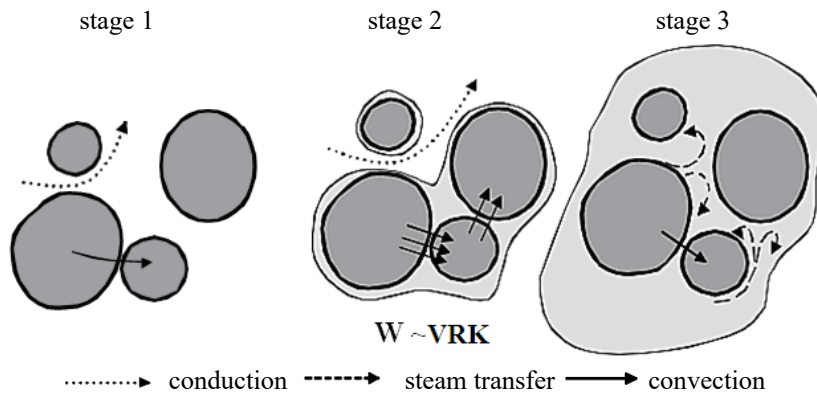


Figure 2. Scheme of heat transfer at different soil humidity

And the heat transfer will be due to only a few individual contacts (conduction). As the water film forms, the particles approach each other. The number of contacts increases, although the free pore space is still significant, and water "plugs", water-filled capillaries, do not interfere with thermal transfer (stage 2). At the moment, the two main mechanisms of steam transfer are fully presented. The thermal conductivity reaches its maximum values. This occurs when the soil reaches a moisture content close to the moisture content of the capillary bond break (RCC) - soil moisture, at which the hydraulic connection of the capillary network is interrupted, and the mobility of moisture in the drying process decreases sharply. It is located in the humidity range between the lowest moisture capacity and the humidity of the stable wilting of plants in the region. The lowest moisture content of HB is the greatest amount of moisture that the soil in the natural occurrence can hold in a stationary or almost stationary state after abundant or artificial moistening and runoff of moisture in the deep occurrence of groundwater ("capillary-suspended moisture").

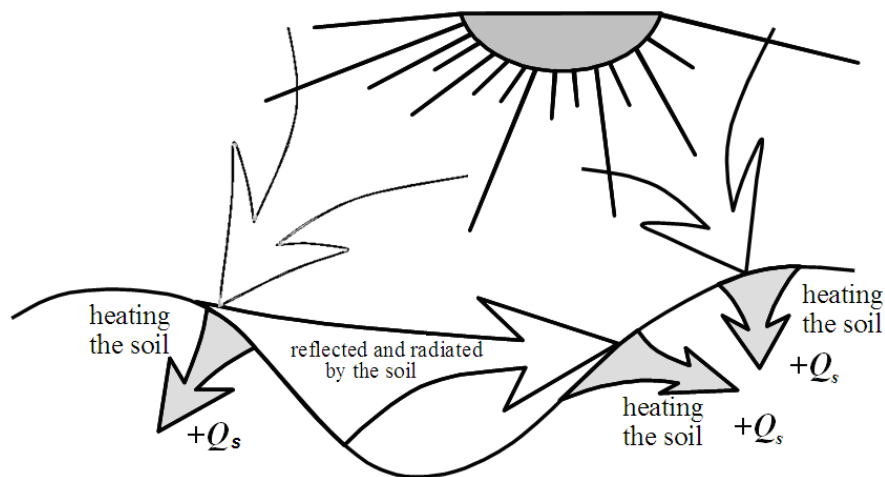
With further increase in humidity, the conductivity will increase already weak, mainly due to the mechanism of convection circulation of fluids (stage 3, Fig. 2).

Therefore, the dependence of conductivity on moisture is in the nature close to exponential, when humidity values close to the WRC, the curve approaches the maximum value [25].

II. RESULTS AND DISCUSSION

The physical basis of temperature regulation is the following processes based on changes in the components of the thermal balance and the thermophysical properties of the soil: - change in the albedo of the soil surface; - decrease in heat loss of the soil; - increase in the thermal conductivity of the soil.

Covering the surface with dark substances (peat) leads to a significant decrease in the albedo, and, accordingly, to an increase in the absorption of energy by the soil. Remember, the albedo is the ratio of the reflected short-wave energy to the received one. To reduce the albedo means to reduce, first of all, the reflection of radiation by the soil, to increase the flow of heat into it. These are traditional techniques that are often referred to as surface mulching. Mulching of the surface in warm periods leads to a decrease in the temperature of the soil, to its shading. Thus, in the broadest sense, mulching reduces the amplitude of the temperature of the soil surface, "smooths" its dynamics. Another technique, based on a change in the balance components, is associated with a decrease in the amount of heating of the surface layer of air. More precisely, using the heat radiation of the soil to heat the soil itself. It sounds paradoxical, but this is a very effective technique: combing the surface of the soil. This technique leads to the fact that the soil from the side surfaces receives solar radiation and with the same side surfaces of the ridges radiates heat to the side surfaces of nearby ridges. This radiated by the lateral surface of the ridge is not lost, but is acquired by those adjacent to it. In total, the soil loses less heat and accumulates less. And, in addition, when combing the surface of the soil increases, it again consumes more total solar radiation energy than the leveled surface of the soil. This is shown schematically in Figure 3.



**Figure 3.** Distribution of heat fluxes on the soil surface during combing

It should not be forgotten, however, that if the surface is given such a wavy mesorelief, there will also be an increase in evaporation. Such beds will dry faster, being physical analogues of small "wicks" that evaporate moisture much faster than the leveled surface of the soil.

Changing the thermophysical properties of the soil, increasing its thermal conductivity is also a way to regulate the temperature regime. Recall that the thermal conductivity of the soil is the quotient of the division of the thermal conductivity by the heat capacity of the soil. You can increase the thermal conductivity by creating conditions for better heat penetration. And this is the optimum humidity, when all the mechanisms of heat transfer are most pronounced, an increase in contacts between particles (i.e., some compaction), an increase in the proportion of large mineral particles (and this is sanding). A decrease in heat capacity is achieved by reducing humidity, increasing the proportion of mineral components with low heat capacity. This is achieved, as a rule, by adding sand, sanding. In this case, firstly, the proportion of mineral particles that are in good contact with each other increases, and secondly, water is less retained due to its faster flow, i.e., the soil moisture decreases. All this leads to a faster warming of the soil after sanding.

### III. CONCLUSIONS

1. Each of the soil phases inside the ridge has a corresponding volumetric heat capacity, based on this, targeted and uniform moistening of the root system of plants accumulates more heat.
2. For the entire ground and subsurface biota, the most important is the soil temperature, the change in soil temperature as a function of time, and the dynamics is determined by the temperature gradient.
3. The physical basis of temperature regulation is the following processes based on changes in the components of the thermal balance and the thermo physical properties of the soil: changes in the albedo of the soil surface; reduction of heat losses of the soil; increase in the thermal conductivity of the soil.

### REFERENCES

- [1] Bazarov D.R. Scientific substantiation of new numerical methods for calculating the deformation of river beds composed of eroded soils. Dissertation for the degree of Doctor of Technical Sciences, M. 2000
- [2] Google Earth. Access mode: <https://earthengine.google.com/timelapse/>.
- [3] Umurzakov, U., Mamatov, F., Aldoshin, N., and Mirzaev, B. Exploration of tillage technologies in the Republic of Uzbekistan // ICECAE 2020 IOP Conf. Series: Earth and Environmental Science 614(2020) 012168. IOP Publishing. doi:10.1088/1755-1315/614/1/012168.
- [4] Mamatov, F., Aldoshin, N., Mirzaev, B., Ravshanov, H., Kurbanov, Sh and Rashidov, N. Development of a frontal plow for smooth, furless plowing with cutoffs // IPICSE 2020. IOP Conf. Series: Materials Science and Engineering 1030 (2021) 012135 IOP Publishing. doi:10.1088/1757-899X/1030/1/012135.



- [5] Mamatov, F., Mirzaev, B., Mirzahodzaev, Sh., Uzakov, Z and Choriyeva, D. Development of a front plow with active and passive working bodies // IPICSE 2020. IOP Conf. Series: Materials Science and Engineering 1030 (2021) 012164. IOP Publishing. doi:10.1088/1757-899X/1030/1/012164.
- [6] Mamato, F.M., Eshdavlatov, E., Suyuno, A. Continuous Feed Mixer Performance //Journal of Advanced Research in Dynamical and Control Systems (JARDCS). – Volume-12, 07-Spesial Issue, 2020. DOI: 10.5373/JARDCS/V12SP7/20202343. ISSN 1943-023X.
- [7] Mamatov, F., Ergashev, I., Mirzaev, B., Pardaev, X, Chorlieva, D. Research of the Penetration Process of the Frontal Plow // 2nd Bukittinggi International Conference on Education (BICED) 2020. Journal of Physics: Conference Series 1779 (2021) 012002. IOP Publishing. doi:10.1088/1742-6596/1779/1/012002.
- [8] Krutov A.N. Development of the theory and methods of forecasting the spread of pollutants in the surface waters of arid zones. Dissertation for the degree of Doctor of Technical Sciences. M., 1997, 162 p.
- [9] Mamatov, F., Mirzaev, B., Shoumarova, M., Berdimuratov, P., Khodzhaev, D. Comb former parameters for a cotton seeder// International Journal of Engineering and Advanced Technology (IJEAT) Volume-9 Issue1 October/ DOI: 10.35940/ijeat.A2932.109119.
- [10] Mamatov, F., Mirzaev, B., Berdimuratov, P., Turkmenov, Kh., Muratov, L., Eshchanova, G. The stability stroke of cotton seeder moulder // CONMECHYDRO – 2020. IOP Conf. Series: Materials Science and Engineering 883 (2020) 012145 IOP Publishing. doi:10.1088/1757-899X/883/1/012145.
- [11] Militeev, A.N., Bazarov, D.R. A two-dimensional mathematical model of the horizontal deformations of river channels. Water Resources. 1999. 26(1). Pp. 17–21.
- [12] Kwon V.I. About the frictional resistance at unsteady motion of an open fluid flow in the channel. Dissertation for the degree of candidate of physical and mathematical sciences. Novosibirsk., 1967
- [13] Lyatkher V.M., Militeev A.N. Numerical methods in hydraulic studies. Water Resources, 1981, № 3.
- [14] Bazarov, D.R., Vokhidov, O.F., Lutsenko, L.A., Sultanov, S. Restrictions Applied When Solving One-Dimensional Hydrodynamic Equations. Proceedings of EECE 2019, Lecture Notes in Civil Engineering 70. 2019. Pp. 299–305. DOI:10.1007/978-3-030-42351-3\_26.
- [15] Lyatkher V.M., Militeev A.N. Study of currents in the downstream of hydraulic structures by numerical methods. Hydraulic Engineering. 1978. No 6. pp. 27 – 32.
- [16] Lyatkher V.M., Prudovskiy A.M. Hydraulic modeling. Energoatomizdat., M., 1984.
- [17] Lyatkher V.M., Shkolnikov S.Ya. Tensor structure of the hydraulic friction coefficient. //Water resources, No 5, 1981
- [18] Bazarov, D., Uralov, B., Matyakubov, B., Vokhidov, O. The effects of morphometric elements of the channel on hydraulic resistance of machine channels of pumping stations. Mater. Sci. Eng. 2020. 869(072014). DOI:10.1088/1757-899X/869/7/072015.
- [19] Meksi A. Prediction of channel dynamics in the headwaters of hydrosystems by numerical methods. Dissertation for the degree of candidate of technical sciences. M., 1987
- [20] Militeyev A.N. Solving problems of hydraulics of shallow reservoirs and hydroelectric facilities using numerical methods. Dissertation for the degree of Doctor of Technical Sciences. M., 1982
- [21] Mukhammedov Ya. S. Operation of the Karshi main canal at water intake from the Amudarya river and ways of its improvement. Access mode: <http://www.cawater-info.net/library/rus/mukhamedov1.pdf>
- [22] Serapinas B.B. Geodetic foundations of maps. Geodetic foundations of maps, theoretical foundations of plane coordinates. Access mode: [http://www.geogr.msu.ru/cafedra/karta/docs/GOK/gok\\_lecture\\_5.pdf](http://www.geogr.msu.ru/cafedra/karta/docs/GOK/gok_lecture_5.pdf)
- [23] Bazarov, D., Markova, I., Norkulov, B., Isabaev, K. Operational efficiency of water damless intake. 2020. DOI:10.1088/1757-899X/869/7/072051.

- [24] Shkolnikov S.Ya. Study of currents in rivers and lakes by numerical methods. Dissertation for the degree of candidate of technical sciences. M., 1980.
- [25] Bazarov, D., Norkulov, B., Vokhidov, O., Uljaev, F., Ishankulov, Z. Two-dimensional flow movement in the area of protective regulatory structures. IOP Conference Series: Materials Science and Engineering. 2020. 890(1). DOI:10.1088/1757-899X/890/1/012162.

# *The Performance Of The Dredger With The Movement Of The Bucket According To Strict Guidelines*

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**Abstract** – The article presents mathematical models for determining the performance of the channel cleaner PP-303, a feature of which is the rectilinear movement of the bucket along rigid guides along the bottom along the axis of the cleaned channel. The studies were carried out on the basis of experimental and calculated data. The object of research is the network of reclamation channels of the drainage system, and the working equipment of the channel cleaning machine is the subject of research. Productivity, which is the amount of production produced by the machine per unit of time, can be of three types: theoretical, technical and operational, determined taking into account the design parameters of the working equipment. When working with channel diggers, their performance directly depends on the main parameter - the depth of the channel under construction, in the case of cleaning channels with channel cleaning machines, this parameter cannot be considered as the main one. This is due to the fact that sediments and siltation accumulated on the bottom and slopes of the channels during the operation of the reclamation system are extremely unevenly distributed along the length of the channel. The greatest concentration and amount of sediment and siltation is observed mainly at the mouth of the channels, at the junctions of channels of different levels, at the junctions of the drainage with the drainage channel. The most significant parameter in this case is the thickness of the chips removed by the working body with a bucket from the bottom and slopes of the channel. In addition, the performance of the channel cleaner, as a batch machine, is affected by the design of the working equipment itself, the main element of which is a bucket capable of moving in a straight line along rigid guides with different speeds. With obvious high performance values of continuous channel cleaning machines, the PP-303 channel cleaner showed quite high values of technical and operational characteristics.

**Keywords** – *Reclamation Systems, Drainage Channels, Irrigation Systems, Performance Of Channel Cleaners, Cleaning Of Channels, Sediments, Siltation, Vegetation In Channels.*

## I. INTRODUCTION

In the Republic of Uzbekistan, targeted research works are being conducted aimed at creating resource-saving technologies for tillage [1-27], sowing [25-26], harvesting [27] and processing [28-29] of agricultural crops, field planning and reclamation work [30-39] to increase the yield of agricultural crops and new samples of technical means for their implementation, developing scientific and technical bases for improvement that ensure resource-saving of existing machines.

The quality of the reclamation system depends directly on the condition of the reclamation channels, on the quality and frequency of their cleaning and repairs. The operation of reclamation channels involves carrying out their current and major repairs, in addition, at reclamation enterprises, it is necessary to carry out thorough maintenance of channels to ensure the quality of the entire system.

The modern market of channel cleaning machines does not have such a variety, number and standard sizes of machines that were produced in the USSR from 1960 to 1980. Currently, for cleaning and repairing channels of reclamation systems, instead of using special channel cleaning machines, general construction excavators are often used, adapted for cleaning operations with widened buckets. Meliorators have to solve the difficult task of cleaning channels in the face of a shortage of special machines and the choice of general construction excavators with re-equipment of working equipment.

In Soviet times, the territory of the RSFSR various factories produced analog oiliest with different types of work with active working bodies, with passive working bodies working on suntans scheme in-ear, and cars driving through the bream clean channel. The choice of a specific channel cleaning machine depends on the type of channel, its purpose and its geometric parameters. Most channels of both drainage and irrigation systems have a trapezoidal profile. On reclamation systems, there are also channels of a parabolic profile, the shape of which is as close as possible to the shape of natural channels-drainers, i.e. rivers. However, cleaning such channels with conventional bucket channel cleaners or single-bucket general construction excavators while maintaining the original profile is a difficult task. Maintaining the original design profile that provides the required throughput during operation is the main task of reclamation plants [30, 31, 32].

Drainage channels of the reclamation system can be made in an earthen body or in an embankment with the fixing of the bottom and slopes. Cleaning of channels with a fixed bottom causes certain difficulties when using single-bucket general construction excavators, which consist in the destruction of the fixing elements. In this case, a channel cleaner with a rectangular bucket on rigid guides is most suitable for cleaning the bottom of the channel. This version of the bucket in the design of this machine moves along the bottom, along the axis of the channel, without destroying the fastening elements (fascines, boards, etc.) and cleans only the bottom of the channel. On reclamation channels of a large length, it is difficult from an economic point of view to secure the bottom and slopes of the channels, so the channels are made in an earthen body. In this case, the channel can be cleaned with a trapezoidal bucket on rigid guides, which will clean not only the bottom of the channel, but also the slopes.

## II. METHODS

The work was performed using a mathematical modeling package to determine the performance of the PP-303 channel cleaner in various operating conditions using a rectangular and trapezoidal bucket.

Channel cleaner PP-303 is designed for the annual routine maintenance of reclamation channels of the regulatory network. The channel cleaner can clean the bottom of channels with both reinforced and non-reinforced slopes with a width of 0.4 m along the bottom and a depth of up to 3.5 m. The channel cleaner equipment is mounted on a crawler tractor of traction class 3.0-DT-75B (Fig. 1). The hydraulic system of the base tractor is used to control the channel cleaner, which is carried out from the driver's cab. The channel cleaner PP-30 has a working body of the "plough" type, made in the form of a guide beam, along which the bucket moves. The guide beam has a welded structure, is made of two channels No. 14, is equipped with two end height-adjustable supports. The beam is mounted on two telescopic arms, which are pivotally mounted on transverse bars located in front and behind the base tractor [33, 34, 35].



**Figure 1.** Channel cleaner PP-303 in the working position (set of soil)

The cycle of the dredger consists of the following series of operations: lowering tough rails with a bucket at the bottom of the channel and install them on the support; the movement of the bucket on rails with the removal of the chips of a certain thickness on

the length of the rigid guides; up tough rails with the filled bucket; the reverse movement of the bucket on the rails with simultaneous unloading of the moving car to the next position at a distance equal to the displacement of the bucket on the hard rails. The theoretical performance of a channel cleaner as a batch machine can be determined by the formula [36, 37, 38]:

$$P_T = 60qn = \frac{3600q}{t_s}$$

where  $P_T$  – is the theoretical performance of the dredger, m<sup>3</sup>/h; the  $q$  – capacity of the bucket, or the amount of sediment and siltation remote from the bottom of the channel in a single cycle, m<sup>3</sup>;  $n$  – design-the calculated number of cycles performed by the dredger per minute;  $t_s$  – theoretical duration of one cycle, p.

Theoretical duration of one cycle analog oiliest machine:  $t_s=t_1+t_2+t_3+t_4$ ; where  $t_1, t_2, t_3, t_4$  – duration operations, lowering the bucket to the bottom of the movement of the bucket (digging), lifting the bucket with soil (sediment), the discharge of the bucket.

The capacity of the bucket used for cleaning the channel with a fixed bottom is determined by the formula:

$$q = bhk_Nk_p$$

where  $b$  – is the width of the bucket corresponding to the width of the channel at the bottom, m;  $h$  – is the height of a ladle, m;  $l$  – is the length of the bucket, m;  $k_N$  – filling ratio of the ladle,  $k_N=0,8-1,1$ ;  $k_p$  – coefficient of loosening developed soils, siltation or sediment  $k_p=1,0-1,2$  depending on the type and condition of the developed environment.

The capacity of the trapezoidal bucket used for cleaning the channel with an unfixed bottom is determined by the formula:

$$q = \frac{a+b}{2} hlk_Nk_p$$

where  $a$  – is the bucket width at the top, m.

The range of changes in the value of the bucket filling coefficient is explained by the fact that the bucket, depending on the selected chip thickness, may not be completely filled or vice versa with a "slide". The range of changes in the loosening coefficient is explained by the nature and condition of sediments, the presence of water at the bottom of the channel.

Obviously, from the above mentioned, the performance of the dredger is affected by the lowering speed of the rigid guide with bucket on the bottom of the channel and install them on the support; the speed of the bucket on rails with the removal of the chips of a certain thickness on the length of the rigid guides; the lifting speed of the hard rails with the filled bucket; the speed of the backward movement of the bucket on the rails with simultaneous unloading; the speed of the moving car to the next position at a distance equal to the displacement of the bucket on the hard rails.



Figure 2. Discharge of sediment from the bucket to the ground receiving device-slip.

To determine the technical performance on the route of the channel, sections with a length of 100 m were marked up and the time of their passage was measured with a stopwatch. The number of cycles in the control area was determined by the number of

piles of ejected sediment, after which the actual length of the working stroke of the bucket was estimated. The average actual bucket stroke length was 4.7-4.9 m for channels up to 1.2 m deep and 4.3-4.5 m for channels up to 3 m deep.

### III. RESULTS AND DISCUSSION

From the conducted studies, it can be seen that the performance of the PP-303 channel cleaner is influenced by such factors as the duration of all cycle operations, the condition and nature of the developed soils, sediments and silting, and the thickness of the chips.

The channel cleaner PP-303 based on the tractor DT-75 or other analog is a workable machine that meets its purpose. The technical-operational and technical-economic indicators obtained as a result of the tests are quite acceptable. The main advantage of this machine in comparison with other types of channel cleaners is the high quality of the work performed, the relatively high productivity for batch machines and the ability to clean channels with a reinforced bottom. According to its parameters, the channel cleaner is able to clean the bottom of channels up to 2.5 m deep when laying slopes of 1:1.5; that is, it can be used to clean more than 70% of all drainage channels in the zone of excessive moisture [39].

The channel cleaner is characterized by a simple design combined with sufficient strength, rigidity and reliability of the technological process. The advantages of the technological process include:

- ability to work in a wide range of ground conditions: on peat and mineral soils, including stony inclusions and buried wood;
- ability to work when the channel is overgrown with vegetation, as well as on channels, as well as on channels both with and without water;
- unloading of the soil is carried out on the bream of the channel (on the lane of the base car) without getting it on the slopes of the channel;
- the hitch of the channel cleaner does not reduce the mobility of the base machine;
- high-quality planning of the channel bottom is carried out regardless of the state of the berm and the position of the base machine on it;
- the work can also be carried out in adhering soils, since the bucket is discharged forcibly;
- the presence of replaceable buckets allows you to clean channels with different widths along the bottom with the greatest efficiency.

### IV. CONCLUSIONS

An increase in the performance of the PP-303 channel cleaner can be achieved by making the following changes and additions to the machine design:

- increase the velocity of the bucket when set and idle and the lifting speed of the working body due to the installation of pumps with a larger supply, making it is possible to increase the performance of the dredger in half;
- restriction of possible movements of the working body in the horizontal plane when unloading the soil;
- improving the conditions for unloading the bucket by changing the design of the bucket attachment to the traverse;
- provision for the cleaning of loose channels, the release of replaceable buckets with a trapezoidal profile.

### REFERENCES

- [1] Mamatov, F., Ergashev, I., Mirzaev, B., Pardaev, X., Chorieva, D. Research of the Penetration Process of the Frontal Plow // 2nd Bukittinggi International Conference on Education (BICED) 2020. Journal of Physics: Conference Series 1779 (2021) 012002. IOP Publishing. doi:10.1088/1742-6596/1779/1/012002.
- [2] Mamatov, F., Ergashev, I., Ochilov, S., Pardaev, X. Traction Resistance of Soil Submersibility Type "Paraplau" // Jour of Adv Research in Dynamical & Control Systems, Vol.12, 07-Special Issue, 2020. DOI: 10.5373/JARDCS/V12SP7/20202336 ISSN1943-023X.

- [3] Aldoshin, N., Mamatov, F., Ismailov, I., Ergashov, G. Development of combined tillage tool for melon cultivation // 19th international scientific conference engineering for rural development Proceedings, Jelgava, 20.-22.05.2020. Volume 19. ISSN 1691-5976. DOI:10.22616/ERDev.2020.19.TF175.
- [4] Umurzakov, U., Mirzaev, B., Mamatov, F., Ravshanov, H., Kurbonov, S. A rationale of broach-plow's parameters of the ridge-stepped ploughing of slopes // XII International Scientific Conference on Agricultural Machinery Industry IOP Conf. Series: Earth and Environmental Science 403(2019) 012163 IOP Publishing doi:10.1088/1755-1315/403/1/012163.
- [5] Mirzaev, B., Mamatov, F., Chuyanov, D., Ravshanov, X., Shodmonov, G., Tavashov, R and Fayzullayev, X. Combined machine for preparing soil for cropping of melons and gourds // XII International Scientific Conference on Agricultural Machinery Industry. doi.org/10.1088/1755-1315/403/1/012158.
- [6] Mirzaev, B., Mamatov, F., Ergashev, I., Ravshanov, H., Mirzaxodjaev, Sh., Kurbanov, Sh., Kodirov, U and Ergashev, G. Effect of fragmentation and pacing at spot ploughing on dry soils // E3S Web of Conferences 97. doi.org/10.1051/e3sconf/201913501065.
- [7] Mamatov, F., Mirzaev, B., Batirov, Z., Toshtemirov, S., Tursunov, O., Bobojonov, L. Justification of machine parameters for ridge forming with simultaneous application of fertilizers // CONMECHYDRO – 2020 IOP Conf. Series: Materials Science and Engineering 883(2020) 012165 IOP Publishing. doi:10.1088/1757-899X/883/1/012165.
- [8] Mirzaev, B., Mamatov, F., Avazov, I., Mardonov, S. Technologies and technical means for anti-erosion differentiated soil treatment system // E3S Web of Conferences. doi.org/10.1051/e3sconf/20199705036.
- [9] Mirzaev, B., Mamatov, F., Aldoshin, N and Amonov, M. Anti-erosion two-stage tillage by ripper// Proceeding of 7th International Conference on Trends in Agricultural Engineering 17th-20th. September 2019 Prague, Czech Republic. – pp.391-396.
- [10] Mirzaev, B., Mamatov, F., Ergashev, I., Isломov, Yo., Toshtemirov, B., Tursunov O. Restoring degraded rangelands in Uzbekistan // Procedia Environmental Science, Engineering and Management 2019. № 6. – pp 395-404.
- [11] Uzakov, Z.U., Mamatov, F.M., Begulov, O. Implementation of object-oriented Programming technology in the one-dimensional oil displacement problem // International Conference on information Science and Communications Technologies: ICISCT 2019/0012008. Tashkent, Uzbekistan. INSPEC Accession Number: 19412491. DOI: 10.1109/ICISCT47635.2019.9012008.
- [12] Mamatov, F., Mirzaev, B., Tursunov, O. A Justification of Broach-Plow's Parameters of the Ridge-Stepped Ploughing // E3S Web of Conferences 97, 05035 (2019). doi.org/10.1051/e3sconf/20199705035.
- [13] Kodirov, U., Aldoshin, N., Ubaydullayev, Sh., Sharipov, E., Muqimov, Z and Tulaganov, B. The soil preparation machine for seeding potatoes on comb // CONMECHYDRO – 2020 IOP Conf. Series: Materials Science and Engineering 883(2020) 012143 IOP Publishing doi:10.1088/1757-899X/883/1/012143.
- [14] Ravshanov, Kh., Fayzullaev, Kh., Ismoilov, I., Irgashev, D., Mamatov, S. The machine for the preparation of the soil in sowing of plow crops under film // CONMECHYDRO – 2020 IOP Conf. Series: Materials Science and Engineering 883(2020) 012138 IOP Publishing doi:10.1088/1757-899X/883/1/012138.
- [15] Ravshanov, H, Babajanov, L, Kuziev, Sh, Rashidov, N, Kurbanov, Sh. Plough hitch parameters for smooth tails// CONMECHYDRO – 2020 IOP Conf. Series: Materials Science and Engineering 883(2020) 012139 IOP Publishing doi:10.1088/1757-899X/883/1/012139.
- [16] Chuyanov, D., Shodmonov, G., Avazov, I., Rashidov, N, Ochilov, S. Soil preparation machine parameters for the cultivation of cucurbitaceous crops // CONMECHYDRO – 2020 IOP Conf. Series: Materials Science and Engineering 883(2020) 012139 IOP Publishing doi:10.1088/1757-899X/883/1/012122.
- [17] Mamatov F.M., Mirzaev B.S., Avazov I.Zh.. Agrotehnicheskie osnovy sozdaniya protivojerozionnyh vlagosberegajushhih tehnikeskikh sredstv obrabotki pochvy v uslovijah Uzbekistana // – Prirodoobustrojstvo, 2014. (In Russian).

- [18] Mamatov F.M., Mirzaev B.S. Erosion preventive technology of crested ladder-shaped tillage and plow design // European Applied Sciences. Stuttgart (Germany), 2014. – pp. 71-73.
- [19] Lobachevskij Ja.P., Mamatov F., Jergashev I.T. Frontal'nyj plug dlja hlopkovodstva // – Hlopok, № 6. 1991. – 35-37 str. (In Russian).
- [20] Ahmedov, B.J., Mirzaev, B.S., Mamatov, F.M., Khodzhaev, D.A., Julliev, M.K. Integrating of gis and gps for ionospheric perturbations in d- And f-layers using vlf receiver // InterCarto, InterGIS 26, - c. 547-560. DOI: 10.35595/2414-9179-2020-1-26-547-560.
- [21] Mamatov, F., Mirzaev, B., Tursunov, O., Ochilov, S and Chorjeva, D. Relief, physico-mechanical and technological properties of soil in the cotton growing area // ICECAE 2020. IOP Conf. Series: Earth and Environmental Science 614(2020) 012169. IOP Publishing. doi:10.1088/1755-1315/614/1/012169.
- [22] Umurzakov, U., Mamatov, F., Aldoshin, N., and Mirzaev, B. Exploration of tillage technologies in the Republic of Uzbekistan // ICECAE 2020 IOP Conf. Series: Earth and Environmental Science 614(2020) 012168. IOP Publishing. doi:10.1088/1755-1315/614/1/012168.
- [23] Mamatov, F., Aldoshin, N., Mirzaev, B., Ravshanov, H., Kurbanov, Sh and Rashidov, N. Development of a frontal plow for smooth, furless plowing with cutoffs // IPICSE 2020. IOP Conf. Series: Materials Science and Engineering 1030 (2021) 012135 IOP Publishing. doi:10.1088/1757-899X/1030/1/012135.
- [24] Mamatov, F., Mirzaev, B., Mirzahodzhaev, Sh., Uzakov, Z and Choriyeva, D. Development of a front plow with active and passive working bodies // IPICSE 2020. IOP Conf. Series: Materials Science and Engineering 1030 (2021) 012164. IOP Publishing. doi:10.1088/1757-899X/1030/1/012164.
- [25] Mamatov, F., Mirzaev, B., Shoumarova, M., Berdimuratov, P., Khodzhaev, D. Comb former parameters for a cotton seeder // International Journal of Engineering and Advanced Technology (IJEAT) Volume-9 Issue1 October/ DOI: 10.35940/ijeat.A2932.109119.
- [26] Mamatov, F., Mirzaev, B., Berdimuratov, P., Turkmenov, Kh., Muratov, L., Eshchanova, G. The stability stroke of cotton seeder moulder // CONMECHYDRO – 2020. IOP Conf. Series: Materials Science and Engineering 883 (2020) 012145 IOP Publishing. doi:10.1088/1757-899X/883/1/012145.
- [27] Aldoshin, N., Didmanidze, O., Mirzayev, B., Mamatov, F. Harvesting of mixed crops by axial rotary combines // Proceeding of 7<sup>th</sup> International Conference on Trends in Agricultural Engineering 2019. 17<sup>th</sup>-20<sup>th</sup> September 2019 Prague, Czech Republic. – pp.20-26.
- [28] Mamato, F.M., Eshdavlatov, E., Suyuno, A. Continuous Feed Mixer Performance // Journal of Advanced Research in Dynamical and Control Systems (JARDCS). – Volume-12, 07-Special Issue, 2020. DOI: 10.5373/JARDCS/V12SP7/20202343. ISSN 1943-023X.
- [29] Mamatov, F.M., Eshdavlatov, E., Suyunov, A. The Shape of the Mixing Chamber of the Continuous Mixer // Jour of Adv Research in Dynamical & Control Systems, Vol. 12, 07-Special Issue, 2020. DOI: 10.5373/JARDCS/V12SP7/20202318 ISSN 1943-023X.
- [30] Abdulmazhidov H.A. Obosnovanie osnovnyh parametrov i rezhimov raboty kovshovyh kanaloochistitel'nyh mashin dlja zony osushenija/ dissertacija na soiskanie uchenoj stepeni kandidata tehniceskikh nauk / Moskva, 2000. [In Russian].
- [31] Kizjaev B.M., Martynova N.B. Realizacija nauchnyh proektov v sfere razvitija meliorativnogo kompleksa Rossii // Prirodoobustrojstvo. 2015. № 5. S. 13-17. [In Russian].
- [32] Solov'ev D.A., Anisimov S.A., Gorjunov D.G. Uovershenstvovannaja tehnologija ochistki orositel'nyh kanalov ot drevesno-kustarnikovej rastitel'nosti i nanosov. V sbornike: Osnovnye problemy sel'skohozjajstvennyh nauk. Sbornik nauchnyh trudov po itogam mezhdunarodnoj nauchno-prakticheskoj konferencii. 2016. S. 11-16. [In Russian].



- [33] Orlov B.N., Karapetjan M.A., Abdulmazhidov H.A. Issledovanie iznosa rabochih jelementov mashin itehnologicheskogo oborudovaniya // Traktory i sel'hoz mashiny: Ezhemesjachnyj nauchno-prakticheskij zhurnal.M., 2014. Vyp. № 2. S. 36–38. [In Russian].
- [34] Abdulmazhidov H.A., Mochunova N.A. Analiticheskaja model' sistemy upravlenija skorost'ju dvizhenija kovsha kanaloochistitel'noj mashiny // Stroitel'nye i dorozhnye mashiny: Ezhemesjachnyj nauchno-tehnicheskij i proizvodstvennyj zhurnal. M., 2014. Vyp. № 9. S. 13. [In Russian].
- [35] Abdulmazhidov H.A. Ochistka osushitel'nyh kanalov ot nanosov/ V sbornike: Nazemnye transportno-tehnologicheskie komplekсы i sredstva. Materialy Mezhdunarodnoj nauchno-tehnicheskoy konferencii. 2015. S. 18-24. [In Russian].
- [36] Abdulmazhidov H.A. Konstruktivnye osobennosti i raschet proizvoditel'nosti kanaloochistitelja s kovshom na zhestkoj napravljajushhej/Vestnik Federal'nogo gosudarstvennogo obrazovatel'nogo uchrezhdenija vysshego professional'nogo obrazovaniya "Moskovskij gosudarstvennyj agroinzhenernyj universitet imeni V.P. Gorjachkina". 2017. № 2 (78). S. 21-25. [In Russian].
- [37] Abdrazakov F.K., Solov'jov D.A., Gorjunov D.G., Anisimov S.A. Issledovaniya raboty mashin dlja ochistki meliorativnyh kanalov i vodojomov protivopozharnogo naznachenija ot drevesno-kustarnikovej rastitel'nosti// Stroitel'nye i dorozhnye mashiny. 2014. № 7. S. 14-20. [In Russian].
- [38] Abdrazakov F.K., Solov'ev D.A., Gorjunov D.G., Anisimov S.A. Polevye issledovaniya mashin dlja ochistki meliorativnyh kanalov i vodoemov protivopozharnogo naznachenija ot drevesno-kustarnikovej rastitel'nosti// Agrarnyj nauchnyj zhurnal. 2014. № 12. S. 51-55. [In Russian].
- [39] Abdrazakov F.K., Solov'ev D.A., Gorjunov D.G., Anisimov S.A. Jekonomiko-jenergeticheskaja ocenka jeffektivnosti tehnologii i tehnicheskikh sredstv dlja ochitski meliorativnyh kanalov i vodoemov protivopozharnogo naznachenija// Agrarnyj nauchnyj zhurnal. 2014. № 9. S. 31-35. [In Russian].

# *Some Aspects Of Proportional Problems Solving In Primary School*

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**Abstract – The article discusses important aspects of the studied problems of mathematics in primary school. He explores the importance of teaching proportional problem solving and student achievement. The effectiveness of creative approaches depends on the specifics of the problem.**

**Keywords – Task, Analysis, Proportional Value, Method Of Ratios, Inverse And Correct To Units.**

Even in elementary school, it is necessary to do a lot of work on observation and comparison in children, the similarity and difference of compared events, analysis, synthesis, generalization, abstraction, identification.

Text questions are very important to familiarize children with existing relationships, such as between ratings and values, time, speed and distance, and so on. The importance of teaching children to solve word problems depends on the method of working with them.

The type of task that children in our lifestyle face more often than others is the task of finding the fourth proportional quantity. This type of task includes three dependent (proportional) quantities, for example: 1) price, cost and quantity; 2) speed, distance traveled and travel time; 3) work, time and quantity of prepared parts. In this case, two values are given for one quantity (for example, quantity: one notebook was purchased for the first time, 14 notebooks were purchased for the second time); one value is given for the second value, and the second must be found (example: the cost of the first purchase is 12 cents, how much was paid for the second?); the values of the third quantity are not given, but it is said that they are the same (in our example, the cost of the notebooks is not displayed, but it is the same). Thus, the task includes 3 quantities and 3 values of these quantities.

To solve the problem of finding the fourth proportional quantity, the following methods are used: 1) method of converting units of measurement; 2) unit inversion method; 3) coefficient method. Let's take a look at each of these methods.

The method of converting to a unit is that first the unit cost (price) of one of the proportional quantities (goods, work, etc.) is determined, and then the value of the quantity specified in the condition is determined. In this case, the two setpoint values are brought to one. For example, consider the following problem: "On the same workday, a worker received \$ 420 in 6 days from his payroll. How many dollars will this worker get in 25 days for the same salary?"

We write the task in tabular form:

## Some Aspects Of Proportional Problems Solving In Primary School

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In this case, both time values are known, one wage value is unknown, and the daily wage is the same. Solving the unit method, we first find the price or size of the first unit, that is, we find the worker's income in one day, and then we calculate how many dollars the worker will receive in 25 days.

The guys solve this problem by dividing and determine the daily wage of the worker:  $420:6=70$ (dollars). Then, multiplying it, it finds the worker's 25-day wage:  $70*25=1750$  (dollars). Answer: the worker gets \$ 175 in 25 days.

It is advisable to use thematic demos to explain the solution to the problem in this way. For example, "\$ 18 was paid for 6 pizzas. How much do you need to pay for 10 of these pizzas?" Solving the problem, the teacher invites the student, whom he calls to the blackboard, to put on the bar as many pizzas (6) as they took for the first time, and write down next to them how much they cost. Then, having determined that the question of the problem cannot be answered immediately (the price of the pizza is unknown), it is necessary to put 1 pizza on the second bar and put a question mark behind it. On the next bar, the student puts 10 pizzas and also puts a question mark behind them. Having analyzed the state and solution of the first such problem, it is recommended to write it down using a thematic demonstration:

6 p. Is worth \$ 18

Is the price the same

10 p.? dollars

Decision:

1) How much does 1 pizza cost?  $18:6=3$  (dollars).

2) How much does 10 pizza cost?  $3*10=30$  (dollars)

Answer: 10 pizzas cost \$ 30.

Note. It is useful to introduce students to various forms of problem writing.

Students repeat the solution to the problem, explaining each action - with the first action we find out how much 1 pizza costs, we divide \$ 18 by 6, because 1 pizza is 6 times cheaper than 6 pizzas; with the second action, we find how much 10 pizzas cost: 1 pizza costs \$ 3 and 10 pizzas cost 10 times as much, so you need to multiply \$ 3 by 10. This is the answer to the main question of the problem.

The method, called the inverse method of the unit, is such that the corresponding value of a given unit of quantity is found for a single value in the case condition. This is revealed when the condition of the problem is written in tabular form. For example, we compare the method of directing to oneness with the method of converting back to oneness.

A task: "The master prepares 60 parts in 6 hours. If a master works in the same rhythm, how long will it take him to make 80 pieces?"

Let's write the task in tabular form:

Productivity in 1 hour of work	Working time	Prepared parts
Equally	6 hours	60
	? hours	80

It can be seen from the table that one value is given for time and two values are given for the number of prepared parts. It is necessary to solve the unit by the reverse method and bring the first quantity (time) to unit, that is, to know how many parts can be prepared in 1 hour. Direct method to unit:

1) How long does it take for a master to make 1 part?  $6 \text{ hours} = 360$  (minutes)  $360:60=6$  (minutes).

2) How long does it take to manufacture 80 parts?  $6*80=480$  (minutes)  $480 \text{ minutes} = 8$  hours. Direct method to one:

- 1) How long does it take for a master to make 1 part?  $60:6=10$  (part)
- 2) How many hours will the master prepare 80 parts?  $80:10=8$  (hours)

students do not always see the difference between the two problem solving methods under consideration. They regard both this method and that method as a method of unification, because in both cases they know the value of one quantity, corresponding to the unit of another quantity. Children do not need to try to show the difference between these methods of solving problems, it is more important for children to understand the content of mathematical relationships (proportionality) between the quantities involved in the problem, to pay attention to how one quantity depends on another.

When children become familiar with the method of solving problems, they begin to solve problems using the method of inversion of one and independently compose several problems with a short record in the form of a table or expression. Consideration of a new method for students can begin by creating a problem, the data of which is recorded in a table.

Capacity of 1 can	Number of cans	Number of liters
Bir xil	9	18
	?	30

Children with experience in creating such problems can easily solve this problem orally: "18 liters of the same milk were poured into 9 identical cans. How many cans do you need to pour 30 liters of the same milk"? When analyzing the conditions of the problem, it is necessary to draw the attention of children to the fact that all banks are the same, which means that their capacity is the same. On this basis, children should consider the following: To know how many cans you need for 30 liters of the same milk, you need to know how much milk goes into one can. This can be found because in this case it is stated that 18 liters of the same milk can be poured into 9 cans. From this we draw up a solution plan:

- 1) How much milk fits in 1 can?

2) How many cans do you need for 30 liters of the same milk? Decision: You will need 15 cans to pour 30 liters of the same milk. This problem can be solved by turning the same problem into inverse problems (there are 3 of them) and writing a solution to at least one of them. For example: "30 liters of the same milk were poured into 15 cans. How many cans of this kind are needed for 18 liters of the same milk"?

Decision: 1)  $30:15=2$  (l.)

2)  $18:2=9$  (cans). The solution of such tasks is usually carried out on questions. However, it is recommended to write the solution of several problems in the form of an expression and calculate the values of these expressions. The ratio method provides more possibilities for solving the problem of finding the fourth proportional quantity using integers than the method of combining (direct and inverse), For example, let's see how to solve a problem using the relationship method.

A task. A team of blacksmiths made 84 axes from 75 kg of steel. How much steel does it take to make 336 of these axes? Students can try to solve this problem using one of the methods they are familiar with. This should not be an obstacle to action; rather, it can be assumed that children are convinced that their knowledge is insufficient to solve the problem as a whole. Once they are convinced that it is impossible to divide 75 kg by 84, even expressing kilograms in grams, children will be more attentive to the relationship between the sizes involved. Analyzing the brief entry for the problem (84 axes -75 kg, 336 axes {-?}), they are convinced that the more axes they prepare, the more steel they will need. To make 168 (84-2) axes, you need 75-2 (kg) steel, not 75 kg. To make (84-3) axes, you will need (75-3) kg of steel, and so on. To find out how much steel is needed for 336 axes, we need to find how many times 84 is included in 336, that is, if 336 is many times greater than 84, the required amount of steel is more than 75 kg.

The result makes it much easier to find a method for solving the problem.

- 1) How many times the number of crafted axes (336) exceeds the number of crafted axes?

$$336 : 84$$

2) How much steel will it take to make 336 axes?  $75-(336: 84)$

Students perform calculations and find the numeric value of this expression:

$$75-(336: 84)=300.$$

Answer: To make 336 axes, you need 300 kg of steel.

In developing students' thinking and developing their problem-solving skills, it is important to understand the possibilities of different approaches to solving problems and choose the most rational of these approaches. The desire to solve problems in different ways also characterizes the practical orientation of the course, since the practical problems that children may encounter in everyday life have different solutions, using the problems given in the mathematics textbook to prepare them.

#### **REFERENCES**

- [1] Dzhumaev M.E., Tadzhiyeva Z.G. Methods of teaching mathematics in primary school. (Textbook for universities) Tashkent. Science and technology, 2005.
- [2] Dzhumaev M.E., Workshop on the methodology of teaching mathematics in elementary school. (For universities) Tashkent. "Teacher", 2004
- [3] Abdullaeva B.S., Sadykova A.V., Mukhiddinova M.N., Toshpulatova M.I. Mathematics. TSPU. (Textbook for bachelors of primary and sports education). Tashkent-2014
- [4] Topical issues of teaching the mother tongue and mathematics in primary education. Materials of the republican scientific and practical conference. Andijan 2020.

# *Structural Characterization of Isolated Siloxaalkane Molecular Gyroscopes via DFTB-based Quantum Mechanical Model*

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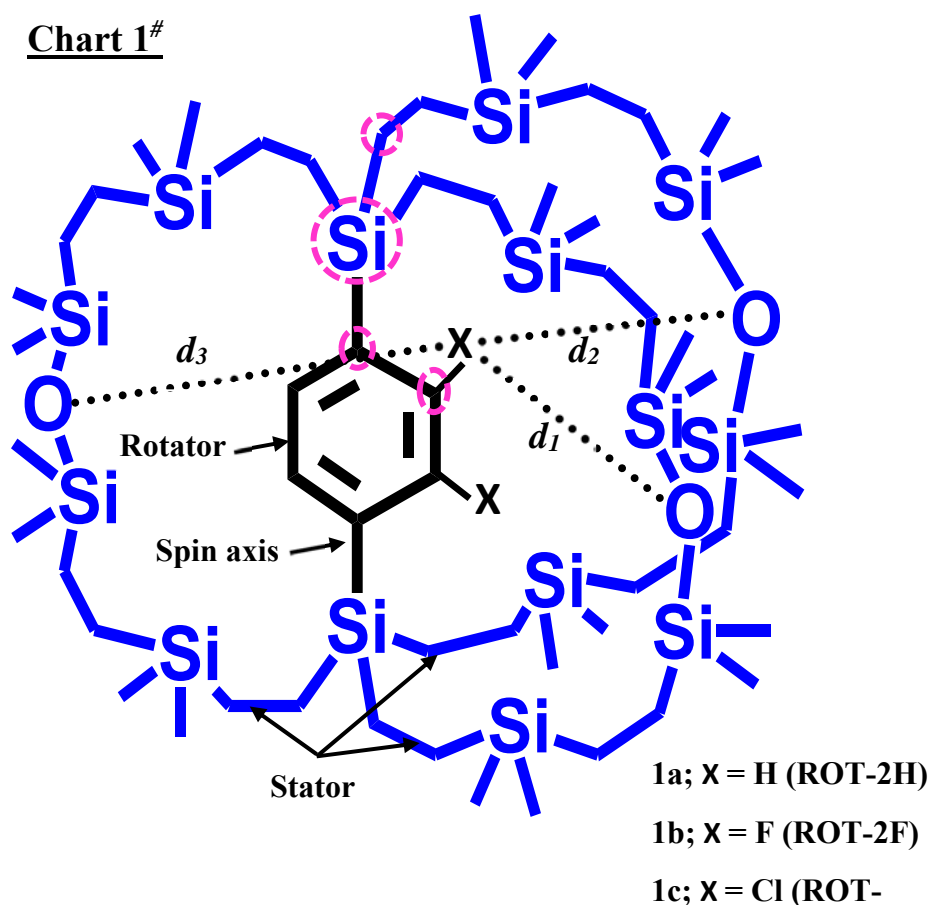
**Abstract** – Despite many more improvements in the mathematical formalisms of the DFT model, it is still unable to compute ground state electronic structure of the crystalline macrocyclic molecular compounds (CMMCs) with closed topology at low computational cost. In the recent years, a less computationally complex and relatively fast plus efficient self-consistent-charge density functional based tight binding (SCC-DFTB) scheme has been heavily extended to CMMCs under both periodic and isolated molecular conditions mainly for computing as reliable molecular structures as standard time-dependent DFT. In this study, the SCC-DFTB method is employed to characterize the molecular structures of three different molecular gyroscopes (MGs) encapsulating dihalogen substituted (e.g. ROT-2F and ROT-2Cl) and non-substituted (e.g. ROT-2H) phenylene segments under isolated condition. We realized the SCC-DFTB method a cheap yet decent quantum mechanical model in reproducing one or more X-ray observed equilibrium structures of all these three MGs as well as in deriving as consistently good structural information as DFT method. While elucidating experimentally observed structural deformation mainly in the ROT-2F and ROT-2Cl, the SCC-DFTB computed free-volume units present around their central phenylene segments are also found to be in quantitatively good agreement with those derived by the X-ray and DFT. The results presented here enlighten us about the SCC-DFTB method for adopting it directly in crystalline condition to predict crystal structures and rotational dynamics of these MGs. This theoretical insight will promote SCC-DFTB studies on gyroscopic nanostructures and giant molecular assemblies that attract increasing attention for molecular machinery world.

**Keywords** – SCC-DFTB, Molecular Gyroscopes, Halogen Substituted Phenylene Rotators, Restricted and Unrestricted Rotation.

## I. INTRODUCTION

A density-functional theory (hereafter, DFT) in principle is an exact computational quantum mechanical modelling method for investigating ground state electronic structures of the multi-electron and/or many-body systems (atoms, molecules, and condensed phases) [1-4]. However, the approximate variants of it that are currently being implemented are far from fail-safe. One of its very fundamental problem that has become widely apparent is the lack of proper mathematical formulations to account the substantial effect of long-range attractions or van der Waals (hereafter, vdW) type intra-/inter- molecular interactions existing predominantly in both isolated caged molecular compounds and their giant molecular assemblies [5-10]. Beside this, its inability to derive ground state electronic structures of such type macrocyclic compounds at a low computational cost is another complication. It means, in terms of computational time and complexity as well, the DFT may not be an appropriate and efficient theoretical model to perform quantum mechanical energy minimization calculations while applying either to the isolated or to the crystalline macrocyclic compounds having bridged delocalized  $\pi$ -electron systems (**chart 1**) where vdW force competes significantly with other interactions. So, on one hand the remarkable effect of intra- /inter- molecular vdW interactions has

to be addressed quantum mechanically by some computational means; but on the other hand, the computational processes should be cheap yet reasonable while attempting real ground state electronic energy and the global minimum electronic structure theoretically. The extended density functional tight binding (hereafter, DFTB) DFTB+ scheme [11-15] is one of such means whose fundamental formulation is actually based on the DFT but is designed differently mainly for executing Slater-Kirkwood model [16] and Slater-Koster files [17] with a focus on giant molecular assemblies bound each other by dispersion type forces. Unlike DFT model, this theoretical scheme allows us to perform calculations for large and complex molecular systems over long timescales at an extremely low computational cost, but derives the results typical of standard time-dependent DFT. In terms of how DFT Kohn-Sham energy is expanded with respect to charge density fluctuations, DFTB has two different approaches: (a) Non-self-consistent-charge DFTB (NCC-DFTB); the zeroth-order expansion [12-14], and (b) Self-consistent-charge DFTB (hereafter, SCC-DFTB); the second-order expansion [18,19]. Technically, both of them can implement Slater-Kirkwood model and Slater-Koster files (SK-files) computationally and execute the effect of the vdW interactions in stabilizing complex molecular structures significantly [20-22]. But, in terms of computing Mulliken charge distribution in a molecule, the SCC-DFTB is regarded as a more promising theoretical approach as it takes into account charge interactions between the atoms through iterative self-consistent manner [18, 19]. This is why, it is more popularly known among the researchers as a practically suitable quantum mechanical DFTB approach more especially for computing low energy electronic structures of the heteroatomic complex molecular systems like the one shown in **chart 1** [21].



<sup>#</sup> It is a model of the siloxaalkane molecular gyroscope reproduced from reference [23]. Two methyl (CH<sub>3</sub>) groups attached to each Si atom of each siloxaalkane arm are omitted for clarity. The atoms encircled by pink colored circle form the dihedral angle ( $\phi$ ) of the central phenylene rotator. The  $d_{OX} = \{d_1, d_2, d_3\}$  estimates the free-volume unit.

In the field of nanotechnology and molecular machinery world, the crystalline macrocyclic compounds with encased phenylene rings of the type displayed in **chart 1** are regarded as the most promising nanomaterials carrying tremendous potentialities in respect to creating varieties of smart, intelligent, and responsive materials due to their amphidynamic behavior: the central phenylene unit (*i.e.* rotator) of each molecule in the crystal undergoes internal rotation with respect to stationary spokes (*i.e.* stator) at temperatures ranging from high to moderate [23-25]. Beside this, such type of uniquely designed and strategically synthesized crystalline compounds with a closed topology and a sufficient free space (free-volume unit) around the rotators are expected to functionalize as nanoscale devices due to their structural flexibility, functionality, and reliability though the related fundamental mechanisms are not fully understood yet. One of the most encouraging examples is to reorient centrally encased dipolar rotators by conserving their internal volume through external stimuli such as electric field, magnetic field, light etc. so that one may realize controllable molecular motions practically [26-28]. Structure wise, each and every molecule in the crystal lattice resembles well to the macroscopic gyroscope used in internal navigation system, and hence, very often called it as a molecular gyroscope [23, 29]. Setaka *et al.* reported experimentally synthesized three different crystalline molecular gyroscopes (**chart 1**) with a nonpolar phenylene rotator (hereafter, ROT-2H, **1a**), and the dipolar halogen substituted rotators: difluorophenylene (hereafter, ROT-2F, **1b**) and dichlorophenylene (hereafter, ROT-2Cl, **1c**) encased into the three siloxaalkane arms elsewhere [23, 24]. Through X-ray crystallography, they confirmed that the rotators of the molecular gyroscopes **1a**, **1b**, and **1c** undergo smooth, restricted, and prevented type rotation between three (position **A**, **B**, and **C**), two (position **A** and **B**), and one stable positions respectively, and the shape of the surrounding siloxaalkane spokes of the **1b**, and **1c** goes through significant deformation while inserting dichloro and difluoro units on the central phenylene unit of their precursor module **1a**. The detailed X-ray observations including rotary motions and the experimental synthetic procedures are reported elsewhere [23, 24]. In the same context, present author has already reported theoretical (DFT and DFTB (NCC & SCC)) insights into the molecular structures under isolated and crystalline conditions and real time rotational dynamics of the molecular gyroscope **1a**, and the DFT analysis on the molecular structures of **1b** and **1c** under isolated condition elsewhere [20, 21, 30]. However, the SCC-DFTB studies carried out on **1b** and **1c** have not been reported so far as it computes as accurate low energy ground state electronic structures as DFT at extremely low computational cost and complexity. Therefore, in the present contribution, the X-ray observed molecular structures of both **1b** and **1c** are interpreted under isolated molecular condition by employing SCC-DFTB method, and the experimentally observed structural consequences including the effect of their deformed siloxaalkane spokes to confine their dipolar rotators at the specific positions are examined and quantified theoretically. For the X-ray observed structural validations and the in-depth structural comparisons, the SCC-DFTB produced ground state electronic structure of their precursor molecular analogue **1a** (most stable position is **B**) is used here as a reference. The structure of this paper is organized as: the theoretical approaches and computational methods are outlined in section 2, the results and discussions are presented in section 3, and the conclusions are given in section 4.

## II. COMPUTATIONAL DETAILS

As the trial structures for geometry optimization of the isolated molecular gyroscopes **1a**, **1b**, and **1c**, the initial coordinates of the atoms were taken directly from the X-ray crystallographic data. For **1a**, the isolated molecule was extracted from the Cartesian coordinates of the unit cell geometry at 223 K (monoclinic crystal) and for **1b** and **1c**, the same was extracted from the unit cell geometry at 273 K (orthorhombic crystal). Since



the dihalogen substituted molecular gyroscopes **1b** and **1c** are molecular analogues of the **1a**, the latter one is taken here as a reference molecule. This is why, only the most stable equilibrium structure (position **B**: dihedral angle =  $0.55\pi$ ) of the **1a** out of its three stable forms (X-ray observed) was optimized under non-crystalline condition by using SCC-DFTB method, whereas for the molecular gyroscope **1b**, both of its degenerate equilibrium structures that are dissimilar to each other by  $1\pi$  phenylene flipping were optimized: they are represented hereafter by structure **A** (dihedral angle =  $0.56\pi$ ) and structure **B** (dihedral angle =  $1.57\pi$ ). Unlike **1a** and **1b**, a single fixed structure of the molecular gyroscope **1c** due to having an immobile central unit (dichlorophenylene ring) was also optimized by the same theoretical method. All the experimentally and theoretically derived electronic structures were visualized by *Jmol*: an open-source Java viewer for chemical structures in 3D [31].

While writing the DFTB+ optimizer code, we set series of the DFTB keywords on the basis of users' manual available elsewhere [32]. Accordingly, the Hamiltonian and non-crystalline computations were implemented *via* the keywords "Hamiltonian = DFTB" and "Periodic = No". The specific trial structure was specified explicitly in XYZ format through the general format (keyword: "GenFormat") method. The "conjugate gradient algorithm" was selected as a driver to change the geometry of the input structure, and the force component for controlling the optimization process was set to an *ab initio* level *i.e.* "ForceComponent =  $1e-6$ " as its maximal absolute value. No any geometry constraints were specified *i.e.* all the atoms were allowed to move freely while the optimization calculations were on the fly. Moreover, the DFTB keyword "AppendGeometries = Yes" was set to receive the geometry file (in the XYZ-format) containing all the geometries obtained during optimizations. Under "ConvergentForcesOnly" option, the terminology "SCC = YES" was set in order to drive the DFTB+ script to run SCC type calculations so that the geometry optimization can be controlled whether it stops prematurely whenever the SCC cycle does not converge at any geometric step. Similarly, the values for the keywords "SCCTolerance" and "MAXSCCIterations" were fixed to  $1e-5$  and 200 respectively. Additionally, a Slater-Kirkwood type dispersion model [16, 32] was implemented for incorporating the vdW type interactions exist in between the rotators and stators of all the three isolated molecular gyroscopes. For it, the dispersion energy parameter sets available elsewhere [32, 33, 34] and the Slater-Koster files [17, 32] of mio-1-1 set were explicitly used for every pairwise permutation atomic types.

### III. RESULTS AND DISCUSSIONS

In general, the SCC type computational procedure involves a self-consistent calculation of the Mulliken charges and a derivation of corresponding nuclear forces [32]. This feature actually makes the SCC-DFTB method highly applicable more especially to heteroatomic complex molecular systems where charge balance between the atoms is crucial. In this study, we optimized the X-ray nuclear coordinates of each molecular gyroscope **1a**, **1b**, and **1c** under non-crystalline condition (isolated molecule) using SCC-DFTB method and interpreted theoretically produced equilibrium structures in reference to their X-ray observed molecular geometries. At the beginning, the most stable X-ray produced equilibrium structure (Figure 1(a)) of the molecular gyroscope **1a** was optimized fully without periodic boundary condition (hereafter, PBC), and then two different degenerate X-ray structures **A** and **B** of the **1b** (Figure 2(a) and Figure 3(a)) followed by an X-ray produced single stable form of the **1c** (Figure 4(a)).

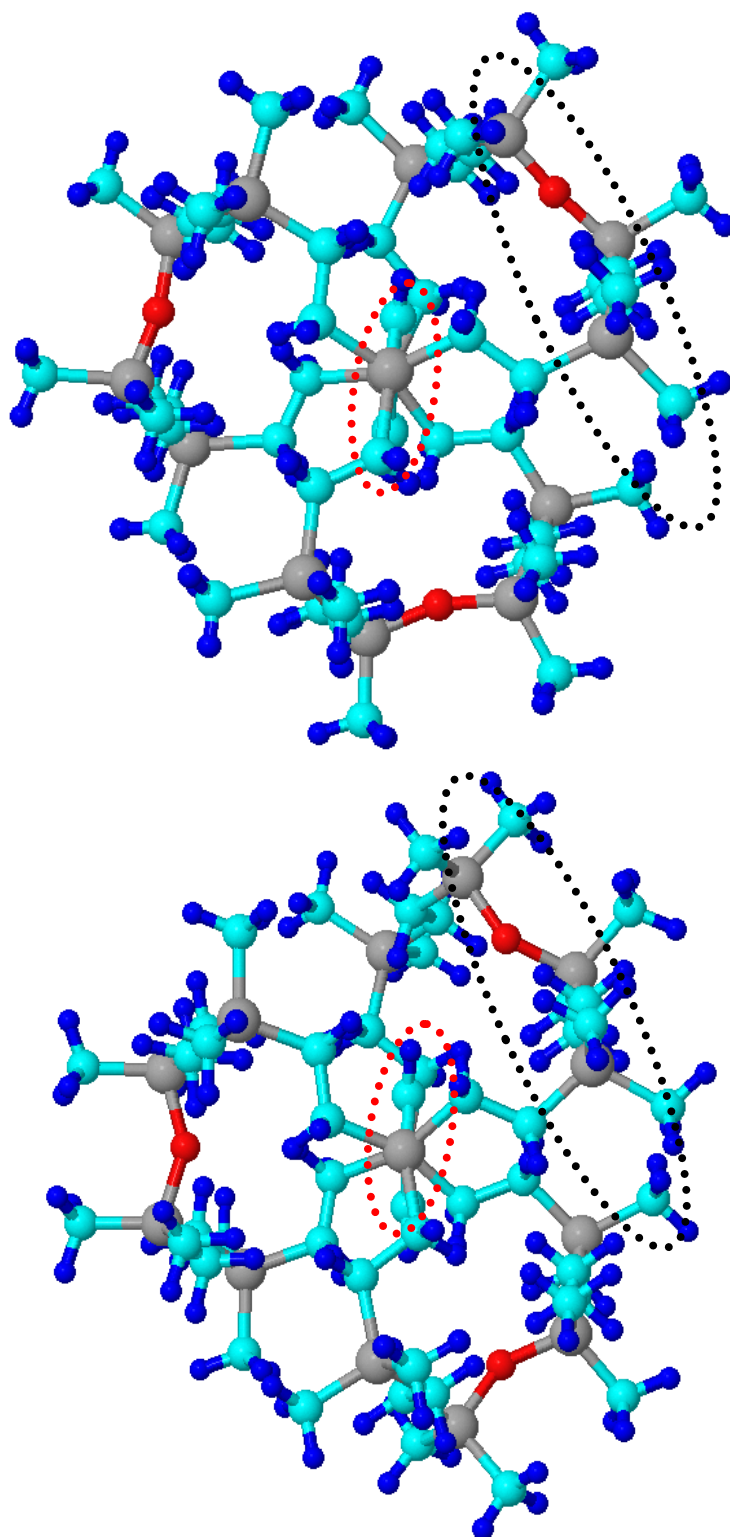
**Table 1.** Experimental vs. Theoretical structural parameters for the central phenylene units of the molecular gyroscopes **1a**, **1b**, and **1c**. The  $d_{OX} = \{d_1, d_2, d_3\}$  and rotator dihedral angle  $\phi$  of each molecular gyroscope are defined in **chart 1**. The DFT datasets presented here are reproduced from the previous publication [30] of the same author for comparative purpose.

Molecular Gyroscopes	Bonds	Bond length (nm)			"Free volume" ( $d_{OX}$ ) $d_{OX} = \{d_1, d_2, d_3\}$ (nm)			Rotator dihedral angle $\phi$ ( $\pi$ )			
		Expt	DFT	DFTB	Expt	DFT	DFTB	Expt	DFT	DFTB	
<b>1a</b> (ROT-2F) Structure A	C-F	0.15	0.14	0.138				0.56	0.63	0.63	
	C-C	0.14	0.14	0.136							
	C-H	0.09	0.11	0.110	0.51	0.48	0.481				
	C-Si <sub>1</sub>	0.19	0.19	0.189	0.84	0.85	0.848				
	C-Si <sub>2</sub>	0.19	0.19	0.189	0.95	0.92	0.923				
	Structure B	C-F	0.15	0.14	0.138				1.57	1.64	1.64
		C-C	0.14	0.14	0.136			0.511			
		C-H	0.09	0.11	0.110	0.52	0.51	0.858			
		C-Si <sub>1</sub>	0.19	0.19	0.188	0.84	0.86	0.921			
		C-Si <sub>2</sub>	0.19	0.19	0.188	0.94	0.92				
<b>1b</b> (ROT-2Cl)	C-Cl	0.17	0.14	0.148				0.32	0.30	0.30	
	C-C	0.14	0.14	0.139							
	C-H	0.09	0.11	0.101	0.81	0.83	0.828				
	C-Si <sub>1</sub>	0.19	0.19	0.188	0.84	0.83	0.828				
	C-Si <sub>2</sub>	0.19	0.19	0.188	0.87	0.79	0.788				
<b>1c</b> (ROT-2H) (reference molecule)	C-C	0.14	0.14	0.142				0.55	0.31	0.31	
	C-H	0.09	0.11	0.110	0.39	0.41	0.412				
	C-Si <sub>1</sub>	0.19	0.19	0.191	0.43	0.41	0.411				
	C-Si <sub>2</sub>	0.19	0.19	0.191	0.51	0.52	0.518				

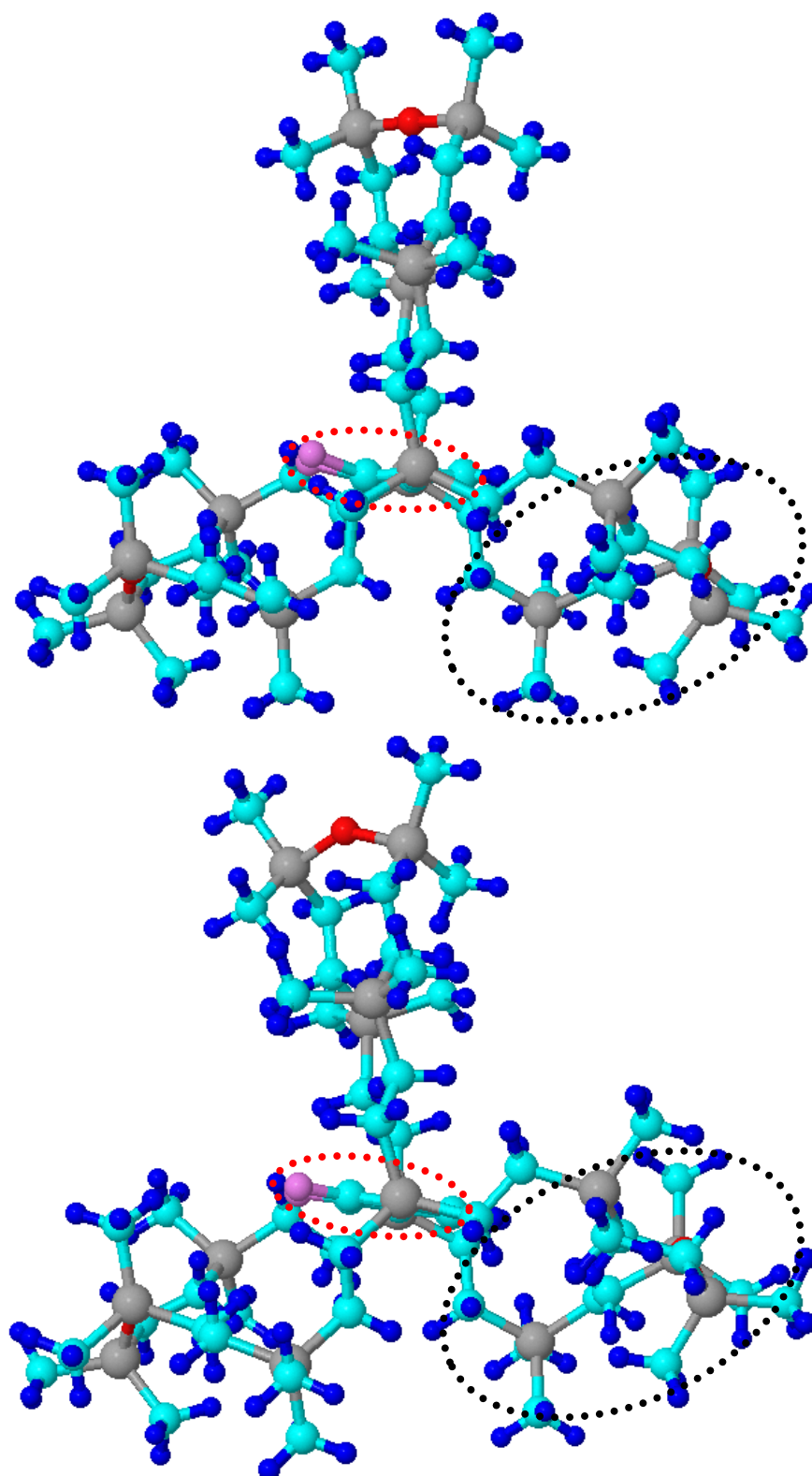
These SCC-DFTB converged ground state electronic structures are displayed in Figure 1(b), Figure 2(b), Figure 3(b), and Figure 4(b) respectively. In theoretical chemistry/physics, it is a usual trend of specifying these low energy ground state molecular geometries by determining their specific type bond lengths, bond angles, and dihedral angles because accurate identification of the position of the atomic nuclei in the theoretically converged structures always generates as reliable as experimentally observed structural information. Therefore, the quite essential sets of these structural parameters that are found to be involved directly in describing 3D molecular geometries of all the three molecular gyroscopes **1a**, **1b**, and **1c** more precisely are carefully selected here. The SCC-DFTB computed values of them for the central phenylene (unsubstituted and substituted) units and the siloxaalkane arms of **1a**, **1b**, and **1c** are tabulated along with the corresponding experimental (X-ray determined) and DFT derived values in Table 1 and Table 2 respectively.

As we can see in the second and third column of the Table 1, all the C–C bond lengths of the non-substituted and dihalogen ( $X = \text{F}$  and  $\text{Cl}$ ) substituted phenylene units of the **1a**, **1b**, and **1c** respectively are found to be in intermediate range while comparing them with the length of a standard C=C double bond (bond length = 0.135 nm) and a C–C single bond (bond length = 0.147 nm). It suggests us that all the three central phenylene units have partial double bond characters responsible for creating some degree of electronic delocalization. Similarly, while monitoring interior and exterior bond angles, and the dihedral angles of these central units (in the X-ray, DFT, and SCC-DFTB derived structures), they are found to be distorted from the respective parameters for the original planar shape of the benzene molecule (all these angular values are excluded in Table 1 as they are considered to be less significant here). Each of these structural distortions is due to the effect of nonbonding type intramolecular interactions taking place between surrounding siloxaalkane arms and central phenylene unit of each molecular gyroscope **1a**, **1b**, and **1c**. In stereochemistry, this interaction is most commonly called steric effects that often arises in each molecular gyroscope from the repulsive forces between the overlapping electron clouds of the central phenylene unit and the surrounding siloxaalkane spokes, and the resulting steric type hindrance is not only responsible to influence the internal shape of the central phenylene unit of each molecular gyroscope but also to impose each unit to adjust in particular position of the free space present inside the static siloxaalkane spokes. Moreover, as listed in the fifth column of Table 1, the phenylene dihedral angle  $\phi$  (it gives us an exact position of the phenylene unit present inside the siloxaalkane spokes and is formed by the four atoms encircled in **chart 1**) for the experimentally produced most stable structure of **1a** is  $0.55\pi$  (modulo  $\pi$ ), the difluorophenylene dihedral angle for the two X-ray degenerate equilibrium structures of **1b** are  $0.56\pi$  and  $1.57\pi$  ( $1\pi$  flip), of which structures or dihedral angles are denoted by **A** and **B** respectively, and the dichlorophenylene dihedral angle of the single equilibrium structure of **1c** is  $0.32\pi$ . By the SCC-DFTB method, these angles are converged to  $0.32\pi$  (DFT:  $0.31\pi$ ),  $0.63\pi \leftrightarrow 1.64\pi$  (DFT:  $0.63\pi \leftrightarrow 1.64\pi$ ) ( $1\pi$  flip), and  $0.30\pi$  (DFT:  $0.30\pi$ ) respectively. As reported experimentally, these theoretically derived data sets confirm that the two stable structures **A** and **B** of **1b** (Figure 2 and Figure 3) are related to each other by  $1\pi$  flipping of the central difluorophenylene unit. Nevertheless, all these SCC-DFTB derived dihedral angles are found to be resembled well with the hybrid functional DFT derived values mentioned above in the closing parenthesis. Additionally, in terms of reproducing DFT predicted values of the phenylene structural data sets for each molecular gyroscope (Table 1) as well, performance of the SCC-DFTB method is also quite impressive.

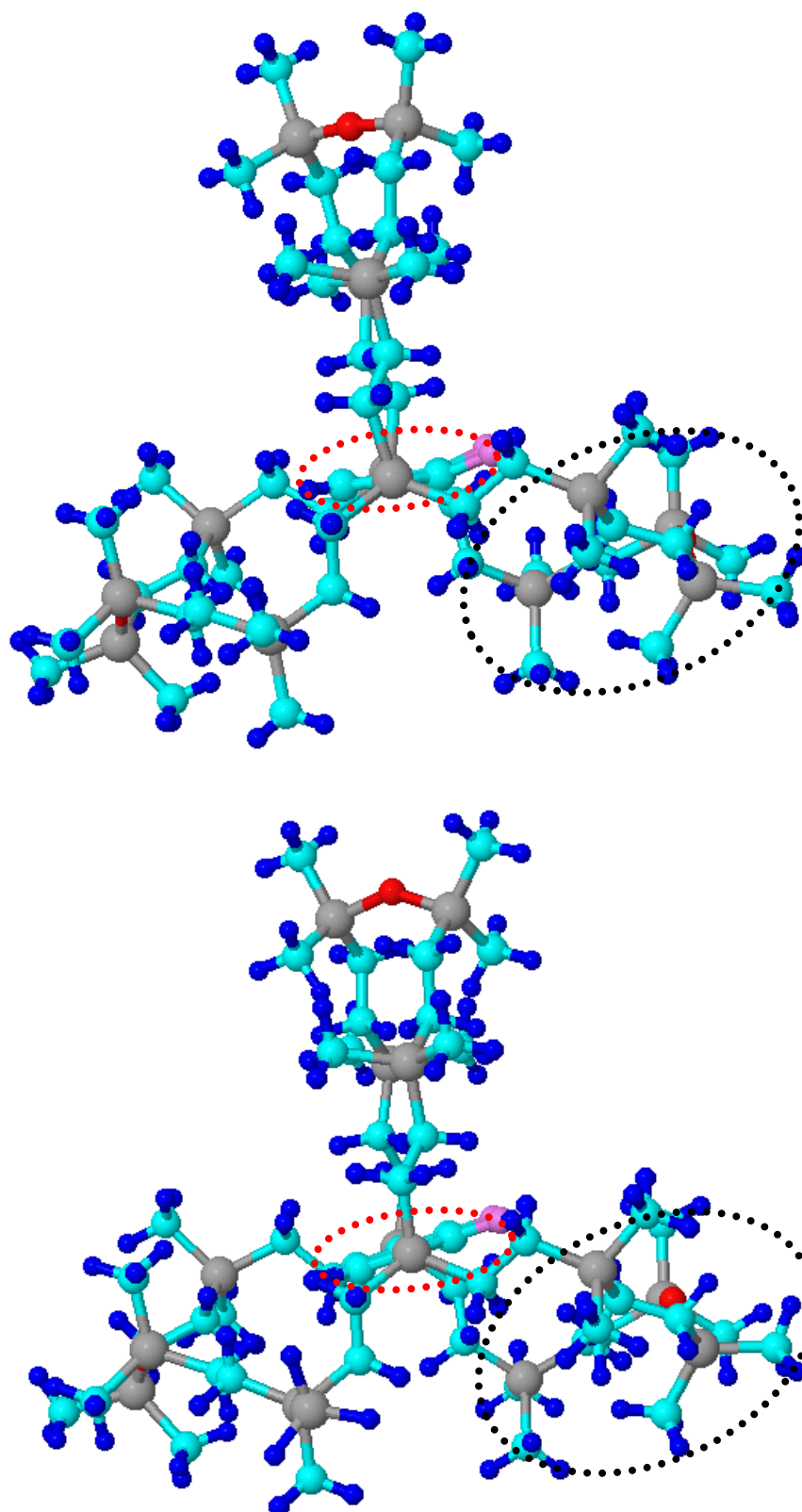
According to X-ray analysis, a notable structural deformation in the siloxaalkane arms is observed while substituting two hydrogen atoms of the central phenylene of **1a** by two fluorine (as



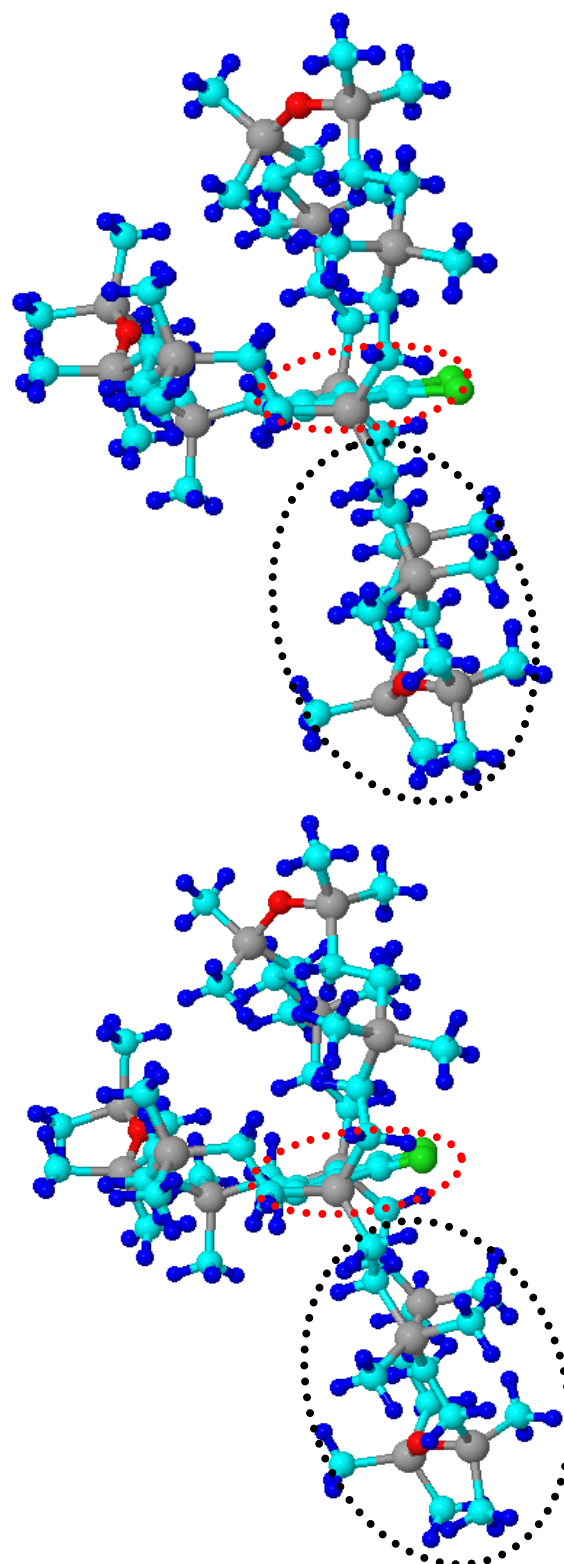
**Figure 1.** (a) X-ray (b) SCC-DFTB optimized geometry of an isolated ROT-2H molecular gyroscope **1a** viewed along the spin axis. The cyan, blue, dark gray, and red spheroids represent Carbon, Hydrogen, Silicon, and Oxygen atoms respectively. The phenylene rotators and siloxaalkane arms are enclosed by red and black circles respectively.



**Figure 2.** (a) X-ray (b) SCC-DFTB optimized geometry of an isolated ROT-2F molecular gyroscope **1b** (structure **A**) viewed along the spin axis. The cyan, blue, dark gray, red, and violet spheroids represent Carbon, Hydrogen, Silicon, Oxygen, and Fluorine atoms respectively. The difluorophenylene rotators and siloxaalkane arms are enclosed by red and black circles respectively.



**Figure 3.** (a) X-ray (b) SCC-DFTB optimized geometry of an isolated ROT-2F molecular gyroscope **1b** (structure **B**) viewed along the spin axis. The cyan, blue, dark gray, red, and violet spheroids represent Carbon, Hydrogen, Silicon, Oxygen, and Fluorine atoms respectively. The difluorophenylene rotators and siloxaalkane arms are enclosed by red and black circles respectively.



**Figure 4.** (a) X-ray (b) SCC-DFTB optimized geometry of an isolated ROT-2Cl molecular gyroscope **1c** viewed along the spin axis. The cyan, blue, dark gray, red, and green spheroids represent Carbon, Hydrogen, Silicon, Oxygen, and Chlorine atoms respectively. The dichlorophenylene rotators and siloxaalkane arms are enclosed by red and black circles respectively.

in **1b**) and two chlorine (as in **1c**) atoms [24]. And, these deformed siloxaalkane arms are reported as responsible parts to narrow down the free-volume unit (the volume where the rotator is enclosed by the static framework inside which it moves more or less freely) present around each rotating segment of **1b** and **1c**. But, such a significant structural changes occurred in their static frameworks and their direct impact in phenylene (rotator) movement has not been interpreted quantitatively. Apart from this, the decisive role of them in demonstrating smooth and restricted rotation as observed in **1a** and **1b** respectively or completely prevented rotation as in **1c** has not been clarified well. In general, the intensity of the intra-molecular type interactions (rotator-stator interactions) increases after inserting two halogen atoms in the central phenylene rotator of **1a**, the free-volume unit is also subjected to change side by side (due to a flexible and elastic nature of the siloxaalkane spokes). As a result, the energy barrier faced by each halogen substituted rotator increases which in turn is accountable for its rotational speed at specific temperature. In short, the free-volume unit, rotational energy barrier, and the types of rotation (smooth, restricted, and prevented as in **1a**, **1b**, and **1c** respectively) observed in all three molecular gyroscopes are correlated to each other. This is the reason why free-volume unit present around the rotator of each molecular gyroscope is determined here precisely. Practically, it can be estimated by measuring an intervening space exists in between O atom of each siloxaalkane arm and the nearest X (H in **1a**; F in **1b**; and Cl in **1c**) atom of the central phenylene ring each of which is assigned as  $d_{OX} = \{d_1, d_2, d_3\}$  in **chart 1**. The separate sets of the  $d_{OX} = \{d_1, d_2, d_3\}$  values measured in the theoretically converged (DFT and SCC-DFTB) equilibrium structures of the **1a**, **1b**, and **1c** are listed in the fourth column of Table 1, where they are found to be in close agreement with the respective values measured in the X-ray produced structures. It ascertains that the theoretically produced electronic structure of each molecular gyroscope possess as sufficient free-volume unit as in X-ray produced molecular geometry, implying that no significant changes will occur in the experimentally observed rotational behaviors and dynamics of the central (unsubstituted and substituted) phenylene units while applying SCC-DFTB method under periodic boundary condition.

Accordingly, the experimentally observed notable structural deformation in the siloxaalkane spokes of **1b** and **1c** (in compare to **1a**) can also be described with the help of their  $d_{OX} = \{d_1, d_2, d_3\}$  values. As can be seen in Table 1, the trend of the  $d_{OX}$  data sets for three different molecular gyroscopes is found to be in the order **1a** < **1b** < **1c**. It means all of them need different amount of free-volume units inside their siloxaalkane spokes, *i.e.* **1c** requires the largest free-volume unit as it has to accommodate bulkiest dichlorophenylene unit (atomic size of Cl: 0.99Å), and then to **1b** for hosting second most bulkiest difluorophenylene unit (atomic size of F: 0.64Å) centrally than to **1a** for housing unsubstituted phenylene rotator (atomic size of H: 0.37Å). Thus, it can be concluded that bulkier the central phenylene unit is stronger would be the structural deformation *i.e.* the most bulky dichlorophenylene of **1c** and the second most bulky difluorophenylene of **1b** impel their siloxaalkane spokes quite apart from the center, resulting an outward expansion (molecular balloon) of the latter or distortion of the whole gyroscopic structures from the original framework of their precursor module (reference molecule) **1a**. In terms of creating steric effects to the surrounding siloxaalkane spokes as well, the halogenated phenylene units are more powerful than the non-substituted phenylene unit. This nonbonding effect also makes the siloxaalkane arms puffing out as they have to avoid this effect to achieve gyroscopic structure having sufficient free-volume unit. In a similar way, the smooth, hindered, and prevented type phenylene rotation observed in **1a**, **1b**, and **1c** can also be explained qualitatively as they are directly related to the energy barriers faced by the rotators themselves. Since the bulkiest dichlorophenylene unit of **1c** and



the second most bulkiest difluorophenylene unit of **1b** interacts most and second most strongly with the siloxaalkane arms (intramolecular interactions) than does by the non-substituted phenylene unit of **1a**, the energy barriers experienced by themselves would be in the order: **1a** < **1b** < **1c**, which means the phenylene unit of **1a** may undergo smooth and facile rotation (low rotational barrier), the difluorophenylene unit of **1b** experiences restricted type flipping motion (comparatively high rotational barrier), and the dichlorophenylene unit of **1c** remains immovable (fixed at a single position) as observed experimentally. Beside this, the prevented type rotation of the dichlorophenylene unit of **1c** is unfavorable structurally as well due to its size, and inappropriate and unfriendly orientation of the two Cl atoms towards their three siloxaalkane arms as can be seen in Figure 4. All these noteworthy explanations directly make us to adopt SCC-DFTB method in studying **1b** and **1c** type crystalline gyroscopic molecular assemblies in future more particularly for investigating their molecular structures and the rotary dynamics under PBC as we applied earlier to their molecular analogue **1a** and reported the results elsewhere [20, 21].

Again, due to the flexible and elastic properties of the three chemically identical siloxaalkane arms of each molecular gyroscope **1a**, **1b**, and **1c**, and their inward and outward dilation while accommodating variably sized rotating units, examining change in bond lengths and angles of their specific bonds further gives us an indirect way to quantify the free-volume units. The theoretically (DFT and SCC-DFTB) and X-ray determined average bond lengths and angles are listed in the third column of Table 2. The careful analyses of them confirm that there is no any significant changes in the bond lengths associated with C atom of the siloxaalkane arms (C–C, C–H, and C–Si) take place while replacing phenylene rotator of **1a** by the difluorophenylene or dichlorophenylene. In contrary, the three sets of Si–O–Si bond angles and an average Si–O bond length in three siloxaalkane arms of each molecular gyroscope are found to vary significantly. This is because the bulkier difluorophenylene and dichlorophenylene units repel their siloxaalkane arms strongly and force them to expand outward (increase in free-volume), resulting a variation in the bond lengths and angles. More importantly, while comparing experimental and theoretical Si–O–Si bond angles and Si–O bond lengths quantitatively, the significant discrepancies are observed. However, this is in good agreement if we consider the partial ionic and double bond characters of the Si–O–Si linkages which not only govern their strength but also contribute to exceptional conformational flexibility of the  $-(\text{Si}-\text{O})_x-$  chains and their segments [35].

**Table 2.** Experimental vs. Theoretical structural parameters for each siloxaalkane arm of the molecular gyroscopes **1a**, **1b**, and **1c**. The DFT datasets presented here are reproduced from the previous publication [30] of the same author for comparative purpose.

Molecular gyroscopes	Si-O-Si angle ( $\theta$ ) ( $\pi$ )			Bonds	Bond lengths (nm)		
	X-ray	DFT	DFTB		X-ray	DFT	DFTB
<b>1b</b> (ROT-2F)				C–C	0.15	0.15	0.152
<u>Structure A</u>	0.97	0.78	0.78	C–H	0.10	0.11	0.109
	0.84	0.75	0.75	C–Si	0.19	0.19	0.191

<b>Structure B</b>	0.84	0.74	0.74	Si–O	0.16	0.17	0.172
				C–C	0.15	0.15	0.152
	0.97	0.78	0.78	C–H	0.10	0.11	0.110
	0.84	0.75	0.75	C–Si	0.19	0.19	0.191
	0.84	0.74	0.74	Si–O	0.16	0.18	0.179
<b>1c (ROT-2Cl)</b>				C–C	0.15	0.15	0.151
	0.79	0.74	0.74	C–H	0.10	0.11	0.110
	0.80	0.76	0.76	C–Si	0.19	0.19	0.189
	0.83	0.79	0.79	Si–O	0.16	0.18	0.181
<b>1a (ROT-2H)</b> (reference molecule)				C–C	0.15	0.15	0.151
	0.91	0.78	0.78	C–H	0.10	0.11	0.110
	0.94	0.78	0.78	C–Si	0.18	0.18	0.179
	0.96	0.82	0.82	Si–O	0.16	0.17	0.171

Altogether, if we compare the X-ray and SCC-DFTB optimized structures of each isolated siloxaalkane molecular gyroscope **1a**, **1b**, and **1c** displayed in Figure 1 to Figure 4, we reconfirm the above mentioned features for the optimized structures that the orientation of the central phenylene units and the conformations of the surrounding siloxaalkane spokes are well reproduced. Beside this, the orientation and conformation of the methyl groups attached to each siloxaalkane arm are also not noticeably different. Though the DFT derived electronic structures of **1a**, **1b**, and **1c** and their structural information are not shown here in detailed, we found that they agree semi-quantitatively with the corresponding SCC-DFTB produced structures and related structural parameters. This actually supports the DFTB+ scheme, a comparatively more computationally cheap and efficient model, applicable to gyroscopic nanostructures and molecular machinery world.

#### IV. CONCLUSION

In this theoretical insight, the ground state electronic structures of the experimentally synthesized three different siloxaalkane molecular gyroscopes having central polar and nonpolar phenylene units: ROT-2F (difluorophenylene), ROT-2Cl (dichlorophenylene) and ROT-2H (phenylene) are investigated theoretically under non-crystalline condition by employing computationally cheap yet decent SCC approach of the DFTB method. Along with this, comparatively more convincing theoretical ways for describing X-ray observed smooth, restricted, and prevented type phenylene rotation in ROT-2H, ROT-2F, and ROT-2Cl respectively are also presented. Basically, the ROT-2H is considered here as a reference molecule for the sake of examining

experimentally observed significant structural deformation in the ROT-2F and ROT-2Cl that arises after substituting two hydrogen atoms of the ROT-2H's central phenylene by two fluorine and two chlorine atoms. The unanimous choice of this reference molecule here is due to being a molecular analogue and precursor module for the ROT-2F and ROT-2Cl molecular gyroscopes synthetically.

In order to verify X-ray produced stable structures theoretically, we first optimized the most stable X-ray structure of the ROT-2H (out of its three stable forms) followed by two degenerate X-ray structures (structure **A** and **B**) of the ROT-2F and a single stable form of the ROT-2Cl separately without endorsing PBC criteria, and compared all these theoretically produced molecular structures with the corresponding X-ray structures on the basis of practically measured structural data sets: bond lengths, bond angles, and dihedral angles. We found no significant structural deviation among the SCC-DFTB and X-ray derived equilibrium structures except in the  $-(\text{Si-O})_x-$  chains and Si-O-Si linkages of each siloxaalkane arm of each molecular gyroscope. But, the inconsistencies we noted in their structural information are in a satisfactory range if we recognize their partial ionic and double bond characters. Moreover, we determined the free-volume units present around the central phenylene segment of each SCC-DFTB produced structure of the molecular gyroscope and elucidated an experimentally observed structural deformation in the siloxaalkane spokes of ROT-2F and ROT-2Cl quantitatively. We concluded that the notable structural deformation in them is mostly occurred as a result of avoiding steric hindrance of their central difluorophenylene and dichlorophenylene segments by surrounding siloxaalkane spokes, and the same effect is responsible to change their free-volume units which in turn decides smooth, restricted, or prevented type phenylene rotation as observed experimentally in ROT-2H, ROT-2F, and ROT-2Cl molecular gyroscopes respectively.

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#### REFERENCES

- [1] W. Kohn, L. J. Sham, "Self-consistent equations including exchange and correlation effects", *Physical Review*, Vol. **140**, No. **4A**, pp. **A1133–A1138**, **1965**.
- [2] A. B. Marahatta, "A DFT Analysis for the Electronic Structure, Mulliken Charges Distribution and Frontier Molecular Orbitals of Monolayer Graphene Sheet", *International Journal of Progressive Sciences and Technologies*, Vol. **16**, No. **1**, pp. **51–65**, **2019**.
- [3] P. Hohenberg, W. Kohn, "Inhomogeneous Electron Gas", *Physical Review B*, Vol. **136**, No. **3B**, pp. **864–871**, **1964**.
- [4] A. B. Marahatta, "DFT Study on Ground State Electronic Structures of Simple to Complex Molecular Specimens", *International Journal of Progressive Sciences and Technologies*, Vol. **19**, No. **1**, pp. **100–112**, **2020**.
- [5] A. J. Cohen, P. M. Sánchez, W. Yang, "Insights into current limitations of density functional theory" *Science*, Vol. **321**, Issue **5890**, pp. **792–794**, **2008**.

- [6] D. Buckingham, P. W. Fowler, J. M. Hudson, "Theoretical studies of van der Waals molecules and intermolecular forces", *Chemical Reviews*, Vol. **88**, No. **6**, pp. **963–988**, **1988**.
- [7] J. Tao, J. P. Perdew, A. Ruzsinszky, "Accurate van der Waals coefficients from density functional theory", *Proceedings of the National Academy of Sciences of the U. S. A.*, Vol **109**, Issue **1**, pp. **18–21**, **2012**.
- [8] A. D. Becke, "Density-functional thermochemistry. III. The role of exact exchange", *Journal of Chemical Physics*, Vol. **98**, Issue **7**, pp. **5648–5652**, **1993**.
- [9] J. P. Perdew, K. Burke, M. Ernzerhof, "Generalized Gradient Approximation Made Simple", *Physical Review Letter*, Vol. **77**, pp. **3865–3868**, **1996**.
- [10] J. Tao, J. P. Perdew, V. N. Staroverov, G. E. Scuseria, "Climbing the density functional ladder: nonempirical meta-generalized gradient approximation designed for molecules and solids", *Physical Review Letter*, Vol. **91**, Issue **14**, 146401-1–146401-4, **2003**.
- [11] G. Seifert, "Tight-Binding Density Functional Theory: An Approximate Kohn–Sham DFT Scheme", *Journal of Physical Chemistry A*, Vol. **111**, Issue **26**, pp. **5609–5613**, **2007**.
- [12] G. Zheng, S. Irle, K. Morokuma, "Performance of the DFTB method in comparison to DFT and semiempirical methods for geometries and energies of C<sub>20</sub>–C<sub>86</sub> fullerene isomers", *Chemical Physics Letter*, Vol. **412**, Issue **1–3**, pp. **210–216**, **2005**.
- [13] B. Aradi, B. Hourahine, Th. Frauenheim, "DFTB+, a Sparse Matrix-Based Implementation of the DFTB Method", *Journal of Physical Chemistry A*, Vol. **111**, Issue **26**, pp. **5678–5684**, **2007**.
- [14] M. Elstner, D. Porezag, G. Jungnickel, J. Elsner, M. Haugk, Th. Frauenheim, S. Suhai, G. Seifert, "Self-consistent-charge density-functional tight-binding method for simulations of complex materials properties", *Physical Review B*, Vol. **58**, pp. **7260–7268**, **1998**.
- [15] T. Frauenheim, G. Seifert, M. Elstner, T. Niehaus, C. Köhler, M. Amkreutz, M. Sternberg, Z. Hajnal, A. D. Carlo, S. Suhai, "Atomistic simulations of complex materials: ground-state and excited-state properties", *Journal of Physics: Condensed Matter*, Vol. **14**, pp. **3015–3047**, **2002**.
- [16] Koehler, Z. Hajnal, P. Deak, Th. Frauenheim, S. Suhai, "Theoretical investigation of carbon defects and diffusion in  $\alpha$ -quartz", *Physical Review B*, Vol. **64**, pp. **085333**, **2001**.
- [17] M. Elstner, Th. Frauenheim, E. Kaxiras, G. Seifert, S. Suhai, "A Self-Consistent Charge Density-Functional Based Tight-Binding Scheme for Large Biomolecules", *Physical Status Solidi B*, Vol. **217**, Issue **1**, pp. **357–376**, **2000**.
- [18] M. Elstner, P. Hobza, Th. Frauenheim, S. Suhai, E. Kaxiras, "Hydrogen bonding and stacking interactions of nucleic acid base pairs: A density-functional-theory based treatment", *Journal of Chemical Physics*, Vol. **114**, Issue **12**, pp. **5149–5155**, **2001**.
- [19] E. Rauls, R. Gutierrez, J. Elsner, Th. Frauenheim, "Stoichiometric and non-stoichiometric (1010) and (1120) surfaces in 2H–SiC: a theoretical study", *Solid State Communications*, Vol. **111**, Issue **8**, pp. **459–464**, **1999**.

- [20] A. B. Marahatta, M. Kanno, K. Hoki, W. Setaka, S. Irle, H. Kono, "Theoretical Investigation of the Structures and Dynamics of Crystalline Molecular Gyroscopes", *Journal of Physical Chemistry C*, Vol. **116**, pp. **24845–24854**, **2012**.
- [21] A. B. Marahatta, H. Kono, "Performance of NCC- and SCC-DFTB Methods for Geometries and Energies of Crystalline Molecular Gyroscopes", *International Journal of Innovative Research and Advanced Studies*, Vol. **6**, Issue **5**, pp. **180–185**, **2019**.
- [22] A. B. Marahatta, "Geometry Optimization Skills of DFTB: Simple to Complex Molecular Systems", *International Journal of Progressive Sciences and Technologies*, Vol. **15**, No. **2**, pp. **263–277**, **2019**.
- [23] W. Setaka, S. Ohmizu, C. Kabuto, M. Kira, "A Molecular Gyroscope Having Phenylene Rotator Encased in Three-Spoke Silicon-Based Stator", *Chemistry Letter*, Vol. **36**, pp. **1076–1077**, **2007**.
- [24] W. Setaka, S. Ohmizu, M. Kira, "Molecular gyroscope having a halogen-substituted *p*-phenylene rotator and silaalkane chain stators", *Chemistry Letter*, Vol. **39**, pp. **468–469**, **2010**.
- [25] W. Setaka, K. Yamaguchi, "Thermal modulation of birefringence observed in a crystalline molecular gyrotop", *Proceedings of the National Academy of Sciences of the U. S. A.*, Vol. **109**, pp. **9271–9275**, **2012**.
- [26] V. Balzani, M. Venturi, A. Credi, "*Molecular Devices and machines: A Journey into the Nano World*", Wiley-VCH: Weinheim, **2003**.
- [27] T. R. Kelley, "Molecular Machines. Topics in Current Chemistry", Springer publication, **2005**.
- [28] Z. Dominguez, H. Dang, M. J. Strouse, M. A. Garcia-Garibay, "Molecular compasses and gyroscopes. III. Dynamics of a phenylene rotor and clathrated benzene in a slipping-gear crystal lattice", *Journal of American Chemical Society*, Vol. **124**, Issue **26**, pp. **7719–7727**, **2002**.
- [29] R. D. Horansky, L. I. Clarke, J. C. Price, T. V. Khuong, P. D. Jarowski, M. A. Garcia-Garibay, "Dielectric response of a dipolar molecular rotor crystal", *Physical Review B*, Vol. **72**, pp. **014302-1–014302-5**, **2005**.
- [30] A. B. Marahatta, H. Kono, "Comparative Theoretical Study on the Electronic Structures of the Isolated Molecular Gyroscopes with Polar and Nonpolar Phenylene Rotator", *International Journal of Progressive Sciences and Technologies*, Vol. **20**, No. **1**, pp. **109–122**, **2020**.
- [31] Jmol: an open-source Java viewer for chemical structures in 3D. <http://www.jmol.org/>
- [32] DFTB+ manual. <https://dftbplus.org/fileadmin/DFTBPLUS/public/dftbplus/latest/manual.pdf>
- [33] Y. K. Kang and M. S. Jhon, "Additivity of atomic static polarizabilities and dispersion coefficients", *Theoretica Chimica Acta*, Vol. **61**, pp. **41–48**, **1982**.
- [34] K. J. Miller, "Additivity methods in molecular polarizability", *Journal of American Chemical Society*, Vol. **112**, pp. **8533–8542**, **1990**.
- [35] G. J. Richard, C. Julian, "Silicon-Containing Polymers: The Science and Technology of Their Synthesis and Applications", Springer publication, **2000**.

# *Practice Of Deprivation Of Voting During Soviet Election Campaign In Uzbekistan*

(On The Example Of The Election Campaigns Of 1928-1929)

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**Abstract** – The article is devoted to the analysis of statistical data on the election campaigns in the Uzbek SSR in 1928-1929. The Soviet electoral system served as one of the most popular and effective ways to strengthen the government of its time. Under the guise of elections, the government has set itself the lofty goal of neutralizing in any way any force that is likely to be its enemy. In this regard, the issue of providing legal evidence and grounds for including citizens on the list of the rich and the kulaks (the people who were oppressed, tortured and often deported to distant places for their beliefs and loyalty to their faith) was not important.

**Keywords** – Soviets, electoral system, election campaign, right to vote, the disfranchised, the rich, the kulaks (the exiled).

An important moment in the development of the Soviet electoral system in the 1920s and 1930s was exclusion of certain categories of citizens from participating in elections by depriving them of voting right. The election campaign itself was marked by an escalation of aggression among the disfranchised, especially among wealthy farmers. This measure was aimed at exerting economic, administrative, social and psychological pressure on certain strata and groups of the population as part of the social policy of the Soviet state. As a result, those who were deprived of the right to vote - "The disfranchised" - appeared. The name was given to one of the most popular groups of people who were subjected to repression at the time. The policy of deprivation of the right to vote later turned into announcing as "kulaks" (the exiled) and deportation of the farmers and their family [6].

At this point, we must pay special attention to the issue of "The disfranchised". This is because the most common form of repression used by the Soviet government in the process of collectivization was the policy and practice of depriving certain segments of the population of the right to vote [5.209].

Based on some statistical and analytical data, it would be just to describe the policy of the Soviet government on the election campaign in the Soviet republics in 1928-1929, which is known in history as the beginning of repressive policies in the union of republics, especially in Central Asia and Uzbekistan.

The activities of the working masses of the urban and rural population were undoubtedly reflected in the identification and registration of people deprived of the right to vote. The number of members of this category more than quadrupled in the following years as a result of the revision of the past lives of anti-Soviet and alien elements hiding behind various masks, and their inclusion in the list of deprived of the right to vote en masse. During this campaign, together with those of deprived the right to vote of Tajikistan, 145.819 people of urban areas and 67.934 people in 23 cities of UzSSR were deprived of their right too. In UzSSR, the average percentage of those deprived of the right to vote was 6,1% in rural areas and 13,7% in 23 cities [10.246].

The number of those deprived of voting rights is distributed among the districts as follows:

**In rural area** Table 1

	Regions	The number of "The disfranchised"	percentage of voters
1	Kharezsm	18.432	9,2%
2	Bukhara	15.492	7,9%
3	Zarafshan	6.992	4,7%
4	Samarkand	7.591	3,3%
5	Tashkent	17.012	8,6%
6	Hujand	7.724	7,7%
7	Fergana	15.957	5%
8	Andijan	21.928	6,4%
9	Sirdarya	5.949	5,7%
10	Kashkadarya	9.494	5%
11	Kanimeh	458	6,3%
12	Tajikistan ASSR	18.790	5,3%
	<b>Total in UzSSR:</b>	<b>145.819</b>	<b>6,1%</b>

**In cities** Table 2

	Regions	The number of "The disfranchised"	percentage of voters
1	Kharezsm	3.122	19,4%
2	Bukhara	6.987	18,1%
3	Samarkand	8.772	11,2%
4	Tashkent	23.021	11%
5	Fergana	13.544	23,2%
6	Andijan	5.070	10,8%
7	Sirdarya	1.315	11,5%
8	Kashkadarya	2.597	19,6%
9	Khujand	3.506	14,8%
	<b>Total in 23 cities:</b>	<b>67.934</b>	<b>13,7%</b>

In 1926-1927, 33.029 people were deprived of the right to vote in rural areas of the UzSSR, and 36.806 people in cities, which accounted for 1,8% and 7,8% of the total number of voters, respectively [10.247]. If we analyze the above statistics on the number

of people deprived of the right to vote, the number of “The disfranchised” in the villages of Kharezm, Tashkent, Bukhara and Khojand regions is much higher than the national average, and in Samarkand region it is significantly lower.

The average rate of "The disfranchised" in the cities of the country was 13,7%. However, the share of “The disfranchised” in the cities of Fergana region had the leading position with 23,2% of voters, and in the cities of Khorezm (19,4%) and Kashkadarya (19,6%) districts, the list of “The disfranchised ” was abnormally high. In turn, there were many complaints from “The disfranchised” in the mentioned districts, who claimed that they had been unfairly deprived of their right to vote and demanded a re-investigation. [4]

If we compare the situation in the electoral processes of 1928-1929 and 1926-1927, dividing the "The disfranchised" into separate categories, the following table will be formed, and it will be clear that the practice of restricting rights becomes more active every year.

**In rural areas Table 3**

	Types of “The disfranchised”	In 1928/1929 <i>(in percentage)</i>	In 1926/1927 <i>(in percentage)</i>
1	Entrepreneurs	10,4	2,7
2	Those living on the income without labor	11,9	11,6
3	Merchants	13,9	19,3
4	Clerics	22,8	28
5	Former policemen, people who had belonged to Khan and Amir governments	8,4	12,6
6	Mentally ill people and the fostered	1,6	1,6
7	The prisoners	3,1	4,6
8	Others	27,9	19,6

Family members of administratively deported people fall into the "others" category. The analysis of the table shows that there were significant changes in the "The disfranchised" groups. In particular, the group of entrepreneurs increased significantly, as they included all individuals who used hired labor, as well as the kulaks and the rich. Therefore, the rate of the “others” group was high, requiring a more in-depth study of the families of those deprived of the right to vote. There has been a significant decline in the number of merchants, clerics and officials, members of the former khan and amir governments, and police officers [10.247].

**In cities Table 4**

T/p	Types of “The disfranchised”	In 1928/1929 <i>(in percentage)</i>	In 1926/1927 <i>(in percentage)</i>
1	Entrepreneurs	9,9	1,3
2	Those living on the income without labor	4,8	13,3
3	Merchants	37,9	58,8
4	Clerics	7,9	12



5	Former policemen, people who had belonged to Khan and Amir governments	2,2	4
6	Mentally ill people and the fostered	1,7	0,9
7	The prisoners	3,9	2,1
8	Others	-	7,6
9	Family members of "The disfranchised"	31,7	-

Family members of those deprived of their rights during the 1926-1927 election campaign were included in the "others" group of this table. By the season of 1928-1929, as a result of the inclusion of these individuals directly in the list of users of hired labor, the number of representatives of this category increased sharply. The number of groups of residents having income without working, traders, clerics, and former police officers declined significantly. [10.248]

In the process of mass collectivization of agriculture, a number of violations of electoral legislation took place. The principle of voluntariness in the process of collectivization was grossly violated, and lawlessness and violence escalated. Restrictions on tax and credit (debt) policy in relation to the business, entrepreneurial and politically active part of the rural population, who did not want to be separated from their land and property and opposed collectivization, included deprivation of the right to vote, confiscation of property, a forced relocation with the whole family policy was implemented [5.212].

Although the Program for Elections to the Soviets described the economic aspects of depriving farmers of the right to vote, it was these indicators that played a decisive role in defining kulak farms in the areas of mass collectivization.

The Soviets wanted to justify the policy of fighting against "kulaks" (the exiled), restricting them, squeezing them out by making various decisions and laws. At a time when the abolition of "kulaks" (the exiled) as a class had not yet begun, the Soviet authorities adopted resolutions of February 20, 1929, "On the Application of the Labor Code in Kulak Farms," and May 21, 1929, "Signs on Kulak Farm Where the labor code should be applied", according to which "announcing as kulak" was also being practiced in Uzbekistan [7.26].

We should also mention that at the beginning of this article we gave official data that in 1926-1927 those who were deprived of the right to vote in rural areas comprised 1,8% (3,5% in the whole union). However, the analysis of the following tables that we have considered shows that these figures are far from the realistic picture. To substantiate this view, we cite a number of additional arguments. First of all, if we briefly consider the organizational aspects of the registration of the people deprived of their rights to vote, the instruction of the Center on careful organization of registration of the "The disfranchised" placed on the ground was not specifically developed, there were no grounds to prove the legitimacy of almost all lists. In a number of districts, the compilation of the list of those deprived of their rights began too late. For example, in Bukhara and Zarafshan districts, until November 27, 1926, there was no information on the registration of those deprived of the right to vote. A number of village councils in the Andijan region did not compile lists of the "The disfranchised" until 17 December, which was a gross violation of the programmatic rules of displaying these lists two weeks before the election day [10.248].

The available materials on the activities of the Central Election Commission show that certain categories of citizens were illegally deprived of the right to vote. In particular in Khojand district election commission 354 citizens were included in the list of "The disfranchised" citizens as a result of incorrect learning of the election program and incorrect assessment of the actions of hooligans and other similar offenders. The Khorezm district election commission pursued a policy of mass deprivation of the right to vote in the Khazarasp district. In Gazovot (now a village in the Koshkopir district - the author) and Gurlan district the poor and discharged from the soldiers were also included in the list of the "The disfranchised" [10.250].

One more noteworthy fact is that Batrak (farm laborer), who was caught stealing chickens in the Khavas district of Tashkent district and was deprived of the right to vote. However, he has not been prosecuted or convicted for that crime. Forty-five people praying in a mosque in the village of Uymovut in Fergana district were placed on a list of those deprived of the right to vote by a

district election commission representative without any inquiries. In the Pop district of the region, even those who died were added to the list of the “The disfranchised”, while the secretary of the village council in the Zakharevsk village of Tashkent district explained to the population that the batraks who did not own property or yards could not participate in the elections and were among the “The disfranchised”.

The high level of illiteracy in local government offices and election commissions and the large number of low-level legal staff often resulted in the suffering of ordinary citizens. In particular, it must be acknowledged that not only the programmatic requirements for elections, but also the human rights section of the constitution of the time devoted to elections, was grossly violated.

In Shahrikhan village of Andijan district, 24% of citizens were deprived of the right to vote, while in Izbaskan district and in some polling stations in Andijan all those over 80 years of age were included in the list of those deprived of the right to vote,.

In Kurgantepa (TASSR), thin chieftain was forbidden to vote because he was paid a large salary and had one day worker under his care. And in Khojand district, some freelance wheelbarrow pullers were also deprived of voting right. Although the election program set standards for the use of hired labor in agriculture, in the Shakhrisabz district of Kashkadarya region, all representatives of the sector were included in the list of the disenfranchised, and as a result, 80 out of 120 voters in one polling station were disenfranchised [10.250].

When speaking about the history of the Soviet electoral system in Uzbekistan, alongside with studying the way of conduction of elections, suffrage, deprivation of the right to vote one of the most sensitive aspects - the problem of restoring the rights of the "The disfranchised " is important. The issue of reviewing related applications is important and this topic will require further separate and comprehensive research. Now we restrict ourselves by only giving the following statistic data currently available at the Central Election Commission.

Table 5

constituency	All applications	viewed:		
		Election rights restored	refused	Send to be reviewed
MSK	158	17	87	54
Samarkand	228	65	137	26
Tashkent	311	61	203	47
Khujand	606	280	192	134
Fergana	192	9	130	53
Andijan	172	34	138	-
Bukhara	136	25	111	-
<b>Total:</b>	<b>1803</b>	<b>491</b>	<b>998</b>	<b>314</b>
<b>Per cent</b>	<b>100%</b>	<b>27,2%</b>	<b>55,3%</b>	<b>17,5%</b>

It should also be noted that during the election campaign of 1928-1929, the activity of the poor, the batraks and the middle class of the rural population increased significantly, while in this process the movements of the rich and those who were announced to be “kulaks” intensified. In particular, those included in the category of rich and kulaks sought to covertly support their own candidates in the election campaign in order to maintain a certain degree of influence in the future, and thus expand their sphere of influence in village councils. In a number of villages in the Andijan constituency, the rich sponsored various public and entertainment events, weddings and celebrations in preparation for the election campaign and in the election process, in return for which they held secret meetings and nominated candidates for the chairmanship and membership of village councils. At the same

time, they raised the issue (before the chairman and candidates for membership in village councils) of not including themselves on the list of the rich and kulaks and deprived of the right to vote.

According to the top-secret information of the Information Department of the Central Committee of the All-Union Communist Party (b) of April 3, 1929, "The program of kulaks and the methods of their struggle", on December 11, 1929, about 40 rich and priests gathered in the village of Kipchakkurgan, Asaka region.

In the house of a rich man in the village of No. 26, Marken district, Syrdarya region, a meeting will be held on the nomination of candidates for the new composition of village councils, which will be attended by 30 poor people, including two members of the VKP (b). Rich supporters are nominated for the chairmanship of the village council [7.43].

On the basis of the above mentioned information there is the open disagreement movement of those listed the "rich" and "kulaks" with the Soviet regime. In some cases, little by little the "The disfranchised", the rich and kulaks began writing applications to local authorities and higher institutions in order reinvestigations to be organized and even some unrest took place [4]. In the village council of Suyri "bays" (the wealthy) deprived of their right to vote held a meeting in the house of unaccepted to the Kolhoz bay Abduraim Karimov's and wrote an application demanding to restore their voting rights and to be accepted by the Kolhoz. When this application was viewed and the authors' demand was rejected, there was a brawl; as a result the meeting was cancelled [7.108].

There is one more important aspect in the process of studying the Soviet electoral system and the history of elections. As noted above, while some categories of citizens were deprived of their suffrage on the basis of the original class, it was not the end. Measures to further restrict the rights of the "The disfranchised" began to intensify.

The law strictly restricted the rights of the "The disfranchised" members of the society, who were deprived of the right to join trade unions and agricultural cooperatives, as well as the right to participate in the governing and inspection bodies of consumer cooperatives (*as a result of their class status and past activities being members of consumer cooperatives is absolutely impossible for them*) [4.129].

Although the law did not provide for the additional deprivation of food rations for the "The disfranchised", it was established that food cards will not be issued to persons with limited rights and their families.

In rural areas, the situation was even worse for the "The disfranchised ". In particular, they were equated to kulaks, not employed on collective farms, and their property was confiscated and they were evicted from their homes along with their family members. In addition, decrees were issued in some villages prohibiting selling them goods at even double prices, and selling tea and any other products in teahouses and hotels. In other words, the "The disfranchised" in rural areas were utterly hopeless [4.130].

In short, the Soviet electoral system served as one of the most popular and effective ways to strengthen the government of its time. Apparently, the government set a lofty goal of neutralizing in any way any force that is likely to be its enemy under the guise of elections. In this regard, the issue of providing legal evidence, proof and grounds on the issue of including citizens in the list of the rich and the kulaks or depriving them of the right to vote was not important.

#### REFERENCE

- [1] Instruction on elections in the Soviet Uzbek SSR (with all the amendments and attachments), Publishing House of the Central Committee of the USSR, 1929.
- [2] Constitution (Basic Law) of the USSR, 1924
- [3] Constitution (Basic Law) of the Uzbek Soviet Socialist Republic. 1927
- [4] Politburo and peasantry: deportation, special relocation. 1930 -1940.
- [5] Rasulov B. Political repression and the situation of exiled peasants in the process of collectivization in Uzbekistan (1929-1959).T. Sharq, 2012
- [6] Tsarikayev A.T. Disfranchisement During The Election Campaign To The Soviets Of 1928/1929 (On The Example Of North Ossetia And Vladikavkaz [Electronic Source] Follow The Link: <https://cyberleninka.ru/article/n/lishenie-izbiratelnyh-prav-v-period-vybornoy-kampanii-v-sovety-1928-1929gg-na-primere-severnoy-osetii-i-vladikavkaza>

- [7] Shamsutdinov R. Village Tragedy: collectivization, oppressing and deportation. T Sharq, 2003
- [8] "Instructions to the Councils on Elections." A collection of laws and orders of the Workers' and Peasants' Government of the USSR. December 12, 1927. № 38.
- [9] Yakubov N.S. The classic nature of the electoral system in the constitutions of the Turkestan ASSR and the Uzbek SSR.
- [10][Electronic resource] the link: <https://7universum.com/ru/social/archive/item/11086>
- [11]The State Central Archives of the Republic of Uzbekistan. r 86 fund, List N1, case N 6449, 246-260 pages
- [12]UzR AVDA. Fund 186, List 48, Page 86
- [13]UzR AVDA. Fund 186, List 3, Page 1.

## *Linguacultural Aspects Of Communication*

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**Abstract – Language, culture, interdependence of ethnic groups, linguistic view of the world and anthropocentric paradigm, the role and characteristics of national-cultural linguistic units in discursive communication are interdisciplinary problems and are studied as ethnological, sociological, psychological and cultural processes.**

**The study of the linguistic and cultural aspects of communication is important for highlighting the unique potential of the language as an expression of national consciousness and national contemplation, the national mentality of the Uzbek people, the national way of life, the level of national and cultural values. This article discusses these issues, in particular, the analysis of the meaning of linguistic units in the process of communication, the correct interpretation of their semantic and pragmatic meaning.**

**Keywords – linguistic view of the world, empirical knowledge, communicant, cultural meaning, national-cultural values, national stereotype, ethnic imagination, image, metaphor, analogy, connotation, symbolic concept.**

The communicator perceives the linguistic landscape of the world around him on the basis of general notions, expressions, empirical knowledge of the socio-cultural group to which he belongs, and as a communicator begins speech activity on the basis of basic notions interrelated with the cultural meaning of information. In this context, linguoculturological principles aim to study language as a product of cultural consciousness, an important component of it and a condition of existence, as a factor in the expression of concepts formed in cultural consciousness.

As far as man grows up in a native language environment that preserves the system of national and cultural values, he enters the world of national culture as a person. The accumulative function of language, which is an invaluable gift of the Creator in terms of its relation to values, becomes even clearer. In human consciousness, the linguistic view of the world is formed through such peculiarities as national stereotypes, ethnic perceptions, figurative metaphors, analogies, connotative words, symbolic concepts [20].

Initially, Humboldt's views on the need to focus on the culture of the nation in the study of the relationship between language and thought led to the emergence of a new direction. Based on the hypotheses put forward by scientists such as A.A. Potebnya, E. Sepir, Wharf, according to Maslova, in the formation of this industry the opinions of linguists such as A.A.Potebnya, L.Weisgerber, H.Glints, H.Holts, U.D.Witney, D.U.Powell, F.Boas, E.Sepir, B.L.Worf, G. Brutyan, A. Vezhbitskaya, D. Haymes were the basis,

whereas the theoretical bases of linguoculturology were formed in the researches of V.N.Telia, V.A.Maslova, V.Vorobyov, V.M.Shaklein, V.I.Karasik, Yu.M.Lotman, S.V.Ivanova [1; 8; 4; 6; 3].

The relationship of language and culture in Uzbek linguistics [9; 10; 18; 19; 17; 21; 2; 5; 12; 16.] is also widely studied. The book "Language and Culture" co-authored by M. Mirtojiev and N. Mahmudov can be called the first step in this direction. It highlights the fact that more than a hundred years of colonialism were the cousins of the development of the Uzbek language, the restoration of the national language as a result of the sharp struggles of the advanced intelligentsia only on the eve of independence, the process of turning the sources of enrichment of our dictionary into national origins in the context of the emergence of national culture in the language for the first time [11, 25].

Professor N.Mahmudov's article "In search of ways to perfect the study of language" provides in-depth and substantive coverage of the essence of linguoculturology, the anthropocentric paradigm in general, and the problems in this area. The article provides very well-founded considerations about the factors that contributed to the formation of linguoculturological theory, the basic concepts in it, the differences in their interpretation. "[7, 29].

D.E.Lutfullaeva, D.S. Khudoiberganova pay attention to the linguocultural and ethnolinguistic features of language units that are directly related to the text - precedent text, sentiment, metaphor, analogy [7, 29].

Sh.Uzmanova's "Course of lectures on the subject of Linguoculturology", M.Saidova and U.Kuziev's methodical manual "Linguoculturology" studied the general issues of this subject. "Semantic and linguoculturological features of anthropozoomorphisms (in the material of Uzbek and Spanish languages) by D.K. Bakhronova, "Linguoculturological features of signifying lexemes" by B.R. Kadyrova were studied; in the dissertation of Doctor of Philosophy (PhD) "Linguocultural study of analogies in the Uzbek language" authored by F.F.Uzmanov, its special features are studied. This means that the scope of scientific research on language and culture in Uzbek linguistics is expanding.

The study of linguistic and cultural aspects of communication is important in highlighting the unique potential of language as an expression of national consciousness and national thinking, the national mentality of the Uzbek people, the national way of life, the level of national-cultural values.

"Language serves as a means of collecting and storing cultural information. In some language units, this information may have been hidden for modern language carriers due to changes over the centuries, but can only be obtained indirectly. But it exists at the subconscious level and "works" [8, 11].

As the children get older, we adults start to get anxious: we collect what we have and start preparing for the wedding. It is no secret that when it comes to marrying a boy or getting a girl, it is understood, first of all, the wedding expenses, to collect the wedding clothes of the bride and groom. If we refrain from spending on food and other necessities in the household, we will try to make up for the lack of food that will be served in front of the crowds.

*"Dear, when will we decide the wedding day?" Said the wife.*

*"I have to talk to the bridesmaids before the wedding," I told my wife.*

*"What will you talk to them about, we'll do as people do."*

*"Well, to be a little more concise, where, for example, is it written that so much should be given?"*

*"Oh, you're still stingy, and if you reduce what you're giving, won't the bridesmaids say that we are mean. Let's drop it. No-one considers that this matches your working status. On top of that, we ate at the wedding of the people, and we should do the same!*

*... Finally, we reach the day we have been waiting for: one day we will scatter what we have gathered. Then we take it easy ... That's it, we did our duty ... (from the Internet)*

In order to be able to analyze the meaning of language units in the process of communication, to understand and correctly interpret their semantic-pragmatic meaning, this subconscious knowledge is required from the language carrier. The reality in this text is a familiar view for Uzbek speakers - the lines related to a modern lifestyle. But doesn't the antinomy "misqollab-botmonlab" (very hard to achieve – very easy to waste) in the text provoke an objection in the language carrier, creating a communicative barrier? Although these words were used by our ancestors as expressions of a unit of measurement and are no longer in use today, through the logical chain of the text we understand the meaning of "kam-ko'p" (more or less) via the subconscious senses. That is,

the material wealth accumulated over the years is "wasted" in a short time. This is a linguistic expression of an indisputable habit of the modern Uzbek mentality.

Thus, the customs and traditions, religious and spiritual values of the ethnic group to which the language belongs, that is, the peculiarities of the mentality of the nation, are reflected in its speech activity.

The Explanatory Dictionary of the Uzbek Language properly explains the essence of the concept of mentality: "Mentality [ger. mentality <lat. mens, mentis – wit, perception]. The level of historical content contemplation of a society, nation, community or individual, their cultural potential, their ability to analyze the laws of life, their mental ability in certain social conditions, their mental strength (the mentality of a society, nation or individual covers their specific traditions, customs, customs, religious beliefs and superstitions) [14, 678].

Maslova points out that there are different approaches to the study of language in the cultural aspect today, and describes the following 11 different methods:

**1. Descriptive.** Individual elements and appearances of culture are descriptive, listing customs, activities, values, ideals, and more. With this approach, culture is described as a set of achievements and institutions that regulate people's relationships with each other (3. Freud).

**2. As a value.** In this, culture is interpreted as a set of spiritual and material values created by people. For an object to have value, a person must know that it has such properties. The ability to determine the value of objects is related to the formation of values in the human mind, but with its help perfect models are created or the ideals, imagination, with which real-life objects are compared, are also important. The downside of such an approach is the narrowing of the content, as the diversity of activities emphasizes only values, not the individual.

**3. As an activity.** Culture is understood as a way of satisfying human needs, a specific type of activity. B. Malinovsky began this approach.

**4. Functional.** It describes culture through the functions performed in society: informational, adaptive, communicative, regulatory, normative, evaluative, integral, socializing, and so on. The weak point of this approach is the lack of development of the theory of functions, the absence of their consistent classification.

**5. Герменевтик.** Маданиятга матнлар тўшлами сифатида қарайди. Улар учун маданият - бу матнлар йиғиндиси, аниқроғи, матнлар йиғиндисини яратадиган механизм (Ю.М. Лотман). Матнлар маданиятнинг асоси ва қонидир. Уларни олиниши керак бўлган маълумотлар омбори сифатида ҳам, муаллиф шахсиятининг ўзига хослиги билан яратилган ноёб асар сифатида ҳам кўриб чиқиш мумкин. Ушбу ёндашувнинг камчилиги матнни аниқ тушунишнинг иложи йўқлигидадир.

**5. Hermeneutic.** In this case, culture is considered as a collection of texts. For them, culture is a collection of texts, more precisely, a mechanism that creates a collection of texts (Yu.M. Lotman). Texts are the foundation and blood of culture. They can be considered both as a repository of information to be obtained and as a unique work created with the uniqueness of the author's personality. The disadvantage of this approach is that it is not possible to clearly understand the text.

**6. Normative.** According to this, culture is a set of norms and rules governing people's lives, a lifestyle program (V.N. Sagatovsky). These concepts were also developed by Y.M. Lotman and B.A. Uspensky, who understood the subconscious feelings expressed through culture through a system of certain prohibitions and norms of the community.

**7. Spiritual.** Proponents of this approach define culture as the spiritual life of a society, the flow of ideas, and other products of spiritual creativity. The spiritual world of society is culture (L. Kertman). The disadvantage of this approach is the narrowing of the concept of culture, because material culture also exists.

**8. Dialogic.** In this case, culture is a "dialogue of cultures" (V. Bibler) - it is a form of communication between subjects (V. Bibler, S. Averintsev, B.A. Uspensky). Ethnic and national cultures created by individual peoples and nations are distinguished. Among national cultures, subcultures are distinguished. These are the cultures of individual social strata and groups (youth subculture, subculture of the underground world, etc.). There is also a metaculture that unites different nations, such as Christian culture, Islamic culture. All of these cultures interact. The more developed a national culture is, the more it seeks to communicate

with other cultures and is enriched by these connections as it absorbs their achievements, but at the same time it is integrated and standardized.

**9. Informative.** It presents culture as a system for creating, storing, using, and transmitting information; it is a system of signs used by society, in which social information is encrypted, i.e., content entered by people, meaning. (Yu.M.Lotman). Here you can see the similarities with the computer, more precisely, with its information software: machine language, memory and data processing software.

**10. The symbolic approach** focuses on the use of symbols in culture. Culture is a “symbolic world” (Yu.M. Lotman). Some of its elements have a specific ethnic meaning and become a symbol of nations: white skinned birch, cabbage soup and porridge, samovar, boots, sundress - for the Russians; ghost legends and myths in castles - for the British; spaghetti - for Italians; beer and sausage - for the Germans and others.

**11. Typological approach.** (M.Mamardashvili, S.S.Averintsev) In meetings with representatives of other nationalities, people tend to perceive their behavior in terms of their own culture, that is, as "measuring them by their own criteria." For example, Europeans in contact with the Japanese are surprised by their smiles when they talk about the death of their loved ones. They see it as a demonstration of heartlessness and cruelty. From the point of view of Japanese culture, this subtle gentleness is understood as not wanting to bother the interlocutor with their problems [8, 15].

According to the general principles of scientific research, each of these methods is applied not on a case-by-case basis, but on the basis of mutual cooperation and harmony. But in terms of research direction and intended purpose, one can prevail over the other.

For example, let's take the concept of "**omonat**" (*deposit*), "**omonatdor**" (*depositor*), which is typical of the Eastern moral norm.

**Omonat** (*deposit*) [Arabic - reliability; accuracy, honesty; something given for storage; gift; inheritance] 1. Storing for someone, temporarily using or transferring to another person. Deposit letter. Omonat money.

2. Money and other things deposited in a deposit, an item.

3. The amount deposited by the client in the bank under certain conditions. (This meaning, in our opinion, is metonymic and has a nominative meaning: for example, I have looked through the types of deposits)

In the figurative sense (our comment, for some reason the structure of the dictionary is broken, there is an ambiguity in the numbering of own and figurative meanings):

1. "**Omonatini topshirmoq**" idiom (to hand over a deposit) - to die, to pass away.

2. **Omonat** (barely) adverb - Chol supadagi yog'och so'riga omonat ilinib, niyatini aytishga so'z topolmay qiylandi (*The old man was barely stuck on a wooden bench, and he could not find the words to express his intentions*). "Youth".

3. **Omonat** (not eternal; temporary) adjective - Odam – omonat, diydor – g'animat (*Man is not eternal, meeting face to face is appreciated*). Proverbs. For example, Jiyan ijara uyda omonat o'tirdi (*Nephew rented house temporarily*). "Youth".

4. **Omonat** (barely hanging; frail) adjective - Omonat bino (*barely hanging building*). For example, Oshpaz kosaga lag'mon suzib, yo'nilmagan taxtadan omonat yasalgan stol ustiga qo'ydi (*The cook floated the lagman into the bowl and placed it on a frail table made of uncurved wood*). S.Ahmad, Ufq [15, 356].

First, we see that this concept is sealed in the foundations of our faith. The lexical meanings of this word, which is derived from the Arabic language, also indicate this: reliability; honesty; something given for saving; gift; inheritance. Hadith: There are three signs of a hypocrite. He tells lies. He does not keep his promise. He betrays other's deposit. (From the hadith) It is clear from the content of the hadith that not lying, keeping a promise, and not betraying other's deposit are important signs of true humanity. This concept of deposit has its own expression in a number of phrases and combinations in our language.

omonat - liveness, life given by God

omonatini topshirmoq - to die, to pass away.

omonatga hiyonat qilmoq - to betray the deposit (things given) of others

omonat ish ovora qiladi - the work done barely bothers



omonat qiyomatga qolmasin - Do not leave the given deposit until the Day of Judgment.

In Russian, only the semantics "temporariness" of the word "omonat" (deposit) is emphasized, and the religious-philosophical aspects of our cultural understanding are not expressed. **Временный, -ая, -ое; Непостоянный, бывающий или действующий** в течение некоторого времени. Временное явление. Временный работник. Эти трудности временны. П сущ. временность, -и, ж. [13, 230]

Thus, in the process of analysis of the concept of deposit, the descriptive, spiritual, informative and typological aspects were clarified.

Issues such as language, culture, interdependence of ethnoses, linguistic landscape and anthropocentric paradigm, the role and peculiarities of national-cultural language units in discursive communication are interdisciplinary problems and are studied as ethnological, sociological, psychological and cultural processes.

#### REFERENCES

- [1] Арутюнова Н.Д. Язык и мир человека, 2-е изд. испр. – М.: Языки русской культуры, 1999. – I-XV. – 896 с.
- [2] Бахронова Д.К. Антропозоморфизмларнинг семантик ва лингвокультурологик хусусиятлари (ўзбек ва испан тиллари материалида). Филол. фан бўйича фалс. д-ри... дисс... автореф. – Т., 2017. – 49 б.
- [3] Воробьев В.В. Лингвокультурология. М.,Изд-во РУДН, 2008. – 340 с.
- [4] Иванова С.В. Лингвокультурологический аспект исследования языковых единиц. Дисс. ... д-ра филол. наук. – Уфа, 2003. – 364 с.
- [5] Кадирова Б.Р. Белги билдирувчи лексемаларнинг лингвокультурологик хусусиятлари Филол. фан бўйича фалс. д-ри... дисс... автореф. – Т., 2019. – 55 б.
- [6] Карасик В.И. Лингвокультурные концепты: подходы к изучению // Социолингвистика вчера и сегодня. / Сб. научных трудов. – М., 2004. – С. 136-146.
- [7] Лутфуллаева Д.Э., Худойберганова Д.С. Антропоцентрик тилшунослик йўналишлари модули бўйича ўқув-услубий мажмуа. – Т., 2016
- [8] Маслова В.А. Лингвокультурология. – Москва: Академия, 2001. – 183 с.
- [9] Маҳмудов Н. Тилнинг мукамал тадқиқи йўллари излаб... // Ўзбек тили ва адабиёти. – Тошкент, 2012. – № 5. – Б. 3-16.
- [10] Маҳмудов Н. Ўхшатишлар – образли тафаккур маҳсули // Ўзбек тили ва адабиёти. – Тошкент, 2011. – №3. – Б. 19-24.
- [11] Миртожиев М., Маҳмудов Н. Тил ва маданият. – Т.: Ўзбекистон, 1992.
- [12] Мўминова А. Лингвокультурологиянинг замонавий тилшуносликдаги ўрни хусусида.// [www.journal.fledu.uz](http://www.journal.fledu.uz)
- [13] Ожегов С.И., Шведова Н.Ю. Толковый словарь русского языка. – Москва, 1960.
- [14] Ўзбек тилининг изоҳли луғати. 5 жилдли. 2-жилд. – Т.: ЎЗМЭ, 2006.
- [15] Ўзбек тилининг изоҳли луғати. 5 жилдли. 3-жилд. – Т.: ЎЗМЭ, 2007.
- [16] Усманов Ф.Ф. Ўзбек тилидаги ўхшатишларнинг лингвомаданий тадқиқи. Филол. фан бўйича фалс. д-ри... дисс... автореф. – Т., 2020. – 57 б.
- [17] Усмонова Ш. Лингвокультурология. – Т.: 2018. – 245 б.
- [18] Худойберганова Д. Матнинг антропоцентрик тадқиқи. –Тошкент: Фан, 2013.
- [19] Худойберганова Д. Ўзбек тили ўхшатишларининг изоҳли луғати. – Т.: Маънавият, 2013. – 320 б.
- [20] Худойберганова З.Н., Мамаражабов Б.Б. Тил ва маданият: ўзаро муносабат ва ўзаро таъсир масаласи. // <https://cyberleninka.ru>
- [21] *Xudoyberganova D. Lingvokulturologiya terminlarining qisqacha izohli lug`ati. – T.: Turon zamin ziyo, 2015. – 40 b.*

# *On Estimation Of The Influence Of Some Factors Leading To Increasing Melting Of Ice Coverings Of The Earth Surface*

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**Abstract – The article presents the results of the study of some mechanisms and physical foundations of thawing processes of ice coatings contaminated with household and industrial waste.**

**Keywords – mechanisms, modelling representations, absorption of a light solar energy, dispersion section, a solar energy.**

## I. INTRODUCTION

Further pollution of the ice cover of the mountains, as well as the south and north poles, create more serious complications in the ecological situation of the planet. The simultaneous influence of various natural forces, which increases the negative impact of pollution, can be a source of emergency situations.

In this paper, an attempt is made to follow the development of a possible negative situation by following the radiophysical methods of multiple wave scattering. For accurate calculations, the task is very difficult and it is almost impossible to trace through the process of the development of negative phenomena. Therefore, the work mainly evaluates the influence of various natural factors [1-4].

## II. SOME TYPES OF POLLUTION AND SOME ENVIRONMENTALLY HAZARDOUS AREAS.

The main dangerous areas exposed to natural and industrial pollution are the mountains and ice sheets of the south and North poles. There are a lot of mechanisms of contamination. For example, part of the industrial emissions and natural dust for more than two hundred years due to the convection of air masses settle at the north and south poles (moreover, the dust settles for as long as it exists). It should be added here that the charged particles of emissions and dust drift and fall out at both the north and south poles, depending on their charges. Further, the particles of pollution drift into the thickness of the glaciers, almost evenly polluting them vertically. Accordingly, the conductivity of ice increases and, as a result, their absorption properties increase. Here we also need to add the possible influence of clusters (especially if they have a closed form) on the absorption of radiation,

followed by the conversion of the energy of the latter into the thermal energy of the surrounding ice particles. All of the above points lead to an increase in the melting of glaciers.

**III. ESTIMATION OF THE ABSORBED SOLAR RADIATION POWER BY THE GLACIER SURFACE.**

We take the incident field as a plane wave -  $E(\vec{r}) = E_0 \exp(i\vec{k} \cdot \vec{r})$  with a unit amplitude. Let the incident power be equal to one. As a result of contamination, snow and ice particles will become good conductors.

Under these conditions, a significant part of the incident power in the particles is converted into thermal radiation. The refractive index of the contaminated particle can be represented in a complex form:

$$n = n_1 + in_2 \quad (2)$$

In the Born approximation, for the absorption cross section of such a particle, we can obtain the formula [2]:

$$\sigma_a = \int k \frac{4n_2}{|n+1|^2} \exp[-2kn(z-z_2)] dv^1 \quad (3)$$

here, the  $z_i$  - coordinate inside the particle

In addition to this exact formula, you can also take into account the particle size distribution, but this will greatly complicate the task (estimates), although the corrections will not be very significant. Therefore, assuming that the particles are spherical with a diameter  $a$  for the absorption cross section, we obtain:

$$\sigma_a = \pi a^2 \left\{ \frac{4n_2}{(n_2 + 1)^2 + n_2^2} \right\} \left\{ 1 + \frac{2 \exp(-4kn_2 a)}{4kn_2 a} + \frac{2}{(4kn_2 a)^2} [\exp(-4kn_2 a) - 1] \right\} \quad (4)$$

Here, the exponential terms give a significant contribution only for radiations with  $\lambda = 10$  cm. Therefore, for the optical, infrared, or even millimeter ranges, the absorption cross-section can be assumed to be equal to

$$\sigma_a = \pi a^2 \frac{4n_2}{(n_2 + 1)^2 + n_2^2} \quad (5)$$

Note another assumption, namely, the particles are considered to be evenly distributed over the surface of the ice cover and located so close to each other that their number in one square meter can be estimated as:

$$N = \frac{2}{\pi a^2} \quad (6)$$

Further, for the amplitude of the absorbed field as a result of multiple scattering, we obtain a decreasing series:

$$E_s = \sigma + \sigma^2 + \sigma^3 + \dots \quad (7)$$

The total absorption power is equal to:

$$P_s = |E_s|^2 \quad (8)$$

or

$$P_s = \sigma^2 + \sigma^3 + \sigma^4 + \dots \quad (9)$$

This expression, if written as  $P = \sigma(1 + \sigma + \sigma^2 + \sigma^3 + \dots)$  it strongly resembles a decreasing geometric progression. It can be evaluated as  $P_s \approx \sigma^2 / (1 - \sigma)$ . This power is accounted for by one particle. If the number of particles on the  $1\text{m}^2 - N = 2 / \pi a^2$ , then the power absorbed by them is respectively equal to  $2\sigma^2 / \pi a^2 (1 - \sigma)$ .

It was noted above that the thickness of the glaciers is polluted with centuries-old dust, industrial waste. These contaminants, as well as on the surface, increase the absorption of electromagnetic energy in the long-wave part and, accordingly, increase the melting rate. Among other things, the following mechanism of increasing the melting of ice is also possible. In the thickness of glaciers, the formation of “dirty clusters” is possible. Let's say that such clusters have closed structures. Then temporary changes in the magnetic field or fluctuations of glaciers can lead to the appearance of induction currents in the clusters and, accordingly, the release of Joule heat. The simultaneous influence of these circumstances in the merchant with the pressure of the upper layers, reducing the melting threshold, can lead to a significant increase in the rate of ice melting.

**IV. ESTIMATION OF THE PRESSURE OF THE GLACIAL LAYER ON THE BASE LINE OF THE GLACIER**

Let's consider a simple problem of estimating the pressure force on the base line of a glacier. Despite its simplicity, this task will allow us to calculate the critical parameters by which it will be possible to distinguish the most unfavorable slopes covered by a glacier.

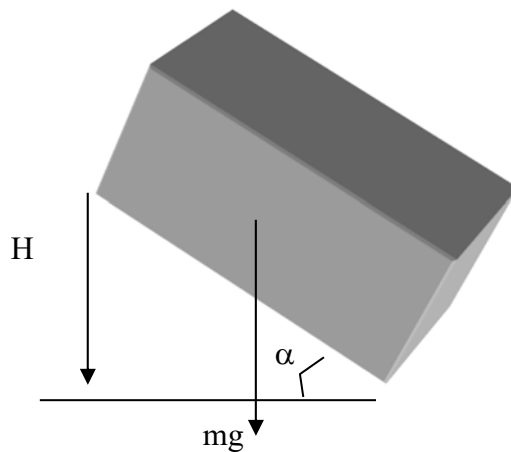


Fig. 1

Let the slope (Fig. 1) have the parameters: slope angle  $\alpha$ , height  $H$ , respectively, the length of the glacier  $H/\sin\alpha$  and the thickness of the glacier  $h$ . Then the weight of the glacier length  $N / \sin\alpha$  thickness and width of 1 meter will be equal to  $p = \rho \cdot h \cdot H / \sin\alpha \cdot g$ . Let's estimate this value for  $h=10\text{m}$ ,  $H = 7 \cdot 10^3 \text{ m}$  and  $\alpha = 45^\circ$ : then  $p = 9 \cdot 10^2 \cdot 7 \cdot 10^3 \cdot 10 / 0,7 = \frac{63}{0,7} \cdot 10^6 H = 9 \cdot 10^8 H$ . This weight without taking into account the friction will be carried down to the bottom with force

$$F_y = P \cdot \sin\alpha = 63 \cdot 10^7 H .$$

The forces of intermolecular adhesion mainly hold the ice on such slopes, in which the pressure of the glacier lying on top exceeds the value of  $1 \text{ N} / \text{cm}^2$ , then the ice begins to melt at  $0^\circ\text{C}$ , and at a pressure of  $675 \text{ N} / \text{cm}^2$ , the ice melts at a temperature of  $-5.53^\circ \text{C}$ , if the pressure is about  $1500 \text{ N}/\text{cm}^2$ , then melting occurs even at  $-14^\circ\text{C}$ , at a pressure of  $2000 \text{ N}/\text{cm}^2$ , this temperature is already equal to  $-20^\circ\text{C}$ .

**V. CONCLUSION**

From the above estimates, it follows that when the snow-glacial surface is polluted, the ice – granite boundary may be loosened, followed by an increase in the pressure of the ice floe on the base line, and as a result, the melting of the glacial slope may increase.

If we take into account the tidal forces during the periodic action of the moon, then the ice floe may split, and its subsequent sliding. This contribution and the contributions of other mechanisms can also be taken into account using simple calculations. The absorption of acoustic waves, radio waves, and a wide range of electromagnetic waves in molecular, intermolecular, and other processes also leads to the melting of glaciers [5-6]. This data will be presented in subsequent publications. The continued contamination of the northern and southern ice surfaces by industrial emissions (including transport emissions) can have irreversible consequences for the melting of ice.

**REFERENCES**

- [1] С. М.Рытов, Ю. А.Кравцов, В. И.Татарский Введение в статистическую радиофизику. Ч. II. Случайные поля. М. «Наука». 1978
- [2] А. Исимару. Распространение и рассеяние волн в случайно-неоднородных средах. Ч.1. М. «Мир».1981. с.279
- [3] Р.Маттук. Фейнмановские диаграммы в проблеме многих тел. М. «Мир». 1969. с.366
- [4] Е.А.Штрауф. Молекулярная физика. М. Гос. Издательство технико- теоретической литературы. 1949. с.575
- [5] М.И. Шахпаронов. Механизмы быстрых процессов в жидкостях. - М.: Высшая школа, 1980. - 352 с.
- [6] V.A. Durov. Thermodynamic Models of the System with Internal Variables: Fluctuation and Relaxation Phenomena. // J.Mol. Liquids, 2004, 113(1-3), 81-99.

# *The Use Of Digital Gaming Technologies In Solving The Problems Of Environmental Education*

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**Abstract** – This paper defines the theoretical justification and the possibility of using digital gaming technologies in the process of solving the problems of environmental education at various stages of the general educational system. A theoretical review of mobile, computer applications and the practical possibility of their use in accordance with the age and individual characteristics of students in the process of environmental education are brought in the article.

**Keywords** – Environmental Outlook, Environmental Education, Play, Information Technology, Personality Education, Mobile And Computer Gaming Technologies.

## I. INTRODUCTION

The actuality of this article largely corresponds to the requirements of the time. Environmental education is one of the most important factors in the formation of a full-fledged, harmoniously developed personality, focused on preserving and increasing the world’s natural wealth, rational use of natural resources of one’s own country and even the formation of national and racial tolerance among civil society. Today, the education of an ecological worldview is placed at the head of many educational systems in the developed countries of the world.

One of the problem areas in the formation of an ecological worldview is the use of information technologies in the process of education, the transition from the educational and academic into the digital plane. Meanwhile, in modern conditions of constant digital noise and pollution of the media space, the teacher has to fight for the student’s attention with various polluting media objects. Mobile and computer games are elevated by most teachers to the rank of the main enemies of the educational and upbringing process. While they can also be used as a powerful means of educational influence on students in the selection and combination of scientific knowledge, theoretical substantiation of game material, pedagogical foundations of education and didactics of the process, combined with the brightness and colorfulness of the gameplay. The current scientific work is devoted to the consideration of this problem, **the object** of which is mobile and computer gaming technologies in the educational process, and **the subject** is environmental education at different stages of the educational process.

## II. THE AIM OF THIS WORK

To consider the use of mobile and computer gaming technologies in the context of education of an ecological worldview.

### III. MAIN PART

Today, there are many approaches to defining the concept of an ecological worldview. Modern teachers who were engaged in the field of pedagogical ecology such as V.V. Lisnichenko and N.B. Lisnichenko gave their following definition to the ecological worldview: “*The ecological worldview is a set of views, assessments, principles that it determines the general vision of a person of his place in the world around him, and at the same time life positions, programs of behavior, actions in the social and natural environment, allowing not to violate natural balance in the system “man – society – nature”*”[4]. At the same time, academician D.K. Belyaev defines the ecological worldview much more succinctly, namely, as a persistent conviction, desire to preserve and understand our influence on nature [1]. By N.G. Vasiliyev is even argued that the concept of an ecological worldview has some notions in following. *Ecological worldview is a set of scientific and everyday knowledge about the relationship of society with nature, ethical, aesthetic, value attitudes of a given subject, that is, specifically subjective features of ecological consciousness, reflecting a specific social environment and specific natural conditions life of the subject of spiritual and practical development of nature*”[2].

Meanwhile, based on the specifics of the subject of ecology, we can derive our own definition of the concept of an ecological worldview: An ecological worldview is an awareness of one’s own place and the importance of human in the natural system of nature. This approach to the definition is the most objective for the simple reason that, often, a person is considered as the highest stage of the evolution of nature, separated from it by some sign. However, as we all know, human is only a part of nature and even far from the highest, because, as the famous scientist biologist Charles Darwin defined that the dominant in the environment is not the perfect or the strongest species, but the most adapted species is in a given niche [3]. Thus, we come to the realization that the preservation of nature and natural diversity is not a necessity for the sake of nature itself, but for the survival of our species. Arguing in this plane, we come to the main problem of ecology – to its misunderstanding and interpretation.

One of the methods for overcoming this problem may be the use of ICT in the process of environmental education. These include, for example, virtual excursions, considered in the lesson and outside the lesson of 3-D models, the construction of such based on knowledge of the principles of biological systems, the use of interactive environmental educational presentations and tasks of an environmental nature, as well as many other methods and techniques.

The main share of environmental education in the general educational system is education in the framework of natural science and biology, which includes both in-class and out-of-class work [5,7].

One of the special and rarely considered forms of using mobile and computer technologies in the pedagogical sphere is mobile and computer games, which combine the advantages of game forms of teaching and upbringing of students in conjunction with the advantages of the operational electronic systems themselves [8,9,10]. Of course, such a form of presentation of material can’t and should not be used by a teacher as the fundamental principle of the didactic and educational process. However, it may well be used as a reinforcing, actualizing factor, a factor in team rallying around a common (in particular, ecological) task, as a method of submitting additional material in a public form or as a means of solving the problem of the absence of an object for research by students.

Games of this kind can be roughly divided into two broad groups:

- Context learning games;
- Purposeful educational games.

In this system, context-learning games here will be existed many computer and mobile games and applications that do not have a direct context and an obvious environmental orientation, but include environmental elements. Therefore, for example, these will be various natural simulators that allow the child to plunge into the natural habitat of this or that animal. These kinds of games are especially common today among students of primary school and the first stage of secondary general education, however, it is necessary to emphasize that before recommending the game as a complementary or general developmental game aid, the teacher must carefully approach the issue of studying the game. Many of these games eventually acquire an exclusively playful character and abandon the scientifically grounded mechanism of play [6].

In turn, for example, an excellent example is Plague.inc, which can serve as a visual aid both for considering the environmental characteristics of the spread of various types of diseases, and as an illustration of the complexity of countering the spread of diseases. Where the student can feel like the head of higher education institutions and may reconsider its attitude to the recommended sanitary

measures. In addition, many games reflect the current ecological state and the unequal struggle of environmental scientists with the consequences of technogenic pollution of the environment.

Meanwhile, as mentioned earlier, games of this type can only be used as an addition to the educational process and be supported by some kind of didactic task. For example, returning to the example of a disease simulator, you can instruct students to write an essay on the importance of maintaining personal health to ensure the safety of everything society or the nature of the rapid spread of some pathogens in the population due to poor environmental conditions.

A special and most significant group of computer and mobile games and applications are special games or didactic ones. To date, there are very few such games in the open access and most of them are at the stage of testing and implementation in general pedagogical practice, however, some developers directly target educational audiences. For example, these include the *Mosaic3D app* from the developer *Mosaic Education*, which has more than a thousand different game 3D models, including those on environmental and biological topics, as well as on history, physics, chemistry and many other school disciplines.

This group also includes specially designed games for individual purposes, for example, a teacher can unite students from an entire school into a single ecosystem by developing an interactive game mobile application. For example, for each “Ecological” case, the student will bring points to their group or class, and the teacher will monitor compliance by analyzing the photos and videos sent through the application of work results of students. At the same time, a distinctive feature of such an application could be an open database system, an electronic library and the presence of various mini-applications for the entertainment of students in their free time.

#### IV. CONCLUSIONS

Thus, despite the low level of knowledge and insufficient material on computer and mobile gaming methods of educating an ecological worldview in the public domain, delving into the jungle of the Internet, a talented teacher can find enough applications and games that position themselves as a teacher’s assistant. However, contextual learning can also be used for the same purposes, which, meanwhile, as practice shows, is often even much more effective in terms of education than special education, because not only we influence the environment, but also to a greater extent – what surrounds us influences us.

#### REFERENCES

- [1] Belyaev D.K. Match the requirement of the time. Questions of Philosophy. 1986. – Pp. 98 -108.
- [2] N.G. Environmental consciousness: Genesis and Essence. Doctoral dissertation. – Irkutsk, 1985. – 23 p.
- [3] Darwin Ch. The origin of species by natural selection or the preservation of favorable races in the struggle for life. Translation from the sixth edition (London, 1872). The executive editor is academician A. L. Takhtadzhyan. – St. Petersburg: “Science”, 1991 – [ URL] <http://charles-darwin.narod.ru/origin-content.html>
- [4] Lisnichenko V.V, Lisnichenko N.B. Fundamentals of pedagogical ecology // Severodvinsk: “Severodvinsk city printing house. – 2015. – P. 95.
- [5] Continuous environmental education: problems, experience, prospects // *Materials of the All-Russian scientific and practical conference*. – Tomsk: Deltaplan, 2017. – 277 p.
- [6] Sabiryanova Yu. Yu. The use of computer games in the ecological education of preschoolers // Yu. Yu. Sabiryanova. – Text: direct // Bioeconomics and Ecobiopolitics. – 2016. – No. 1 (2). – Pp. 121-124. – URL: <https://moluch.ru/th/7/archive/26/1171/> (date of access: 27.02.2021).
- [7] Sukhorukova O.E. Formation of the ecological worldview of schoolchildren // Materials of the V International Student Scientific Conference “Student Scientific Forum” URL: <https://scienceforum.ru/2013/article/2013008700> (date of access: 27.02.2021).
- [8] Sharipova D.D., Shakhmurova G.A., Karimova S.I., Akhmedkhodzhaeva N.A. The use of the health-preserving component of multimedia technologies at the university in the classroom of the biomedical cycle. Ta’lim tekhnolari. Ilmiy-usubiy magazine. – T., 2014. – No. 2 (46). – Pp. 28-30.



- [9] Shakhmurova G.A., Egamberdieva L.N., Akhmedkhodzhaeva N.A. The use of information technology in the learning process of biology. Innovation in Education: Search and Solutions. Collection of materials of the II-nd international scientific-practical conference. National Academy of Education named after I. Altynsarin. – Astana, November 20, 2015. – Pp. 576-578.
- [10] Shakhmurova G.A., Khamdamova M.I. The use of information - computer technology in higher educational institutions in the classes of “Anatomy and human physiology” // Вестник НУУз. 2020. - №1/3. С.56-58.

# *Catégories Et Sante Des Exploitants Des Plaines D'inondation De La Basse Vallée De L'Ouémé Au Benin (Afrique De L'ouest)*

SOUDE Jacques ; ABDOULAYE Djafarou ; AZONHE Thierry et SINSIN Brice



**Résumé**– Les pratiques et modes d'exploitation des ressources naturelles des plaines inondables de la basse vallée de l'Ouémé sont mal connus. C'est un secteur qui couvre les communes d'Adjohoun, des Aguégus, de Bonou et de Dangbo dans l'Ouémé (Sud-Bénin). L'objectif de la présente recherche est d'identifier les catégories d'exploitants affectés dans l'exploitation des plaines inondables de la basse allée de l'Ouémé

L'approche méthodologique utilisée comprend la recherche documentaire et l'enquête de terrain qui s'est basée sur les observations directes et l'administration de questionnaires à un échantillon de 1 379 personnes sur 1 500 prévus. Les interviewés proviennent des villages représentant 60 % des localités des communes de la basse vallée de l'Ouémé.

Les résultats obtenus indiquent que la basse vallée de l'Ouémé couvre une superficie de 1 236 km<sup>2</sup> dont 74 930 ha de superficies cultivables constituées essentiellement de plaines inondables qui reçoivent les alluvions après les crues. Cette caractéristique favorise diverses activités telles que la pêche, l'artisanat, l'élevage et la culture de contre-saison dans la basse vallée toute l'année. L'exploitation des plaines inondables par les populations de la basse vallée de l'Ouémé leur procure le mieux-être, en leur assurant un revenu qui contribue à l'amélioration de leur situation socio-économique. Toutefois des inquiétudes liées à l'effet des modes d'exploitation desdites ressources demeurent. Ainsi, les affections prédominantes rencontrées chez les exploitants sont le paludisme (62 %), les affections gastro-intestinales (4 %) et les affections lombaires ou douleurs de hanche (3 %).

**Mots clés** – Modes d'exploitation, plaine inondable, santé, basse vallée de l'Ouémé.

**Abstract** – The practices and exploitation's modes of the natural resources of the easily flooded plains of the lower valley of Ouémé are badly known. It is a sector which covers the communes of Adjohoun, Aguégus, Bonou and Dangbo in Ouémé (South-Benin). The objective of this research work is to identify the categories of affected farmers of the easily flooded plains of Ouémé's lower Valley.

The methodological approach used includes documentary research and the field survey which was based on direct observations and the administration of questionnaires to a sample of 1379 people out of a planned 1500. The interviewees come from the villages representing 60% of the localities of the communes of the lower valley of the Ouémé.

The results obtained show that the low valley of Ouémé covers a surface of 1236 km<sup>2</sup> including 74930 ha of cultivable surfaces constituted essentially of flooded plains which receive the alluvial deposits after the risings. This characteristic permits diverse activities such as the fishing, the handicraft, the breeding and the counter-season's culture in the lower valley the whole year. The exploitation of flooded plains by the populations of low valley of Ouémé procures them the improved standard of living, by ensuring them an income which contributes to the improvement of their socio-economic situation. However, anxieties bound to the effect of the exploitation modes of the aforesaid resources remain. Thus, the prevailing affections that the farmers are victims of are: malaria (62 %), stomach aches (4%) and the lumbar affections or hip pains (3 %).

**Keywords** – Exploitation's modes, easily flooded plain, health, the lower valley of Ouémé.

## I. INTRODUCTION

Les préoccupations de développement n'ont cessé de retenir l'attention de la communauté internationale. Ainsi, depuis la Conférence des Nations Unies sur l'homme et son environnement tenue à Stockholm en 1972 et le Sommet Planète-Terre sur l'environnement et le développement tenu à Rio de Janeiro en 1992, les problèmes écologiques se retrouvent au centre des débats.

De ce fait, la Communauté Internationale a pris conscience du fait qu'il ne saurait y avoir de société et d'économie équilibrée (MEHU, 1996), dans un monde victime d'une dégradation continue des ressources naturelles. Les formes de dégradation de l'environnement s'étendent à une échelle internationale voire mondiale et porte atteinte à toutes les composantes du milieu dont la forêt, l'eau, le sol et l'atmosphère (RERAT, 1994).

Les questions de gestion des ressources naturelles font l'objet depuis quelques années de séminaires, de colloques internationaux, dont la conférence de Rio de Janéiro (1992), qui a défini des directives précises aux différents acteurs dont entre autres, l'élaboration de l'Agenda 21 pour lequel les nations se sont engagées pour sa mise en place au niveau local, national et régional. Une décennie après, à la conférence de Johannesburg tenue en 2002 en Afrique du Sud, il a été élaboré un plan d'application du Sommet mondial pour le développement durable. Ce plan concerne entre autres, la protection et la gestion des ressources naturelles aux fins d'un développement durable.

L'homme, dans la recherche de la satisfaction de ses besoins, utilise et exploite les ressources naturelles du milieu qui sont ainsi transformées et dégradées (Soude, 1997). Dans la basse vallée de l'Ouémé les modes d'exploitation inventoriés concernent entre autres : l'agriculture, la pêche, l'élevage, le commerce, le transport, l'exploitation du sable lagunaire et l'exploitation forestière. Parmi ces activités, l'agriculture, la pêche et l'élevage viennent en tête (Vodounou, 2002).

Le rythme d'exploitation des différentes ressources du milieu entraîne la dégradation de l'environnement, l'érosion des berges, l'encombrement et le comblement des milieux aquatiques et plans d'eau (Vodounou, 2002). L'exploitation des plaines inondables en général et celles de la basse vallée de l'Ouémé en particulier expose les exploitants à des risques et nuisances de pollution, préjudiciable à leur santé.

## II. PRESENTATION DU MILIEU D'ETUDE

La basse vallée de l'Ouémé qui couvre territorialement les Communes d'Adjohoun, des Aguégus, de Bonou, de Dangbo et de Sô-Ava est située entre 02°25 et 02° 32 de longitude Est et entre 06° 27 et 06° 94 de latitude Nord. Elle est constituée d'une série de deltas qui s'étend de Bonou jusqu'à la latitude des Aguégus. Elle est limitée au Nord par la commune de Ouinhi avec le haut-delta qui s'étend de Zagnanado jusqu'à Bonou, au Sud par la commune de Sèmè-Podji avec le Lac Nokoué et la Lagune de Porto-Novo, à l'Est par les communes d'Adja-Ouèrè, Sakété et Porto-Novo avec le Plateau de Porto-Novo et à l'Ouest par les communes de Zè et d'Abomey-Calavi avec la rivière Sô comme l'indique la figure 1.

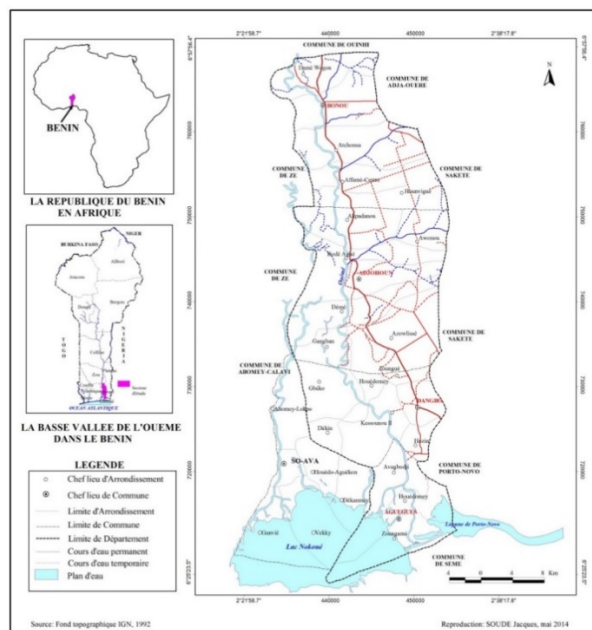


Figure 1 : Situation géographique de la Basse Vallée de l'Ouémé

La basse vallée de l'Ouémé couvre une superficie totale estimée à 1 236 km<sup>2</sup> dont 74 930 ha (DDC/Bureau de Coopération de l'Ambassade de Suisse, 2001) de superficie cultivable, avec une population totale de 336 975 habitants (RGPH 4 -2013). Elle appartient à la région subéquatoriale de l'Afrique de l'Ouest caractérisée par un climat à quatre saisons :

- une grande saison de pluies de mars-avril à juillet favorable aux travaux champêtres et à la pêche à travers la technique de parcs de branchage ;
- une petite saison sèche d'août à septembre propice à la pêche ;
- une petite saison des pluies septembre à novembre qui se prête tout particulièrement à la pêche et à la chasse ;
- une grande saison sèche de décembre à mars favorable à l'agriculture et à la pêche.

### **III. MATÉRIEL ET MÉTHODE**

*Deux types de questionnaires et un guide d'entretien élaborés ont permis d'appréhender comment les activités anthropiques impactent sur la dynamique de l'occupation des terres et les effets sanitaires subits par les exploitants des plaines inondables.*

un GPS (Global Positioning System) de marque Garmin GPS Map 60CSX pour le relevé des coordonnées des unités vérifiées sur le terrain dans le cadre de la campagne « vérité terrain », en vue de la validation des cartes ;

un appareil photographique numérique Sony Cyber-shot muni de GPS (10.2 Méga pixel) pour la prise des vues.

Dans le cadre de cette recherche, la Méthode Active de Recherche Participative (MARP) a permis de collecter les informations auprès des populations paysannes, du personnel d'encadrement, des intellectuels communautaires (personnes ayant une bonne connaissance des faits climatiques et qui en détiennent la mémoire à travers les canaux informationnels traditionnels).

Ce point concerne également la recherche documentaire ; l'échantillonnage, la méthode et le traitement des données.

#### **3.1. Analyse des documents existants**

Elle a permis d'appréhender et de délimiter les grands ensembles du milieu physique et d'acquérir des connaissances de base sur l'état d'occupation des sols. Pour ce faire, la carte topographique de la Commune de Bonou, feuille d'Affamè NB-31-XV-3d, Dahomey au 1/50000e (Type Outre-mer), la carte topographique, feuille de Porto-Novo NB-31-XV-3d, Dahomey au 1/50000e (Type Outre-mer) ont été exploitées. En outre, la carte d'occupation des sols Bénin, situation de 2006 à l'échelle de 1/200.000 (Projet de IFN) a été utilisée.

#### **3.2. Echantillonnage**

La basse vallée de l'Ouémé couverte par deux départements (Ouémé et Atlantique) est constituée de cinq (5) communes qui comptent 99 979 ménages dont 27 020 ménages agricoles (RGPH 4, 2013) ; elle couvre vingt-huit (28) arrondissements comprenant 170 villages dont 102 villages disposent de plaines inondables.

L'unité statistique étant le ménage, les ménages agricoles exploitant les plaines inondables sont estimés à 20 986. La détermination de la taille de l'échantillon passe par le calcul d'un coefficient de réduction qui est un ratio par commune. Ainsi, considérant la population des ménages agricoles, la taille  $n$  de l'échantillon est supérieure ou égale à 50 et inférieure au  $1/10$  de la population comme l'indique la relation suivante :  $50 \leq n \leq 1/10 P$

Avec  $P$  représentant la population de la localité et  $n$  l'échantillon

Ainsi, elle est estimée à 1 500. Avec ce nombre, il a été déterminé l'effectif réel par commune comme le montre le tableau I.

#### **3.3. Traitement des données**

Des logiciels de traitement et d'analyse statistique ont été utilisés. Il s'agit de :

- Logiciel ArcGIS version 10.1, il a permis de faire non seulement certains travaux réalisés sur ArcView., mais aussi d'autres travaux complémentaires pour réaliser les cartes.
- Map Source pour le déchargement des informations du GPS ;
- Ainsi, des logiciels d'analyse statistique, d'importation et de conversion des données ont été exploités à savoir :
- Le tableur Excel a été utilisé pour la représentation graphique des statistiques extraites des résultats cartographiques, la conversion et l'importation ou l'exportation des données sous d'autres formats compatibles avec d'autres programmes informatiques.

A l'issue de cette méthodologie, les résultats suivants ont été obtenus et analysés.

#### IV. RESULTATS

Dans la basse vallée de l'Ouémé, le travail est organisé selon le statut de chaque membre des ménages agricoles. Cette organisation facilite la cohésion au sein des ménages et favorise une production qui assure dans une certaine mesure la sécurité alimentaire.

##### 4.1. Répartition du travail au sein des ménages

La survie des populations et l'exploitation des ressources des plaines inondables sont régies à travers dix-huit activités réparties entre les membres des ménages agricoles selon leur statut. Cette répartition se présente comme l'indique le tableau I suivant.

Tableau I : Organisation du travail au sein des ménages agricoles dans les plaines inondables de la basse vallée de l'Ouémé

N°	Statut des membres Travaux effectués	Chef de ménage	Epouse (s) du chef de ménage	Grands enfants non mariés	Grandes filles non mariées
1	Construction, réparation des cases	+			
2	Défrichage	+		+	
3	Billonnage	+		+	
4	Semis	+	+	+	+
5	Entretien des cultures (sarclages)	+	+	+	+
6	Surveillance contre prédateurs			+	
7	Récolte, nettoyage et transport	+	+	+	+
8	Elevage petits ruminants et volailles	+	+		
9	Elevage de bovins	+		+	
10	Pêche, trou à poisson	+		+	
11	Transformation des produits		+		+
12	Cueillette (feuille, bois, feuille de thalia)	+	+		+
13	Cueillette (fruitiers)	+		+	
14	Corvée d'eau		+	+	+
15	Préparation de repas et ménage		+		+
16	Commercialisation des produits		+		+
17	Artisanat, vannerie, tressage, poterie	+	+		+
18	Réparation du matériel de pêche	+		+	

Source : travaux de terrain, 2011-2012-2013

Légende : + : Activité réalisée

L'analyse du tableau IV indique que la division du travail au sein des ménages se présente globalement comme ci-après :

- les hommes y compris les grands enfants non mariés se chargent de la préparation (défrichage, essouchage, billonnage, labour, etc.) puis de l'installation des champs de cultures annuelles dans la plaine d'inondation (photo 1). Pour les tâches connexes (semis, entretien, surveillance, récolte), ils recourent généralement à l'aide des femmes et des enfants. Comme activités secondaires, ils pratiquent la pêche, l'artisanat de production. C'est également aux hommes qu'incombent les tâches de construction et de réparation des cases, des trous à poisson.



**Photo n° 1** : Mise en place de pare-feu autour de la forêt Gnanhouizounmè.

Prise de vue SOUDE en janvier 2015.

- les femmes y compris les grandes filles non mariées prennent activement part aux travaux champêtres et de pêche comme l'indique la planche 1. Généralement, leurs activités sont axées sur les travaux domestiques (préparation de repas, propreté de l'habitation, soins aux enfants, corvée d'eau et de bois). Elles constituent également la main d'œuvre la plus importante et "qualifiée" pour le transport des produits récoltés (fruits, légumes, céréales, racines et tubercules), la transformation, la recherche et la commercialisation (feuilles, feuille de thalia, poisson, etc.)



**Planche 1** : Femme en train d'éplucher le manioc-Femme en train de transformer le manioc en farine-Femme de retour de la corvée d'eau à Gnanhouizounmè (Commune de Bonou)

Prise de vue SOUDE, avril 2014 et janvier 2015.

Le mode dominant reste encore le faire-valoir direct de type familial. Dans ce cas, généralement l'exploitation familiale se suffit en main d'œuvre. Toutefois, pour certains travaux à exécuter soumis à des contraintes de calendrier agricole (en particulier les cultures de décrue), les exploitants recourent à des groupes d'entraide ou des occasionnels salariés agricoles. Cette organisation des ménages permet d'évaluer les différents domaines de production. Ainsi, celle qui est la plus importante dans la gestion traditionnelle des plaines inondables est la production végétale.

#### 4.2. Production végétale

La production végétale prend en compte ici l'agriculture et l'exploitation forestière. Les produits de forêts sont essentiellement tirés des formations naturelles et anthropiques provenant des forêts communautaires (Gnanhouizounmè, Gbèvozoun, à Bonou, Kodjizoun et Bamèzoun aux Aguégoués, Kpinkonzounmè à Adjohoun, Yessizoun et Legbazoun à Kessounou Dangbo). L'agriculture concerne les activités axées sur la production de céréales (*Zea mays* (maïs), *Phaseolus vulgaris* (haricot) et *Oryza sativa* (riz), de solanacée. (*Lycopersicon esculentum* (tomate) et *Capsium frutescens* (piment), de malvacée (*Hibiscus esculentum* (gombo), de feuilles (légumes) et de racines (*Manihot esculenta* (manioc) et *Ipomea batata* (patate). Ces produits constituent la base alimentaire des populations des plaines inondables de la basse vallée de l'Ouémé (Planche 2)..



**Planche 2** : Champ de *Manihot esculenta* (manioc) à Hozin Commune de Dangbo et *Hibiscus esculentum* (gombo) à Gogbo Commune d'Adjohoun en train d'être récolté. Prise de vue SOUDE le 15 février 2012 et 17 mars 2015

Cette planche traduit les spéculations *Manihot esculenta* (manioc) et *Hibiscus esculentum* (gombo), qui sont pratiquées sur les plaines inondables en février et mars, une période qui coïncide avec la saison sèche sur le plateau et où l'humidité du milieu favorise les cultures de contre-saison dans la basse vallée de l'Ouémé.

En ce qui concerne l'artisanat, l'argile de Kodonou (Kessounou) constitue une ressource importante pour la communauté de cette localité. Ainsi, en dehors de la fabrication des jarres qui se fait par les femmes, il y a la commercialisation des jarres non cuites qui sont finalisées par les femmes d'Agoundji (Dangbo) comme le montre les illustrations ci-jointes



**Planche 3** : Foyer de cuisson de jarres et Assemblage de jarres cuites et finalisées à Agoundji (Dangbo) Prise de vue SOUDE le 18 juillet 2014

La planche montre un foyer de cuisson de jarres après la fabrication dans une cour de concession avec en arrière-plan une bananeraie. Ensuite, les jarres retirées après cuisson sont regroupées dans la cour de la concession devant les bananiers.

#### 4.3. Catégorie d'exploitants et affections enregistrées dans l'exploitation des plaines inondables de la basse vallée de l'Ouémé

L'intervention dans l'exploitation des plaines d'inondation de la basse vallée de l'Ouémé, nécessite des aptitudes et des attitudes au regard de l'exigence des activités qui s'y développent. Le traitement des données collectées a permis de dégager les catégories d'exploitants des plaines inondables de la basse vallée de l'Ouémé ; il s'agit :

- ☞ les vieux c'est-à-dire ceux dont le temps d'exploitation dépassent 30 ans qui souffrent de la bilharziose, diarrhée, paludisme, tension, ulcère, douleur d'articulation et fatigue
- ☞ les jeunes c'est-à-dire ceux dont le temps d'exploitation est compris entre 20 et 30 ans qui souffrent de maux de ventre, paludisme, tension et ulcère
- ☞ les adultes c'est-à-dire ceux qui souffrent plus de diarrhée.

C'est ce qu'indique la figure ci-dessous

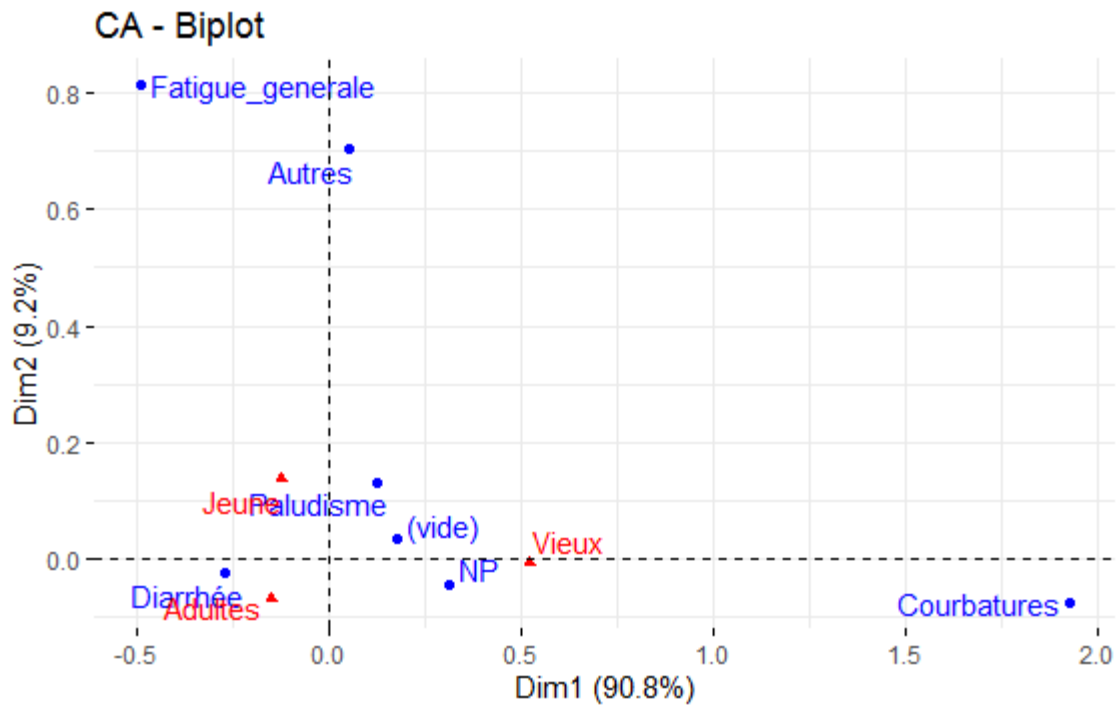


Figure 2 : Synthèse des affections enregistrées suivant les catégories d'exploitants des plaines inondables de la basse vallée de l'Ouémé

Les problèmes de santé sont ceux des pêcheurs, des cultivateurs, des artisans et dans une moindre mesure des éleveurs. La principale activité des populations couvertes par l'enquête est l'agriculture. Cette population dont la tranche d'âge se situe entre 20 à 60 ans (95,13 %) est composée essentiellement d'hommes ou de femmes mariés ou veufs. Elle est soumise à un certain nombre d'affections rencontrées en consultation ou en hospitalisation, et dont les principales sont représentées dans les figures ci-dessous

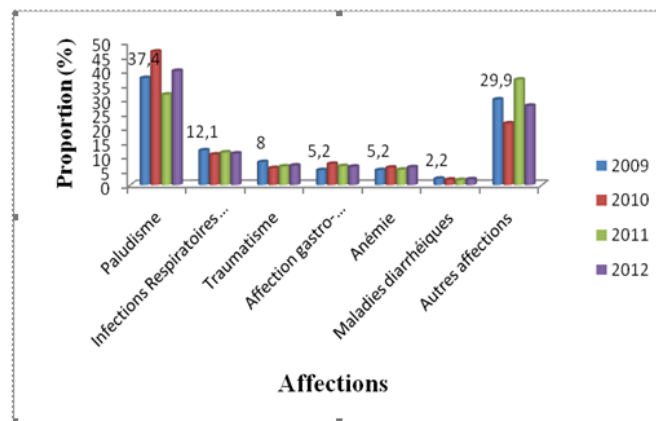


Figure 3: Taux des cinq premières affections rencontrées par année en hospitalisations dans les centres de santé du département de l'Ouémé-Plateau de 2009 à 2012 DDS O/P 2009 -2012

L'analyse de ces figures montre la prédominance du paludisme qui représente respectivement 46,62 % et 22,87 % en 2010 des affections aussi bien en consultation qu'en hospitalisation sur la période de 2009 à 2012 dans les centres de santé des communes de l'Ouémé. Au paludisme, peuvent s'ajouter les autres maladies dont l'anémie, les infections respiratoires et les maladies diarrhéiques. Les maladies diarrhéiques représentent 2,2 % et 2,7 % des affections enregistrées en consultation qu'en hospitalisation en 2009.

Les autres affections sont celles qui ne sont liées à l'eau ou qui n'ont pas de lien direct avec l'eau ; il s'agit des affections cardiovasculaires, des affections oculaires, des affections uro-génitales, des conjonctivites, etc.



La plupart de ces populations ont acquis une expérience dans les activités de l'exploitation de la plaine inondable. Malgré la durée (plus de 10 ans) de contact dans l'exploitation des plaines inondables, des cas de maladies sont enregistrées telles que le paludisme, la lombalgie, les affections gastro intestinales dont le choléra, les infections cutanées telles que l'ulcère de Buruli.

Les conditions d'apparition de ces maladies sont non seulement liées aux pratiques et techniques culturelles, à l'eau, mais aussi aux activités elles-mêmes.

A l'origine, l'agriculture tropicale dépendait des ressources naturelles, de connaissances, de savoir-faire et d'institutions. Sur les plaines inondables de la vallée de l'Ouémé, en fonction des moyens, les techniques traditionnelles de production ont continué ; ainsi, l'agriculture se pratique avec des outils rudimentaires, ce qui amène les exploitants à adopter une position courbée pendant une longue durée. L'adoption de cette position serait à l'origine des douleurs lombaires ou douleur de hanche.

Contrairement au plateau où les paysans partent au champ avec des bouteilles d'eau pour étancher leur soif, dans la vallée, ils se désaltèrent avec de l'eau souillée qui est souvent celle d'un trou à poisson ou celle d'un trou quelconque sur la plaine inondable ; cette eau résulte de la stagnation après le retrait de l'eau. D'après les investigations, cette eau est souvent utilisée pour se désaltérer ou délayer la farine au champ. Dans ces conditions, le risque des maladies diarrhéiques qui varie d'une année à une autre et selon les communes où il a été enregistré 1 % en 2009 aux Aguégus et 60 % en 2010 à Dangbo, a caractérisé plus la situation des exploitants qui l'ont infirmé dans les investigations comme le montrent les figures 35 et 36. L'absence d'eau potable dans le milieu aggrave la situation au niveau de toute la population. Ce qui est à l'origine des affections gastro intestinales qui représentent respectivement 44 % à Dangbo en 2010, 30 et 40 % à Adjohoun respectivement en 2010 et 2011 puis 33 % à Bonou en 2012 comme sur les figures 33, 34, et 35 avec les données enregistrés dans la zone sanitaire Adjohoun-Bonou-Dangbo et Porto-Novo-Aguégus-Sèmè-Podji (Annuaire des Statistiques sanitaires 2009 à 2012).

En dehors des conditions de travail déjà déplorables dans les champs, la majeure partie de la population consomme l'eau du fleuve ou d'un marigot telle qu'exprimée par 74 % des exploitants interrogés. Le milieu étant une zone de forte humidité, il est propice à l'éclosion des œufs du moustique femelle (l'anophèle) vecteur du paludisme 40 % (figure 4). Aucun cas de dracunculose ou ver de guinée n'a été enregistré pendant la période des investigations ; dans le même temps, les données concernant l'Ulcer de Buruli, maladie cutanée très invalidante, qui sévit dans les zones intertropicales humides, et se manifeste d'abord par un nodule, et plus tardivement par de vastes ulcérations cutanées, causées par une toxine secrétée par *M. ulcerans*, n'étaient pas disponibles lors des investigations. Toutefois, la prévalence de l'ulcère de Buruli, qui présente de graves handicaps : limitations importantes des mouvements articulaires et cicatrices invalidantes entre autres, est plus élevée dans les communes de Bonou, Adjohoun et Dangbo. Pour cette pathologie, les facteurs de risque identifiés sont notamment : le contact avec des eaux stagnantes, le port de vêtements courts pendant des activités agricoles et le soin incorrect des plaies. Tandis que les facteurs protecteurs décrits sont l'utilisation de moustiquaires, le lavage fréquent des vêtements, la pêche dans les eaux du Nyong qui est un fleuve du Cameroun et le soin correct des plaies avec des solutions antiseptiques.

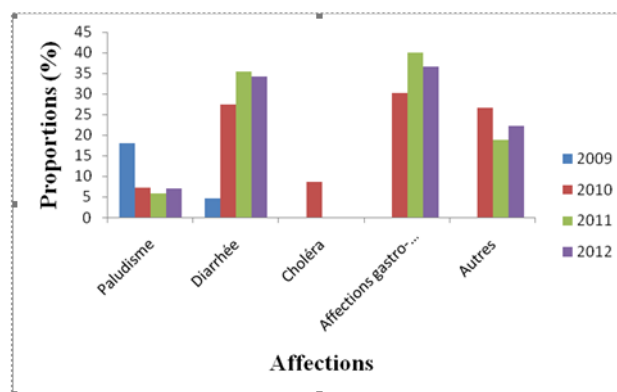


Figure 4 : Evolution des maladies liées à l'eau par année dans la commune d'Adjohoun

Source : Annuaire des Statistiques sanitaires des zones sanitaires Adjohoun-Bonou-Dangbo et Porto-Novo-Aguégus-Sèmè-Podji (2009 à 2012) DDSP O/P

D'après cette figure, le paludisme présente une proportion élevée (18 %) seulement pour 2009 tandis que cette affection est absente les autres années ; cette absence s'explique par les campagnes de sensibilisation caractérisées par la distribution de moustiquaires imprégnées aux populations et la mise en application des conseils prodigués.

Ensuite, toutes les années 2009 à 2012 connaissent la présence de toutes les affections, mais avec une particularité relative aux diarrhées et affections gastro-intestinales qui présentent des proportions élevées supérieur à 25 % et inférieur à 45 % pour les années 2010 et 2011. Cette situation s'explique par la faible application des mesures d'hygiène et des précautions à prendre pour réduire les affections.

Il faut mentionner l'apparition du choléra en 2010 ; cette affection résulte des effets des crues exceptionnelles de 2010 (figure 5).

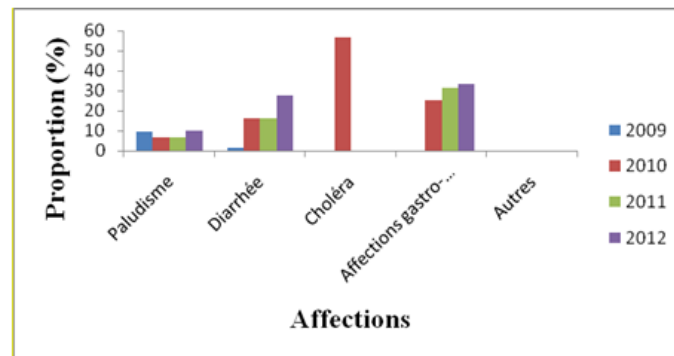


Figure 6 : Evolution des maladies liées à l'eau par année dans la commune de Bonou

Source : Annuaire des Statistiques sanitaires des zones sanitaires Adjohoun-Bonou-Dangbo et Porto-Novo-Aguégués-Sèmè-Podji (2009 à 2012) DDSP O/P 2009 -2012

Dans la commune de Bonou, les années 2009 et 2012 sont marquées par le paludisme bien que faiblement enregistré, suivi de diarrhées fortement enregistrées en 2012. Ce faible taux du paludisme provient de l'utilisation des conseils de prévention et des précautions qui sont prises. Tout comme à Adjohoun, le choléra a été fortement enregistré en 2010 (figure 7).

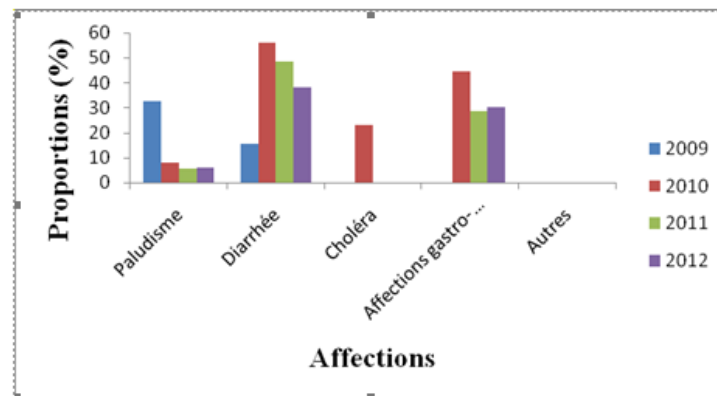


Figure 7 : Evolution des maladies liées à l'eau par année dans la commune de Dangbo

Source : Annuaire des Statistiques sanitaires des zones sanitaires Adjohoun-Bonou-Dangbo et Porto-Novo-Aguégués-Sèmè-Podji (2009 à 2012) DDSP O/P 2009 -2012

Tout comme à Adjohoun, la figure de l'évolution des maladies liées à l'eau dans la commune de Dangbo présente un fort taux de paludisme (32,4 %) en 2009 et les diarrhées toutes les autres années respectivement en 2010, 2011 et 2012 avec un taux variant entre 38,2 % et 56,2 %. Cette situation est due à la mauvaise application des conseils et mesures de prévention et de précautions des maladies liées à l'eau.

Aux affections relatives au paludisme et aux diarrhées, s'ajoute le choléra enregistré en 2010 en raison des effets de crues exceptionnelles de cette année.

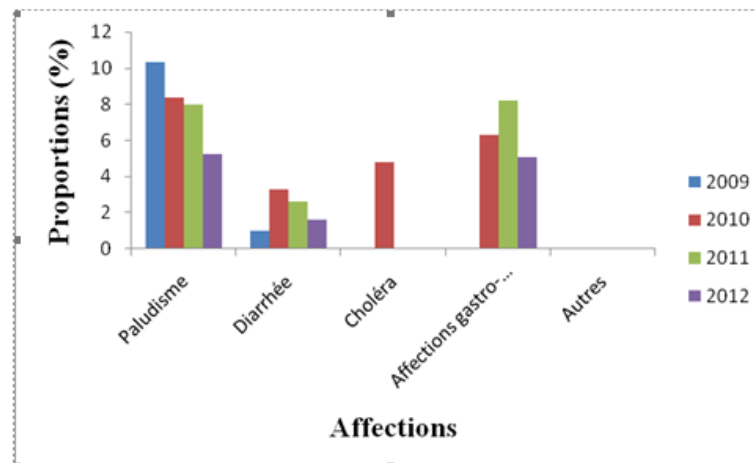


Figure 8 : Evolution des maladies liées à l'eau par année dans la commune des Aguégoués

Source : Annuaire des Statistiques sanitaires des zones sanitaires Adjohoun-Bonou-Dangbo et Porto-Novo-Aguégoués-Sèmè-Podji (2009 à 2012) DDSP O/P 2009 -2012

Dans la commune des Aguégoués, le paludisme prend une proportion élevée toutes les quatre années selon les annuaires statistiques exploités (figure 9). Le paludisme est suivi par le choléra puis les diarrhées.

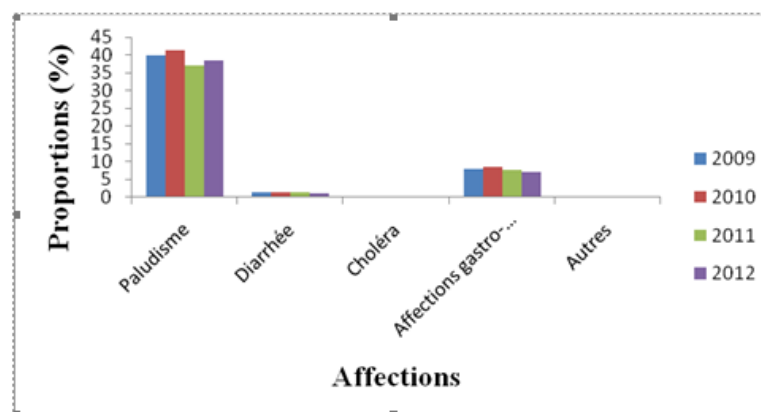


Figure 9 : Evolution des maladies liées à l'eau par année dans la commune de Sô-Ava

Source : Annuaire des Statistiques sanitaires de la zone sanitaire Abomey-Calavi –Sô-Ava (2009 à 2012)

Dans la commune de Sô-Ava, parmi les affections liées à l'eau, le paludisme occupe une proportion élevée pour toutes les années de 2009 à 2012. Ce fort taux s'explique par la présence des gîtes de moustiques, vecteur de la transmission de la maladie, l'inobservance des mesures de précaution et de prévention de la maladie.

Les informations des services départementaux de santé recueillies, exploitées et comparées aux données collectées au niveau des ménages de dégager trois catégories de maladies à savoir :

- ◆ les maladies liées à l'eau (paludisme);
- ◆ les maladies transmises par l'eau (choléra, diarrhée, bilharziose),

- ◆ les affections dues à l'exploitation des plaines inondables (douleurs de hanche et des articulations, etc.).

Parmi les maladies liées à l'eau, l'on relève la prédominance du paludisme dans les communes de la basse vallée et surtout à Dangbo, l'existence des diarrhées et du choléra à Adjohoun ; dans les affections liées à l'exploitation des plaines inondables, on note la présence des douleurs de hanche et des articulations.

Enfin, le non-respect des prescriptions (exposition et manipulation) et l'utilisation des produits chimiques exposent les exploitants et toute la population à des risques d'intoxications.

#### 4.4. Discussion

Malgré l'atout que représente les plaines inondables de la basse vallée de l'Ouémé, les plantes de ses forêts sont utilisées pour les soins des maladies contractées. Un constat similaire est fait par l'Organisation Mondiale de la Santé (2002), qui déclarait que plus de 80 % de la population africaine a recours à la médecine traditionnelle en matière de santé. Cet attachement à cette médecine relève du fait que celle-ci fait partie intégrante du patrimoine socioculturel des communautés. Par ailleurs, la médecine traditionnelle constitue un véritable moyen de traitement des maladies pour les populations locales qui n'ont pas toujours les moyens financiers pour s'acheter les médicaments modernes généralement au-dessus de leur pouvoir d'achat. Les connaissances endogènes en médecine traditionnelle des populations sur les espèces végétales des forêts sacrées et communautaires sont d'une grande richesse et varient d'un groupe socioculturel à un autre. Ces résultats corroborent le constat de l'OMS, qui affirme que 4/5 de la population mondiale dépendent des médecines traditionnelles pour leur santé. Pour Ali Omar (2009), « nos masses rurales qui comptent pour plus de 90 % de la population nationale disposent des moyens financiers les plus dérisoires pour faire face aux prix sans cesse croissants des produits pharmaceutiques modernes, alors qu'elles n'auront pas besoin de faire 100 pas au - delà de leur maison avant d'avoir leurs médicaments gracieusement offerts par la nature ». Elle est la médecine de proximité qui se caractérise par la diversité de ses moyens thérapeutiques, son accessibilité et son acceptabilité. Dans ce même sens, Sangaré (2003), trouve que la non-accessibilité géographique et économique aux soins de santé, de même que les comportements socioculturels, sont les facteurs qui font que plus de 80 % de la population en Afrique ont recours à la médecine traditionnelle.

#### V. CONCLUSION

Les plaines inondables de la basse vallée de l'Ouémé font partie des zones humides du Sud-Bénin. Elles appartiennent au site 1018 de RAMSAR. Elles ont une grande importance économique pour les populations à travers les différents produits qu'elles offrent.

A travers les différents modes et pratiques d'exploitation des plaines inondables par lesquels, les exploitants adoptent diverses positions et font usage des dépôts alluvionnaires au retrait des eaux après les crues, les produits récoltés apparaissent sains contrairement à ceux qui font usage d'intrants dont les produits renferment les germes de ces intrants. Ces exploitants sont exposés à des maladies liées à l'eau que sont le paludisme (62 %), les affections gastro-intestinales (4 %) et les affections lombaires ou douleurs de hanche (3 %), qui n'empêchent pour autant l'exploitation des ressources naturelles et des plaines inondables qui sont les seuls moyens dont disposent les populations pour assurer leur existence. Les ressources naturelles concernées par ces exploitations sont le sol, l'eau et la végétation.

Quelle que soit la ressource, l'exploitation bien que ne respectant pas les normes environnementales, permet aux exploitants de trouver des revenus qui permettent d'améliorer les conditions de vie sociale et économique en inscrivant des enfants, en changeant le cadre de vie (construction de nouvel habitat plus moderne).

#### REFERENCES

- [1] ABE, 1999. *Étude diagnostique de la gestion des zones humides du Sud- Bénin : état actuel des connaissances relatives aux zones humides du Sud-Bénin*. Rapport de synthèse, Cotonou, 55 p.
- [2] ABE & CBDD, 1997. *Programme d'Aménagement des Zones Humides du Bénin* ; PAZH/Bénin. Rapport de formulation, Cotonou, Bénin, 97p.
- [3] ABOTCHI T. & HOUNDAGBA J.C., 2003. Disponibilité et gestion des ressources en eau dans la basse vallée de l'Ouémé au Sud-Bénin, *in Revue Travaux et Recherches Géographiques*, n°17, Déc.2003 : 39-66.

- [4] ADAM K. S., 1993. *Etude sur l'aménagement des habitats des plaines d'inondation du Bénin* : rapport intermédiaire. MEHU, PNUD, Cotonou, Bénin, 119 p.
- [5] ADJAKPA B. J., 1999. *Etude de la faune aviaire des zones humides du Bénin : inventaire faunique, habitats et cycles migratoires*, Rapport de consultation, CEROE, Cotonou, Bénin, 42 p.
- [6] AGBANI K. M. A., 2000. *Dynamique fluvio-lacustre et impacts environnementaux dans le sud-Ouest du Bénin (Afrique de l'Ouest)*. Mém. de DEA-Gestion de l'environnement ; FLASH/UNB, Abomey-Calavi, 71 p.
- [7] AKOEGNINO A., van der BURG W.J., van der MAESEN L.J.G., ADJAKIDJE V., ESSOU J.P., SINSIN B., & YEDOMONHAN H., 2006. *Flore Analytique du Bénin*. Leiden, Backhuys, 1034 p.
- [8] AKOEGNINO A., 2004. *Recherches botaniques et écologiques sur les forêts actuelles du Bénin (Afrique de l'Ouest)*. Thèse de doctorat d'Etat. UFR Biosciences, Côte d'Ivoire, 325 p.
- [9] ALI OMAR M., 2009. Pharmacopée traditionnelle et valorisation d'autres ressources naturelles par la femme Toubou dans le Termit-Niger, ME/ LCD, P/ ASS, 75p.
- [10] ASSOGBADJO A.E., 2000. Biodiversité des ressources alimentaires forestières et leur contribution à l'alimentation des populations locales. Cas de la forêt classée de la Lama. Thèse d'Ingénieur Agronome, FSA/UAC, 131 p.
- [11] Arrêté n° 0002/MEHU/DC/DGA du 07 février 1992 définissant les zones impropres à l'habitation
- [12] AKOWANOU E., (1991) : Aménagement hydro-agricoles et santé publique (cas du périmètre agricole irrigué de DEVE), Mémoire IRSP, Cotonou, 90p.
- [13] ASSABA O.M., 2009. *Variabilité climatique et dynamique des états de surface dans le bassin inférieur de l'Ouémé : cas de la rivière Sô*. Mém. de maîtrise de géographie, Université d'Abomey-Calavi, Bénin, 85p.
- [14] AYADOKOUN A.V.C.- Impacts de l'utilisation des pesticides organo chlorés et du trafic de produits pétroliers sur l'environnement côtier au Bénin. Exemple de la lagune de Cotonou. Mémoire de fin d'étude pour l'obtention du Diplôme d'Etudes des Techniques Supérieures (DETS). CPU /UNB, 52p.
- [15] AZONHOUME A. (1979) : Dégradation anthropique de la végétation naturelle sur le bassin sédimentaire côtier du Bénin. Mémoire de maîtrise de géographie, FLASH/UNB, Abomey-Calavi, 114 p.
- [16] BAGLO M., (1995) : Environnement et santé au Bénin. In Actes du Colloque Régional sur les soins de santé primaires au Bénin, 16 au 20 décembre 1993, "Dix ans d'expérience de développement communautaire à la base (CREDESA 1983-1993) Pahou pp 90-95.
- [17] BAGLO A.M., (1993). *Environnement et santé dans le cadre du PAE, séminaire national sur le développement agricole et la santé*, Cotonou, INFOSEC, 23 au 26 novembre 1993, 18 pages.
- [18] BA MOUSSA B.; BLOCK P. C.; BODART N.; CROUSSE B., 1991. *La vallée du fleuve Sénégal : évaluations*. Paris, Karthala, 380 p.
- [19] BELLONCLE G., (1985) : Participation paysanne et aménagement hydro-agricole. Ed KARTHALA ; Paris 340P
- [20] Bhowmik, N.G. et Stal, J.B., (1979): Hydraulic Geometry and Carrying Capacity of Flood Plains, Water Research Center, Research Report No. 145, Urbana, Ill., University of Illinois.
- [21] BLANC-PAMARD Ch., (1992) : Dynamique des systèmes agraires la santé en société : regards et remèdes. Ed ORSTOM, Paris, 302 P.
- [22] BOKO M., (1988) : Climatologie et communautés rurales du Bénin rythmes climatiques et rythmes de développement. Thèse de doctorat d'Etat ès Lettres à l'Université de Bourgogne, Dijon, 608p.
- [23] BOKONON-GANTA E., (1980) : Les climats de la région du golfe du Bénin. Thème de doctorat de 3<sup>e</sup> cycle, Paris IV Sorbonne, 248p + annexes
- [24] BOKONON-GANTA E., (1992) : Stress et pathologie liées aux types de temps d'harmattan dans la région du golfe du Bénin. In : BESANCENOT J.P., LIBBEY J. (coord.), Risques pathologiques, rythmes et paroxysmes climatiques, Eurotext, Paris, pp 271-278.
- [25] BOSSA J., (2000) : Etude des potentialités hydro agricoles de la basse vallée du fleuve Ouémé en aval de Bonou. Mémoire de DEA, Université nationale du Bénin, Faculté de Lettres, Arts et Sciences Humaines, Ecole Doctorale Pluridisciplinaire "Espaces, Cultures et Développement 58 p + annexes.
- [26] BRENGUES J. et HERVE J-P., (1998) : Aménagement hydro-agricoles et santé (vallée du fleuve Sénégal) Edition de l'ORSTOM, Coll. Colloques et Séminaires, 313p.
- [27] CLEDJO P., 2006. *La gestion locale de l'environnement dans les cités du lac Nokoué au Bénin méridional*. Thèse unique de doctorat, Université d'Abomey-Calavi, EDP/FLASH/UAC-Bénin, 323 p.

- [28] CLEDJO F.G.A.P., (1999) : La gestion de l'environnement dans les cités du lac Nokoué (région du littoral du Sud Bénin). Mémoire de DEA Gestion de l'environnement, FLASH/UNB Abomey-Calavi 59p.
- [29] CLEDJO F.G.A.P., (1995) : Rythme hydro-climatiques et affections gastro-intestinale en milieu lagunaire du bas Bénin. In : Climat et Santé n°13 Cahiers de bioclimatologie et Biométéorologie, Université de Bourgogne, pp.147-163
- [30] Commission du Bassin du Lac Tchad ; (2001) : Évaluation Environnementale et Évaluation Sociale (EE/ES) du projet FEM intitulé Renversement des Tendances de Dégradation des Terres et de l'Eau dans le Bassin du Lac Tchad. NDjaména, 88 p
- [31] CODJIA C.J., ASSOGBADJO A. E.et EKUE M.R., 2003. Diversité et valorisation au niveau local des ressources végétales forestières alimentaire du Bénin. *Cahier Agriculture-ISSN*,**12** (5) :321-331
- [32] CONVENTION DE RAMSAR, 1998. La Convention sur les zones humides. Brochure fait à partir d'une série de publications à l'occasion du 25<sup>ème</sup> anniversaire de Ramsar en février 1998.
- [33] CORNELIA Jasper, (...) : Les maladies causées par la pollution de l'environnement. Projet « Conseiller en Environnement auprès du MEHU/ GTZ », 50 p
- [34] Direction du Développement et de la Coopération (DDC)/Bureau de Coopération de l'Ambassade de Suisse, 2001. *Problématique de l'intercommunalité dans le fonctionnement des communes béninoises. LARES. Cotonou p*
- [35] DAN., 2009. Etude écologique, floristique phytosociologique et ethnobotanique de la forêt marécageuse de Lokoli. Thèse de doctorat. Université Libre de Bruxelles. 260 p.
- [36] DOSSOU M. E., 2010. Etude floristique phytosociologie et ethnobotanique et proposition d'aménagement de la forêt marécageuse d'Agovè et Zones connexes (Commune de Zangnanado). Mémoire de maîtrise/DGAT/FLASH/UAC. 54 p.
- [37] DOSSOU-GBETE G., SALIFOU S., ABOH A., DOSSA S., 2006. Evaluation participative de l'importance des tiques et méthodes endogènes de lutte au nord Bénin : perspectives et valorisations, *revue africaine de santé et de productions animales*, **4** (1-2) : 61-68.
- [38] LOKOHOUNDE M.P.,2002. Diversité des ressources forestières élémentaires végétales de la forêt classée des Trois Rivières et leur contribution à l'économie locale. Thèse d'Ingénieur Agronome. FSA/UAC, 104 p.
- [39] OMS, 2002. Stratégie pour la Médecine Traditionnelle pour 2002-2005.
- [40] SANGARE D., 2003. Etude de la prise en charge du paludisme par les thérapeutes traditionnels dans les aires de kandié (Bandiagara) et de Finkolo (Sikasso). Thèse Doct, Univ.Bamako, 115 p.
- [41] SINSIN, B. & KAMPMANN D., 2010. Atlas de la diversité de l'Afrique de l'ouest, druckerie Grammlish, Piezhausen, Germany, 726 p.
- [42] VIHOTOGBE R., 2001. Diversité biologique et potentialités socioéconomiques des Ressources Alimentaires Végétales (RAV) de la forêt de Pobè et de ses Zones connexes. Thèse d'Ingénieur Agronome, FSA/UAC, 103 p.
- [43] WOTTO A., 2013. Forestiers non ligneux chez les populations riveraines du Massif Forestier d'Agoua au Bénin. Mémoire de DEA/EDP/FLASH/UAC, 70 p.

## *Prospective Ways Of Methanol Application*

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**Abstract – The article presents the search for promising ways of using and processing methanol, the technology creation and development for new environmentally friendly, highly effective octane-increasing additives production. It was presented a technological scheme for the methyl tertiary butyl ether production.**

**Keywords – Methanol, Octane-Enhancing Additives, Gasoline, Methyl Tertiary Butyl Ether, Technological Scheme, Ether, Catalysis.**

Methanol is one of the most important products of the chemical industry, in production volumes, the leading places are occupied by Saudi Arabia, China, Trinidad and Tobago, Russia and the United States. Mainly methanol is used as raw material for many of organic synthesis products production, mostly formaldehyde (up to 50%), which serves as one of the components for the plastics and resins production [1]. About 65% in the methanol consumption structure in the world falls on the chemical industry - production of formalin, acetic acid, methyl methacrylate, methyl mercaptan, DL- methionine and etc. In the petrochemical industry, the main consumers are the isoprene and methyl tertiary butyl ether production (MTBE) [2]. Also methanol is actively used in the gas industry as a reagent in the fight against hydrate formation and a reagent for drying natural gas. In addition, the use of methanol in the olefins production on MTO and MTP technologies is being discussed today (ethylene and propylene) [3-5].

The most important problem at the present time is the search for alternative energy sources. This is due not only to the upcoming oil raw materials shortage, but also to environmental problems. Transport consumes about 40% of the oil produced in the world [6]. Use of hydrocarbon fuels in internal combustion engines accompanied by emissions into the atmosphere of a huge amount of harmful substances: nitrogen oxides, carbon monoxide, etc. The possibility of using alcohols as motor fuel seems to be very attractive. At the same time, harmful emissions are significantly reduced. The very problem of using alcohols as a fuel is not new, and in some European countries in the 1920s and 1930s, laws were passed that prescribe the alcohol addition to gasoline [7–8].

At the beginning of its development, the valuable hydrocarbons obtaining technology from synthesis gas was considered as a productive method for producing high-octane gasoline from coal. In fact, with this technology from coal or natural gas almost all hydrocarbons can be obtained, which could be obtained from petroleum raw materials. Methanol is dehydrated, forming an equilibrium mixture of methanol, DME and water, which, depending on the reaction conditions and catalyst can be directed or to obtain lower olefins (MTO process), or for the liquid hydrocarbons production (MTG process).

Although methanol itself is a potential motor fuel or can be used as an additive to gasoline, however, high financial costs are required to solve technical problems, associated with the use of methanol as a vehicle fuel.

1973 year was the year of the energy crisis, at the same time, interest in new synthetic fuels increased, and continued research on converting methanol to hydrocarbons was approved.

In the same year, MTG and MTO processes are carried out on an industrial scale, because for this there are technological and economic prerequisites. "Mobil" MOGD firm process (methanol-olefins-gasoline-distillate process) (Fig. 1) [9] was originally developed as a refinery process, which can be well combined with the MTO process. In the MOGD process on a ZSM catalyst the lower olefins oligomerization occurs, which enter the reactor from refinery streams, or converting olefins from the MTO process to high molecular weight olefins. The later fall within the boiling range of gasoline and distillate.

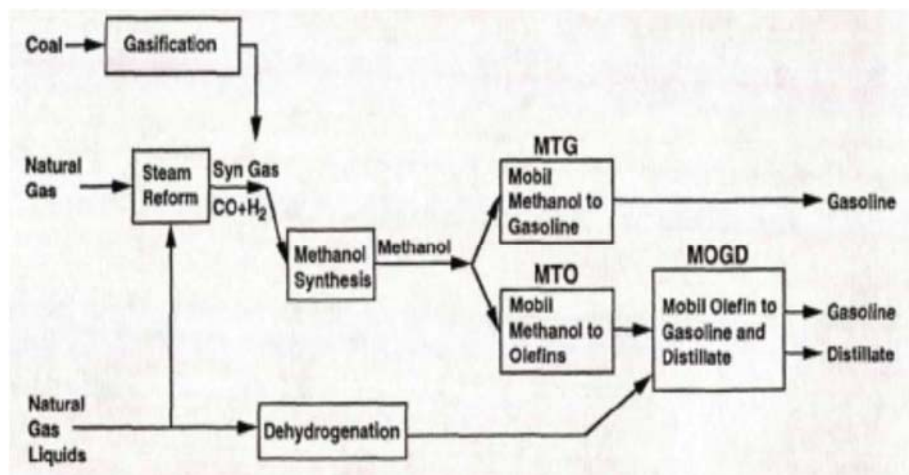


Fig. 1. Getting gasoline and distillate from methanol by technology of «Mobil» firm [10]

Synthesis gas is obtained from natural gas by steam reforming, which converts to methanol. The methanol is then sent to the MTG and/or MTO processes. The formed olefins are oligomerized with the natural gas dehydrogenation products by the MOGD process into gasoline and distillate.

The «Mobil Research», «Development Corporation», «Union Rheinische Braunkohlen KraftstoffAG» and "Udde GmbH" firms jointly created in Wesseling (Germany) a demonstration unit for the MTG process with a fluidized bed of catalyst [11], which from December 1982 to the end of 1985 worked with a liquid fuel 15.9 m<sup>3</sup>/day capacities (Fig. 2). This project is described in detail in [12] and [13]. This project was partially funded by the American and German governments.

A simplified diagram of the installation with a fluidized catalyst bed is shown in Fig. 2 shows that methanol is converted to steam and fed to the reactor. To improve the economy process, methanol is dehydrated. The reaction temperature can be used to produce high pressure steam; The MTG process is carried out on a ZSM-5 catalyst at about 400 °C temperature, partial pressure of methanol is 0.4-1 MPa.



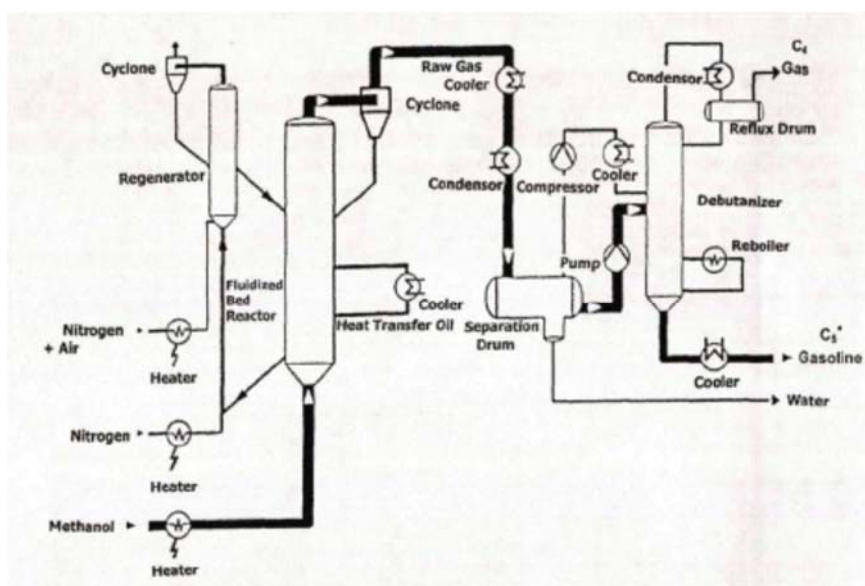


Fig. 2. Demonstration installation of MTG (Mobil)

For some physical and chemical properties (heat of combustion, octane number, etc.) methanol is approaching, and in such an important characteristic as the heat of vaporization, it even surpasses the best hydrocarbon fuels. However, the high methanol toxicity, aggressiveness hydrophilicity towards some metals, low heat capacity inhibits its use for internal combustion engines. In addition, the use of methanol as a clean fuel requires significant engine re-equipment. The more economical way seems, therefore, the methanol processing into gasoline. The gasoline formation process from methanol on the ZSM-5 catalyst proceeds through the methanol dehydration stage into dimethyl ether, which is further converted into a mixture of hydrocarbons (gasoline), consisting of more than 50% of valuable highly branched paraffins:  $2\text{CH}_3\text{OH}$  и  $\text{CH}_3\text{OCH}_3$ . Currently, the problem of using methanol as an additive to fuel for power plants is being seriously considered. In addition to the use of methanol as a fuel, we note its use as a raw material for obtaining high-octane additives to gasoline, primarily methyl tert-butyl ether (MTBE), which replaced the toxic tetraethyl lead in this capacity. The addition of small amounts of this antiknock agent allows the use of gasolines without adding such a toxic substance as tetraethyl lead. MTBE, the industrial production of which is rapidly growing in the world, is obtained by the interaction of methanol with isobutylene in the presence of acid catalysts [10, 14, 15].

It is known that the bulk of the oil produced in Uzbekistan is characterized by a high content of asphaltenes and resinous compounds and a low content of aromatic hydrocarbons and hydrocarbons of the iso-construction industry. Gasoline obtained by direct distillation of a mixture of oil and gas condensate has an octane number of about 50 RON (motor octane number).

In order to bring it to the SS requirement, there are two ways: chemical processing - reforming, platforming, destructive hydrogenation, etc., which requires huge capital costs. The second method is the use of octane-enhancing additives and additives. The FORP reformers capacities do not allow the gasoline production with an AI-80 octane rating and higher. Therefore, at present, the Fergana oil refinery plant uses imported reagents imported from foreign countries for foreign currency in the amount of about 70 million US dollars to increase the octane number of low-octane gasolines.

Currently in developed countries to increase the octane number of gasoline used aliphatic alcohols - methanol, ethanol, isopropanol; simple ethers - methyl tert-butyl ether (MTBE), ethyl tert-butyl ether (ETBE), amyl tert-butyl ether (ATBE), diisopropyl ether (DIPE); aromatic amines - monomethylaniline (MMA), ashless highly effective additive - AEA (70% MMA + 30% methanol), metallocenes - ferrocene, manganese, organic compounds (Hitech-3000), ADA, Ferrada and etc.

In JSC "Navoiazot" there is a methanol production from synthesis gas with 35 thousand tons capacity per year, which has no proper application.

Many works have been devoted to the use of aliphatic alcohols, including methanol and ethers such as dimethyl, methyl tert-butyl, aromatic amines and metallocenes as octane-increasing additives.

However, the use of aliphatic polyamines, esters, 1,1,3-trimethoxy and 1,1,3-triethoxybutanes, acetone, acetonitrile and sodium, potassium, magnesium, manganese acetates; ammonium nitrate and others as octane-increasing additives have not been studied.

The purpose of the research is to find promising ways of using and processing methanol, creating and developing a technology for new environmentally friendly, highly effective octane-increasing additives production.

Technological process for the production of octane-increasing additives (OIA) based on methanol developed by Tashkent chemical-technological institute jointly with CLO "Navoiazot" JSC, TADI and FORP. To test the process at the TCTI and CLO of JSC "Navoiazot", pilot plants have been mounted.

The production consists of three technological lines:

1. MTBE production installation based on butane fraction.
2. 1,1,3 - triethoxybutane production setup.
3. Installation for the chromium-alumina catalyst production.

The anti-knock properties of the developed octane-increasing additives have been tested at the TADI, FORP and Kuchlyuk oil depot laboratories. The process is periodic.

The developed method for obtaining octane-increasing additives consists of obtaining MTBE, 1,1,3-triethoxybutane and mixing them with acetone, methanol, acetonitrile, urotropine and manganese acetate.

In the octane-increasing additives, gaseous, liquid and solid wastes obtaining process are not formed.

Esters have a number of advantages over alcohols. The ethanol use is not advisable, which creates difficulties in exceeding the saturated vapor pressure norms, especially in the summer. Although methanol is the most readily available and cheapest of the known alcohols, it is unacceptable due to environmental considerations and its high water solubility. The ethers advantage over alcohols is that the latter have sufficiently high octane numbers and low saturated vapor pressure; they replace aromatics and butanes in gasoline. Methyl tert-butyl ether (MTBE) is the most widely used in practice. Its additive to gasoline reduces the carbon monoxide (to 27%) and hydrocarbons content in car exhaust gases. The tests carried out at Fergana ORP showed that the most economical MTBE additive is about 11%.

In the USA, it is allowed to use MTBE in compounded gasolines up to 15% by volume, which corresponds to 2.7% of the oxygen mass.

In some countries, due to groundwater contamination incidents with MTBE, due to the non-compliance of the tank farm for underground gasoline storage, a company was deployed to limit and even exclude this oxygenate use. The analytical company SRJnHrnatinal connects the noted facts with the tank farm improving problem. Currently, MTBE is produced in Russia in the amount of 400 thousand tons per year.

Although MTBE is the most effective additive with good performance characteristics, its production is associated with nuances number. The demand of Fergana ORP for MTBE is about 100 thousand tons per year. The "Navoiazot" JSC operates a methanol production facility with 35 thousand tons capacity per year.

This amount can be used to obtain MTBE up to 80 thousand tons per year. SJSC "Uzkimyosanoat" is ready to increase the methanol capacity up to 100 thousand tons per year, if there is a consumer.

A technological scheme for the octane-increasing additives production by the n-butane and i-butane dehydrogenation is proposed followed by isobutylene esterification with methanol in the presence of a cation exchanger in  $H^+$  is shown in the following sequence (Fig. 3).

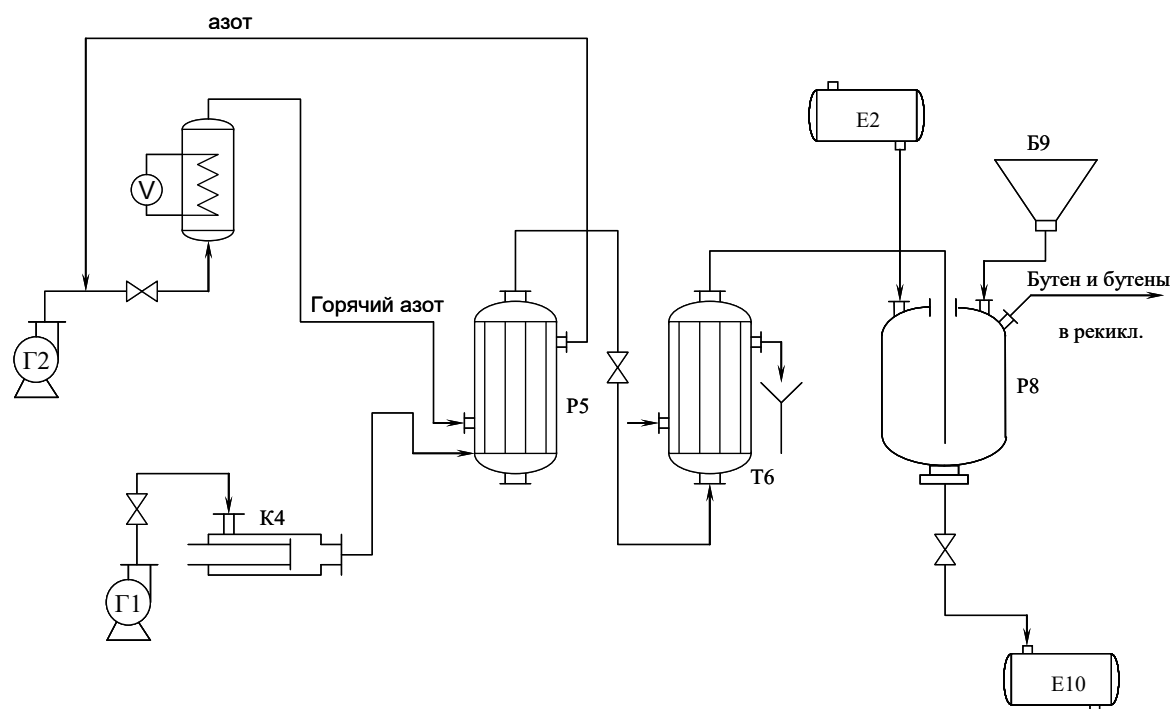


Fig.3. Basic technological scheme for the methyl tert-butyl ether (MTBE) production based on butanes: G1 and G2 - gas holders for butane and nitrogen; T3 - ТЕH (thermoelectric heater); K4 - compressor; P5 - dehydrogenation reactor; T6 - heat exchanger; E2 - container for methanol; P8 - ether reactor; B9 - catalyst hopper; E10 - container for the finished product.

A n-butane with isobutane mixture from the G1 gas tank is fed to the lower reactor part position P5, with the help of a compressor position K4. Hot nitrogen is supplied to the annular space from position T3. Reactor position P5 is a cylindrical tube-in-tube apparatus. Pipe diameter is 55 mm, length 5000 mm. The pipes number is 52 pieces. The butanes dehydrogenation reaction is carried out at 550 - 570 °C temperature, the volumetric velocity of a butanes mixture is 1000-1200 ч<sup>-1</sup>. The resulting butenes and hydrogen mixture is fed to the heat exchanger position T6, where they are cooled to 90-100 °C and then enter the lower the reactor - etherizer part, position P8.

When the MTBE content in the etherizer reaches 90% and above, the process is stopped, the catalysis is poured into the finished product container, position E10. At this point, the butenes mixture is sent to the reactor at position P11, operating in parallel with reactor P8. Every 2 months the process is stopped, the system is purged with nitrogen, and then the chromia-alumina catalyst is regenerated. Oxygen in the air at 600°C as follows. After purging the system with nitrogen, nitrogen and air mixture is fed into the reactor at nitrogen: air ratio of 8: 2. Then the air content is gradually increased. Clean air falls into the system into the regeneration cone. The regeneration completeness is determined by the carbon dioxide in the exhaust gases and when its content is reduced to 0.4%, the regeneration process is terminated.

An analytical review of the methanol use has been carried out. The basic technological scheme for the methyl tert-butyl ether (MTBE) production based on butanes is presented.

#### REFERENCES

- [1] Zhumezov Zh.Zh., Kholikova S.J. Production of methanol from gases of thermal oxidative pyrolysis of natural gas.// Materials Rep. NPK with international participation of scientists on the topic "Actual problems of chemical technology" dedicated to the 85th anniversary of the birth and 65th anniversary of the labor and scientific activity of Doctor of Chemical Sciences, Professor Makhsumov Abdukhamid Gafurovich, (Tashkent, March 10-11, 2021).– Tashkent, 2021.– p.214-215.
- [2] Rozovsky A.I. Dimethyl ether and gasoline from natural gas. // Ros. chem. g. – 2003. т. XXVII, № 6. - p. 53-61.
- [3] Makhsumov A.G., Kholikulov B.N., Kholikova S.D. Synthesis of a superbiostimulant based on bis - [(4-bromophenoxy) - carbamate] derivatives, properties and application // J.: Universum: chemistry and biology: electron. scientific. zhurn. (Russian

- Federation Moscow) - 2020. № 10(76). - p.50-55.URL: <https://7universum.com/ru/nature/archive/item/10766>. DOI - 10.32743/UniChem.2020.76.10-2.
- [4] Makhsumov A., Ismailov B., Lutfullayev S., Valeeva N. Synthesis on the Basis of 2,2<sup>1</sup>-Dipropargyl Ether of Azobenzene, Structure, Properties and their Application // International Journal of Advanced Research in Science, Engineering and Technology, India-2019. Vol.6, Issue 9. - PP.10620-10629.
- [5] Ismailov B.M., Rakhmatullaev A.Kh., Ergashev J.K., Makhsumov A.G. Aminomethylation process of propargyl ethers // International Online Conference "Innovations in the oil and gas industries, modern energy and Challenges" (Tashkent, on May 26, 2020.). - Tashkent, 2020. - PP.426-427.
- [6] Tang S., Lin J., Tan K.L. Partial oxidation of methane to syngas over Ni/MgO, Ni/CaO and Ni/CeO<sub>2</sub> // Catalysis Letters. - V. 51.- 2008.- PP 3-4.
- [7] Semin, G.L., Belyaev V.D., Demin A.K., Sobyenin V.A. Methane conversion- to syngas over Pt-based electrode in a solid oxide fuel cell reactor // Applied Catalysis A: General 181.-2009 - PP. 131-137.
- [8] Makhsumov A.G., Ismailov B.M. Syntheses based on 4,4'-dipropargyl diester of azobenzene, structure and their properties // J. Life Sciences and Agriculture electronic scientific and practical journal ISSN:2181-0761, DOI: 10.24411/2181- 0761/2020-10038.Issue: №2.2-2020.-p.15-19.
- [9] Chang C.D., Silvestri A J. // Chemtech. 10 (2007) p. 624
- [10] Galvita V. V., Belyaev V.D., Demin A.K., Sobyenin V.A. Electrocatalytic conversion of methane to syngas over Ni electrode in a solid oxide electrolyte cell // Applied Catalysis A: General 165. – 2007. - PP.301-308.
- [11] Meisel S.L. // Chemtech. 1 (2002). - P. 32
- [12] French J. Keli. Methanol-to-hydrocarbons: process technology. // Microporous and Mesoporous Materials 29 (2009). - P. 49-66
- [13] Gierlich H.H., Keim K.H., Thiagarajan N., Nitschke E., Daviduk N. / Paper presented at the 2nd EPRI Conference Synthetic Fuels - Status and Directions, San Francisco, CA, 2005. –P. 39.
- [14] Yang M., Papp H., CO<sub>2</sub> reforming of methane to syngas over highly active and stable Pt/MgO catalysts // Proceedings of the 8th International Conference on Carbon Dioxide Utilization. 30 June 2006.V. 115. - PP. 199-240.
- [15] Grimmer H.R., Thiagarajan N., Nitschke E., Bibby D.M., Chang C.D., Howe R.W., Yurchak S. (Eds.) Methane Conversion, Studies in Surface // Science and Catalysis, vol. 36, Elsevier, Amsterdam, 2008. - P. 273.

# *Uzbekistan At A New Stage Of Development Corporate Pedagogical Foundations For Improving The Efficiency Of Higher Education Management*

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**Abstract – This article reveals the urgent tasks of modern Uzbekistan at a new stage of development, on the threshold of the Third Renaissance, as the basis of social reforms aimed at increasing the efficiency of education, improving the system of competitive training, creating a social environment that values Enlightenment.**

**Keywords – Management, University Management, Corporate Pedagogical, Management Methods, Corporate Governance, Independence In Management.**

Based on the general principles of the Corporate Governance method in the world, each higher educational institution becomes one of the tasks of creating a special model based on its nature. As an integral part of these reforms, the main education system, which is the main industry in training, is also a system of quality of modernization and experience of developed countries using a quality system. For this, "for our country, we need to clearly define priorities in the field of science. No state can afford all spheres of science. That is why we also support the development of several science priorities" [1]. To implement these priorities, of course, the creation of vocational education and the organization of effective continuing education is required. The establishment of potential and competitive personnel has also become a social arrangement through higher education and structural changes. For this, "gradual academic and financial independence will be given to higher education" [1]. It also remains one of the important tasks in the reform of higher education, reforms of management reforms, bureaucracy and decentralization in management, openness, transparency and accountable principles.

Today, based on the management model of developed transnational corporations and the requirements of the market economy, the principles of corporate governance are accompanied by hybrids in many areas. Although corporate governance is actually used in cases of large enterprises, the principles are caused by useful and effective aspects due to the importance of each side of society.

In general, improving management efficiency in the Higher Education System of Uzbekistan is one of the main objectives to improve the experience of new principles, importing the experience of managing advanced foreign institutions and thanks to this one of the main objectives becomes an increase in education efficiency.

In fact, the experience of developed countries shows that the professionally created efficiency of the social development system and the development of society depends on the experimental reforms in education. And in our country, the only way is educational education reforms to ensure new development, ensuring a consistent and systematic system of continuing education in order to improve the management of formations.

This article is intended to study the pedagogical aspects of the implementation of the management system in higher education reform, improving management systems and modern requirements. Based on this purpose, we consider it expedient to analyze the problems and the necessary aspects of the country's higher education system and we believe that it will be advisable to compare it by the formation of developed countries.

In recent years, not looking at the fact that the education system is reformed in the education system of our country and the wide opportunities are opened, there are many problems that need to be eliminated. Special attention is paid to the formation of the head of state itself, and the fact that, at the beginning of these reforms, the president itself stands to how educational reforms for society are needed. According to the head of our state, "If we correctly organize" training "education, qualified specialists themselves will develop all areas of activity". In addition, at the National University of Uzbekistan at a meeting of the President and members of the science consisting on May 24, 2019, Shavkat Mirziyoev stressed that the only way is the educational reform and development of science. Further development of science in our country, to educate our youth reaching deep knowledge, high spirituality and culture, continue to work in the formation of a competitive economy and for the introduction of a new, modern stage I offer 2020 to name the year of "knowledge, education and the development of a digital economy"[1]. It should be noted that the introduction of continuing education in our country requires the management of education authorities, requires solving and improving them and continuous improvement. In a series of this, it is important to provide an educational process with high-quality regulatory legal acts. In the past period, on the execution of the above legislative and regulatory documents, legislation and regulatory documents were re-adopted in the following areas of activity:

- management of the education system;
- satisfaction of the learning process;
- Financing and logistics;
- retraining and increased training of teacher and scientific and pedagogical personnel;
- Development of the market of educational services;
- International relations in the field of education and training;
- Learning foreign languages;
- Creating electronic libraries and a combination of a single network;
- Ensuring social and financial state aid and others [2].

Building higher education potential in Uzbekistan, to achieve competitiveness around the world, it is necessary to solve the following problems and perform a number of tasks. However, these problems must be completely eliminated by a comprehensive and consistent approach.

1. Uzbekistan should teach the best specialists in this area as an improvement in the digital economy and improving information technology and leading to a new level in this area. Today, the tasks of creating educational programs, teaching and technologies for "future specialties" are necessary for systemic educational institutions and educational institutions of our country. Through the reform of higher education should be developed "Smart Technologies", "Computer Mechanics", "Analysis of a Large Data", "CyberStics", "Cryptology", "Digital Crime", "Intellectual Information Analysis", "Robot Engineering Systems", "Software for the development and addition of new educational programs for engineering", "Digital Humanitarian" and other sectors [3]. That is, one of the future tasks of higher education is also adapting to a digital format and professions in the future, to form personnel skills in various environments and conditions.

Competition must be created in the system by liberalization of management, renunciation from centralized management in a higher education system, providing universities academic independence and creating financial freedom. And also organize a learning process based on their capabilities in higher educational institutions, the development of educational programs and their regular update, in general, it is necessary to increase creativity with the refusal of standard curricula.

2. Uzbekistan should also ratify the International Bologna Declaration, which is an important basis for reforming higher education and university improvement. Thanks to this, the technology of credit education, the curriculum, as well as the ECTS

assessment system, should be implemented in our education system. Unfortunately, only Uzbekistan and Turkmenistan have not ratified the Bologna procedure between the countries of Central Asia. Therefore, it is necessary to introduce the principles of management under the Bologna Declaration, formulate contributions and results in management.

3. The provision of broad autonomy for universities, scientific, managerial and financial systems, to give freedom of activity of the Council for public control in the management and control of potential tasks, also to pay special attention to improving the quality of education and should immediately eliminate the problems in this regard. Improving freedom of academy and management also requires an increase in university responsibility.

Ensuring international international education will be one of the most important tasks of universities in the new millennium. *According to our compatriot Azamat Akbarov Professor of Busan University of Foreign Languages in South Korea, "the attractiveness of the Higher Education system is proved by the degree of international.* The number of foreign students in the world has increased 8.3 times over the past 41 years, and the number has reached about 5 million people. According to UNESCO, by 2025 foreign students will reach 7 million. The international education of higher education strengthens the geopolitical status of the country, attracting the maximum economic benefits in a short time. For example, in the 2013-2014 school year, France earned 1.5 times more money from the allocation to attract foreign students: \$ 3.5 billion was spent for scholarships and subsidies, and foreign students spent 5.4 billion dollars for expenses for travel and travels. In 2014-2015, foreign students paid \$ 4.8 billion at the Universities of Great Britain, for various goods and services, they spent an additional 5.4 billion dollars and this was given an opportunity for 207,000 jobs [4]. *In recent years, Asian states also pay special attention to the internationalization of higher educational institutions and thanks to the development of student tourism. Along with the benefits of the country's economy, the exchange of education, the dialogue of cultures and transformation of communication and education will be carried out.* By 2020, China plans to be the most attractive place in Asia for foreign students - according to the government plan, 500,000 foreign students must be trained in Chinese universities. The President of the Russian Federation in May 2017 on the Council of Strategic Development approved that the number of full-fledged foreign students in Russian universities is expensive three times more: from 220 students in 2017 to 710 in 2025. There are 115,000 foreign students in Turkey" [5]. However, in Turkey, it is planned to increase the number of students from foreign countries to 350,000 people, and urgent objectives for the internationalization of the formation of one of the urgent tasks.

4. In recent years, the volume of highlighting graduates through higher education is expanding in Uzbekistan. In 2016, graduates covered with higher education amounted to 9 percent in 2020, this figure was 25 percent. If this process continues, the coverage of students with higher education institutions will further increase students and will help to form a fair competitive environment. "Special attention will be paid to improving the coverage and quality of higher education. In the next year, the number of state grants allocated for higher education will be improved at least 25%" [6]. "There is also a risk of uneven education, that is, the course taught is chosen on the basis of the existence of industry teachers. In most cases, the content of old objects in beautiful courses are the contents. In the process of forming programs, most universities are trying to satisfy the requirements of educational services without any thinking about the knowledge system" [7]. Questions of working with personnel and their rejuvenation are also one of the current issues in the management of higher educational institutions. In addition to the growing number of graduates in Uzbekistan to higher education, young professors and teachers are also on the rise. "Teaching young teachers gradually passes at the rate of a growing student. For this reason, the number of cases of forced use of the qualifications of low-level teachers is observed [8].

We need to speed up the process of improving the attractiveness of the education system of Uzbekistan and adhere to the coordination process and adoption of international standards and subsequent modern systems. In order to liberalize the management of higher education, systematically improving the share of teachers with a scientific degree in higher education since 2021 the procedure for determining and providing a scientific degree to the highest educational institutions themselves is being implemented. "In the new year, 30 leading higher educational institutions in the country received the right to independently develop training programs, reception quotas and financial issues. Based on the advanced international practice of awarding the degree of associate professors and professors, the doctor of philosophy and science will be transferred to the prestigious scientific advice of universities in their directions" [9]. It is also one of the important steps to modernize higher education. In fact, it is necessary to provide him with freedom and financial independence to form corporate governance in higher education.

It is also necessary to improve the efficiency of higher educational institutions, increase the preparation of competitive personnel, liberalize higher education reforms to manage reforms and change ways of working managers. Management personnel, wrapped in bureaucratic relations, countless meetings and organizational issues, are trying to remove working, strong, knowledgeable scientists in every way. 25-30-year-old five teachers plan for two years of publication several of the order of 32 sheet textbooks, and in practice they do not write a line. Hired young teachers do not write one thesis per year. What knowledge and scientific competence can talk about [10]. Thus, employees of the leadership of the highest educational institution should encourage, support young professors and teachers, and most importantly need to disperse them from financial dependence.

For this purpose, reforms are held to improve the management of higher education, and new principles are made to manage. In particular, on July 11, 2019, he was signed by the presidential resolution "On measures to introduce new management principles" on improving the Higher Education Management System, the Presidential Decree on the Measures on the Management of Higher and Secondary Special Education Reform and the Presidential Resolution of " Higher and medium special education system". As a result, the process began to gradually transfer to its own financing system. It imposes high responsibility for higher education. After the management has the right to independently permit financial issues, academic freedom is formed, and a number of possibilities will arise in management of changes in management and incentives for employees. Including,

- independent designation of insurance and financial incentives for teachers of professors and workers;
- Financial incentives and support for students who need social protection;
- Independent creation of educational programs, the introduction of costs, retraining and improving new forms and teaching techniques;
- Based on its capabilities, based on contract payment, an independent definition of the cost of training.

On June 5, 2018, the chapter of our state Shavkat Mirziyoev was adopted a resolution "On additional measures to improve the quality of education in higher educational institutions and to ensure their active participation in the comprehensive reforms of the country" The goal, to enter the qualitative stage of education, as well as the development of the preparation of the generation of competitive staff was aims to develop work. However, even if reforms are conducted in the education system, problems are not reduced, and there are several reasons for this. Including:

- Problems in the management of the education system is due to the fact that old-fashioned styles are preserved in the appointment of managers and frames of old-fashioned thinking. Therefore, it is also necessary to create a system to select an innovative manager who knows the work, reforming the system;

- In education in training, it's time to move to quality, and not to pursuing the quantity. That is, a higher education institution must go to the stage of training dozens of competitive and potential personnel, and not thousands of ignorant and illiterate staff.

The problems of higher education in Uzbekistan also grow on expanding students in recent years. Today, students of one State University of Fergana rose twice compared with 2016. Such cases are also observed in many other universities, and this situation clearly shows the control disadvantages in management. The lack of material and technical bases generates existing problems in the management system, including the absence of educational buildings and other problems. In the end, an increase in demand for educational services will not last in the number of educational institutions, and also creates unscrupulous competition. There is a risk of a unit of education, that is, the structure of the taught level is chosen on the basis of the existence of industry teachers. In most cases, an old content is in the new names of the courses in the content of objects. In the process of programming, most universities are trying to satisfy the requirements of incompetent consumers of educational services without any knowledge of the system" [11]. The elimination of organizational problems actually requires many years. At the same time, the management reforms that are necessary for fixing in the most important speed increases the position of the potential and personnel in higher education.

## REFERENCES

- [1] National recovery T-P. 14
- [2] Shamuratov R. Organization of activities of higher education system and improvement of the management process technologies., Scientific Bulletin of Namangan State University: Vol. 1 : Iss. 8 , Article 70. 2019. Available at: <https://uzjournals.edu.uz/namdu/vol1/iss8/70>



- [3] <https://buyukkelajak.uz/uz/olij-talimning-tanazzuli-millatnin> / (Higher education degradation is a fall in nation or an open letter to the Minister of Higher Education).
- [4] <https://buyukkelajak.uz/uz/olij-talimning-tanazzuli-millatnin> / (Higher education degradation is a fall in nation or an open letter to the Minister of Higher Education).
- [5] <https://buyukkelajak.uz/uz/olij-talimning-tanazzuli-millatnin> / (Higher education degradation is a fall in nation or an open letter to the Minister of Higher Education).
- [6] President of the Republic of Uzbekistan Shavkat Mirziyev addresses Oliy Majlis // Popular Word. December 30, 2020.
- [7] <https://buyukkelajak.uz/uz/olij-talimning-tanazzuli-millatnin> / (Higher education degradation is a fall in nation or an open letter to the Minister of Higher Education).
- [8] <https://buyukkelajak.uz/uz/olij-talimning-tanazzuli-millatnin> / (Higher education degradation is a fall in nation or an open letter to the Minister of Higher Education).
- [9] President of the Republic of Uzbekistan Shavkat Mirziyev addresses Oliy Majlis // Popular Word. December 30, 2020.
- [10] <https://buyukkelajak.uz/uz/olij-talimning-tanazzuli-millatnin> / (Higher education degradation is a fall in nation or an open letter to the Minister of Higher Education).
- [11] <https://daryo.uz>. It is important to get a diploma, not literacy. On the problems of higher education in Uzbekistan.
- [12] Bakhromovich, S. I. Development trends and transformation processes in academic mobility in higher education in uzbekistan and the world.
- [13] Bakhromovich, S. I. (2020). Analysis Of Modern Approaches To Ensuring The Effectiveness Of Management In Higher Education Institutions. *The American Journal of Social Science and Education Innovations*, 2(12), 364-369.

# *Study Of Advertising Texts In Russian On The Topic Of Medical Terminology*

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**Abstract – – In the new millennium, it is impossible to imagine our life without advertising. Advertising texts that have managed to surround us everywhere are created based on the linguistic capabilities of each language. But to influence the state of any advertising reader, some grammatical rules are sometimes violated, which is a normal phenomenon for producers of advertising texts.**

**Keywords – Advertising, Linguistic Capabilities, Grammatical Rules, Goods, Services, Professions, Enterprises, Institutions.**

## I. INTRODUCTION

Advertising - first of all, it is the face of goods, services, professions, enterprises and institutions.

Advertising texts are extensively studied by both Russian, Uzbek and foreign linguists. For example, “interest in learning the language of advertising in Germany appeared earlier than in Russia. The first works there began to appear in the early 1920s, for example, K. Lauterer's textbook on advertising was published in 1923. Accordingly, the volume of literature devoted to the study of the language of German advertising exceeds the volume of research on the language of Russian advertising.

## II. LITERATURE REVIEW

First of all, this is due to the fact that in Russia "due to well-known historical factors" the development of the advertising text temporarily stopped, and "from the beginning of the 90s. XX century resumed on the principles developed by that time by the foreign advertising industry." Around the same time, the first works began to appear, describing the features of the structure and language of advertising texts [1, p.5-26].

According to O.A. Feofanov, “advertising should not only inform about the availability of a product, but also so affect the consciousness and subconsciousness of a potential consumer, mainly in all possible psychological ways, in order to ensure the preference of this product or service over other similar products or services” [17, p. 58].

A prerequisite for creating a correct advertising text is that its producer has information about the target audience, which is a potential consumer of the advertised product and the addressee of the text being created. Political preferences, biographical information, decision-making processes, demographic information (age, gender, race, religion, economic income, cultural preferences) and other data are considered as criteria for the target audience. In accordance with the information received, advertising texts are constructed in such a way as to match the addressee's picture of the world to the maximum extent. This applies both to the formal organization of the text and to its content, which appeals to the spiritual, cultural, moral and other ideological stereotypes inherent in the mentality of the target audience to whom it is intended [2, pp.186-190].

### III. ANALYSIS

**Phraseologisms** can serve as a source for creating an advertising text - they can be a stable turn of speech, the meaning of which does not add up to the meanings of its constituent words. Such speech patterns are also called idioms. For example: To lead by the nose - to deceive; Pounding water in a mortar - doing nonsense; Where Makar did not drive calves - very far.

According to A. V. Olyanich, in the text of the advertisement "a positive assessment is created using vocabulary with positive connotations, comparative and superlative degrees of adjectives and adverbs, expressive syntax, etc. [15, p. 17].

As D.Sh. Mamirova notes, "the expressive means of language are a necessary means of revealing the essential aspects of the advertised product. For example, in visual advertising texts, words from the category of adjectives, which have high emotional expressiveness, are mainly used as a linguistic means. Because, emphasizing and exaggerating the features, advantages of the advertised services, goods, mainly through the word "quality". For example, fragrant, delicate, transparent, pure, original, clean, authentic, natural, genuine, cheap, popular, famous, cute, elegant, bright, shiny, elegant, mediocre, beautiful and etc.

It is also known that in advertising texts very often command-style challenge verbs are used. For example, feel, visit, welcome, meet, choose, wait, participate, have, hurry, enjoy, rejoice and etc. It should also be noted that in order for the advertising language to be meaningful and vivid, and its text was conveyed to the reader in an effective form, in a meaningful, compact form and to the public with visual arts, that is, a combination of linguistic units and visual arts in advertising should be provided. Visual advertising can be conditionally divided into linguistic text and linguistic textless advertising, depending on the use or non-use of language units. Linguistic text ads carry more information than linguistic text ads. Achieving the intended goal in linguistic text advertising also depends on the choice of the main words that characterize the content of the advertisement, their abbreviations, the form of writing, its color and other characteristics. Linguistic units are practically not used in advertising without a linguistic text. Such advertising is based on various symbols, pictures and non-linguistic means" [11, p.133-138].

According to T. N. Kolokoltseva, "members of society are included in the advertising discourse against their will and sometimes even unnoticed by themselves. This happens due to the high technological equipment of the environment with equipment through which this or that advertising information is broadcast, the ubiquitous presence of advertising banners, posters, etc. advertising creators are forced to use a wide range of verbal and non-verbal means of influence" [9, p.6].

"Absolutely every person uses phraseological units in communication with other people. Sometimes, we don't even notice it. But this is the case with native speakers. And what about foreigners? These expressions are often incomprehensible to them. Let's try to figure out what phraseological units are and why students who want to speak Russian fluently need to know and use them correctly. A bit tricky, isn't it? In fact, it only seems so. In each of the languages there are analogs of one or another phraseological unit, meaning the same thing, but expressed, possibly, in different words. Where do the phraseological units come from? Who invented them?

1. It is likely that phraseological units, they are also idioms, aphorisms, catchphrases, began to exist from the time human speech appeared. Academician Vinogradov began to study phraseological units closely. He also laid the foundation for phraseological units as a linguistic discipline" [19].

2. Any phraseological unit cannot be understood the first time. The meaning of each phraseological unit is always allegorical. For example, the phraseological unit "to play the fool" is in no way connected with fools.

### IV. DISCUSSION

Phraseological dictionaries help to understand the meaning of one or another phraseological phrase. For example, such dictionaries as the "Phraseological Dictionary of the Russian Language" edited by A.I. Molotkov [13] or "The Phraseological Dictionary of the Russian Literary Language" (about 13,000 phraseological units) edited by A.I. Fedorov [16].

Advertising text is present everywhere, it has a variety of topics, and carries a semantic meaning. Advertising displayed in the media has a specific text. The text of the advertisement awakens to perform this or that action, and also under its influence it is possible to influence the human consciousness, state.

Phraseologisms of medical significance can be widely used in advertising texts. Medical phraseological units indicate the symptoms of diseases and their course.

Medical phraseological units are widely used in the following areas of medicine. For example:

in the field of dentistry: *Grinding teeth, bouncing off teeth, not kicking into a tooth, holding a tooth, putting teeth on a shelf, talking teeth*, etc.

in surgery: *We begin to take out the brain*.

in cardiology: *"Dance of the carotid"* (carotid pulse) or *"dance of the carotid arteries"* pronounced pulsation of the common carotid arteries in case of aortic valve insufficiency.

among ophthalmologists and dentists: **from the Bible, the law of retribution: "Fracture for fracture, eye for eye, tooth for tooth."**

in traumatology and orthopedics: *"Chicken breast"* - deformation of the chest in children. A shoemaker's chest is a curvature of the chest.

*"In a healthy body - a healthy mind"* (ancient medical).

*"Seven nannies have a child without an eye"* (ophthalmological).

in diseases of the abdominal organs: *"Abdominal toad"* - an attack of ischemic pain in the abdomen. *"Cobblestone pavement"* - a lumpy intestinal mucosa with numerous longitudinal, slit-like ulcers and transverse cracks in Crohn's disease.

for nervous diseases: **"Green cap"** - a type of brain with purulent meningitis. **"St. Vitus's Dance"** - chronic progressive chorea (Huntington's disease).

In addition to the above, the following medical phraseological units are widely used: **"The face of Hippocrates"** - it happens in severe diseases of the abdominal organs. The surnames of some scientists form medical phraseological units: **"Parkinson's mask"** - a frozen smile on nerves. **"Stokes collar"** - an increase in mediastinal lymph nodes, due to local venous stasis (with compression of the superior vena cava).

In a number of medical phraseological units, sections of medicine can be traced. **Hepatic palms** - yellow bronze palms. **"Vascular asterisks"** - hemorrhage in the form of dots.

Names of professions and types of sports: **"Shoemaker's Chest"** - a funnel-shaped chest (congenital or acquired), deformation of the funnel-shaped depressions of the lower part of the chest wall and the upper part of the abdominal wall. **"Fencer's Pose"** - when the head is turned to the side, the corresponding arm is straightened, and the arm to which the back of the head is facing bends at the elbow joint (in children - with brain damage - tonic cervical asymmetric reflex).

**"Ballerina's pose"** - crossing the leg and extending the arm when throwing the head back and vice versa (in children with brain damage - tonic cervical asymmetric reflex).

Now let's look at advertising texts in which medical phraseological units are used:

*Coldrex Medicine: Seven Troubles - One Answer!* (drug advertisement).

*Everything for repair! Even eyes run wide!* (advertising plumbing).

*"Instant" - Throw the pain out of your head!* (drug advertisement).

*"Tavegil. Allergy was blown away by the wind"* (drug advertisement).

*"Regetsin. Take care of your skin when you are young"* (drug advertisement).

*"Arbidol. The flu has no future"* (drug advertisement).

*"Wipe your runny nose."*

Here the phraseological unit "wipe your nose" is used - "to emphasize, to show, to prove your superiority in anything over anyone". In addition to the objective association - wipe your nose with a runny nose, i.e. to show their superiority over the common cold, here is used a reminder of the means of dealing with the consequences of the common cold [18].

## V. CONCLUSION

So, Phraseologisms are rarely used in live speech, but when used in the preparation of advertising texts for medical products, they give a positive result. It can be clearly emphasized that phraseological units in the texts of drug advertising can serve as an important element for drawing up sentence structures, in order to distribute and sell the advertised drug among consumers.

## REFERENCES

- [1] Bornyakova I.V. The specifics of the language of advertising messages and their translation in the framework of intercultural communication (based on the material of German and Russian magazine advertising). Abstract of the thesis. for the degree of Ph.D. –M., 2007. –26p.
- [2] Gafurov B.Z. Presentation of phono-stylistics in Uzbek linguistics (based on phonovariants of nouns) // Modern Turkkluk Arastirmalari Dergisi. –Ankara, Turkiye. Cilt 7, Sayi 4. Aralik 2010. No. 7 (4). –Pp. 68-83. E-yayin Tarihi: 22 Subat 2011.
- [3] Gafurov B.Z. Analysis of the relationship of medical terminology with segment phonostylistics of the noun in Russian, Uzbek and English languages // Theoretical & Applied Science. International Scientific Journal. –Philadelphia, USA, 2020. –№1 (81). –Pp.464-466. <http://T-Science.org>. (Impact Factor SJIF 5.6).
- [4] Gafurov B.Z. Research of phonostylistics of nouns in the Uzbek language beginning with the consonant letter "K" // Научный вестник NamGU. - Namangan, 2019. -№6. -pp.272-275.
- [5] Gafurov B.Z. Super-segment phonostylistics as the basis for studying the problems of accent variants of Russian nouns // International Engineering Journal for Research & Development. Published in IEJRD, May 14, 2020. –Vol.5. Issue 4. – Pp. 1-7. [www.iejrd.com](http://www.iejrd.com).
- [6] Gafurov B.Z. Similarities and differences of segment background options for Russian, Uzbek and English languages // Monografia pokonferency jnascience, Research, development №26. – Познань/Poznan, 2020. – Pp.17-19.
- [7] Gafurov B.Z. Analysis of segment phonostylistics of the subject in the English language // Conference of Management of Islamic Education Leadership in the Era of Revolution 4.0. №6 (2020). – Indonesia, Published: 2020-03-07. –Pp.1-2.
- [8] Gafurov B.Z. Comparative typological study of the characteristics of the segment phono-stylistics of a noun (based on the material of the Russian, Uzbek and English languages). Abstract of the dissertation of Doctor of Philosophy (PhD) in Philology. sciences. –Bukhara, 2020. –48p.
- [9] Kolkoltseva T.N. Foreword // Advertising discourse and advertising text. - M.: Flinta: Nauka, 2016. -- pp. 5-9.
- [10] Makedontseva A.M. Functions of advertising texts. Linguistics and Literary Studies. - Moscow, 2009. pp.186-190.
- [11] Mamirova D. Sh. Some comments on the peculiarities of advertising texts. Foreign philology. - Samarkand. - 2020, pp. 133-138.
- [12] Medvedeva E.V. Advertising text for interlanguage and intercultural communication. Abstract of the thesis. for the degree of Ph.D. - M, 2002. -30p.
- [13] A.I. Molotkov Phraseological dictionary of the Russian language. M. : Soviet encyclopedia, 1968. -- 543 p.
- [14] Morozov A.Y. Functional specificity of the advertising text. Proceedings of the Samara Scientific Center of the Russian Academy of Sciences, v. 11, 4. - Moscow, 2009. Pp.232-237.
- [15] Olyanich A. V. Advertising discourse and its constitutive features // Advertising discourse and advertising text. - M.: Flinta: Nauka, 2016. -- pp. 10-38.

- [16] Fedorov A.I. Phraseological dictionary of the Russian literary language. (about 13000 phraseological units). - M: Astrel: AST, 2008 .-- 828 p.
- [17] Feofanov O.A. Advertising. New technologies in Russia / O.A. Feofanov. - SPb .: Peter, 2000 .-- 377 p.
- [18] Khvoynova J. Phraseologisms in advertising. Regional scientific and practical conference "Creativity" .<https://nsportal.ru/ap/library/drugoe/2014/11/09/frazeologizmy-v-reklame>.
- [19] <https://learnrussian.by/ru/blog/2016/11/14/что-такое-фразеологизмы-и-зачем-их-луч/>.

# *Synthesis Of Related Compounds Of Ethylenediamine-Tetraacetic Acid And Their Applications*

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**Abstract** – The development purpose is to study the urea interaction reaction with monochloroacetic acid, obtaining tetracarboxymethylene-related urea by the ethylenediamine tetraacetic acid structure. The regularities of the tetracarboxymethylene urea formation from urea and chloroacetic acid have been established. It was studied the synergic efficacy of the resulting product in a composition with industrial scale inhibitors in waters of hardness 4- 14 mg/eq·l, which efficiency was in of 80.0 - 98.0% range.

**Keywords** – Chelating Agents, Polydentate Compounds, Urea, Monochloroacetic Acid, Inhibitors Of Mineral Salt Deposition.

## I. INTRODUCTION

Currently the complexones chemistry is going through an intensive development period. If in the middle of the 20th century has been described and studied in detail only two classes of connections: nitrilotriacetic and ethylenediaminetetraacetic acids, then already today several dozen chelants are known and the number of complexones mentioned in the literature exceeded 200 items and continues to grow. Even greater dynamism is distinguished by the information accumulating process about the composition, structure and properties of complexonates, conditions of their existence, potential and real areas of practical use [1-4].

Much attention is paid to the obtaining methods, complexon technology, in particular, original methods of waste-free production. Complexones - organic ligands of the polyamino-polyacetic acids group containing iminodiacetate fragments associated with various aliphatic and aromatic radicals - have been developed and are being produced. Relying on the complexonates production a large number of similar compounds have been synthesized, including other acid groups instead of acetate – alkylphosphonic, arylarsonic and alkylsulfonic, instead of nitrogen -(III) – phosphorus (III), sulfur (II), selenium (II), tellurium (II).

The main properties of complexon is the ability to form complexonates with most metal ions in aqueous solutions, which stability, as a rule, is so high that the corresponding cation cannot be detected using classical analytical methods. Synthetic availability and wide possibilities for modifying the molecular structure of complexones and complexes based on them open up large promising connections with a predefined set of properties to solve both theoretical problems of coordination chemistry, and envelope national economic tasks.

Enterprises of chemical, petrochemical, gas, metallurgical and other industries, as well as communication water treatment systems are the main water consumers. As a result, the increasing water sources mineralization, a also multiple use of limited water volumes and wastewater use cause the equipment contamination of heat exchange systems with low-soluble salts and corrosion products deposits.

The protecting technological equipment problem from scale deposits and internal corrosion invariably remains relevant. One of the most effective approaches solving it, recommended by a number of normative documents [5], is the use of scale and corrosion inhibitors.

The most effective scale and corrosion inhibitors are organophosphonic acids complexes with transition metals, of which, as noted above, OEDP and NTP complexes with zinc received the greatest practical application, stable in the sodium or potassium salts form [6]. Modern scientific research [7] has fully established the mechanism of these inhibitors action. High efficiency of phosphonate zincate corrosion inhibitors noted by IPCE RAS specialists [8] and confirmed in practice by VTI (All-Russian thermal engineering institute) [9] specialists.

In this regard, the new highly effective, stable, economic means development to prevent abnormal phenomena and the water supply systems improvement is a very urgent task.

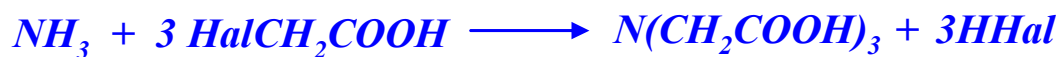
Methods for the carboxyl-containing complexones synthesis are quite diverse and are widely used in these practically important compounds obtaining technology.

Carboxyl-containing complexones of the aliphatic series are the most common ligands, which synthesis ways are still attracting the researchers' attention. Currently, more than a thousand polydentate compounds have been synthesized and studied mainly by amines carboxylation reaction with haloalkylcarboxylic acids and cyanomethylation followed by obtained nitriles hydrolysis.

Among the considered polydentate compounds the most characteristic and thoroughly studied are nitrilotriacetic and ethylenediaminetetraacetic acids [3].

Nitrilotriacetic acid (NTA, complexon I, trilon A, chelaton 1) is a crystalline powder; poorly soluble in water: at 5 °C 0.1338 g dissolves in 100 ml of water. NTA is a tribasic acid with a zwitterionic structure [4].

A typical method for the nitrilotriacetic acid preparation consists in the aqueous ammonia solution interaction with chlorine or bromine acetic acids. The reaction proceeds sequentially according to the S<sub>N</sub>2 mechanism, maximum speed is reached at pH=10 – 11.

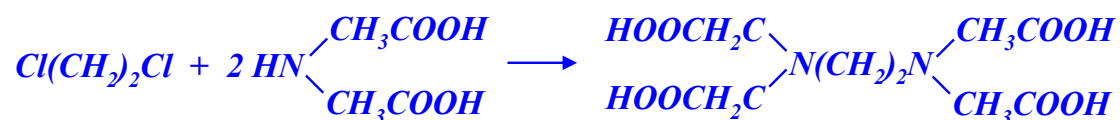


It is noted that glycine reacts with monochloroacetic acid about 10 times more actively.

Ethylenediaminetetraacetic acid (EDTA, ethylenediamine-N,N,N',N'- tetraacetic acid, complexone II, chelaton II) due to the successful combination and mutual arrangement of donor centers in the molecule proved to be one of the most effective universal chelates, found the widest application in various fields of technology, analytical chemistry, medicine [4].

The proposed method for producing ethylenediaminetetraacetic acid is the ethylenediamine carboxyalkylation with monochloroacetic acid. Ethylenediaminetetraacetic acid is also synthesized by an amine cyanomethylation in acidic or alkaline media. It is noted that, in this case, nitrilotriacetic acid is formed as a by-product.

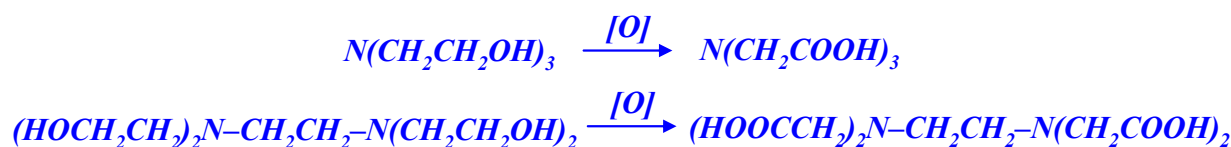
The ethylenediaminetetraacetic acid preparation by the introduction of iminodiacetic acid into the nucleophilic substitution reaction of halogen in dihaloethane is described:



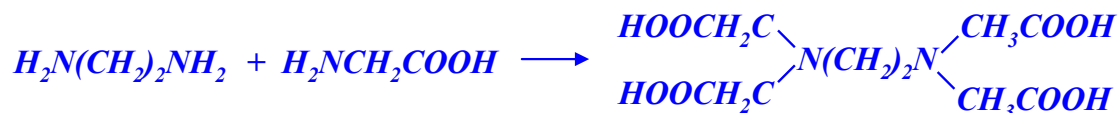
The reaction is carried out in an alkaline environment (pH=8,5 - 9) at 80 - 100°C.

NTA, EDTA and its analogs can be obtained by oxidation of N-hydroxyethyl derivatives of amines. The reaction is proposed to be carried out in the alkali presence under rather harsh conditions at 200 - 260°C, under pressure, for a long time (~90 ч). The use of catalysts activates the process:





It is proposed to obtain EDTA homologues by the  $\alpha$ -amino acids interaction with amines. The reaction is recommended to be carried out in an aqueous-alkaline medium without air access, with the removal of the formed ammonia.

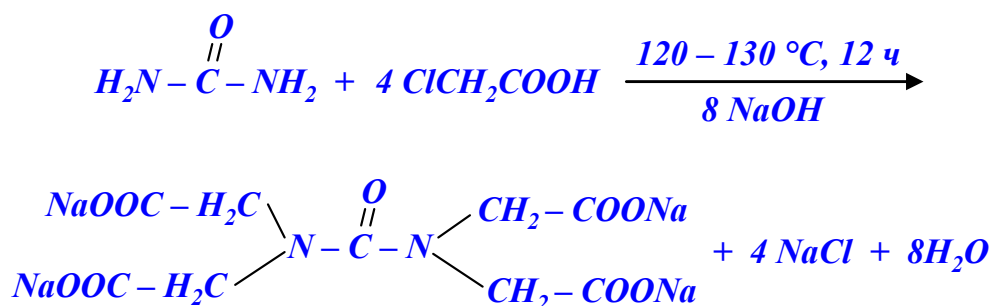


## II. EXPERIMENTAL PART

It is known that carboxyalkylated amines such as iminodiacetic acid, ethylenediaminetetraacetic acid, and etc. are of significant theoretical and practical interest and are widely used in various national economy sectors.

In these compounds, the effect on the resulting complexes strength, an increase in dentition due to the introduction of additional iminoacetate groups, as well as the steric factors influence, is quite evident.

With the aim of expanding the amino polyacids range and their practical application finding areas, we have studied the condensation reaction of carbamide with monochloroacetic acid. Condensation of urea with monochloroacetic acid in an alkaline medium (pH = 8-10), at 45-80°C temperature range, leads to the formation of carboxymethyl derivatives according to the scheme:



Product yield up to 51.0%.

We have studied two methods of carbamide carboxymethylation with monochloroacetic acid. The first of them is based on the urea interaction with monochloroacetic acid in an alkaline medium pH = 10-12. Condensation was carried out in a three-necked flask equipped with a mechanical stirrer, thermometer, and dropping funnel.

100 g (0.42 mol) of monochloroacetic acid was dissolved in 50 ml water and while cooling, add 20% sodium hydroxide to the set environment. At the same time, the temperature was controlled so that it did not exceed 40°C. Then, 6 g (0.1 mol) of urea was added to the reaction medium and heated to 70°C with vigorous stirring. To maintain the pH of the medium, at regular intervals, 20% NaOH was added to the reaction mass from a dropping funnel in an amount of 12-14 ml. The solution cooled to 20°C was neutralized with HCl. The formed NaCl from the finished product was isolated by repeated washing with cold water.

New possibilities in the complexones synthesis are opened by the use of corresponding esters instead of haloalkylcarboxylic acids. This allows the reaction to be carried out in a non-aqueous medium in the alkalis absence. The esterified derivatives of chelating agents thus obtained are converted into the corresponding chelating agents by saponification.

The second method is based on the ethyl ester interaction of monochloroacetic acid with urea. For this, 32 g of ethyl alcohol was added to the calculated amount (108 g 4 mol) of chloroacetic acid, the reaction proceeds with decreasing temperature, the reaction is endothermic. After complete dissolution of monochloroacetic acid, 3 g of urea was added with vigorous stirring. The temperature was maintained in the 50-55°C range. The reaction time is 5-6 hours. Then the mass was cooled to room temperature and neutralized by saponification, adding 50% aqueous NaOH solution. Since the finished product, carboxymethylene carbamide,

is insoluble in organic solvents, including alcohol, during neutralization and cooling, a white precipitate begins to form. The precipitated finished product was filtered using a Nutsch filter and washed with alcohol. The product yield is 80% of theoretical.

### III. THE RESULTS DISCUSSION

As a research result, the temperature, reaction time, components ratio and product isolation method influence the optimal conditions for the carboxymethylene carbamide derivatives yield and quality were determined.

Table 1. The temperature effect on the carboxymethylene carbamide derivatives yield

№	Temperature, °C	Product yield, %	
		1- method	2- method
1	45-50	43,0	46,0
2	50-55	47,0	53,0
3	55-60	51,0	64,0
4	60-65	56,0	70,0
5	65-70	59,0	74,0
6	70-75	64,0	81,0
7	75-80	60,0	76,0

Comparative data in Table 1 show that at 45-50°C temperature the tetracarboxymethylene carbamide derivatives yield remains minimal and is 43.0% when using the alkaline method and 46.0% when using the esterification method. As the temperature rises, the product yield smoothly increases in the temperature range 70-75°C and reaches a maximum of 64.0 and 81.0%, respectively, thus proving the esterification method advantages.

To determine the finished product yield effect depending on the reaction time, the urea interaction with monochloroacetic acid was carried out for 2-14 hours (Fig. 2).

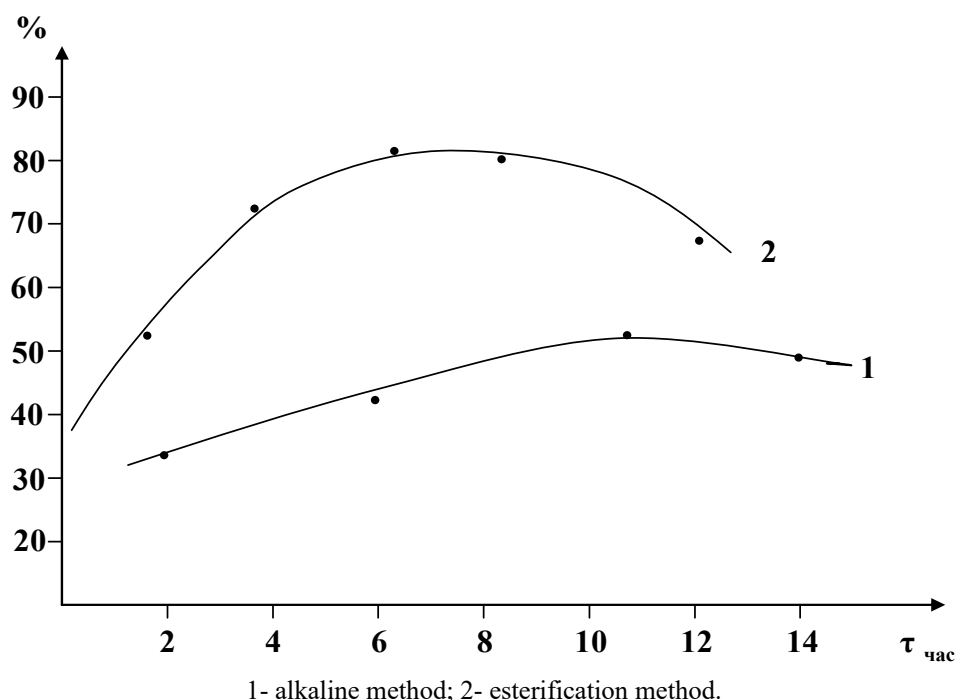


Fig. 2. Dependence of the product yield on the reaction time

As can be seen from Fig. 2, when using the esterification method, the finished product can be obtained with the maximum yield (more than 80 %) with a reaction duration of 6-8 hours, at the same time, with the alkaline method, the maximum yield is achieved with the interaction of the starting products in the time interval of 10-12 hours and is less than 55%.

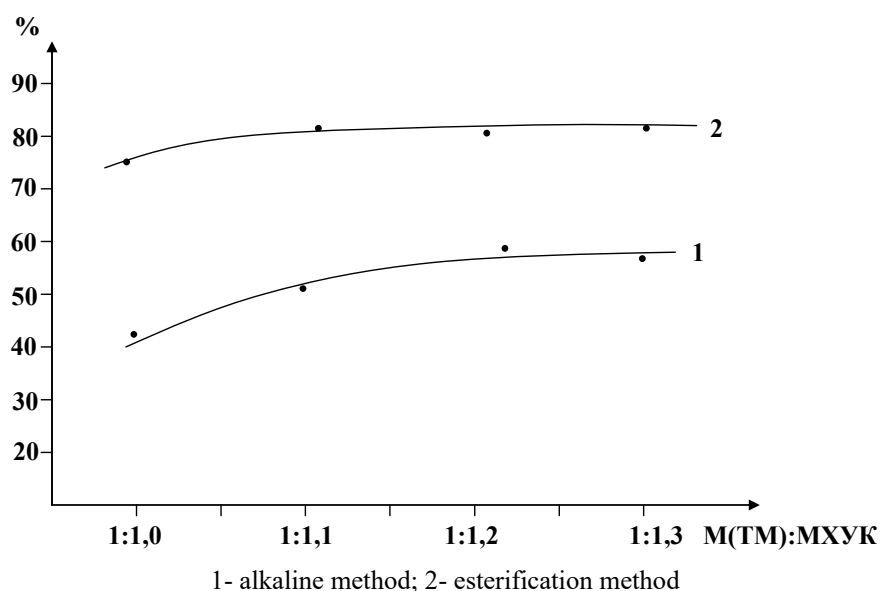


Fig. 3. Dependence of the components ratio on the carboxymethylene carbamide derivatives yield

As can be seen from Fig. 3, the ratio of the initial components of urea can be considered optimal: monochloroacetic acid 1: 1.2 mol, at which the products yield is more than 80%.

The IR spectrum of the resulting product has characteristic bands for the dimeric form of acids, containing hydrogen bonds, stretching vibrations of the COO–H bond in the 2500–3000  $\text{cm}^{-1}$  range; stretching vibration of OH - groups give an intense broad band in the region of 3600–3400  $\text{cm}^{-1}$ , stretching vibrations for C=O in the range 1530–1550  $\text{cm}^{-1}$ , also detected C–O–H vibrations at about 3640  $\text{cm}^{-1}$ .

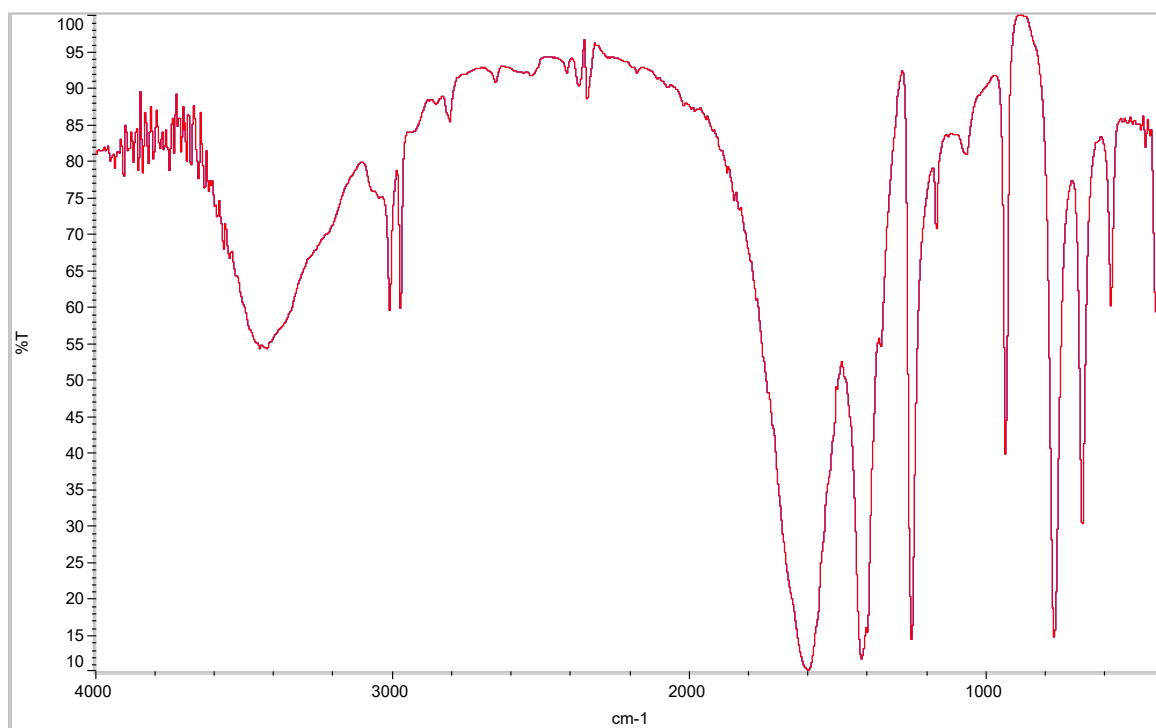


Fig. 4. IR spectrum of the condensation product of monochloroacetic acid with urea,  $\text{cm}^{-1}$

COO–H

OH

C=O

C–O–H

2500-3000

3600-3400

1530-1550

3640

**ИМР** spectra of the obtained products show absorption in a weak field ( $\tau$  from  $-2$  to  $-0,5$ ;  $\delta - 10,5-12$ ) of the proton of the carboxyl groups. The finished product quality is regulated by the following technological indicators.

1. Appearance - white powder.
2. The main substance content is up to 80%.

The water-insoluble substances content is not more than 0.1%.

In order to obtain highly effective inhibitors of the deposition of mineral salts compositions prepared based on our carboxymethylene urea derivatives (CUD) and thiourea (CMTU) with the addition of bases of industrial scale inhibitors OEDP and **ИОМС-1** in 1 : 1 ratio and tested in real waters of Kokand, Yangiyul, Navoi (the results are shown in Table 2).

Table 2. Effectiveness of mineral salt inhibitors  
(85 - 90 °C temperature)

Components	Inhibitor dose mg/l	Efficiency with test water hardness, mg-eq/l		
		4-5	7-8	8-11
CUD + <b>ОЭФК</b>	2,0	88,0	82,0	81,0
	4,0	91,0	89,0	84,0
	6,0	99,0	98,0	96,0
	8,0	98,0	95,0	91,0
CMTU + <b>ОЭФК</b>	2,0	85,0	81,0	76,0
	4,0	89,0	84,0	79,0
	6,0	91,0	90,0	91,0
	8,0	98,0	97,0	96,0
CUD + <b>ИОМС-1</b>	2,0	86,0	83,0	70,0
	4,0	90,0	87,0	71,0
	6,0	93,0	80,0	85,0
	8,0	93,5	81,0	85,0
CMTU + <b>ИОМС-1</b>	2,0	81,0	78,0	76,0
	4,0	87,0	81,0	78,0
	6,0	82,0	88,0	82,0
	8,0	81,0	81,0	89,0
<b>ИОМС-1</b>	4,0	93,0	92,0	90,0
OEDP	4,0	90,0	88,0	90,0

As can be seen from the data in Table 3, the effectiveness of inhibitors CUD + **ОЭФК** and CMTU + **ОЭФК** is much higher, than the original products and reaches up to 98 - 99%.

#### IV. CONCLUSION

Purposeful research has been carried out to develop, study the properties of new improved methods for obtaining complexones based on amines and amides with monochloroacetic acid in an alkaline medium and by the esterification method.

It was studied the carboxymethylation of urea (thiourea) and aniline reaction at 50 – 95°C temperature range. It was found that in the synthesis of carboxymethyl derivatives of urea (thiourea), the optimal temperature is with alkaline method 75 - 80 °C and when synthesizing from esters of the corresponding acids 50 - 65 °C.

The inhibiting properties of the synthesized CUD and CMTU were studied in waters with hardness in the 4-11 mg-eq/l range. It has been shown that with an increase in the inhibitor concentration, its selectivity and effect increase. In the water of Nukus, this has the highest hardness, at 8.0 mg/l - 96.0% concentration.

REFERENCES

- [1] Chemistry of organophosphonate scale growth inhibitors: Physicochemical aspects of 2-phosphonobutane-1,2,4-tricarboxylate (PBTC) and its effect on CaCO<sub>3</sub> crystal growth / Konstantinos D. Demadis, Panos Lykoudis // *Bioinorganic chemistry and applications*. 2005. № 3-4. p. 135-149.
- [2] Yashunsky V.G., Samoilo O.I. *Advances in chemistry*. 1976. T.45. p.1537.
- [3] Kobachnik M.I., Medved T.Ya., Rudomino M.V. and others. *Advances in chemistry*. 1968. T.37. p.116.
- [4] Temkina V.Ya., Tsirulnikova N.V., Lastovsky R.P. *ZhVHO*. 1984. T.29. p.293.
- [5] Schwarzenbach G., Flash G. *Complexometric titration*. M.: Chemistry. 1970. p360. // Spitsina V.I., Martinenko L.I. *Coordination chemistry of rare earth elements*. M. MSU, 1979, 254 p.
- [6] Prishbil R. *Analytical application of ethylidenediamine-tetraacetic acid and related compounds*. M.: Mir, 1975. 531 p.
- [7] Choi Dong-Jin et al. // *Materials and Engineering, A: Structural Materials: Properties, Microstructure and Processing A 335* (1-2), 228-235. 2002.
- [8] Kuznetsov Yu. I., Kazanskaya G. Yu., Tsirulnikova N. V. // *Protection of metals*. 2003. T. 39. № 2. p. 141-145.
- [9] Experience of corrosion inhibition in non-deaerated water of heat supply systems / Potapov S.A. et al. // *Heat supply news*. 2003. № 10 (38). p. 50-53.
- [10] G 1-321-03. Guidelines for corrective treatment of feed water for steam boilers, make-up water for heating systems, hot water boilers with OEDP, NTP-Zn complexonates Zn. Rostov-on-Don: 2003. – 20 p.
- [11] G 1-322-03. M Guidelines for stabilization treatment of water in heat supply systems, hot water boilers with OEDP-Zn, NTP-Zn complexonates. Rostov-on-Don: 2003. – 18 p.
- [12] Diray P.A., Abalikina T.A., Silvanskaya G.A. Inhibition of abnormal processes in water supply systems. *Environmental protection and rational use of natural resources. Survey information*. M, NIITEKHIM, 1988, issue 1 (74), 41 c.
- [13] Odnorog D.S., Puguba A.I. Application of salt deposition inhibitors in oil fields of Mangyshlak // *Oil household*. 1980. № 3. p. 67-68.
- [14] Marichev F.N., Kim V.K., Glazkov A.A. Method for predicting the deposition of carbonate salts on oilfield equipment. *Oilfield business*, 1980, №10, p.23-26.

# *Innovative Approach To The Development Of Professional Thinking Of Students In Classes*

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**Abstract – The article gives account of the findings of the research on the efficient lecturing techniques and the methods of enhancing students' cognitive activity at lectures.**

**Keywords – Student, Thinking, Development, Lecture, Method, Reception, Activation.**

## I. INTRODUCTION

In the educational process we call traditional, lecture sessions have been recognized as the primary form of teaching students. But lately, we are witnessing a drastic change in attitudes towards the report. Due to the widespread use of modern media, the opportunities for direct reading and learning of electronic copies of e-learning materials, including textbooks, manuals and guidelines, as well as their reproduction are expanding.

The results of the survey at the university show that in the process of mastering the material, students are ranked fourth in terms of the effectiveness of lectures - training and production practice, workshops and laboratory classes, as well as independent study.

In their view, e-manuals on a particular course prevent unnecessary summarizing of lecture materials and allow more time to be spent on the internship process.

It is unfortunate that most of the lecture sessions organized in educational institutions are organized on the basis of some inconsistencies, which inevitably have a negative impact on the effectiveness of the sessions. In the mentioned lectures, the teaching materials are presented verbally, with very little use of visual materials, and the saddest thing is that they are organized in the form of low intellectual activity of students. It is well known that fundamental knowledge is not generated adaptively, that is, simply by adding new information to existing information.

Acquisition of fundamental knowledge requires intensive thinking activities aimed primarily at understanding, processing and systematizing the learning material. Many students are left at the stage of intellectual development at the level of mastering unanalyzed knowledge and find it difficult to express their views on an existing problem, to make a comparative analysis of alternative ideas, to generalize concepts in the content of materials, to draw conclusions.

A natural question arises. Is it possible to ensure the effectiveness of lectures through the use of pedagogical methods aimed at activating students' thinking? or is it possible to develop students' professional thinking based on modern teaching methods and pedagogical methods while ensuring the effectiveness of lecture sessions?

## II. LITERATURE REVIEW

The relevance of the topic is a number of researches and developments of domestic and foreign scientists in this field (O.R. Rozikov, K.Z. Zaripov, B.R. Adizov, N. Saidakhmedov, O. Tolipov, I. O. Zagashev, S. I. . Zair-Bek, L. F. Krasinskaya, L. I. Savva, T. G. Galaktionova, A. A. Verbitsky, Y. R. Yakupova, Dillon J.T., Halpern D., and etc.) the existence and teachers of many higher education institutions is marked by a special interest in the topic of our research.

## III. ANALYSIS

The purpose of our study was to study the methods aimed at activating students' memory and thinking in the course of lectures developed by researchers, and to assess their use in the educational process of students of medical and pedagogical education.

Lecture is one of the main organizational forms of teaching that continuously manages the learning activities of students.

The term lecture originated from the Latin word *lection* (reading), originally originated in ancient Greece and began to be recognized as the main form of teaching in ancient Rome.

Lectures in higher education institutions are the main link in the didactic cycle in the educational process, the purpose of which is to form a solid scientific and theoretical basis for students to master the next parts of the educational material<sup>1</sup>.

The report performs the following functions:

- Information (provides the necessary information);
- Stimulant (arouses interest in the topic);
- Educator, developer (evaluates events, develops thinking);
- Reference;
- Explanatory (for example, the main scientific categories);
- Convincing or proving.

It also influences the student's personal maturity and contributes to the development of general culture and erudition in him.

As mentioned above, in addition to the "supporters" of the lectures, there are also "rivals" who give the following arguments about the disadvantages of presenting the training material in the form of lectures:

- The lecture teaches students to passively accept the opinion of others and hinders the development of independent thinking.
- The lecture extinguishes the interest in independent training;
- Lectures are needed only in the absence of textbooks;
- Not all students have time to master the material during the lecture;

However, it should be noted that the abandonment of the lecture reduces the level of scientific preparation of students and has a negative impact on the systematic and smooth conduct of educational activities during the semester. Therefore, the lecture deserves attention as the most basic form of teaching in higher education.

The above shortcomings can be overcome by describing the training material on the basis of an improved methodology. The opportunities for the development of independent thinking, as well as the implementation of thinking operations such as analysis, synthesis, comparison, generalization in the lectures are invaluable. Therefore, the report has a wide range of untapped opportunities and internal resources for the implementation of pedagogical tasks.

The effective technology of organizing lectures was developed by American experts D. V. Johnson, R. T. Johnson and K. A. Smiths suggested that they distinguish three stages in the organization of lectures:

1) preparation, in which the teacher activates the existing knowledge of students, fully draws their attention to the problem under study and arouses interest in the study of this problem;

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<sup>1</sup> Rozikov O.R., Adizov B.R., Najmiddinova G.N. .. "General didactics" textbook. Buxoro 2012 y. 320 p.

2) the stage of implementation and understanding. At this stage, the new learning material is described and a system of pre-thought-out and prepared assignments is presented for the purpose of critical processing and analysis;

3) reflection phase. At this stage, students master the process of understanding new knowledge while analyzing the content of the study material.

The technology of organization of lectures, in turn, requires the use of methods to activate the learning activities of students during the lectures.

Based on the study of methods developed and used in practice, we have recommended the method of problem pedagogy for students of medical education: the method of problem situations, the method of activating questions, the method of dialogue, the method of visualization, and other methods of developing professional thinking.

#### **IV. METHODS**

**The problem-solving method** is based on the teacher's creation of problem-solving situations and the learners' active cognitive activities during the lecture session.

It consists of analyzing, evaluating, and making a subsequent decision on a specific situation. The lecture focuses on developing students' professional thinking skills in analyzing the causes and consequences of problematic situations and finding solutions to them. The complexity of the problem chosen for the "problem situation" method should be appropriate to the learners' level of knowledge. They need to be able to find a solution to the problem posed; otherwise when they fail to find a solution, the learners lose interest and lose their self-confidence. When using the "problem situation" method, learners learn to think independently, analyze the causes and consequences of the problem, and find a solution.

Developing a problem task requires great effort and pedagogical skills. As a rule, the task is divided into having to create a successful option in the study group after several experiments. Nevertheless, such tasks allow the theory to be linked to the real situation. This allows students to activate teaching in their minds, helping them to understand the practical benefits of the material being studied for the development of their professional thinking.

**Activation questions method.** In order to stimulate students' thinking and attract their attention, the speaker asks activating and rhetorical questions to the audience. After a while, the teacher engages any student to answer the activating question. The teacher must explain the answer given, and if the answer is incorrect, he must answer it himself.

**Dialog method.** The dialogue during the lecture provides an opportunity for the teacher and the student to express and reinforce the learning information at a certain stage of the lecture through interaction, creating an exchange of ideas.

The dialogue is organized in response to three questions:

- Which and what information did we receive?
- What do we strive for in our activities, is the received information enough to achieve the goal?
- How do we use the acquired knowledge to achieve the goal?

In organizing the dialogue, it is necessary to create an atmosphere of complete trust between the teacher and the student. The student should be able to express his / her ideas boldly even if they are wrong. Because the main purpose of the dialogue is to arouse students' interest in this problem and thus to activate its thinking mechanism. Achieving this, the smart teacher quickly and easily eliminates the student's mistakes through a short review, filling in the answers if necessary.

**Visualization method.** This method implements the principle of demonstration in education. It is known that the exhibition not only allows to remember and accept the educational material, but also to activate the mental activity of the student, to deepen the understanding and comprehension of the content of the studied situations. It is possible to speak at length to describe any information, but it is certain that everything will be clear by showing a picture, diagram, diagram, histogram, or table substantiating that information.

The study of the laws of visual thinking shows that it is related to the creative nature of decision-making. The visualization method ensures the formation of a thinking process by systematizing, focusing, and separating the most important aspects of the data being analyzed.



Visual information is displayed by the teacher on a board or projector in the form of a model, picture, graphic, photography, film, cartoon.

Such organized lectures not only develop students' professional thinking, but also stimulate the teacher's self-study and creative activity.

Current teaching materials developed by experienced teachers using many animation programs such as LearningApps, Hot Potatoes, 3ds Max, Blender, AutoQ3D, Bryce (DAZ Productions), DX Studio, Sculptris also help students to listen to lectures, understand the essence of the studied material and develop thinking skills.

### V. CONCLUSION

Thus, the management and improvement of students' learning activities in lectures is one of the most important didactic tasks for the teacher. This problem involves the process of stimulating students' professional and curiosity, their active participation in lectures, the organization of independent work on lecture materials.

All these tasks are solved through the use of an integrated set of methodological methods.

In turn, it is advisable to use all methods that activate the cognitive activity of students, depending on the content of the educational material, the composition and preparation of the audience.

### REFERENCES

- [1] Busygin A. G., Busygina T. A. Production of a university lecture and evaluation of its quality / ed. A. L. Busygina. Samara: Publishing house of SGPU 2005.32 p.
- [2] Kurbanova G.N., Pedagogical and psychological bases on developing students' professional thinking in medical pedagogical education. *International Journal of Psychosocial Rehabilitation*, Vol. 24, Issue 06, 2020. 3059-3067 p.
- [3] *Rozikov O.R., Adizov B.R., Najmiddinova G.N. Textbook "General didactics". Buxoro 2012 y. 320 p.*
- [4] Zagashev I.O., Zair-Bek S.I. Critical thinking: development technology. SPb.: Publishing house "Alliance" Delta ", 2003. 284 p.
- [5] Kurbanova G.N. Professional development history of sanitary-hygiene works in the end of XIX and the beginning of XX century//*International Scientific Journal Theoretical & Applied Science* // p-ISSN: 2308-4944 (print) e-ISSN: 2409-0085 (online) Year: 2020 Issue: 04 Volume: 84 Published: 30.04.2020 <http://T-Science.org>. SOI: 1.1/TAS DOI: 10.15863/TAS
- [6] Kurbanova G.N. Pedagogical and psychological bases on developing students' professional thinking in medical pedagogical education// *International Journal of Psychosocial Rehabilitation*//2020 march Volume 24-Issue 6 3059-3067
- [7] Kurbanova G.N. Formation of professional thinking in future // *International Journal for Advanced Research In Science* // Volume 10, Issue 05, May 2020, 98-102.
- [8] Kurbanova G.N. The role of ancestral heritage in the development of professional thinking of future professionals // *International Scientific Journal* Published: 30.01.2020, 447-450.
- [9] Kurbanova G.N. Development of professional thinking through communicative skills among students of medical universities // *International Scientific Journal Theoretical & Applied Science* // p-ISSN: 2308-4944 (print) e-ISSN: 2409-0085 (online) Year: 2019 Issue: 11 Volume: 79 Published: 30.11.2019 [http:// T-Science.org](http://T-Science.org)
- [10] Akhmedova D.B. Set of semantic tags for Uzbek language units: constants and operator/classifier. *International Scientific Journal Theoretical & Applied Science*. Impact Factor, 2409-0085(online) Issue:02 Volume:82 Published 29.02.2020. – P.177-179. <https://www.elibrary.ru/defaultx.asp?rpage=https://www.elibrary.ru/item.asp?id=42658994>