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GENERALIZED MODEL FOR THE ENERGY SPECTRUM OF ELECTRONS IN TUNNEL-COUPLED SEMICONDUCTOR QUANTUM WELLS

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ABSTRACT

The electronic properties of both symmetric and asymmetric with respect to the geometric dimensions of the semiconductor structure layers have been studied. In this case, the Schrödinger equation is solved both for the general wave function and for quantum wells, taking into account the difference in effective masses in the layers of the structure.

The expression for the gap between the energy levels of the energy appearing in the quantum well is analyzed. It is shown that the energy gap is determined by a quantity that is a measure of the asymmetry of two quantum wells, and it is equal to zero for symmetric wells. In the case when the asymmetry of the wells is negligibly small, then the gap between the levels in the tunnel-coupled wells is determined by the value characterizing the tunneling splitting of the energy levels.

It is determined that in tunnel-coupled wells, the energy levels are shifted relative to the levels of isolated wells, and wave functions arise from the wave functions of isolated wells as a result of their "mixing".

KEYWORDS: energy levels, quantum well, tunneling, tunnel-coupled potential wells, size quantization, energy spectrum, potential well.

INTRODUCTION

The study of the electronic properties of both symmetric and asymmetric with respect to the geometric dimensions of the layers of a semiconductor structure is relevant in connection with the use of these structures in micro- or nanoelectronics and in other areas of solid-state physics [1]. In [2–17], the kinetic properties of multilayer and nanosized semiconductor structures were studied. The theory was created in different models using different mathematical methods for solving the complete Schrödinger equation for a system of electrons interacting with an electromagnetic field in a structure with a δ shaped potential barrier. In the above-mentioned works, the problem was solved without taking into account the Bastard condition: the difference in the effective masses of current carriers in adjacent layers of the structure was not taken into account. And also, tunnel-bound electronic states in quantum wells, between which there is a narrow tunnel-transparent potential barrier, have not been studied. This work is devoted to this case.

General Ratios

In structures with two (or more) closely spaced potential wells, the wave functions of adjacent wells overlap with each other in the barrier region between the wells, so that the probability of detecting an electron in the barrier region is noticeably different from zero. Consequently, current carriers can pass from one well to another with a noticeable probability, despite the fact that their energies do not exceed the barrier value. Such a quantum phenomenon is called the tunneling effect [18]. Quantum wells, in which the probability of the tunneling effect is not small, are called tunnel-coupled.

The emergence of a tunnel coupling as the wells approach each other affects the position of the energy levels in them and the shape of the wave functions. To calculate the size quantization levels and the wave functions belonging to them, we must solve the Schrödinger equation for the chosen potential with Bastard boundary conditions, where $\psi(x)$ the wave function and

$\frac{1}{m} \frac{d\psi}{dx}$ magnitudes remain continuous at the interface of the potential well (A layer) and the barrier (B layer) [7], i.e. .



$$\psi|_A = \psi|_B, \quad \left. \frac{1}{m} \frac{d\psi(x)}{dx} \right|_A = \left. \frac{1}{m} \frac{d\psi(x)}{dx} \right|_B \quad (1)$$

Therefore, in further calculations it is necessary to take into account (1) at each heterointerface (and it is necessary to take into account the decrease in the wave functions for if the wave vector of the current carriers is real). In a nanostructure with two wells, there are two interfaces. Therefore, conditions (1) give a relatively cumbersome system of equations for eight unknowns.

Let $U_1(x)$ and $U_2(x)$ are single-well potentials (left and right wells) considered independently of each other. Here it is convenient to assume that the energy reference point is chosen at the level of the barrier, and each of the functions $U_1(x)$, $U_2(x)$ differs from zero only within its own layer. Then the potential $U(x)$ for the structure with two wells is written as the sum of $U_1(x)$ and $U_2(x)$, and the Schrödinger equation in the two-well problem with coordinate-independent effective mass m takes the form:

$$H\psi = E\psi, \quad (2)$$

where $H = H_1 + H_2 + U_1 + U_2$, $H_1(U_1)$, and $H_2(U_2)$ the operator of the Hamiltonian (potential) for the left and right potential wells. Then the general Schrödinger equation takes the form

$$\left(-\frac{\hbar^2}{2m_1} \nabla^2 - \frac{\hbar^2}{2m_2} \nabla^2 + U_1 + U_2 \right) \psi = E\psi$$

and for the one-dimensional case we have

$$\left(-\frac{\hbar^2}{2\mu_{12}^+} \frac{\partial^2}{\partial z^2} + U_1 + U_2 \right) \psi(x) = \left(E - \frac{\hbar^2 k_{\perp}^2}{2\mu_{12}^+} \right) \psi(x) \quad (3)$$

where $\frac{1}{\mu_{12}^+} = \left(\frac{1}{m_1} + \frac{1}{m_2} \right)$, $k_{\perp}^2 = k_x^2 + k_y^2$.

Then the Schrödinger equation for the left and right potential wells can be written as

$$\left(-\frac{\hbar^2}{2m_1} \frac{\partial^2}{\partial z^2} + U_1 \right) \psi_1 = \left(E_1 - \frac{\hbar^2 k_{\perp}^2}{2m_1} \right) \psi_1, \quad \left(-\frac{\hbar^2}{2m_2} \frac{\partial^2}{\partial z^2} + U_2 \right) \psi_2 = \left(E_2 - \frac{\hbar^2 k_{\perp}^2}{2m_2} \right) \psi_2. \quad (4)$$

If we take into account the principle of superposition, then we have

$$\psi(x) = C_1 \psi_1(x) + C_2 \psi_2(x) \quad (5)$$

Then substitution (5) into equation (3) and taking into account (4), we obtain:

$$\begin{aligned} & C_1 \left(\frac{m_1}{\mu_{12}^+} \left[-\frac{\hbar^2}{2m_1} \frac{\partial^2 \psi_1(x)}{\partial z^2} + U_1 \psi_1(x) \right] + \left(1 - \frac{m_1}{\mu_{12}^+} \right) U_1 \psi_1(x) + U_2 \psi_1(x) \right) + \\ & + C_2 \left(\frac{m_2}{\mu_{12}^+} \left[-\frac{\hbar^2}{2m_2} \frac{\partial^2 \psi_2(x)}{\partial z^2} + U_2 \psi_2(x) \right] + U_1 \psi_2(x) + \left(1 - \frac{m_2}{\mu_{12}^+} \right) U_2 \psi_2(x) \right) = \\ & = C_1 \left(E - \frac{\hbar^2 k_{\perp}^2}{2\mu_{12}^+} \right) \psi_1(x) + C_2 \left(E - \frac{\hbar^2 k_{\perp}^2}{2\mu_{12}^+} \right) \psi_2(x) \end{aligned} \quad (6)$$

Then multiplying (6) on the left side by $\psi_1^*(x)$ and $\psi_2^*(x)$ alternately, as well as integrating, we obtain

$$\begin{cases} C_1 \left[\tilde{E}_1 \sigma + \left(1 - \frac{m_1}{\mu_{12}^+} \right) U_1^{(21)} + U_2^{(21)} - \tilde{E} \sigma \right] + C_2 \left[\tilde{E}_2 + U_1^{(22)} + \left(1 - \frac{m_2}{\mu_{12}^+} \right) U_2^{(22)} - \tilde{E} \right] = 0, \\ C_1 \left[\tilde{E}_1 + \left(1 - \frac{m_1}{\mu_{12}^+} \right) U_1^{(11)} + U_2^{(11)} - \tilde{E} \right] + C_2 \left[\tilde{E}_2 \sigma + U_1^{(12)} + \left(1 - \frac{m_2}{\mu_{12}^+} \right) U_2^{(12)} - \tilde{E} \sigma \right] = 0. \end{cases} \quad (7)$$

Здесь $U_1^{(21)} = \int \psi_2^*(x) U_1 \psi_1(x) \cdot dx$, $U_2^{(21)} = \int \psi_2^*(x) U_2 \psi_1(x) \cdot dx$, $U_1^{(22)} = \int \psi_2^*(x) U_1 \psi_2(x) \cdot dx$,

$U_2^{(22)} = \int \psi_2^*(x) U_2 \psi_2(x) \cdot dx$, $U_1^{(11)} = \int \psi_1^*(x) U_1 \psi_1(x) dx$, $U_2^{(11)} = \int \psi_1^*(x) U_2 \psi_1(x) dx$,

$U_1^{(12)} = \int \psi_1^*(x) U_1 \psi_2(x) dx$, $U_2^{(12)} = \int \psi_1^*(x) U_2 \psi_2(x) dx$, $\sigma = \int \psi_2^*(x) \psi_1(x) \cdot dx$, $\tilde{E} = E - \frac{\hbar^2 k_{\perp}^2}{2\mu_{12}^+}$

$\tilde{E}_a = E_a - \frac{\hbar^2 k_{\perp}^2}{2m_a}$, $\tilde{E}_1 = \frac{m_1}{\mu_{12}^+} \left(E_1 - \frac{\hbar^2 k_{\perp}^2}{2m_1} \right)$, $\tilde{E}_2 = \frac{m_2}{\mu_{12}^+} \left(E_2 - \frac{\hbar^2 k_{\perp}^2}{2m_2} \right)$.

In order for the system of homogeneous equations (7) to have a nonzero solution, it is necessary to equate its determinant to zero. Then

$$\begin{bmatrix} \tilde{E}_1 \sigma + \left(1 - \frac{m_1}{\mu_{12}^+} \right) U_1^{(21)} + U_2^{(21)} - \tilde{E} \sigma & \tilde{E}_2 + U_1^{(22)} + \left(1 - \frac{m_2}{\mu_{12}^+} \right) U_2^{(22)} - \tilde{E} \\ \tilde{E}_1 + \left(1 - \frac{m_1}{\mu_{12}^+} \right) U_1^{(11)} + U_2^{(11)} - \tilde{E} & \tilde{E}_2 \sigma + U_1^{(12)} + \left(1 - \frac{m_2}{\mu_{12}^+} \right) U_2^{(12)} - \tilde{E} \sigma \end{bmatrix} = 0. \quad (8)$$

Where do we get the algebraic equation of the second degree for the variable \tilde{E}

$$a\tilde{E}^2 - b \cdot \tilde{E} + c = 0, \quad (9)$$

which has two of its roots \tilde{E}_{\pm} , which are the desired energy levels of an electron in a double-well potential $U(x)$

$$\tilde{E}_+ = \frac{b}{2a} \left(-1 + \sqrt{1 - 4 \frac{ac}{b^2}} \right), \quad \tilde{E}_- = \frac{b}{2a} \left(-1 - \sqrt{1 - 4 \frac{ac}{b^2}} \right) \quad (10)$$

где $a = (1 + \sigma^2)$, $b = (1 + \Xi_6 + \Xi_2 + \Xi_3)$, $c = \Xi_4 - \Xi_1$,

$\Xi_1 = \left(\tilde{E}_1 \sigma + \left(1 - \frac{m_1}{\mu_{12}^+} \right) U_1^{(21)} + U_2^{(21)} \right) \left(\tilde{E}_2 \sigma + U_1^{(12)} + \left(1 - \frac{m_2}{\mu_{12}^+} \right) U_2^{(12)} \right)$,

$\Xi_2 = \left(\tilde{E}_2 \sigma + U_1^{(12)} + \left(1 - \frac{m_2}{\mu_{12}^+} \right) U_2^{(12)} \right) \sigma$, $\Xi_3 = \left(\tilde{E}_1 \sigma + \left(1 - \frac{m_1}{\mu_{12}^+} \right) U_1^{(21)} + U_2^{(21)} \right) \sigma$,

$\Xi_4 = \left(\tilde{E}_1 + \left(1 - \frac{m_1}{\mu_{12}^+} \right) U_1^{(11)} + U_2^{(11)} \right) \cdot \left(\tilde{E}_2 + U_1^{(22)} + \left(1 - \frac{m_2}{\mu_{12}^+} \right) U_2^{(22)} \right)$,



$$\Xi_5 = \left(\tilde{E}_2 + U_1^{(22)} + \left(1 - \frac{m_2}{\mu_{12}^+} \right) U_2^{(22)} \right), \Xi_6 = \left(\tilde{E}_1 + \left(1 - \frac{m_1}{\mu_{12}^+} \right) U_1^{(11)} + U_2^{(11)} \right)$$

By substituting alternately these roots in (7), we can find two solutions of the system, $(C_1/C_2)_+$ and $(C_1/C_2)_-$, which, according to (7), determine the wave functions $\tilde{\psi}_1(z), \tilde{\psi}_2(z)$ belonging to the energy levels \tilde{E}_+ and \tilde{E}_- .

RESULTS AND CONCLUSIONS

Thus, in tunnel-coupled wells, the energy levels shift relative to the levels of isolated wells, and the wave functions arise from the wave functions of isolated wells as a result of their "mixing" - the formation of linear combinations (7).

It is easy to see that the mixing of functions $\psi_1(z)$ and $\psi_2(z)$ is due to the presence of the following expressions

$$\tilde{E}_2 + U_1^{(22)} + \left(1 - \frac{m_2}{\mu_{12}^+} \right) U_2^{(22)} - \tilde{E} \quad \text{and} \quad \tilde{E}_1 + \left(1 - \frac{m_1}{\mu_{12}^+} \right) U_1^{(11)} + U_2^{(11)} - \tilde{E},$$

since in the absence of these expressions in the system of equations (7) it has only solutions for which one of the coefficients C_1, C_2 is equal to zero. Therefore, system (7) can be simplified, retaining the main features of its solutions, if we neglect the contributions from $U_{1,2}^{(m)}$, where $n = 1, 2$. Then (7) takes the form

$$\begin{cases} \Re_1 C_1 + C_2 (\tilde{E}_2 - \tilde{E}') = 0, \\ C_1 (\tilde{E}_1 - \tilde{E}') + \Re_2 C_2 = 0, \end{cases} \quad (11)$$

where $\Re_1 = \left(1 - \frac{m_1}{\mu_{12}^+} \right) U_1^{(21)} + U_2^{(21)}$, $\Re_2 = U_1^{(12)} + \left(1 - \frac{m_2}{\mu_{12}^+} \right) U_2^{(12)}$. Then, equating the determinant of the system of equations (11) to zero, we obtain instead of (8) a less cumbersome equation

$$\tilde{E}'^2 - (\tilde{E}_1 + \tilde{E}_2) \tilde{E}' + \tilde{E}_1 \tilde{E}_2 + \Re_1 \Re_2 = 0, \quad (12)$$

the roots of which are equal

$$\tilde{E}'_{\pm} = \frac{1}{2} \left[\tilde{E}_1 + \tilde{E}_2 \pm \sqrt{(\tilde{E}_1 - \tilde{E}_2)^2 + 4\Re_1 \Re_2} \right]. \quad (13)$$

Let us now analyze the expression for the gap between energy levels (13), i.e. the value $\Delta E = |\tilde{E}'_+ - \tilde{E}'_-|$. The value $\Delta E_{asym} = |\tilde{E}_1 - \tilde{E}_2|$ is a measure of the asymmetry of two quantum wells, and it is equal to zero for symmetric wells. If its square dominates under the root sign in (4), then $\Delta E \approx \Delta E_{asym}$. In this case, the solutions of system (11) correspond to wave functions $\tilde{\psi}_1(z), \tilde{\psi}_2(z)$ close to the original functions ψ_1, ψ_2 , i.e. there is almost no mixing of the wave functions. In the opposite case, when the asymmetry of the wells is negligibly small, then the gap between the levels (13) in the tunnel-coupled wells is $\Delta E \approx \sqrt{4\Re_1 \Re_2}$, where this value characterizes the tunneling splitting of the energy levels. In this case, the solutions of system (11) correspond to a strong mixing of the initial wave functions, where the coefficients C_1 and C_2 are comparable in absolute value to each other.



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HOW TO TEACH ENGLISH PRONUNCIATION

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ABSTRACT

Teaching English pronunciation is a challenging task with different objectives at each level. This guide on how to teach pronunciation provides a short overview of the main issues to be addressed at each level, as well as pointing to resources on the site, such as lesson plans and activities, that you can use in class to help your students improve their English pronunciation skills. Following each level are a few suggestions for level appropriate activities. Finally, the best way to help students improve their pronunciation skills is to encourage them to speak English as much as they possibly can.

KEY WORDS : vowels, sounds, grammar, pronunciation, consonants

Every ESL student should have a pronunciation element to their language studies. Sometimes, though, a student may need more than one strategy for tackling English pronunciation.

By making sure you use variety in your pronunciation lessons, your students will be more successful with English pronunciation and gain the confidence that comes with it.

Correct pronunciation leads to effective communication and the reason why it's essential to equip your students with the necessary tools to speak and listen, right from the beginning of their lessons.

How to Teach Vowel Pronunciation in English

1. Listen and repeat

This will be the first and most common method of teaching sound specific pronunciation in English. You say the target sound and have your students repeat it after you. If you are teaching a long word with multiple syllables, start with the final syllable of the word and have your class repeat it. Then add the penultimate syllable and say the two together having your class repeat after you. Work backwards in this manner until your students are able to pronounce the entire word correctly.

2. Isolation

When working on a specific sound, it may help your students to isolate that particular sound from any others. Instead of presenting a certain sound as part of a complete word in English, you can simply pronounce the sound itself repeatedly. When you do, your students can repeat it along with you, focusing on the small nuances in the correct pronunciation and also engraining the sound pattern into their minds. This is especially helpful when you have several students struggling with a specific sound delineation.

3. Minimal pairs

Minimal pairs are a great way to focus pronunciation on just one sound. If you are not familiar with linguistics, a minimal pair is two words that vary in only one sound. For example, rat and rate are minimal pairs because only the vowel sound differs between the two words. Additional minimal pairs are pin and pen, dim and dime, and bat and pat. You can use minimal pairs to help your students with their pronunciation by focusing on one particular sound. In addition to the pronunciation benefits, your students will also expand their vocabularies when you teach minimal pairs.



4. Record and replay

At times, your students may think they are using correct pronunciation when in fact they are saying something quite different. By using a device to record what your students are actually saying, you have empirical data to play back for each person. Encourage him or her to listen to what they actually said rather than what they think they said. You may also want to compare their recording to that of a native speaker. In this way, your students will have a more objective understanding of their true pronunciation and be able to take steps to correct it.

5. Use a mirror

Giving your students a chance to view their own physical movements while they are working on their pronunciation can be of great value. You can always encourage them to look at your mouth and face as you pronounce certain sounds, but they will also benefit from seeing what movements they are making as they speak. Sometimes, becoming aware of the physical movements involved in pronunciation is all your students need to correct pronunciation issues of which they are unaware.

Correct pronunciation means effective communication. Students on all levels need to learn the correct pronunciation of certain key sounds or they'll be misunderstood by other English speakers. This skill extends to listening too. Miscommunication and uncertainty in pronunciation can demotivate students and undermine their self-confidence.

6. Phonetics

When your students are facing a pronunciation challenge, it could be that English spelling is adding to the mystery of the spoken word. Instead of spelling new vocabulary out on the white board, try using phonetic symbols to represent the sounds (rather than the alphabet to represent the spelling). If you were to use phonetic symbols, the word seat would be written /si:t/ and eat would be written /i:t/. You can find a list of the phonetic symbols on several websites or in introductory linguistics books. Once you teach your students the International Phonetic Alphabet, you can use those symbols any time you introduce new vocabulary to your students.

7. Show a vowel diagram

If you are using phonetic symbols to help you teach vowel pronunciation, a diagram of where each English vowel sound is produced can be eye opening for your students. Print copies to distribute in class or show your students where they can find this diagram online. When students know which area of the mouth in which they should be making their sounds, they may have an easier time distinguishing between similar sounds because they are produced in different areas of the mouth.

8. Sing

Surprisingly enough, singing can be a good way for your ESL students to practice their vowel pronunciation. Because singing requires a person to maintain vowel sounds over more than just a moment, it can give your students a chance to focus in on the target sound and adjust what sound he or she is making.

9. Tongue twisters

Though tongue twisters are probably more popular for practicing consonant pronunciation, they are still a valuable resource for vowel practice. Not only are they a challenge to your students' pronunciation abilities, they add an element of fun to the classroom that can help your students relax and therefore free them to be more daring in their attempts at English. See our 'Top 20 Tongue Twisters' classroom poster.

10. Target language specific sounds

Some pronunciation patterns are found consistently in students with the same native language. Being aware of these patterns is helpful in addressing problems your students may not even know they have. You can find practice exercises to target specific pronunciation patterns, or you can write your own to target the specific needs of your class. Either way, making students aware of pronunciation patterns of speakers of their native language can be the biggest help in eliminating the mispronunciations.



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ATTITUDE TOWARDS YOGA EDUCATION AMONG UNDERGRADUATE STUDENTS

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ABSTRACT

The present study was aimed at assessing the attitude of undergraduate students towards yoga education. The study analyzed the data from 295 undergraduate students. Out of these, 161 students were male and 134 female. A questionnaire related to attitude towards yoga education was developed and standardized by the investigators and was used to collect responses from the students. The findings of this study revealed that there is no significant difference existing between male vs. female and rural college vs. urban college undergraduate students regarding their attitude toward yoga education. Another finding of this study also showed that there is no significant difference existing between arts and science undergraduate students regarding their attitude toward yoga education.

I. INTRODUCTION

We need to know about yoga before we can learn about yoga education. Yoga is an integral part of the current education system because; one of the main goals of the current education system is the overall development of the children. Yoga is a medium through which students develop mentally as well as physically. Yoga is essentially a spiritual discipline based on an extremely subtle science that focuses on bringing harmony between mind and body. It is an art and science for healthy living. The word 'Yoga' is derived from the Sanskrit root 'Yuj', meaning 'to join' or 'to yoke' or 'to unite'. The science of Yoga has its origin thousands of years ago, long before the first religion or belief systems were born. According to Yogic lore, Shiva is seen as the first yogi or Adiyogi and the first guru or Adiguru. Several thousand years ago, on the banks of Lake Kantisarovar in the Himalayas, Adiyogi poured his profound knowledge into the legendary Saptarishis or 'seven sages'. According to Yogic scriptures, the practice of Yoga leads to the union of individual consciousness with universal consciousness. According to modern scientists, everything in the universe is just a manifestation of the same quantum firmament. One who experiences this oneness of existence is said to be 'in Yoga' and is termed as a yogi who has attained a state of freedom, referred to as Mukti, nirvana, Kaivalya, or Moksha. Yoga also refers to an inner science comprising a variety of methods through which human beings can achieve union between the body and mind to attain self-realization. The aim of Yoga practice (sādhana) is to overcome all kinds of suffering that lead to a sense of freedom in every walk of life with holistic health, happiness and harmony. Yoga education can supplement school and university education. It can prepare the

students physically and mentally for the integration of their physical, mental and spiritual faculties so that the students can become healthier, saner and more integrated members of society and the nation. Practicing yoga can help reduce stress, anxiety symptoms and depression (Cvitkovic, 2021). The practice of yoga not only helps to keep the mental body strong and supple but also incorporates mental activities and disciplines that help to develop attention and concentration and stimulate the creative ability that is latent within the human body (Kumar, 2012). With the intervention of yoga, academic performance improves by optimizing the stress level (Sharma and Kauts, 2009). The practice of yoga helps to develop qualities like positive thinking, inner peace, compassion, skill for nonviolent conflict resolution, respect for the self and others, etc. which are regarded as components of peace behavior (Sharma, 2018). The practice of yoga show promises for promoting better mental health (Avasthi, 2018). Yoga in education specially focused meditation practice in classroom teaching can play an important role to achieve the aim and objective of true education (Devi and Rathore, 2021). Yoga education is the educational appendage to school and university knowledge. This education gives students physical and mental integration of their physical, mental and spiritual faculties so that the students can be integrated into society with a sober mind of yoga and meditation. Yoga education is the only education through which it is possible to make students aware of yoga and develop a positive attitude toward yoga among them. Therefore, with the help of this study the researcher tries to know the attitude of undergraduate students of Purulia Districts towards yoga.



II. LITERATURE REVIEW

Saha, B., Sen, S. & Adhikari, A. (2021) examined the attitude of college students towards yoga using clustering techniques. The findings of this study revealed that female students of arts formed two clusters, male students of arts formed one cluster, one cluster is formed by science students and one cluster is formed by arts, commerce and science students. Sembian (2019) conducted a study on attitudes toward yoga among secondary school students in Cuddalore District. The main objective of this study is to test the attitude of secondary school students towards yoga. Overall findings of this study revealed that the attitude of secondary school students in the Cuddalore district is neither more favorable nor unfavorable towards Yoga. Another finding of this study also showed that there is a significant difference existing between Government and Self-finance secondary school students regarding their attitude toward Yoga. Government secondary school students have a better attitude towards Yoga than that Self-finance secondary school students. Nanaware and Palanethra (2019) conducted a study on the attitude of teacher trainees towards yoga as an organized activity. The results of this study showed that arts and science teacher trainees of the training colleges had sound awareness, most of the arts and science teacher-trainees' showed a favorable attitude towards Yoga. Hasan and Halder (2019) conducted a study on attitudes towards yoga education in school among secondary students. The findings of this study found that there is a significant difference existing between urban and rural students, between high achiever and low achiever students but there is no significant difference existing between male and female secondary students. Taylor et al. (2019) examined integrating yoga into a comprehensive school counseling program: a qualitative approach. The main aims of this study are to investigate the lived experiences of 10 school counselors who integrate yoga into their comprehensive school counseling programs. The findings of this study showed five significant themes and subsequent subthemes describing the participants' lived experiences of yoga integration within their school counseling programs. They include implications for research and practice. Wise (2017) studied yoga as a reasonable alternative to physical therapy for lower back pain. The findings of this study revealed that a yoga class designed for chronic low back pain in patients was as effective as physical therapy for reducing pain, improving function and lowering the use of pain medicine. Yang and James (2016) examined yoga as a transitional platform to a more active lifestyle. The findings of this study revealed that a yoga program may be utilized as a stepping stone toward regular exercise among overweight sedentary adults. Nguyen et al. (2014) conducted a study on hot yoga establishments in local communities serving pregnant women: a pilot study on the health implications of its practice and environmental conditions. The finding of this study revealed that mothers who practiced prenatal hot yoga were more likely than non-hot yoga practitioners to have someone aside from an obstetrician/gynecologist discuss prenatal exercise safety with them. Another finding also revealed that prenatal public health education campaigns need to be refined. Public health officials and obstetricians/gynecologists need to be aware that those who engage in a hot yoga practice are more likely to trust someone other than their

health care provider or public health professional regarding the safety of this practice. Hyde (2012) examined the yoga in schools' movement: using standards for educating the whole child and making space for teacher self-care. The researcher concluded that Yoga is not a religion; therefore, including schools as part of the regular school day, or as does not constitute an establishment of religion. Hartfiel et al. (2011) examined the effectiveness of yoga for the improvement of well-being and resilience to stress in the workplace. The finding of this study revealed that even a short program of yoga is effective for enhancing emotional well-being and resilience to stress in the workplace. They suggest that employers should consider offering yoga classes to their employees. Brisbon and Lowery (2011) conducted a study on Mindfulness and Levels of Stress: A Comparison of Beginner and Advanced Hatha Yoga Practitioners. The main objective of this study is to examine mindfulness and stress levels in beginner and advanced practitioners of Hatha yoga. The findings of this study revealed a significant negative correlation between mindfulness and stress levels and there are no significant correlations found between experience levels and mindfulness and stress. Chaoul and Cohen (2010) investigated rethinking yoga and the application of yoga in modern medicine. Through in this study, the researchers discussed the use of the term as pan-Asian mind-body practices, and provide an overview of research being conducted with this practice. The investigators said the big strides in our understanding of the role of mind-body practices in health and well-being come from some of the studies examining psychological, behavioral and biological outcomes. Alexander et al. (2008) conducted a study on contextualizing the effects of yoga therapy on diabetes management: a review of the social determinants of physical activity. The findings of this study indicated that yoga has a positive short-term effect on multiple diabetes-related outcomes. However, the long-term effects of yoga therapy on diabetes management remain unclear. Potter (2007) conducted a study on Rock Hopping, Yoga and Student Empowerment: A Case Study of a Sustainable School. The main objective of this study is to afford ideas and support for teachers and school managers who wish to maximize the influence that schools can have on creating a more sustainable future. Scholz (2005) studied Bible and yoga: towards an esoteric reading of biblical literature. The researchers concluded that Christian mystics of the past rarely practiced Yoga to reach union with the divine, Bible reading might nurture a connection with the divine.

III. OBJECTIVES OF THE STUDY

The main objectives of this study are:

- i. To study the difference between the attitude of male and female students towards yogaeducation.
- ii. To explore the difference between the attitude of rural college and urban college students towards yoga education.
- iii. To find out the difference between the attitude of arts and science students towards yogaeducation.



IV. HYPOTHESES OF THE STUDY

In order to conduct this study precisely, following null hypotheses has been developed:

H₀1: There is no significant difference between the attitude of male and female students towards yoga education.

H₀2: There is no significant difference between the attitude of rural college and urban college students towards yoga education.

H₀3: There is no significant difference between the attitude of arts and science students towards yoga education.

V. METHODOLOGY

In this chapter, the methodology or the design of the research is discussed. In this chapter, the details of the present research are given. From this chapter, it is clear what the objective of the study is. This study was conducted through a descriptive survey type research method.

V.1 Population of the study

The population area of this study is all the Undergraduate students of Purulia, Purulia, West Bengal, India.

V.2 Sample and sampling

In this research study stratified random sampling method was used for selecting the samples for the study. A total number of 295 students were selected from two colleges representing one college from urban areas and another one is rural areas.

V.3 Instrument used for data collection

To assess the attitude of undergraduate students towards yoga education, the investigators framed a Likert-type yoga education questionnaire with 40 statements. Scores that were given to the positive questions: 5 for Strongly Agree, 4 for Agree, 3 for Neutral, 2 for Disagree, and 1 for Strongly Disagree, and ascending for the negative questions. The investigators standardized this questionnaire by following standard procedure. The reliability of the scale was determined by calculating the reliability coefficient on a sample of 200 undergraduate students. The Cronbach's alpha value was found 0.79 which proved the acceptability of the overall reliability of this scale.

VI. ANALYSIS AND INTERPRETATION

A. Descriptive Statistics

Descriptive statistics are used to describe or summarize the characteristics of a sample or data set, such as variable's mean, S.D, or frequency. Here we present our descriptive data (Table 1) in the form of mean and standard deviation (S.D) for the scores of attitude towards yoga education among undergraduate students.

Table 1

Variables	N	Mean	S.D
Male	161	147.87	15.33
Female	134	149.36	14.25
Rural College	148	150	14.89
Urban College	147	146	14.59
Arts	178	149.30	15.25
Science	117	147.41	14.22

B. Inferential Statistic

Inferential statistic plays an important role in hypothesis testing. It is a branch of statistic that makes the use of various analytical tools to draw inferences about the population data from sample data. For the present study, we have constructed 't'-value (Table 2) to analyze the mean difference between the pairs.

Table 2

Pair of Composition	N	df	Mean Difference	't'-value
Male	161	293	1.49	0.39
Female	134			
Rural College	148	293	4	0.01
Urban College	147			
Arts	148	293	1.89	0.28
Science	117			

VII. HYPOTHESIS TESTING

A. Testing of H₀1

The mean (M) of attitude towards yoga education scores for male and female undergraduate students are 147.87 (S. D= 15.33) and 149.36 (S. D=14.25) respectively and the calculated 't' value between this pair is 0.39. The critical value of df 293 is 1.96 and 2.58 at 0.05 level and 0.01 is the level of significance respectively. So, it is found that the calculated 't' value is less than the critical value at 0.01 and 0.05 level of significance. Thus, it is evident that there is no significance difference existing between male and female undergraduate students of Purulia District regarding to their attitude towards yoga education. Hence the H₀1 "There is no significant difference between the attitude of male and female students towards yoga education" is accepted at 0.01 level of significance.

B. Testing of H₀2

The mean (M) of attitude towards yoga education scores for rural college and urban college students are 150 (S. D=14.89) and 146 (S. D=14.59) respectively and the 't' value for the pair of rural college and urban college students is found 0.01 which is less than the 't' table value at 0.01 level of significance. It is evident that the H₀2 is accepted at both level and there is no significant difference existing between rural college and urban college students regarding their attitude towards yoga education.

C. Testing of H₀3

The mean (M) of arts and science undergraduate students regarding their attitude towards yoga education are 149.30 (S. D=15.24) and 147.41 (S. D=14.42) respectively and the calculated 't' value between arts and science undergraduate students regarding their attitude towards yoga education is 0.28. The critical value of df 293 is 1.96 and 2.58 at 0.05 level and 0.01 level of significance respectively. So, it is found that the calculated 't' value is less than the critical value at 0.01 and 0.05 level of significance. Thus, it is evident that there is no significance difference between arts and science undergraduate students of Purulia District regarding to their attitude towards yoga education.



VIII. DISCUSSION

The 't'-value of male and female indicated that there is no significant difference existing between male and female undergraduate students regarding their attitude toward yoga education. This result is supported by different researchers (Saha, 2021; Sembian, 2019; Singh, 2017; Narang, 2017; Gray, 2013; and opposed by Mehta and Pathak, 2020 ;). But the mean score is a slight different between these two variables. The mean score of male undergraduate students is a little more than female undergraduate students. Other findings of this study also indicated that there is no significant difference existing between rural college and urban college students in the Purulia district regarding their attitude towards yoga education (Sembian, 2019 and Singh, 2017). But mean score of rural college students (Mean=150) is found higher than that of urban college students (Mean=146). That proved that rural college students showed a more favourable attitude toward yoga education than urban college students. The science and arts undergraduate students revealed their attitude toward yoga education is not significant, but the mean score of art students is also little more than that of science undergraduate students.

IX. CONCLUSION

Yoga is a form of mind-body fitness that involves a combination of muscular activity and an internally directed mindful focus on awareness of the self, the breath and energy. The overall findings of this study revealed that there is no significant difference existing between male and female, rural college students and urban college students, and arts as well as science students. But the mean score of rural college students is found higher than that of urban college students which proved that rural college students showed favourable attitude towards yoga education. Therefore, we need to make sure that urban boys and girls put a little more emphasis on yoga education.

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HOW TO TEACH ENGLISH VOCABULARY TO YOUNG LEARNERS

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ABSTRACT

It's hard for students to read and understand a text if they don't know what the words mean. A solid vocabulary boosts reading comprehension for students of all ages. The more words students know, the better they understand the text. That's why effective vocabulary teaching is so important, especially for students who learn and think differently.

In this article, you'll learn how to explicitly teach vocabulary using easy-to-understand definitions, engaging activities, and repeated exposure. This strategy includes playing vocabulary games, incorporating visual supports like graphic organizers, and giving students the chance to see and use new words in real-world contexts.

KEY WORDS: context, strategies, memory, games, meaning.

The goal of this teaching strategy isn't just to increase your students' vocabulary. It's to make sure the words are meaningful and relevant to their lives.

When choosing which vocabulary words to teach, you may want to pick words from Tier 2 because they're the most useful across all subject areas.

Select a text. Find an appropriate text (or multiple texts for students to choose from) that includes the vocabulary words you want to teach.

Come up with student-friendly definitions. Find resources you and your students can consult to come up with a definition for each word. The definition should be easy to understand, be written in everyday language, and capture the word's common use. Your definitions can include pictures, videos, or other multimedia options. Cambridge Learner's Dictionary, Merriam-Webster Learner's Dictionary, and Wordsmyth Children's Dictionary are all good resources to help create student-friendly definitions.

How to teach:

1. Introduce each new word one at a time. Say the word aloud and have students repeat the word. For visual support, display the words and their definitions for

students to see, such as on a word wall, flip chart, or vocabulary graphic organizer. Showing pictures related to the word can be helpful, too.

2. Reflect. Allow time for students to reflect on what they know or don't know about the words. Remember that your class will come to the lesson with varying levels of vocabulary knowledge. Some students may be familiar with some of the words. Other students may not know any of them. If time permits, this could be a good opportunity to use flexible grouping so students can work on different words.

3. Read the text you've chosen. You can read it to your students or have students read on their own (either a printed version or by listening to an audio version). As you read, pause to point to the vocabulary words in context. Use explicit instruction to teach the word parts, such as prefixes and suffixes, to help define the word. If students are reading on their own or with a partner, encourage them to "hunt" for the words before reading. Hunting for these words first can reduce distractions later when the focus is on reading the text.

4. Ask students to repeat the word after you've read it in the text. Then remind students of the word's



definition. If a word has more than one meaning, focus on the definition that applies to the text.

5. Use a quick, fun activity to reinforce each new word's meaning. After reading, use one or more of the following to help students learn the words more effectively:

Word associations: Ask students, "What does the word delicate make you think of? What other words go with delicate?" Students can turn and talk with a partner to come up with a response. Then invite pairs to share their responses with the rest of the class.

Use your senses: Ask your students to use their senses to describe when they saw, heard, felt, tasted, or smelled something that was delicate. Allow students time to think. Then ask them to give a thumbs up if they've ever seen something delicate. Call on students to share their responses. Do the same with each of the senses.

A round of applause: If the word is an adjective, invite students to clap based on how much they would like a delicate toy, for example. Or students can "vote with their feet" by moving to one corner of the room if they want a delicate toy or another corner if they don't. This activity works especially well if you pair the new adjective with a familiar noun.

Picture perfect: Invite students to draw a picture that represents the word's meaning.

Examples and non-examples: Give one example and one non-example of how the word is and isn't used. For instance, you could tell students that one thing that is delicate is a teacup. One thing that isn't delicate is the cement stairs into the school. Then invite students to share their own examples of things that are and aren't delicate.

After students do one or more of the activities above, have them say or draw the word again.

6. Play word games. Throughout the week, play word games like vocabulary bingo, vocabulary Pictionary, and charades to practice the new words. Include words you've taught in the past for additional reinforcement.

7. Challenge students to use new words. They can use their new vocabulary in different contexts, like at home, at recess, or during afterschool activities. Consider asking students to use a vocabulary notebook to jot down when they use the words. You can even get your colleagues or school administrators in on the fun by asking them to use the words when talking with students

or in announcements. Praise students when you hear them using those words in and out of the classroom.

This explicit approach helps all students and is especially helpful for students who learn and think differently. This includes students who have a hard time figuring out the meaning of new words when they're reading. It can be difficult for them to make an inference or use context clues to figure out what a word means.

Explicit vocabulary instruction with student-friendly definitions means there's no guesswork involved. Repeated exposure and practice help to reinforce the words in students' memories.

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5. *ZAMONAVIY TA'LIMDAGI MUAMMOLAR*
6. *TIL TA'LIMIDA ZAMONAVIY TRENDLAR*



WHY DO START-UPS FAIL IN INDIA: A STUDY

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ABSTRACT

The aim of this study is to why the initiative and scope of start-ups fails by various factors influences and contribute for the startups in India have failed. The majority of people in our nation choose services over businesses. Unfortunately, the value of entrepreneurship is not emphasised by our educational system. IITs, which are technical institutions, have stepped up their efforts to support entrepreneurs and the idea of self-employment. Many IIT graduates are leaving well-paying employment to launch their own businesses. However, given the nature of the education and training offered, it might not be sufficient to equip new entrepreneurs. The Indian learning process is not suited for the development of entrepreneurship. Talented individuals are available to work in the government, in the private market, or in white collar employment. There are several causes for the gloomy state of entrepreneurship in India.

KEYWORDS: Start-up, Failure, Entrepreneurship, Review, Entrepreneurship Failure and growth

INTRODUCTION

India suffers from the caste, class, creed, and religion systems among other things, such as the joint family structure and social pressure. Traditional cultural standards and mentalities frequently produce barriers in the way of entrepreneurship growth. The inability of entrepreneurship to advance quickly can be attributed to the absence of key infrastructure facilities, including raw materials, the capital market, logistics, and technostructure (shortage of skilled managers, specialists, and labour force).

However, among all other factors, the confined and conventional mindset of Indians, particularly parents and young people, is the main deterrent for many to engage in entrepreneurial activity. The main factors preventing the growth of business are an inadequate level of family support and social pressure. Parents always prefer that their offspring work conventional 10–6 jobs. The actions of the job-holics that our people like are the only obsession with having a good job, doing jobs only, gaining better jobs in the top firms, the anticipation to work in multinational corporations, doing government work, and being born, raised, and dying with jobs. Our folks only see, think about, and fantasise doing jobs because they are job addicts. The jobs are not a problem for me. After all, it provides my family and I with food. However, it can be painful when we get so preoccupied with seeking work that if we don't, we believe it would be better to stay at home and do nothing. The parents share equal blame for instilling a workaholic mentality in their kids.

REVIEW OF LITERATURE

TRUPTI PAIKARAY (2022) Startups are the untapped reservoir of experience that pave the road for entrepreneurs to gain priceless lessons and open doors to success. The development contributes to significant subsidizing, innovation

progression, and market support, and the current wave of it aids in boosting the Indian economy. The increase in Startup activity is the result of the existing system, which developed from post-liberalization economic activities. The resources appear positive as startup investments exceed US \$10 billion. The realization that there was increased rivalry led to the development of skilled professionals who were always available as a service bank to foreign corporations. Startups are the young businesses with many concurrent tasks moving at such a rapid pace that people will develop a background in multitasking. being both inside and externally. India, behind the UK, the US, and Israel, is the fourth place for biologically stimulating startups. The idea and implementation of the organization are internal variables, whereas the Indian government is an external one. As it grows gradually, the government also focuses on enhancing processes and bringing about improvements to increase the convenience of doing business. [1]

BHAVOOK CHITKARA (2019) Startups are the young businesses with many concurrent tasks moving at such a rapid pace has people will develop a background in multitasking. being both inside and externally. India, behind the UK, the US, and Israel, is the fourth place for biologically stimulating startups. The idea and implementation of the organization are internal variables, whereas the Indian government is an external one. As it grows gradually, the government also focuses on enhancing processes and bringing about changes to improve the accessibility of doing business. The longevity of startups depends on a lot of support networks, including incubators, science and technology parks, corporate development centers, etc. When these support mechanisms are absent, the risk of failure rises.[2]



Dr. SYED MOHD JAMAL (2019) If businesspeople are the planets in the planetary system, then the government is the sun, the single largest facilitator. Government policies are progressively and slowly improving, despite the fact that India continues to rank incredibly poorly in the World Bank research on the ease of doing business. India has more rules and regulations than the majority of other countries around the globe, which makes it more challenging for company directors to conduct operations there. Whenever they do, it gets far worse. Due to a contempt for market constraints, startups fail. Due to the novelty of the product, the environment for a startup is typically more demanding than for an established company. For a new product, the issue is more complex because of firm must create everything from scratch. [3]

Dr ROSHAN S PATEL (2016) Personal growth is extremely crucial. You must practice self-discipline if you want to succeed as an entrepreneur. You must understand the fundamentals of business in order to succeed as an entrepreneur. You must continually educate yourself if you want to experience personal improvement. Entrepreneurs psychologically get ready for difficulties. Entrepreneurship is always characterized by two possibilities: a good scenario and a terrible situation. Personally, I think visualization is crucial since it helps you remain faithful and never give up. You may determine your entrepreneurial journey with just one attitude. [4]

ANAND PARAMJIT(2016) Nine out of ten new businesses fail. Entrepreneurs have always needed to be aware of the crucial elements required in starting a successful business. Every entrepreneur hopes that his or her hypothesis will come true and help create a profitable business. They want to develop a product that their customers adore while also ensuring that the business continues to gain adequate traction. The introduction of new technologies is one of the technological elements. Environmental considerations include things like weather, climate change, and environmental laws that have an impact on industries. Legal factors include things like legal challenges and consumer and employment rules that these firms must abide by. [5]

ALDRICH ILYAS (2022) The Covid-19 virus continues to represent a clear threat to nations all over the world. The WHO reports that there are more and more new cases of COVID-19. 11,500,302 cases will have been reported by July 7, 2020, in 216 different countries. The US, Brazil, India, Russia, and Peru have the most cases per capita. 3,309 deaths, 30,785 recoveries, and 66,226 confirmed cases were reported for Indonesia. Despite an increase in recoveries, Covid-19's spread is also leading to a rise in new cases, which has an impact on Indonesia's economy. According to the Statistic Indonesia (BPS) report, Indonesia's GDP only increased by 2.97% in the 2020 Quarter, slowing down from 5.07% in the same quarter in 2019. [6]

AMIR HAMZAH (2022) The Government of India's flagship project, Startup India, aims to create a strong ecosystem that is

supportive of the development of new firms, to promote sustainable economic growth, and to create significant job opportunity. The government hopes that this effort would enable startups to develop via creativity and innovation. Additionally, a Startup India webpage was developed to help with different related tasks. Incubators, venture and angel funds, mentors, information access, and many other things are among them. [7]

Dr MADHUR GUPTA (2021) India came in third globally in terms of startup ecosystem, according to a NASSCOM survey (2015). On the organization's official website (startupindia.gov.in), the Department of Industrial Policy and Promotion defines startup (DIPP). A startup, as described in that definition, is "an entity, incorporated or registered in India, not prior to seven years, however, for Biotechnology Startups, not prior to ten years. With annual turnover not exceeding Rs 25 crore in any previous financial year, and Working toward innovation, development or improvement of products, methods, or services, or if it is a scalable business strategy with a high potential for employment generation or wealth creation." All startups in India must be approved by the Ministry of Corporate Affairs. [8]

WHY DO START-UPS FAILS IN INDIA?

A profound ignorance of market demand:

Every state in India has its own distinct tastes, cultures, eating habits, languages, and clothing. Therefore, what is selling like hotcakes in Maharashtra might not be noticed in Tamil Nadu. Before diving into the dangerous startup waters, it is crucial to have a full understanding of regional needs and conduct a complete market analysis. Thus, location is crucial to the success. People don't know what they desire until you show them, thus it's preferable not to follow Steve Jobs' advice in this particular situation and not ask the customers. It's important to keep in mind that not every startup creates something as groundbreaking as the iPod. Similarly, marketing strategy falls under this heading.

Internal factors affecting the failure of start-ups:

By taking into consideration the essential parts of the startups' value chain, it is possible to identify the fundamental factors that influence their enterprises. By examining startups, internal elements can be studied. The main variables that impact the value stream and capabilities of startups are the timing of manifestation, the team, the marketing plan, the product fit, etc.

Talent

Due to businesses growing to a particular size and then shrinking to improve efficiencies, employment at startups is unpredictable. This issue is minor in comparison to locating qualified talent and keeping that talent. Since they have experienced widespread layoffs and downsizing in the past, skilled individuals is reluctant to join startups. Additionally, early-stage or pre-series startups get paid less than their corporate counterparts. Most startups hire

insufficient talent without processes in an effort to grow, and they ultimately lose out.

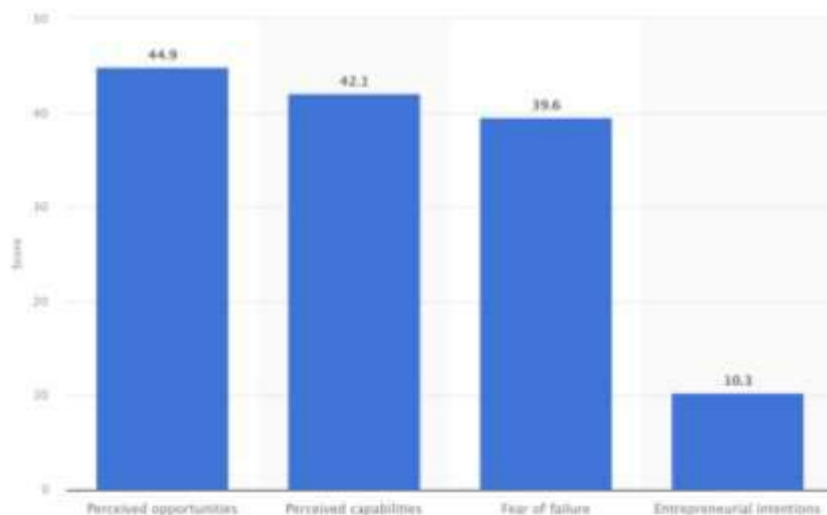
Funding

For start-ups, raising finance has been a prolonged problem. It is simpler to acquire angel and seed funding because the sums are smaller, but it is much harder to participate in later stage rounds because businesses burn through money too quickly and don't consider unit economics.

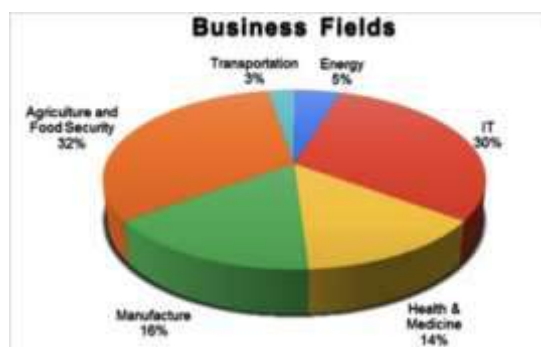
It should be celebrated when an entrepreneur arrives at the starting line of the race rather than when they raise money. Larger cheques, which are a very rare source of finance, are available in India. In our environment (India), we patronize the entrepreneur rather than the company, and the founder occasionally gets pulled into the glamour of funding. Entrepreneurs should establish goals for the next 5 years and avoid being obsessed on any one thing.

Country	Start-ups (Total)	Non-tech-based start-ups	Tech based start-ups	Bank Lending rates in %	Corporate tax rate	Setting up of new company in days
USA	83000	34500	48500	3.3	39	4
China	10000	6600	3400	5.6	25	30
India	10000	5700	4300	10.3	34	45
Israel	4750	750	4000	3.9	26	12
Singapore	---	---	---	5.38	17	2
Japan	---	---	---	1.2	31	9

Table showing the Indian startups are compared to those in other regions.



Graph showing self-perceptions of Entrepreneurs in India (Source: Statista)



Graph showing the percentage of start-ups in different fields

The main complaint from users is "Lack of knowledge in their field." It's accurate because the majority of young businesspeople launch startups despite having little expertise in their industry. The second most common causes

of startup failure are poor management and misguided marketing.



Team

Members of the ideal co-founders team should have the necessary abilities, ambition, and employment history to work in ventures. For startups, a team with different backgrounds is appropriate, and the partnerships between the

founding team members are essential to how effectively businesses-run. According to research on business failure post mortems, During the startup's early phases, the founding team should be able to spread the risk across numerous initial members.



Graph showing what are the major factors contributes for entrepreneurship failure

CONCLUSION

The top 10 reasons why start-ups failures are similar in number. This study paper discusses the causes of startup failure and offers tips for averting such a situation. Startup founders need to be aware of this information. In this study, we talked about the crucial requirement for start-ups to structure their business models appropriately in order to avoid such problems. The start-up scene in India is brimming with innovative concepts and tremendous talent. Therefore, entrepreneurship needs to be promoted, the public needs to recognize its importance, and young people need to be encouraged to pursue it as a different career path. Many unemployed young people can get jobs because to one entrepreneur. Our Indian teens shouldn't ever be subjected to pressure, just like American teens aren't forced to choose a particular style or job route. In America, people are aware of how unique they all are and have created systems to accommodate this. They can so freely select their job courses. They work part-time jobs to cover their expenses, and they don't value people according to the type of work they do. In our nation, parents choose whether their children should major in engineering or medicine. As a result of the research, it is concluded that both internal and external factors have a significant impact on a startup's ability to succeed. The inability to discern a market need for a product as well as a lack of innovation and technology are the most common triggers of startup failure.

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INDIA'S DETERRENCE GOLDBLOCKS PROBLEM IN SOUTH ASIA

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ABSTRACT

The previous twenty years have seen a significant change in the world. Developing nations have made military and economic strides and are now pursuing their national interests with greater vigour. China and India, the two largest of these nations, have been at odds for many years due to border disputes. In addition, China's efforts to encircle India and its closer ties to Pakistan have put the two nations on a collision course, which the United States, which sees China as a rival great power, would be well-positioned to take advantage of. This is a challenging task, though, due to the nuclear standoff between Pakistan and India. According to Vipin Narang's writings, even in the face of terrorist acts like the 2008 Mumbai attacks, Pakistan has taken an asymmetrical nuclear escalation posture that successfully dissuades India from exerting pressure on it. In my research, I aim to highlight the special Goldilocks problem that India faces in balancing China and Pakistan and explore how closer Indo-American cooperation is the most effective strategy to prevent regional instability and a potential nuclear exchange. This article looks at the need for a closer US-Indian partnership in the future to help India find a Goldilocks solution.

THE DETERRENCE GOLDBLOCKS DILEMMA

Deterrence during the Cold War was comparatively simple: have enough nuclear weapons and strategically placed ground forces to make sure your adversary felt constrained in what they could do against your side. Although the world's economic integration has grown significantly over the past 30 years, political integration and alliances have lagged behind in comparison to the bipolar world of the Cold War between the United States and the Soviet Union. As a result, our current multipolar international system is much messier, or G-Zero, as defined by author Ian Bremmer. In this situation, "no country or bloc of countries has the political and economic leverage to drive an international agenda."

The Goldilocks problem is one of the difficulties that this new normal provides to states in the area of deterrence. When anything must be "just right," that is, neither too much nor too little, this is known as the Goldilocks principle. This is impossible to achieve in the Goldilocks problem, which is a balancing issue. When two pressures combine to produce an environment where getting things "exactly perfect" is unattainable, you either need more to solve one issue or less to solve another.

As more nations reach nuclear breakout and the structures change to a more multipolar paradigm, this deterrence conundrum will become a more frequent problem than it was during the more structurally bipolar Cold War. Recently, the United States and its Intermediate-Range Nuclear Forces Treaty (INF) with Russia is a prime example of a state dealing with this conundrum. On the one hand, by guaranteeing that no local

nuclear battle at shorter range could leave the United States undisturbed, this treaty helped maintain strategic stability with Russia and boosted European faith in American assurances. However, China was not obligated to abide by this agreement and currently has 2,650 land-based missiles, which would be against the agreement if Beijing were a signatory. To establish strategic stability and reassure its allies in East Asia, the United States felt the need to counterbalance these weapons with resources that were prohibited by the treaty. Thus, following a verbal exchange with Russia over Moscow's adherence to the treaty, Washington withdrew from the agreement on August 2, 2019, only to immediately reverse course and test its own medium-range missile on August 20.

The United States came into the issue as a result of two opposing forces acting against it and undermining Washington's deterrence strategies. America is not unique in this regard, though, and its situation is stable when compared to others'. The prize for least effective deterrence India is in a difficult position because it has to deal with two rivals: China, a rising regional power with territorial claims on parts of India, and Pakistan, a nuclear-armed revisionist nation that is paranoid about its security and frequently supports terrorist attacks across the border. India faces a dilemma where New Delhi must decide between stability on one front and deterrence on the other, similar to the American dynamic. Even worse, either decision will have disastrous effects on India's future.



QUADRILATERAL NATURE OF THE SOUTH ASIAN SECURITY SITUATION

Kashmir is the main contributor to the security situation in South Asia. There has been hostility between India and Pakistan ever since the brutal partition of India that took place in 1947. The Hindu-Muslim split that Partition intensified resulted in a situation that was destined to bring war and strife notwithstanding the shared language and cultural history. India was not a cohesive country when it attained independence, and the several Princely States and their rulers theoretically had the option of joining either India or Pakistan. Ten million people died in the ensuing chaos, and fifteen million people were forced to relocate. Sardar Patel, the Deputy Prime Minister of India and the man dubbed the Bismarck of India for his tireless efforts to unite the country politically, was able to force all but three states into the Union. Patel used force in the latter half of 1947 to compel Hyderabad and Junagadh, both of which had Muslim rulers, to join the Union. However, when Pakistan and Kashmir's Muslim-majority population rejected this, the 1947 Indo-Pakistan War broke out, dividing Kashmir in two. On the other hand, Kashmir's Hindu ruler had voluntarily decided to join. Due to their territorial disputes, Pakistan and India are perpetually at odds and can never have close relations.

Beijing's claims to northeast Kashmir and other regions of North India added China into the fight in 1962, when Chinese troops invaded Indian-held territory in the Sino-Indian War, while the rest of the world was preoccupied with the Cuban missile crisis. Later that year, in order to put an end to the disagreements and improve relations with Beijing, Pakistan relinquished the area China asserted it owned in Kashmir. This marked the beginning of the two nations' "All-Weather Friendship," which India perceived as the formation of an anti-Indian alliance. Later, under the Nixon administration, Pakistan would help to foster ties between China and the United States. The biggest military ally of Pakistan now is China, which has referred to Pakistan as "our Israel."

However, the United States, which in the past supported Pakistan in exchange for Islamabad's assistance in Afghanistan, has gradually switched to a strongly pro-India attitude since 2000, is now in India's corner. Washington views India as a natural democratic ally who can assist it preserve its influence in the Indo-Pacific and significantly thwart Chinese attempts to exert hegemony and control. As a result, since President Barack Obama's "pivot to Asia," Washington has sought to improve ties with New Delhi. As of right now, the Defense Technology and Trade Initiative (DTTI) from 2012 and the Declaration on Defense Cooperation from 2014 have both been ratified by the United States and India. Later, during India's 66th Republic Day, President Obama and Prime Minister Narendra Modi met and worked out a framework for the US-India defence relationship as well as a shared strategic vision for the Indo-Pacific region as well as four projects for the DTTI. From the US's perspective, everything worked to strengthen the alliance with India. One indication of the strength of this new alliance is how it has developed throughout the Trump administration, despite

deteriorating ties between America and most of its other key allies.

The United States is seen by India as a welcome outsider whose assistance could somewhat swing the balance in India's favour. India is significantly less militarily and economically developed than China, and Beijing has slowly built relationships along India's borders using its financial resources, which has caused New Delhi to be uneasy and sceptical of China's "peaceful rise." Apart from the ongoing territorial disputes that have existed since 1962 and that were made worse by the Doklam Standoff in 2017 and the ongoing situation in the Galwan Valley, Chinese support for Pakistan's military, nuclear program, and participation in international organisations has become an intolerable thorn in India's side. India is currently a defensive power under intense pressure from China on one side and a nuclear-armed, revisionist Pakistan on the other. The fact that India is warming up to the United States not out of a sense of brotherhood among democratic states but rather out of need and a shared interest in maintaining the status quo in South Asia is something Washington does not often take into account. Which gets us to the article's major argument: How can the US and India collaborate to help India find the perfect balance?

In order to respond to this query, it is important to have a thorough understanding of both sides of India's Goldilocks situation as well as the dynamics at play that have led the nation that launched the Non-Aligned Movement (NAM) to align itself with the US. The first is what New Delhi can do to prevent China from invading Indian territory and its sphere of influence more successfully. The South Asian nuclear dyad is the second, and much trickier, problem. Narang's research indicates that Islamabad has already taken an asymmetrical nuclear escalation posture, which effectively discourages India from exerting pressure on Pakistan but also raises the possibility of nuclear theft and accident launch. This indicates that Pakistan has made use of its nuclear arsenal to threaten India with a first strike should a conventional conflict break out between the two countries. Since the events of the 1971 war, Pakistan has been extremely sensitive to the relative power dynamics between itself and India. As a result, Indian grand strategy plans have been consistently hampered by Pakistan's nuclear programme. As a result, India has tried a variety of deterrence-reinforcing measures that have only served to fuel more instability. As a result, India must raise its capabilities to make Chinese decision-makers fear it without alarming Islamabad, which puts New Delhi in a Catch-22 situation. Therefore, maintaining stability with or discouraging Pakistan while simultaneously freeing up enough resources to be able to discourage China is the key to India's Goldilocks conundrum. A very challenging task for India alone.

DETECTING CHINA

Detering China from further action and expansionism along the Indian border, in terms of both claimed land and measures to restrict New Delhi's relations with India's neighbours, would be one of the key objectives of a US-India



alliance, especially from the perspective of India. I find it most beneficial to keep in mind the line from Doctor Strangelove while trying to grasp and conceptualise deterrence: “Deterrence is the art of instilling in the mind of the opponent... the fear to attack.” The enemy’s thinking is what matters most in this situation, thus we must understand what China thinks of India. Since I lack the Mandarin language skills necessary to do this properly, I have relied on the research of Xiaoping Yang of the Carnegie Endowment for International Peace and more recent work by Yun Sun of the Stimson Center’s East Asia Program for this section of my paper.

The fact that Beijing is unconcerned with New Delhi and does not see India as a security threat is my main and most important takeaway from Yang’s study. This way of thinking is motivated by two factors in particular. The first is that China has a capability advantage over the other country, especially in terms of technology. The second factor is the no-war bottom-line threshold, which simply states that Beijing must avoid bringing any issue to that point because China believes neither side wants war. The foundation for all of this is the idea that China does not have to react to India as a nuclear state. Again, this assumption is based on two factors. One is that New Delhi’s claim that the weapons were created in order to deter China is not entirely accepted in Beijing. Beijing acknowledges that the Sino-Pakistani alliance puts India under strain, but the Chinese leadership believes that since China’s nuclear arsenal is focused on the United States, India’s concerns are unfounded. Chinese strategic circles, however, hold the view that New Delhi did not actually intend to pose a threat to China and instead went brazenly nuclear for political pride reasons. Due to New Delhi’s “no first use” policy and limited nuclear arsenal, China is also unconcerned about India’s nukes. Once more, Beijing does not think that India will actually use its nuclear weapons against it. Essentially, Beijing does not see a scenario in which the two nations will engage in a full-scale war, either conventional or nuclear, which is at the heart of Beijing’s threat perception of India.

The Initiatives that India launched as a partner of the United States were seen by China as taking a further step in the wrong way. The next step was India’s creation of a special border force designed to handle border concerns involving Tibet and China. Finally, the launch of India’s nuclear submarine, the Arihant, in 2016 was another step that raised the possibility of a future crisis while not alarming China due to the ship’s lack of technological sophistication. Once more, China does not currently consider India to be a security threat, but Beijing is unhappy with the course that New Delhi is taking.

PAKISTAN’S FULL-SPECTRUM DETERRENCE AND NUCLEAR STRATEGY

Pakistan’s nuclear capabilities are the issue on the opposite side of the Goldilocks conundrum, which Narang’s book thoroughly outlines. Pakistan has operationalized its nuclear arsenal to establish an asymmetric escalation posture, in which a state, historically a state that is conventionally weaker

than its adversary, operationalizes its nuclear arsenal so that it can launch a first strike, thereby discouraging the use of both nuclear and conventional capabilities against itself. This posture needs to include some level of delegation of authority and be coupled with the state’s military forces in order to be credible in the event that an opponent launches an assault. This is to make sure that no matter how the opponent may try to create misunderstanding, every aggressive move is likely to result in a nuclear reaction. This also means that in order to maximise deterrence, this posture partially depends on the state being clear about its capabilities and deployment.

Due to the stark contrast between India’s and Pakistan’s conventional forces in terms of strength, only Pakistan currently uses this posture. The memory of Pakistan’s humiliating defeat in the 1971 war, when India split Pakistan in half in just 13 days and declared Bangladesh to be an independent nation, is ingrained in the minds of all Pakistani commanders. Despite Pakistan’s preference for some form of strategic restraint regime with India that would restrict conventional and nuclear forces, Islamabad is aware that this is impossible given India’s security concerns towards China. In addition, Pakistan does not see stability as a possibility until New Delhi demonstrates that India is serious about resolving territorial disputes, which is highly improbable given India’s privileged position. The current Pakistani strategy of full-spectrum deterrence, which threatens nuclear first use in conventional conflict through its nuclear posture, is the result of this perception of an increase in Indian capabilities coupled with the belief that diplomatic solutions are a pipe dream.

However, using subconventional attacks has made India frustrated and desperate for retaliation, and New Delhi has tried strategies like Operation Cold Start which it believes will allow India to strike Pakistan in a limited manner without crossing the nuclear red line. This has led to an even greater escalation and instability in the region. This did not deter Pakistan, though, and it is likely that New Delhi was compelled to violate some aspects of India’s no-first-use policy in order to restore deterrence. It is very likely that India is developing the intelligence and military capabilities to launch a preemptive counterforce strike that could credibly destroy Pakistan’s nuclear capabilities, as Narang’s more recent work suggests. This strategy is extremely unstable because it would induce Islamabad to use all of its nuclear weapons in the event of a crisis out of concern that it might lose them. In order to maintain the credibility of Islamabad’s deterrent against Indian conventional forces, this will also cause Pakistan to delegate even more power, disperse its arsenal, and increase the risk of accidental use and theft. According to Narang, this will put the region on an ongoing state of crisis as both nations engage in increasingly risky brinkmanship.

Recent developments have brought attention to the problem of such South Asian brinkmanship. Pakistan launched the Nasr, a close-range ballistic missile with nuclear weapons capability, at the end of January 2019. In response to the Indian Cold Start doctrine, the Nasr was developed. Then, on February



14, 2019, the Pakistan-based terrorist organisation Jaish-e-Mohammed murdered 46 Indian soldiers in the Jammu and Kashmir district of Pulwama. In response, New Delhi launched an airstrike at Balakot on February 26, 2019, which resulted in the downing of an Indian jet and the capture of its pilot. India dramatically increased its tension in the ensuing confusion, and it was said that Prime Minister Modi threatened to employ missiles if the Indian pilot was not brought back to his country. It appears Pakistan flinched for the first time in this game of cat-and-mouse since gaining nuclear weapons, and Islamabad quickly returned the pilot. Furthermore, Pakistan used conventional airpower rather than nuclear weapons to counter the first Indian warplanes to violate line control since 1971. Even though it is a small victory for India, this small concession will undoubtedly help to solidify current plans to pursue a preemptive counterforce strike to deter Pakistan. Pakistan, on the other hand, is not going to sit around and will probably be developing its own strategies to undermine Indian confidence in its abilities through improved weapon survivability and/or more sophisticated designs. The outcome seems to be more unpredictable than the majority of the Cold War, with no clear winners, and it is obvious that other solutions must be found to resolve the issue.

THE LUKEWARM PORRIDGE: OF THE UNAPPETIZING OPTIONS, A FORMAL US-INDIA ALLIANCE IS THE ONLY VIABLE CHOICE

After taking into account the problems India has at both ends of its Goldilocks situation, it is evident how the two pressures combined to cause New Delhi to ally with the US. The magnitude of the transformation for the nation that established the NAM during the Cold War merits reiteration. Even though this is a significant start, it is still insufficient to help India resolve its Goldilocks problem. The US-India alliance is fragile, which means it doesn't do much to discourage Beijing or limit Chinese activity in the area. While this is going on, the nuclear relationship between Pakistan and India has only grown more shaky, with India barely managing to secure what seems to be a fleeting pyrrhic victory. The relationship between the Modi and Trump administrations has become stronger. Even though it may be unappealing, a formal treaty alliance is New Delhi's best chance at resolving India's Goldilocks problem. However, this hasn't yet happened.

India currently has three options for escaping its predicament, according to New Delhi. The first course of action is the one that is currently being taken, in which New Delhi keeps trying to resolve the situation using India's own resources while maintaining some neutrality and only forging tactical alliances when it suits its purposes. As we can already see, however, this course of action does not work to stop China from taking action against India, and the preemptive counterforce strategy will only lead to further crisis instability and is extremely unlikely to permanently restore deterrence with Pakistan. In fact, it is almost guaranteed to lead to an arms race that will increase regional risk, deplete resources needed to

compete with China, and stop the presently faltering Indian economy's growth engine. In other words, we already know that this path won't succeed.

A second option would be to try and resolve these problems with China rather than the US. Sun's research, however, indicates that this course of action would probably end in failure. China is frustratingly pushed in two different directions when it comes to India. On the one hand, Beijing genuinely wants to keep things peaceful so it can concentrate on its conflict with the United States in the Indo-Pacific region and avoid shifting resources to its front with India. Indian and Chinese plans and visions for South Asia, however, are incompatible and a source of conflict. This is made worse by the fact that South Asia is China's secondary theatre while India's primary one, resulting in an imbalance in demands and actions. As was previously stated, China only requests that India maintain its neutrality, while India requests of China actions that Beijing could not undo and that would help India's position in the region. Beijing, which considers the demands to be excessive and contributing to India's internal politics, finds this intolerable. Beijing believes that granting India any kind of victory would only give New Delhi more confidence. It is obvious that diplomatic efforts to find solutions to New Delhi's Goldilocks dilemma will be stalled by China, whose main goal is Indian passivity, as China's core interest in this situation is that India continues to struggle to control South Asia and remain neutral in China's conflict with the United States. It is, in essence, a waste of time.

The extension of American security guarantees could be the most potent deterrent that India could hope for against Beijing. The third option is a formal alliance between the United States and India against China. China may believe that its capabilities are far superior to those of India, but Beijing is aware of how far behind the US it is. Furthermore, as was already mentioned, this would make China deal with a new front and divide its forces, giving both India and the United States a better chance in the area. An Indo-American alliance gives a number of options for handling Pakistan. First, it poses a challenge for Islamabad because India would fall under American nuclear protection, whether formally or informally (since the United States would never permit a nuclear attack on its troops to go unpunished), making Pakistani threats that could escalate to attacks on Indian territory less credible. More significant would be the potential for India to expand its options for imposing sanctions through the US alliance network to raise the cost of Pakistan's unconventional attacks. The last option is that a stronger Sino-Pakistan alliance may develop in response to a US-India alliance. Naturally, this scenario has drawbacks, but there may also be two significant advantages. First off, since the war would take on a bipolar character and split into two unified fronts, it would put an end to the Goldilocks conundrum. The second is that this bipolar scenario could lead to some real strategic stability in the area and would more readily allow for treaties to stop nuclear arms races. All things considered, it is not a given that India would be able to escape the Goldilocks



situation through a formal alliance, but it does give New Delhi the best chance of deterring Beijing and new tools for dealing with Islamabad.

Despite this, there are significant speed bumps that need to be taken into account and resolved before New Delhi and Washington can forge a formal partnership. With the renaming of US Pacific Command to US Indo-Pacific Command, Trump has meaningfully advanced cooperation and demonstrated a readiness to collaborate more closely. His stance on immigration and his immigration policies, however, have not been well received in New Delhi. Additionally, it has been challenging for the United States to work toward interoperability and position some of its most sensitive technologies in India due to India's purchase of Russian missile defence systems and other weapons, according to Narang. These purchases were made to enable India's new counterforce posture. These are some of the quirks in the relationship between the US and India, which is still developing. To maintain the partnership, New Delhi will have to pay a price, namely giving up its counterforce strategy against Pakistan and the Russian missile defence system that is a crucial component of it.

In addition, given the current circumstances, it is debatable whether the United States would benefit from this alliance. There are significant domestic issues that India is dealing with, and it's not clear whether New Delhi will be able to live up to the expectations that US policymakers have for it. Despite the fact that both countries are democracies, US interests are very much on the periphery of Indian domestic politics. Historically, this hasn't produced the kind of positive relations that it did in the West. Fast economic growth in India is accompanied by significant income inequality, underemployment, a brain drain, and drought. India is spending a lot of money and manpower on its armed forces because they are mainly concentrated on Pakistan and Kashmir. Even though India would prefer to break away from the India-Pakistan rivalry, the Kashmir conflict and rising nationalism keep forcing New Delhi to return to a conflict that Washington would much rather avoid. The hesitation on both sides to forge a defence alliance is based on some significant obstacles that will take time to overcome, but given that opening a second front against China is America's and India's best option for resolving the Goldilocks problem, Washington should keep pushing for a treaty alliance.

Last but not least, given that American strategy clearly wants the Indo-Pacific to play a significant role in its future plans to counter China, supporting India might be the price Washington is willing to pay to create a new front in this new Cold War against China. A strategy to restore strategic stability by switching the conflict from multipolar to bipolar is one that is worth considering given the current status of Pakistan's and India's nuclear forces as well as the fact that China will be as useless in resolving this crisis as it has proven to be with North Korea.

CONCLUSION

India is in a Goldilocks Dilemma where New Delhi needs to improve its capabilities in relation to China, but Islamabad is also pressuring and limiting India. Pakistan is attempting full-spectrum deterrence against India by using its nuclear arsenal to establish an asymmetrical escalation posture. By doing this, Islamabad has brought about a security situation that poses hazards to both the region and the global community. In this post, I've made the case that India's sole practical choice for achieving both of its goals is a formal alliance with the United States. New Delhi would never be able to escape the Goldilocks situation by adhering to the previous Indian policy of nonalignment since India lacks the power to do so on its own. It is impossible to resolve the problem by bringing India and China together because Beijing sees India as a rival that needs to be subjugated in order to maintain Chinese hegemony due to New Delhi's influence and position in South Asia. Beijing's goodwill is constrained since it just wants to keep things peaceful with India while still having to worry about the United States. These factors have already compelled India to support America; the question now is whether India and the United States can reach an agreement on the formal alliance required to oppose China. If not, New Delhi is merely delaying an inevitable conflict with China over the Indo-Pacific, possibly until a time when Washington and its allies may not be there to support the maintenance of Indian borders and territorial waters as they are at the moment.

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MICROBIOTA AS A FACTOR OF SELF-CLEANING FORMER COASTAL WATER BODIES

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ANNOTATION

The article discusses the features of the microbiota as a factor in the self-purification of coastal waters. Microbiota play an exceptional role in the processes of self-purification of water bodies, since they are primarily responsible for the destruction of organic matter accumulating in lakes.

KEY WORDS: *food, circulation, carbon, reservoir, bacterium, microflora, phosphorus, nitrogen, sulfur.*

Microorganisms, utilizing autochthonous and allochthonous organics, are "orderlies" of water bodies. Processing the flow of polluting organic substances, bacteria at the same time serve as food for a number of microbionts. The contribution of microorganisms to the process of self-purification of water bodies has been evaluated by a number of researchers (Drabkova, 1983, Kuznetsov, 1970). Thus, microflora is an important lever in the ecosystem of water bodies (Kuznetsov, 1970).

Bacteria carry out a complex set of changes and transformations of substances. By mineralizing organic residues, they return carbon, sulfur, nitrogen, phosphorus, and also trace elements necessary for algae and other hydrobionts into the cycle.

The biochemical activity of microorganisms is associated with the oxygen regime of reservoirs and streams, the transformation of biogenic elements. The use of microbiological research methods makes it possible to decipher the course of the destruction of organic matter in water bodies, for which it is necessary to have data on the number of microorganisms, the rate of their reproduction, the intensity of respiration, and production.

Bacteria play an exceptional role in the processes of self-purification of water bodies, since they are primarily responsible for the destruction of organic matter accumulating in lakes.

The purpose of our research was to study the regularities of the distribution of microorganisms in the reservoirs of the Muynak region, fed exclusively by the Amu Darya water.

The total number of bacteria. An important morphological characteristic that clearly reveals the relationship with the type of water bodies is the number of microorganisms. We have carried out long-term studies on the content of microorganisms and their forms in the studied objects. The average annual values of the total number (highs and lows) are presented in the figure. Interannual changes (1995-1997) of the total number of microorganisms studied in lakes and bays are insignificant. However, in 1996 the level of spread of bacteria throughout the year and at all stations was much higher than in previous years.

The intra-annual fluctuations are characterized by spring and summer-autumn peaks, with the maximum values shifting to the end of summer and the beginning of autumn. The total number of bacteria directly counted in the water of the studied lakes and bays is unevenly distributed over the stations and fluctuated over a very wide range from 1.0 to 2.3 million/ml cells, depending on the place of sampling and the season of the year. The greatest number of bacteria was in coastal zones, in old channels, intensively overgrown with reeds and water-immersed vegetation, a significantly smaller number of microorganisms was noted on open shoulders. Water



bodies are characterized by bacterial stratification, but the maximum number of microorganisms was noted in the bottom layers.

The total number of microbes in lakes and bays fluctuated significantly by the seasons of the year: two maxima were noted - in summer and early autumn. Dimensions and biomass of microorganism cells. For each water body, we measured 50 cells of different morphological groups on colored membrane filters using an ocular micrometer; the drying coefficient of bacterial cells in the filters was not taken into account.

The volume of bacterial cells varies: rods from 0.12 to 0.80, cocci from 0.11 to 0.66 microns. Comparing with the literature data, we can say that the volume of cells in the studied area is relatively small, larger cells are characteristic of littoral stations and more productive areas, and cells are smaller in less productive areas.

The average volumes of cells in all objects in the annual cycle fluctuated within a very wide range, and no regularity was observed over the seasons. Sometimes the minimum volume of cells was observed during the freeze-up period, sometimes in spring, even in autumn. Often, an increase in the volume of microorganisms was recorded in the summer.

Characteristic of all objects is an increase in the size of cells in the bottom layers of lakes, especially in periods with well-defined stratification. This is clearly seen in Lake Shegekul, where the average volume of cells in the bottom layer is 2-3 times higher than in the surface.

A certain relationship was noted between the productivity of the reservoir and the size of bacterial cells, especially rods.

In Shegekul Lake and Muynak Bay, they are long and wider than in other water sources. For the coccal flora, it is difficult to talk about such a relationship. Sometimes in channels their volume is greater than in lakes and bays.

It should be noted that earlier in the Amu Darya there was no own microflora, and microorganisms that got from outside were at a minimum.

Simultaneously with the determination of the total number of bacteria, the number of bacteria growing on meat-peptone agar (MPA) was determined. This group also indicates the presence of biochemically active organic matter in the lake.

The study of the distribution of saprophytes in the annual cycle and along the vertical revealed a predominantly summer maximum, and it is most pronounced in the surface layer. The layer at a depth of 1m is significantly enriched with saprophytes. Larger numbers of saprophytes are recorded in the autumn months than in other seasons of the year.

In winter, the content of saprophytic bacteria ranges from 488 to 621 cells per ml, often the minimum number of saprophytic bacteria was detected in spring. A very important indicator in determining areas of pollution in lake waters can be the ratio of morphological forms of heterotrophic bacteria (rods, cocci). The predominance of rods, for example, indicates that the site is contaminated with easily oxidized organic matter.

On glass fouling (bacterial periphyton) one can get a picture of contamination of a particular area by the ratio of both gram-positive and gram-negative forms of microorganisms. It was found that gram-negative forms of bacteria prevailed in the pollution zone in lakes and bays. The increase in gram-negative forms once again allows us to speak about anthropogenic pollution of the reservoir. In areas of high content of organic matter, the morphological diversity of cells and the density of bacterial periphyton increase. As the concentrations of organic substances decrease, the microflora is less diverse, and the amount of periphyton decreases.

Bacterial respiration. According to the activity of respiration, one can judge the amount of organic matter subjected to destruction. The intensity of respiration of one bacterial cell ranges from 0.12 to 0.42×10^{-6} mg O₂/l per day. The total intensity of respiration of bacterioplankton is from 47 to 90%, which gives reason to consider bacterioplankton as one of the leading links in hydrocenosis in the formation of the hydrochemical regime of water sources.

Based on the above, the following conclusions can be drawn:

- The distribution of microorganisms in the studied reservoirs is very variable and ranges from 1.0 to 2.3 million cells per milliliter;
- microflora is represented by medium-sized forms, cell sizes closely correlated with the productivity of the reservoir and even depended on the productivity of a particular area and the nature of its pollution;



-bacterioplankton living in the studied reservoirs is very active, with a high respiration rate. The total destruction reaches 90%, which indicates a significant contribution of bacteria in the process of self-purification of water bodies.

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FROM PROFESSIONAL STANDARD TO PSYCHOLOGICAL AND PEDAGOGICAL FEATURES OF PROFESSIONAL DEVELOPMENT OF PEDAGOGICAL STAFF

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ANNOTATION

The article is devoted to the analysis of reforms, preparation for the adoption of a new standard in the activities of a teacher of a general education school and the features of advanced training of teaching staff. Approaches to the design of the educational process in accordance with the psychological characteristics of learning adults are substantiated.

KEY WORDS: *reform, standard, quality, activity, professionalism, advanced training, teacher, forms.*

Uzbekistan is carrying out large-scale reforms in the education system, aimed primarily at improving the quality of learning processes and achieving high results.

Currently, a new National Curriculum for General Secondary Education is being developed, which will introduce new approaches to teaching, including a competency-based approach.

The teacher is a key figure in the formation of a new content and quality of education. "In the matter of education and upbringing, in the whole school business, nothing can be improved without a teacher" (K. D. Ushinsky).

In a rapidly changing open world, the main professional quality that a teacher must constantly demonstrate to his students is the ability to learn. Readiness for change, mobility, ability for non-standard work activities, responsibility and independence in decision-making - all these characteristics of the activity of a successful professional fully apply to the teacher. The acquisition of these valuable qualities is impossible without expanding the space of pedagogical creativity. The work of a teacher should be freed from petty regulation, freed from total control.

The existing cumbersome qualifications and job descriptions, which hamper the initiative of the teacher, burdening him with formal requirements (for example, prescribing educational programs) and additional

functional duties that distract from direct work with children, do not correspond to the spirit of the time.

The professional standard of the teacher, which should replace the obsolete documents that have so far regulated his activities, is intended, first of all, to liberate the teacher, to give a new impetus to his development. The professional standard is the most important tool for managing the quality of pedagogical activity and ensuring its continuity. It defines the basic requirements for competencies that are necessary for a teacher to perform his professional tasks with high quality.

The world is changing, children are changing, which, in turn, puts forward new requirements for the qualifications of a teacher. But one cannot demand from a teacher what no one has ever taught him. Consequently, the introduction of a new professional teacher standard should inevitably lead to a change in the standards of his training and retraining in higher education and in centers for advanced training. Expanding the boundaries of the teacher's freedom, the professional standard at the same time increases his responsibility for the results of his work, making demands on his qualifications, offering criteria for its assessment.

In 2019, the Ministry of Public Education of Uzbekistan implemented measures to improve the status



of teachers in society, improve infrastructure, attract students to circles within the framework of five initiatives of the President and improve the quality of education. The “Concept for the development of the public education system of the Republic of Uzbekistan until 2030” was developed and approved [1].

One of the main directions of the Concept is the qualitative renewal of the content of the system of continuous education, as well as the training, retraining and advanced training of professional personnel [2].

In modern socio-economic conditions, the task of improving the qualifications of teaching staff objectively comes to the fore. Without attention to the solution of this problem, it is impossible to modernize the education system, to ensure the training of graduates of educational institutions, the quality of education of which must meet the needs of a modern developing economy. In the context of the development of the national education system, the search for new theoretical and practical approaches to the process of increasing the professional competence of teachers and the mechanisms for their implementation is of great importance. The modern system of advanced training of teachers is in search of the most effective forms of teaching teachers.

The differences between adult students and child students were gradually recognized by science. In pedagogy, even a special section of didactics appeared, called andragogy. An andragogical model of organization of learning was also proposed, in which it is the learner who is responsible for determining the field of study, choosing methods, planning terms, and also for evaluating results. He acts as the main "driving force" of learning, while the teacher plays the role of a coordinator of the process, an "architect" who creates new forms, methods and opportunities A.Yu. Panasyuk argues that “the pedagogy of advanced training as an independent branch of pedagogical science does not yet exist, although there are already separate works on the didactics of this process [6, p. 11].

Recently, active adult learning methods that have proven their effectiveness have become increasingly popular: presentations, seminars, business and role-playing games, business trainings, case studies, discussions in small groups, modeling and project implementation, learning by doing, etc. What is the difference between adult learning? Is it only in the content of the exercises or do people have their own

practical experience? No, of course not - the approaches to organizing interaction with students are different, as are the methods of communication, and the distribution of responsibility for the results, and the very motivation for learning. B.Ts. Badmaev notes that

“A strictly scientific approach to teaching the activities of an adult to a vital matter for him - a profession, a specialty, requires placing him on a psychological basis. It is psychology that provides answers to such questions as the laws of mastering knowledge, the formation of skills and abilities, as well as the conditions for motivating learning, interest in knowledge, etc., without taking into account which all work goes by the “trial and error” method [3].

The design of the educational process is based on the psychological patterns of adult development. Therefore, when organizing the training of pedagogical workers, it is necessary to take into account the following features of adults:

- ✓ conscious attitude to the process of their learning;
- ✓ need for independence;
- ✓ the need for meaningful learning (to solve an important problem and achieve a specific goal), which provides motivation;
- ✓ practical orientation in relation to training, the desire to apply the acquired knowledge, skills and abilities;
- ✓ availability of life experience — an important source of knowledge;
- ✓ influence on the learning process of professional, social, domestic and temporary factors [4].

In the light of the problems of adult learning, a cyclic four-stage empirical model of the learning process and the assimilation of new information by a person has gained particular popularity. The Kolb model is a theory by adult learning psychologist David Kolb that focuses on the gradual formation of mental actions. It is widely used in various variations during interactive classes [7].

Researchers have found that people learn in one of four ways: 1) through experience; 2) through observation and reflection; 3) with the help of abstract conceptualization; 4) through active experimentation - giving preference to one of them over the others. According to the authors' ideas, learning consists of repeated stages of "execution" and "thinking". This means that it is not possible to effectively learn



something simply by reading about the subject, studying theory, or listening to lectures. However, training, during which new actions are performed thoughtlessly, without analysis and summing up, cannot be effective either [7].

The stages of the Kolb model (or cycle) can be represented as follows:

1. Getting direct experience.
2. An observation in which the learner reflects on what he has just learned.
3. Comprehension of new knowledge, their theoretical generalization.
4. Experimental verification of new knowledge and their independent application in practice.

Taking into account all of the above, we can conclude that the focus of the system of continuous professional development of teachers on improving efficiency is its integral characteristic.

Many adults do experience learning difficulties. In most cases, this is due to unwillingness to change and to psychological reasons: anxiety about one's authority, fear of looking incompetent in the eyes of others, inconsistency of one's own image of a "solid person" with the traditionally understood role of a student (unwillingness to "return to childhood", "sit down at a desk"). Today, the complexity of teaching adults is aggravated by the fact that they all experienced the impact of the old pedagogical paradigm, with all its inherent shortcomings, such as: dogmatic type of learning, lecture form of conducting classes, separation of learning from life, the predominance of technocratic thinking, orientation to assimilation ready-made knowledge and individual forms of work [5].

Taking into account the different levels of qualification of teachers in the country in Uzbekistan, a procedure is envisaged for the gradual, phased introduction of a professional standard for a teacher.

The organization of the process of advanced training of teachers is an urgent pedagogical problem, the solution of which is seen in innovative processes based on pedagogical principles and the use of scientific and methodological developments in the field of adult education. Adult education is always associated with change and transformation; therefore, it can be effective only if it is carried out taking into account not only age and professional characteristics, but also the personal interests of a person, and is built on a partnership basis.

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THEORETICAL AND EXPERIMENTAL INVESTIGATION OF AVALANCHE BREAKDOWN VOLTAGE OF DIODES WITH AN ARBITRARY BASE DOPING PROFILE

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ANNOTATION

With the improvement of the elements of the base of modern microelectronics and microwave electronics, the capabilities of devices based on homogeneous semiconductor materials in some cases are no longer satisfactory. At present, these devices are manufactured on the basis of semiconductor eliteaxial structures with a complex doping profile and with parameters corresponding to the calculated ones. Such structures have one more advantage: they do not contain microplasmas [1]. The mechanism leading to the absence of microplasmas is not yet clear. However, in order to predict the characteristics of such systems in the process of their design and manufacture, it becomes necessary to theoretically calculate such an important parameter as the avalanche breakdown voltage V_b .

KEY WORDS: shape, Schottky, concentration, electric field, level, magnitude

In this paper, we will propose a method for calculating the value of V_b for a p-n junction or a Schottky barrier with a variable doping level N , and its profile can be specified both in tabular form and in the form of the $N(x)$ dependence. In this case, when the working part of the diode consists of two regions (lo-hi and hi-lo) with a constant impurity concentration in each of the convenient technique. It is based on the knowledge of the analytical dependence of the potential value V_b and the electric field strength E on the doping levels of the hi and lo regions, which was studied in [2].

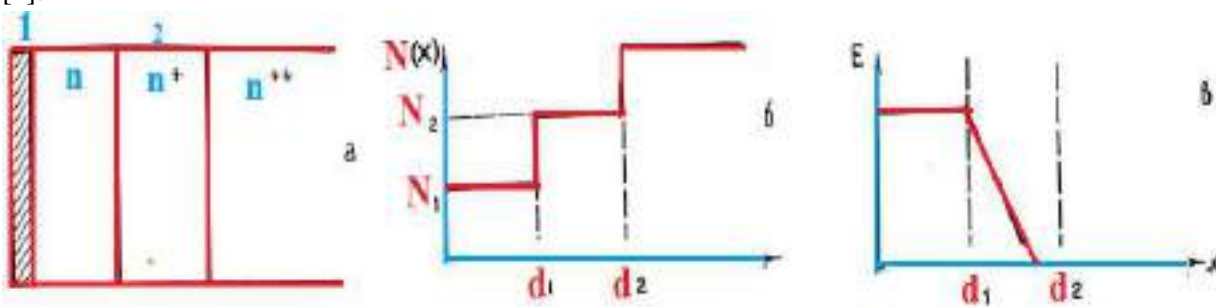


Fig-1. Schematic drawing of a diode (to define the metal-semiconductor contact) with lo-hi doping profile (a). Doping profile of the base region with an arbitrary ratio between N_1 and N_2 possible ($N_1 \geq N_2$, $N_1 < N_2$) (b). (1)-metal, (2)-semiconductor, $n^{++} \gg n^+$. Distribution of the electric field in the base area of the device(s).

Theoretical curves are compared with the experimental values of the breakdown voltage V_b in silicon Schottky diodes with a lo-hi structure obtained by membrane technology [3]. The magnitude of the avalanche breakdown voltage V_b was determined using the integral criterion [4].

$$J = \int_0^D \alpha(x) dx = \int_0^D A \cdot e^{-\left[\frac{B}{E(x)}\right]^m} dx = 1 \quad (1)$$

where $\alpha(E)$ is the coefficient of avalanche multiplication of electron-hole pairs, A and B are constants known for the semiconductors used, depending on their type $m=1$ or $m=2$. The application of the criterion that uses the double integral instead of (1) in this case [4] seems inappropriate, since the errors in the experimental determination of the alloying profile make the main contribution to the error value. At the same time, the calculation method proposed below is fully compatible with a more accurate criterion, since numerical integration is necessary in any case. In turn, such use of the criterion [1] requires knowledge of the dependence $E(x)$, which will be determined below.

Let us consider a planarly homogeneous system, the doping level N, in which is only a function of the coordinate deep into the semiconductor (see Fig. 1). The electric field $E(x)$ in this case is determined by the equation:

$$\frac{dE}{dx} = -\frac{e \cdot N(x)}{\epsilon \cdot \epsilon_0} \quad (2)$$

where e is the charge of the electron, ϵ - dielectric constant at the point d_0 , then the value of $E(x)$ at $x < x_0$ is found by the formula:

$$E(x) = -\frac{e}{\epsilon \cdot \epsilon_0} \int_{d_0}^x N(x) dx \quad (3)$$

When $x=0$, $E(x)=E_s$ is a superficial knowledge of the electric field. From the known knowledge of $E(x)$, for the potential φ applied to the semiconductor, we have:

$$\varphi(x) = \int_{d_0}^x E(x) dx \quad (4)$$

Using (3), (1), and then (4) with the help of a program developed for computer technology, we obtain numerical values for such parameters as V_b , E_s , d_0 .

As already noted, the approach described above is valid for an arbitrary doping profile of the base part of the diode. At the same time, admixture technologies exist. If this profile corresponds to the case shown in Figure 1, then the problem of determining the value of V_b can be solved even taking into account the capabilities of programmable computing technology.

Indeed, in this case, for the fields in areas I and II we can write

$$E(x) = \begin{cases} E_1 = E_s - \alpha_2 x; \dots x \leq d_1 \\ E_2 = (E_s - \alpha_1 x_1) - \alpha_2 (x - d); \dots d_1 < x \leq d_2 \end{cases} \quad (5)$$

$$\alpha_1 = \frac{e \cdot N_1}{\epsilon \cdot \epsilon_0};$$

$\alpha_2 = \frac{e \cdot N_2}{\varepsilon \cdot \varepsilon_0}$, moreover, it is assumed that only domains II of the modification of formulas (5) are “pierced”. These expressions are obtained by 23 simple geometric considerations of valid constant values of N within a given region.

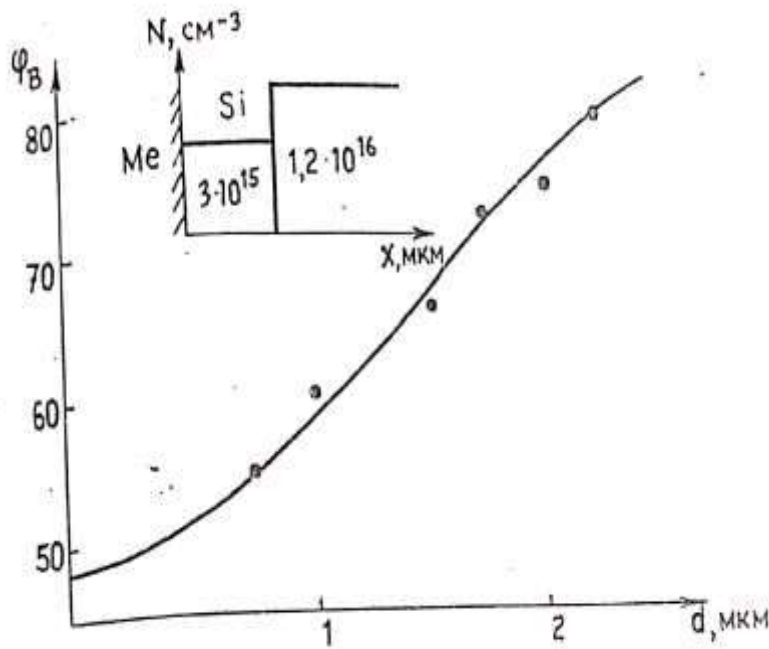


Figure 2. Dependence of the avalanche breakdown voltage of silicon Schottky diodes on the structure parameters from the table 1. $N_1=3 \cdot 10^{15} \text{ cm}^{-3}$, $N_2=1.2 \cdot 10^{16} \text{ cm}^{-3}$.

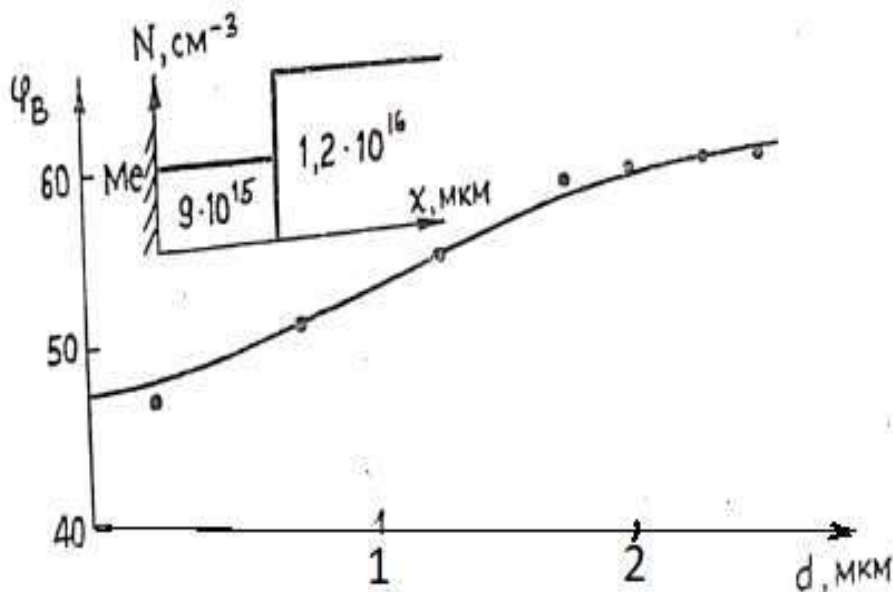


Рис 3. Зависимость напряжения лавинного пробоя кремневых диодов Шоттки от параметров структуры из таблицы 1. $N_1=9 \cdot 10^{15} \text{ cm}^{-3}$, $N_2=1,2 \cdot 10^{16} \text{ cm}^{-3}$.

Table 1
Parameters of epitaxial silicon layers

N ₀	N ₁ ,(sm ⁻³)	d ₁ (mkm)	N ₂ ,(sm ⁻³)	d ₁ (mkm)	N ₃ ,(sm ⁻³)	d ₃ (mkm)
1	0,3 10 ¹⁶	0,3				
2	0,6 10 ¹⁶					
3	0,9 10 ¹⁶					
4	1,2 10 ¹⁶	0,6	1,2 10 ¹⁶	2,5	25 10 ¹⁶	300
5	0,3 10 ¹⁶					
6	0,6 10 ¹⁶					
7	0,9 10 ¹⁶					
8	0,3 10 ¹⁶	0,9				
9	0,6 10 ¹⁶					
10	0,9 10 ¹⁶					

In contrast to a more complex doping profile, in the case described by formulas (5) for any chosen value of the electric field E(x) and the voltage applied to the diode, according to the formulas:

$$E_s = \alpha_2 \cdot (t - d_1) + \alpha_1 \cdot d_1 \quad (6)$$

$$\varphi = \alpha_2 \cdot (t - d_1) \cdot d_1 + \frac{\alpha_1 \cdot d_1^2}{2} \quad (7)$$

Taking into account formulas (5) - (7), the avalanche breakdown voltage was calculated for Schottky diodes obtained using the membrane technology described in [4]. The avalanche breakdown voltage was determined using double differentiation of the current-voltage characteristic according to the method [5] .

Figure 2 shows the theoretical dependences of the avalanche breakdown voltage obtained by us for several types of diodes (the values of the doping levels in the hi and lo layers are indicated in the figures at 1. The experimental values are also shown there. The figures show good agreement between the experimental data on V_b and theoretical values, which indicates the applicability of the developed approach [6-10].

It has been experimentally established that, regardless of the method of manufacturing silicon avalanche transit diodes, the microplasma parameters in them are identical, which indicates the common nature of their occurrence, associated with the inhomogeneities of heavily doped silicon substrates and n-n⁺ structures.

Using theoretical and experimental analysis, that the diameters of microplasmas in silicon avalanche transit diodes are: 0.2-0.4 μm, and in silicon zener diodes - 0.6-10 μm, the overheating of microplasma channels, respectively, is equal to 70-120K in avalanche transit diodes, and in zener diodes they exceed 100K.

Thus, the proposed method for determining the diameter of microplasmas makes it possible to reliably determine this key parameter according to differential characterography data (breakdown voltage and differential resistance of microplasma) and, accordingly, the parameters of current filaments, which plays an important role in diagnosing the reliability of semiconductor diodes operating in the avalanche breakdown mode.



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DIGITAL TRANSFORMATION OF EDUCATION DURING AND POST COVID-19 ERA: THE SOCIAL IMPACT ON ADOLESCENTS

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ABSTRACT

The study was premised on investigating the impact of digital transformation on the education system in Nigeria especially during and post COVID-19 with adolescents being the focus. This study utilized a well-structured survey method, the questionnaires were prepared through Google Forms, and a total of 840 undergraduate students participated in this survey. All the data collected have been analyzed and presented in the form of tables. Statistical percentage was applied in the analysis of the data. From the findings therefore, it was confirmed that overuse of technology has negative social impact on young people. The findings revealed that although technology during COVID-19 has positive impacts on academic improvement on the students, it can also negatively affect their mental health. The study also found that the increasing dependency on technology can have detrimental effects on the nation's health.

KEYWORDS: Digital Transformation, Education, COVID-19 Era, Social Impact, Adolescents

INTRODUCTION

The outbreak of the pandemic disease is a global phenomenal occurrence that has ravaged the people at a cataclysmic rate (Audu, 2022), it has caused large-scale institutional and behavioural 'shock effects' in various areas of human activity including education (Teras, Suoranta, Teräs and Curcher, 2020). The covid-19 pandemic affected educational systems worldwide, leading to the near-total closure of schools. In response to school closures, world organizations such as UNESCO, United Nations (UN), International Association of Association universities (IAU) and World Health Organization (WHO) recommended the use of distance learning programs, open educational applications and other e-learning platforms that institutions and teachers could use to reach learners remotely and limit the disruption of education (Zizek, 2020).

More than 1 billion and 575 million students in approximately 188 countries around the world are reported to have been affected by the closure of schools and universities due to preventive measures taken by countries against the spread of COVID-19 (UNESCO, 2020). Also, multiple lines of evidence indicate that the COVID-19 pandemic has profound psychological and social effects (Sher, 2020). Hyseni-Duraku and Hoxha (2020) however stated that, despite the declared changes and concerns, the early implementation of remote and online learning has been confirmed to have been positively assessed during this period, keeping students engaged and distracting them from the pandemic.

Technology is seen as a basis of educational development of any nation as no educational system can arise above her technological advancement in today's scenario (Raja & Nagasubramani, 2018). Therefore, 21st century education system is said to be technology-driven owing to the fact that technologies are included in curriculum design, teaching and learning processes (Osinem, 2020). Technology has made it possible for schools to offer online education for quite some time and the number of students taking online courses has been on the rise, but not until the arrival of COVID-19 has the majority of education been offered through this mode.

Although the shift to online learning has already become part of many education systems in the world, the level of use and the way technology is used to achieve the quality of distance or online learning is considered to vary. This level depends on many factors, related to the various parties involved in the implementation of this learning format and the integration of technology in education systems before the school closure period as a result of the COVID-19 pandemic. During Lockdown, Governments, education systems, and schools offered remote learning and teaching without much preparation, planning, and in some cases, digital experience (Kamanetz 2020; Sun et al. 2020). However, the changes or innovations that occurred in the immediate days and weeks when COVID-19 struck are not necessarily the changes education needs to make in the face of massive societal changes in a post-COVID-19 world (Zhao & Watterston, 2021).



Therefore, since the outbreak of the pandemic, the compulsory adoption of information and communication technology (ICT) in the educational sector worldwide is a major tool that helps students and staff to cope with the “New Normal” (Guiney, 2011 and Godswill, 2016). This implies that the educational sector in Nigeria is greatly affected by the COVID-19 pandemic and with the increasing digital transformation process in the education, there’s is bound to be some major negative effects on young people. Hence, a real-time survey was conducted to try to respond to this question on a large group of adolescents across Nigeria. The aim was to detect the negative effects induced by the overuse of technology in learning during post-COVID 19.

METHODOLOGY

This cross-sectional study involved a nationally representative sample of 840 adolescents. Data were collected with the survey titled “COVID-19, Technology and Adolescents. Random selection of school classes was performed based on a stratified multistage according to a factorial design that considered the geographic distribution (North, East, West, South,) and, within each area, the size of the population. Students were invited to fill in all the sections of the questionnaire, which were applicable. Four thematic areas were investigated through a short online questionnaire using the four ways technology has negatively changed education. Alhumaid (2019) listed that the usual socio-personal variables such as age,

gender, and geographical location. Students were invited to fill in all the sections of the questionnaire, which were applicable.

RESULTS

The results provided interesting information about the adolescents’ reactions to the increasing use of technology post-COVID-19. As regards negative impact on the three basic skills in learning, the majority of adolescents declared that to a little extent technology negatively impacts reading, writing and arithmetic skills, a third “some extent” (Table 1). In this sense, the adolescents’ tendency, more in males than females, to a perception of the danger was not confirmed, majority of the students agreed that e-resources could be quickly accessed and easy to read. In this respect, adolescents from the north and west geopolitical zone also were less inclined to believe that technology could negatively affect the basic skills in learning (Table 2). Young people were more realistic by sharing technology allows for cyberbullying and harassment and online grooming (Table 3). The second interesting result was that the judgment on the influence of technology on social inequalities expressed by adolescents (residing in the north and west regions, was almost equaled (Table 4), although in the south and west zones, majority of the adolescent agreed (Table 5). In other words, technology has made it possible for schools to offer online education for quite some time and the number of students taking online courses has been on the rise, but not until the arrival of COVID-19 has the majority of education been offered through this mode (Zhao & Watterston).

Table 1 Table of contingency of degree of the negative impact on the three basic skills in learning

		Gender		
		Female	Male	
Negative impact on the three basic skills in learning	To full extent	17.5%	12.3%	14.9%
	To little extent	39.7%	47.3%	43.5%
	To some extent	37.1%	33.9%	35.5%
	Not at all	5.6%	6.5%	6.1%
Total		100%	100%	100%

Table 2 Table of contingency of degree of the impact on the three basic skills in learning: The West vs North

		Zone		
		West	North	
Negative impact on the three basic skills in learning	To full extent	20.7%	19.4%	20.2%
	To little extent	27%	28.6%	27.6%
	To some extent	17.2%	12%	15.2%
	Not at all	35.1%	40%	37%
Total		100%	100%	100%

**Table 3 Table of contingency of degree of dehumanizing effect of technology**

		Gender		
		Female	Male	
Dehumanizing effect of technology	To full extent	39.1%	22.5%	31.9%
	To little extent	15.2%	23.5%	18.6%
	To some extent	33.1%	38.8%	35.7%
	Not at all	12.6%	15.2%	13.8%
Total		100%	100%	100%

Table 4 Table of contingency of judgment of the influence on social inequalities

		Zones		
		North	East	
The influence on social inequalities	Strongly Agree	15.2%	22.5%	18.6%
	Agree	39.1%	23.5%	31.9%
	Can't say	12.6%	15.2%	13.8%
	Disagree	33.1%	38.8%	35.7%
Total		100%	100%	100%

Table 5 Table of contingency of judgment of the influence on social inequalities: West vs South

		Zones		
		West	South	
The influence on social inequalities	Strongly Agree	25.5%	30.6%	27.6%
	Agree	43.1%	40%	41.9%
	Can't say	9.1%	18.8%	13.6%
	Disagree	22.3%	10.6%	16.9%
Total		100%	100%	100%

Table 6 Table of contingency of degree of technology and isolation

		Gender		
		Female	Male	
Technology and isolation	To full extent	33.1%	25.8%	29.8%
	To little extent	13.2%	23.5%	19%
	To some extent	29.4%	31.1%	30%
	Not at all	24.3%	19.6%	22.1%
Total		100%	100%	100%

DISCUSSION

The current research highlighted the remarkable and undoubtedly expected, effects of digital transformation in the education of the new generations. The increasing use technology in learning post-COVID19 pandemic is significantly affecting the emotional, social and behavioral experience in Nigerian adolescents. Adequate information and guidance could give helpful support to cope with this issue. Teachers need to interface with their students, even if they are assisted by TVs, smartphones, feature phones, laptops, and tablets. Google Classroom has developed a whole suite of integrated learning platforms that can be easily linked to YouTube, Lexia, Khan Academy, and other teaching aids. But each platform requires

the teacher to create the right learning environment (Iyengar, 2020).

CONCLUSION

Technology has brought unprecedented changes to education system globally. The change that technology brought is revolutionary, not evolutionary, and it affects all stakeholders – students, teachers, administrators, parents, employers and citizens (Osinem, 2020; Jolls, 2008). However, there are many good reasons for the adoption of the increasing use of technology in education, the negative influence should not be ignored and should be considered when implementing the curriculum, if not adequately monitored the purpose could be lost in education and this could prove catastrophic. Although



COVID-19-related concerns and commitments about their children's learning can be overwhelming for parents, and also the teachers in charge of them, the situation created during the pandemic can be considered as a priority in increasing the cooperation of the school with the parents, their support to overcome the challenges related to the school, and at the same time to advance their level of knowledge and technological skills for appropriate support practices in regards to their children, in order to guide and improve behaviors, foster learning, and create a positive approach to school.

RECOMMENDATIONS

The following recommendations should suffice to improve the digitalization of pedagogy in our school system.

1. Adequate information and guidance to students could provide helpful support to cope with challenges of digitalization.
2. Teachers need to interface with their students in terms of psych-social support for the students to master all the necessary technical imperative in digitalization of teaching and learning process.
3. The students need to be assisted in the provision of smartphones, feature phones, laptops, and tablets. Google Classroom has developed a whole suite of integrated learning platforms that can be easily linked to YouTube, Lexia, Khan Academy, and other teaching aids. But each platform requires the teacher to create the right learning environment (Iyengar, 2020).

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A STUDY ON QUALITY OF WORK LIFE OF EMPLOYEES AT MADHARAM DOLOMITE MINE

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ABSTRACT

At this point in time, Quality of Work Life is gaining increasing relevance on a worldwide scale. Organizations are experiencing various problems linked to human resources, one of the most significant of which is Employee Stability, and finding a solution to this issue is the top most priority. The quality of the employee's work-life balance is one of the many factors that contribute to employee retention. The concept of quality of life is multifaceted, and it has been shaped by the interaction of a great number of different factors. The present study investigated the characteristics that have an impact on the quality of life enjoyed by Madharam Dolomite personnel while they are on the job. A standardised questionnaire was utilised to obtain primary data from 174 workers, and the researcher employed a stratified random sample procedure to choose those individuals. In order to arrive at definitive findings and judgments based on the study, the data were analysed using ANOVAs included inside the SPSS 23.0 version. According to the findings of the study, there is a significant impact of quality of work life factors such as facilities of organization, job satisfaction and security, autonomy of work, and adequacy of resources had a significant impact on the employee's quality of work life at Madharam Dolomite.

KEYWORDS: *facilities of organization, job satisfaction and security, autonomy of work, adequacy of resources, quality of work life.*

1. INTRODUCTION

The phrase "quality of work life" (QWL) refers to the degree to which an employee's personal and professional requirements are met as a result of their involvement in their place of employment while also contributing to the accomplishment of the organization's objectives. This term was coined by the American Psychological Association (APA) in the 1980s. The significance of QWL in reducing employee turnover and promoting employee well-being in relation to the quality of services supplied was established by a research that was carried out by Louis and Smith (1990). Initially, the QWL concept was only used to the process of work redesigning by taking into consideration a social-technical system approach. However, over the course of time, this concept has gradually been broadened to take into account large interventions.

A focus on boosting employees' quality of work life (QWL) in order to increase their satisfaction and enjoyment may result in a number of advantages, some of which accrue to the workers while others accrue to the organisation. It is possible to raise the status of QWL in employees by successfully implementing QWL interventions such as flexible work hours, job enrichment and enlargement, and autonomous work group culture. This goal is attainable and can be accomplished. These interventions ensure that the entire potential of a worker is used by assuring a higher level of involvement on the side of the worker. This, in turn, makes the job more effective and efficient by enhancing the quality of the work being done. In addition to this, employees are provided opportunities to take an active role in the decision-making process when QWL is implemented.

The human resources of a business are one of its most precious assets; on the other hand, dissatisfied employees are

among an organization's most damaging competitors. It is essential for companies to continue educating and training their employees in order to remain competitive in today's highly competitive industry.

It is vital that workers be seen as an asset rather than a liability, and the only way to accomplish this aim is via the deployment of a humanised job design process known as quality of work life. It is essential that employees be recognised as an asset rather than a liability.

2. REVIEW OF LITERATURE

The concept of work-life balance encompasses many different factors. More and more people are paying attention to it since several studies have examined its relationship to factors like work happiness, employment security, salary, etc. Quantitative well-being also depends on a variety of other aspects, such as those of a physical, physiological, and social nature. Accordingly, efforts have been undertaken to add the aforementioned element and create a valid scale for measuring QWL.

The primary goal of this literature review is to explain the thought process that went into deciding which factors were most important. According to Feldman (1993), quality of work life refers to how satisfied workers are with their overall working conditions. According to Lau et al. (2001), a quality work life (QWL) is one that encourages and fosters happiness in the workplace by means of monetary compensation, employment stability, and advancement prospects for workers.

According to research by Mehdi Hosseini et al. (2010), the quality of work life (QWL) is one of the most intriguing strategies of building motivation and is a means to have job enrichment, alongside career accomplishment, career



happiness, and career balance. Research also shows that a company's commitment to its workers' well-being, as seen by initiatives like pay equity, career advancement chances, and regular promotions, may have a positive effect on QWL.

Fair pay and autonomy, job security, health and safety standards, reward systems, recognition of efforts, training and career advancement opportunities, participation in decision making, interesting and satisfying work, trust in senior management, work-life balance, stress at work, amount of work to be done, and occupational health and safety standards are all QWL variables identified by Nasl Saraji and Dargahi (2006).

Employees' QWL was linked to their dedication to their companies by researchers Normala and Daud (2010).

The physical setting, opportunities for personal development, opportunities for teamwork and collaboration, supervision, social significance, and compensation and benefits are the seven QWL characteristics identified.

In a study conducted by Behnam Talebi et al. (2012), the authors looked at how QWL affects productivity in service industries like banking. Seven QWL factors are used to assess workers' current levels of QWL. They include a safe and pleasant workplace, competitive pay and benefits, long-term employment, a say in one's work schedule, a solid foundation for professional growth, and a say in the future of one's profession.

Compensation, benefits, and other forms of remuneration were shown to be the most common QWL drivers by Anwar et al., (2013)'s research, followed by opportunities for professional growth, open lines of communication, and a feeling of safety and security. Important QWL factors that are often overlooked in studies include leadership commitment, work-life balance, job contentment, and employee motivation.

Two researchers from India, Nitesh Sharma and Devendra Singh Verma (2013), looked for QWLs in Indore's small-scale manufacturing sector. The Quality of Work Life (QWL) of employees can be measured across seven different dimensions, including the quality of the workplace, the likelihood of advancement, the amount of money earned, the enthusiasm of workers, the ease of communication between coworkers, and the availability of appropriate working hours. According to the research, QWL is not widely accepted inside organisations.

In 2013, Godina Krishna Mohan and Kota Neela Mani Kanta investigated the factors that significantly affect Andhra Pradesh's manufacturing companies' QWL. Working conditions, interpersonal relations, trust among employees, autonomy and freedom, participation in decision making, career advancement, training, superior support, safety conditions, top management support, conflict management, amenities, performance linked pay system, communication, implementation of organisational policies, participative management, transparency system, nature of job, rewards and recognition, and valuing were all chosen as variables for the study. Workplace conditions, team dynamics, opportunities for professional development, intrinsic motivation, and the

culture of a company were shown to have the greatest impact on quality of work life.

Working circumstances, the chance to develop human skills, and career progression opportunities are all factors that contribute to a positive Quality of Work Life for Indian industrial employees, as stated by Sangeeta Jain (2004).

Research on Canberra nurses' QWL was undertaken by Ellis and Pompli in 2002. Poor working environments, resident aggression, workload, inability to deliver preferred quality of care, work-life imbalance, shift work, lack of involvement in decision making, professional isolation, lack of recognition, poor relationships with supervisors and peers, role conflict, and lack of opportunity to learn new skills were found to be the major barriers in improving employees' QWL.

Using data from the Dadevarz Jooya Company in Iran, Ebrahim Kheradmand et al.,(2010) investigate how workers' quality of life at work correlates with their level of contentment in their jobs. Walton's theoretical framework is used in this study to assess how respondents feel about various aspects of quality of work life, including: satisfaction with fair payment; a safe and healthy working environment; opportunity for continuous growth; social relationships in the organisation; a balanced role for work; social coherent in the work organisation; regulations and rule orientation; developing human capacities.

QWL was measured using career satisfaction, career accomplishment, and career balance as exogenous variables by Alireza Bolhari et al. (2011) and Rose et al. (2006) in Malaysian managers of free trade zones for both MNCs and SMEs. Relationship with coworkers, opinion about workload, health and safety measures, satisfaction with feedback given, opinion about working hours, training programmes provided by the organisation, opinion about respect at the workplace, grievance handling procedure, and other factors were used by Subhashini and Ramani Gopal (2013) to assess the quality of women's working lives in selected garment factories in the Coimbatore district of Tamil Nadu.

In order to assess the Quality of Work Life for professors at the University of Tehran and the Sharif University of Technology, Mirkamali and Thani (2011) employed an adapted version of Walton's factors questionnaire. Included in this survey are questions about respondents' satisfaction with their overall quality of life, their ability to provide for their families, the safety and health of their workplaces, their prospects for professional advancement, their job security, the respect accorded to the Constitution in the workplace, and the social significance of their jobs.

Emoluments, safe and healthy working conditions, social integration, social relevance of work, constitutionalism, opportunities to develop human capabilities, career planning, growth and development, work with job enrichment, and organisational structure were some of the nine dimensions used by Reddy and Reddy (2014) to measure QWL in public and private banks. Good working environment, chance of development, fair remuneration, job satisfaction, employees' motivation, communication flow, and flexible or adequate working time were the seven variables utilised by Nitesh



Sharma et al., (2013) to evaluate the state of QWL in small size enterprises.

3. SIGNIFICANCE OF THE STUDY

Employees in the Madharam Dolomite Mine have a different work schedule than those in other industries. Because of the high workload, personnel are often required to labour for long periods of time. Under these conditions, the work environment cannot be appealing, pleasant, or mind-stirring. Employees must adjust to their unusual work environment and focus harder in order to provide their full efficiency. To survive and prosper in modern world dominated by the private sector, the Madharam Dolomite Mine must achieve maximum customer satisfaction and income results. Despite the fact that the work environment is completely different from that of other sectors, firms strive to provide a conducive work environment for their employees in order to improve their performance. The conducive work atmosphere encourages individuals to offer their best effort in order to boost organisational productivity. Employees at Madharam Dolomite Mine have heightened workplace stress since they work long hours. Employees must have a sense of teamwork, excellent relationships, and cooperation in order to adjust to this unusual work environment. As a result, there is a need to improve the quality of work life and work-life balance for Madharam Dolomite Mine workers in order to keep their competent workforce.

4. STATEMENT OF THE RESEARCH PROBLEM

Globalization and the drive to compete in local and worldwide markets provide a challenge to all stakeholders, including corporations, employees, and the government. This required companies to improve. All of this requires a new work culture and strong worker enthusiasm and dedication to the job and business goals. This can't be done without improving workplace quality of life. Despite evidence of the benefits of work-life balance, all partners in the organisation reject any plans or processes to improve it. Management may assume the present level of work life quality is adequate and no change is needed. Employees are reluctant to change because they assume any approach applied by management would raise productivity without incurring extra expenditures. An assessment of Indian organisations suggests that most are excessively focused on group psychology before comprehending the individual mind. This limits value-based system consolidation. Many managers think meeting deadlines by any means possible may boost corporate output. Most organisations still believe that a manager's job is to get work done via others, not understanding that when workers' skill levels rise through education, more attention must be made on managing people's skills. The new workforce has greater knowledge, social reform prospects, and economic expectations.

The free market, the removal of trade obstacles, and globalisation push today's businesses to compete in all fields. In Indian firms, performance ranks first, thus it's important to understand how various factors affect it. Employers may be more aware of workload and job expectations to improve

work life and reduce stress. Employers must consider training, communication, reward schemes, colleague relationships, and work environment. Employers may help employees reduce workplace stress.

With growing competition, people's understanding of how their contributions fit with the organization's objectives becomes more crucial. Uncertainty has heightened people's and organisations' expectations and performance standards. Globalization, technological innovation, increased competition, and growth, diversification, and acquisition affect employee work satisfaction. Employee and employer lists are comparable. Companies must use convergence to reimagine work, reduce workplace stress, increase job autonomy, provide learning and training opportunities, and enhance work life quality to attract and retain employees. High-quality work lives are needed to address such difficulties. This thesis studies the RINN/Vishakhapatnam steel factory's Madharam Dolomite Mine. This study will help us understand the importance of work-life quality in managing shifting environmental demands and employee needs to boost employee engagement and the firm's internal climate.

4. OBJECTIVE OF THE STUDY

The following research objectives have been established for the study with the purpose of providing answers to the research questions:

1. To understand the socioeconomic class of Madharam Dolomite Mine workers.
2. To determine the elements that influences the quality of life at Madharam Dolomite Mine.
3. To identify the most important criteria for enhancing work-life quality.

5. HYPOTHESES OF THE STUDY

- ✓ **H01:** There is no significant impact of facilities on the employee's quality of work life.
- ✓ **H02:** There is no significant impact of job satisfaction and job security on the employee's quality of work life.
- ✓ **H03:** There is no significant impact of autonomy of work on the employee's quality of work life.
- ✓ **H04:** There is no significant impact of adequacy of resources on the employee's quality of work life.

5. METHODOLOGY

- **Research Design:** Descriptive research
- **Sources of data:** For this study, the 174 workers who are employed in the Madharam Dolomite Mine will provide the primary data. The information will be gathered via the use of standardised questionnaires and interviews with personnel of the dolomite mine who hold a variety of positions. Secondary data is gathered from a variety of journals and periodicals, such as magazines and business newspapers, as well as from subject-specific books and websites, among other sources.
- **Data collections methods:** The information was gathered via the use of a structured questionnaire, a



survey approach, and a personal interview with customers.

- **Sampling area and size:** The sample unit for the research was drawn from the Madharam dolomite mine, and it consisted of two distinct groups: executive and non-executive workers. For this study, the 174 employees (executive and non-executive workers) who are employed in the Madharam Dolomite Mine will provide the primary data.
- **Sampling Method:** The sampling design is based on stratified random sampling approach was used for this particular research endeavour.

Stratified random sampling refers to a sampling technique in which a population is divided into discrete units (executive and non-executive workers) called strata based on similar attributes. The selection is done in a manner that represents the whole population. The sampling technique is preferred in heterogeneous populations because it minimizes selection bias and ensures that the entire population group is represented.

- **Statistical tools used:** ANOVAs, as well as multiple regression, were performed using SPSS 23.0 version for data analysis

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.855	.811	24

According to Table 1, the questionnaire was assessed for reliability and the findings are shown below. The constructed questionnaire has been pretested and validated via face validity by being provided to a carefully chosen group of experts, and it also has a sufficiently high reliability score. The

outcome was a value of 0.855 for the. It shows that the data has a high level of dependability and validity.

5.1 Demographic Variables: The frequency distribution of demographic variables is presented in the following table.

Table 2 Demographic Analysis

Particulars	Classification	No of Responses	Percentage
Age	Below 25 Years	20	11.5
	26 years to 35 year	78	44.8
	36 years to 45 years	43	24.7
	46 years to 55 years	26	14.9
	56 years and above	7	4.0
Gender	Male	174	100.0
	Female	00	00
Education	ITI	34	19.5
	SSC	53	30.5
	Intermediate	41	23.6
	Graduation	32	18.4
Monthly income (in rupees)	Below Rs.50,000	13	7.5
	Rs.50,001 to Rs.60,000	28	16.1
	Rs.60,001 to Rs.70,000	41	23.6
	Rs.70,001 to Rs.80,000	51	29.3
	Rs.80,001 and above	41	23.6
Experience level	5 years below	4	2.3
	6 year to 10 years	13	7.5
	11 years to 15 years	6	3.4
	16 years to 20 years	73	42.0
	21 year and above	78	44.8
Total		N= 174	100.0

5.2 ANOVA was conducted to determine the significant effect of facilities on the employee's quality of work life:

An ANOVA is used to determine whether or not facilities

have a substantial impact on the employee's quality of work life.

- **H01: There is no significant impact of facilities on the employee's quality of work life.**



Table 3 ANOVA Results

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	13.383	9	1.487	2.355	.016
Within Groups	103.540	164	.631		
Total	116.922	173			

It is observed that from the above table, the sum of the squares of the significant difference between means of the difference in the facilities and employee's quality of work life, and the between-groups variation 13.383 is due to interaction in samples between groups. If sample means are close to each other. The Within variation 103.540 is due to differences within individual samples. The table also lists the F statistic 2.355. The significance level of 0.016 is less than 0.05, indicating that the null the hypothesis was rejected and the

alternative hypothesis accepted; thus, there is a significant impact of facilities on the employee's quality of work life.

5.3 ANOVA was conducted to determine the significant effect of job satisfaction and job security on the employee's quality of work life: An ANOVA is used to determine whether or not job satisfaction and job security has a substantial impact on the employee's quality of work life.

- **H02: There is no significant impact of job satisfaction and job security on the employee's quality of work life.**

Table 4 ANOVA Results

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.009	7	.430	.626	.034
Within Groups	113.913	166	.686		
Total	116.922	173			

It is observed that from the above table, the sum of the squares of the significant difference between means of the difference in the job satisfaction and job security and employee's quality of work life, and the between-groups variation 3.009 is due to interaction in samples between groups. If sample means are close to each other. The Within variation 113.913 is due to differences within individual samples. The table also lists the F statistic .626. The significance level of .034 is less than 0.05, indicating that the null the hypothesis was rejected and the alternative hypothesis accepted; thus, there is a significant

impact of job satisfaction and job security on the employee's quality of work life.

5.4 ANOVA was conducted to determine the significant effect of autonomy of work on the employee's quality of work life: An ANOVA is used to determine whether or not autonomy of work has a substantial impact on the employee's quality of work life.

- **H03: There is no significant impact of autonomy of work on the employee's quality of work life.**

Table 5 ANOVA Results

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	6.296	16	.394	.528	.029
Within Groups	116.945	157	.745		
Total	123.241	173			

It is observed that from the above table, the sum of the squares of the significant difference between means of the difference in the autonomy of work and employee's quality of work life, and the between-groups variation 6.296 is due to interaction in samples between groups. If sample means are close to each other. The Within variation 116.945 is due to differences within individual samples. The table also lists the F statistic .528. The significance level of 0.029 is less than 0.05, indicating that the null the hypothesis was rejected and the alternative hypothesis accepted; thus, there is a significant impact of autonomy of work on the employee's quality of work life.

5.5 ANOVA was conducted to determine the significant effect of adequacy of resources on the employee's quality of work life: An ANOVA is used to determine whether or not adequacy of resources has a substantial impact on the employee's quality of work life.

- **H04: There is no significant impact of adequacy of resources on the employee's quality of work life.**



Table 6 ANOVA Results

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	33.850	16	2.116	4.073	.000
Within Groups	81.558	157	.519		
Total	115.408	173			

It is observed that from the above table, the sum of the squares of the significant difference between means of the difference in the adequacy of resources and employee's quality of work life, and the between-groups variation 33.850 is due to interaction in samples between groups. If sample means are close to each other. The Within variation 81.558 is due to differences within individual samples. The table also lists the F statistic 4.073. The significance level of 0.000 is less than 0.05, indicating that the null the hypothesis was rejected and the alternative hypothesis accepted; thus, there is a significant impact of adequacy of resources on the employee's quality of work life.

7. LIMITATIONS OF THE STUDY

- Since the sample at Madharam Dolomite Mine, Telanagna was drawn from a cross-section of the mine rather than the complete population, it is probable that the results may not reflect those of the population as a whole. These factors would likewise limit the statement's generality.
- 174 respondents were picked from the Madharam Dolomite Mine in Telanagna state to account for possible limitations such as those linked to the universe, respondent bias, a lack of published / unpublished stress literature and coping techniques, and time restrictions.
- Finally, the study looked at the working conditions at Madharam Dolomite Mine in Khammam, Telangana.
- Respondents' personal biases likely impacted the findings in some way, despite the fact that many quantitative and qualitative methodologies were used to verify the results; respondents' perspectives may vary across sectors, but are generally positive in the private and public sectors.

8. RESULTS

This study looked at life at the Madharam Dolomite Mine in Telanagna in great detail. According to the results of this research, it's not enough to look at ways to improve workers' quality of life on the job. Instead, the working conditions and the difficulty and stress of the environments in which workers are expected to perform might negatively affect their quality of life on the job. However, when quality of work life efforts helps address employee desires for work life balance and promote the capacity to engage and establish relationships with colleagues, they may provide positive experiences for workers. Therefore, such initiatives need to be carried out on a consistent basis. Employees may gain

confidence in themselves and feel more enthusiastic about the service they give to commuters when they experience the positive effects of quality of work life, which may be delivered via quality of work life initiatives. Professionalism's focus on employees' needs is an important consideration when looking at how job satisfaction relates to customer satisfaction. The negative demands on work life and service quality may be mitigated by professionalism. A person's physical and mental health is inextricably linked to the manner in which they conduct their daily lives at home and at work at Madharam Dolomite Mine. Workers will have a tougher time of it because of rising health risks, such as greater traffic and tighter operational hours brought on by commercial pressure. Such an attitude is neither beneficial nor ethical, since the vast majority of Madharam Dolomite Mine's workers are pleased with their jobs and the time they spend at work. Companies should partner with researchers, labour leaders, government officials, and employees to create stress-prevention and wellbeing-in-the-workplace initiatives.

The study results illustrated that, there is a significant impact of quality of work life factors such as facilities of organization, job satisfaction and security, autonomy of work, and adequacy of resources had a significant impact on the employee's quality of work life at Madharam Dolomite. This study focused entirely on the subjective aspects of the various factors that contribute to employees' quality of life in the Madharam Dolomite Mine. In any case, it is hoped that the current results will serve as a starting point towards a greater understanding of the current scenario that the employees of the Madharam Dolomite Mine are facing in order to bring about an improvement.

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THE HISTORY OF THE EMERGENCE OF THE KARAKALPAK GAME “KASHARMAN TOP”

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ABSTRACT

The article deals with the revival of spiritual wealth, customs, national traditions and national games of the Karakalpak people, accumulated over several centuries, the development and enrichment of the content of universal values is an important task of today. Also, the paper describes the history of the development of this game “Kasharman top” and the solemn holding of national folk games plays an important role in increasing the working capacity of our people.

KEYWORDS: *kasharman top, game, Karakalpak people, national traditions, sport, education, folk game.*

INTRODUCTION

The revival of spiritual wealth, customs, national traditions and national games of the Karakalpak people, accumulated over several centuries, the development and enrichment of the content of universal values is an important task of today. The solemn holding of national folk games plays an important role in increasing the working capacity of our people. It is of great importance, the solution by our scientists of the tasks of using restored, updated, reconstructed, modernized and corresponding to modern requirements of national folk games in the education of young people. Karakalpak national games have a long history. According to reports, the appearance of the game “kasharman top” happened about a thousand years ago, and in the past this game was one of the most beloved games of our people.

However, written information about the history and rules of this game has not survived to this day. The rules of the game were passed down from generation to generation only orally. Sports similar to the game “kasharman top” in content and some movements include “cricket” in England, “baseball” in the United States of America, “pesapallo” in Finland, “oyna” in Romania and they are very popular among young people. There is every reason to believe that the game of baseball, which is widespread in the United States in a number of developed countries, originated from the Karakalpak national game “kasharman top”. There is a book about this game by an unknown author called “*Khududu Olam*” as well as testimonies left by the Italian traveler Marco Polo, Vamberi, the Persian historian Fazallah ibn Abdul-Khair Hamadani and others.

LITERATURE REVIEW

Furthermore, Marco Polo, who visited the cities of Kunya-Urgen and Khojeyli during his travels in the XIV and XV

centuries, in which he drew a map of Asia in his work. “The Book of the Diversity of the World” writes that at that time they played the game “kasharman top” with a small ball, made of cowhide and filled with wool. We must achieve the same level of prestige for the Karakalpak national game “kasharman top” as the game of baseball, which is now popular in 120 countries around the world. Since ancient times, the Karakalpak people have been rich in their national games. Such national games were held during various celebrations, including the celebration of Navruz, the harvest festival, in wedding events and brought great joy to our people. In Soviet times, there were contradictions and obstacles to free development and, in fact, to the holding of national folk games. However, as a result of the restoration of national self-consciousness, national games have come down to our days practically without losing their content. National games, including the game “kasharman top” are of particular importance not only for developing the skills of correct free movements in the young generation, but also for raising their consciousness, the ability to play to improve health. They instill in the people such qualities as dexterity, ingenuity, zeal, endurance and strength. In addition, national games play an important role in improving the performance of our people. Since 1991, the game “kasharman top” has been included in the curriculum of secondary specialized and higher educational institutions, and the first competitions were held to develop the game and enrich its content, as well as to attract young people.

In April 1994, competitions in the game “kasharman top” were introduced into the program of the sports and athletics of secondary specialized educational institutions for the first time. 6 teams took part in the competition, the team of the Nukus State Pedagogical Institute named after Ajiniyaz became the winner. National folk games, including the game “kasharman



top” were included in the working plan of activities of the republican department of the sports and sports society of trade unions for holding sports competitions, and in the same year a sports festival of Karakalpakstan national games was held.

The best participants of this competition were selected, and in April 2005, 42 talented young people from our republic took part in the festival of national games, which was held in the city of Jizzakh. In the competition, the Karakalpak national game “kasharman top” received special attention and high appreciation among the games. The organizing committee of the conference held on February 15, 2006 created and began its work the Federation of the Republic of Karakalpakstan on the game “kasharman top” appeared on the celebration of Navruz. 9 teams took part in it. The first place was taken by the team of the “Olympic Reserves” college of the capital, the second place was taken by the Nukus State Pedagogical Institute named after Ajiniyaz, the third place was taken by the team of school No. 18.

The winning team was awarded the “Kasharman Top Cup”. The second festival of national games was also held, and the team of the college “Olympic Reserves” became the winner. To date, in the Chimbay, Khodjeyli, Nukus, Karauzyak regions of the Republic, the games “kasharman top” are well organized and branches of the federation have been opened in these regions. It is necessary to plan the formation of the major leagues for the game “kasharman top” in Karakalpakstan.

Thus, one of the tasks facing the federation is the development of this Karakalpak national game not only in our republic, but also in other areas and even in middle-sized countries. Furthermore, it is necessary to include in the educational program of educational institutions updated, restored, reconstructed and meeting modern requirements national folk games, including the game “kasharman top” to be held on national holidays, wedding events, folk festivities. Today, the further deepening of the national identity of the national games, the rules of the game, and their educational value are being decided. In the future, it is planned to hold international competitions, bringing the value of the Kasharman Top game to the level of propaganda mass events and sports games among the regions of Uzbekistan. The project of the federation includes the issues of bringing the game “Kasharman top” to the international level of development and its inclusion in the program of the Games of Uzbekistan and Asia. Therefore, in order to train a good team, in addition to sports equipment, a sports base that meets modern requirements is needed. For this reason, it is planned to build a sports ground for the Karakalpak national game “Kasharman Top”.

METHODOLOGY

Players who do not have an identity card (a pass where the player's data is written) and who have not passed a medical examination are not allowed to play. The Chief Judge and the Secretary are directly responsible for this. The game “Kasharman top” consists of two parts, 40 minutes and a 10-minute break every 20 minutes. The game “Kasharman top” is played by 22 players, 11 players from each team. Each player must know the rules of the game and follow them correctly. During the game, only the team leader and the captain can address the referees. For all questions, the team leader can

contact the side judge. However, a player may be replaced by the Chief Referee at the direction of the Side Referee.

The player is prohibited from the followings:

1. Disputes with judges and opponents;
2. Noise at the site;
3. Resist and when stop the game;
4. Try to block the opponent who ran towards the base (point) or back, block his path;
5. Make a trip to an opponent;
6. Pull on the opponent's clothes;
7. Pushing the opponent off the field;
8. Sam spontaneous departure from the battlefield;
9. Hitting a player who crossed the line is preparing to run or runs in;
10. Pass the ball to each other with your head or feet;
11. Hit the ball before reaching the court line, directing it to the right, left, back.

As well as:

- the next opponent is allowed to hit the ball only after the player's attempt to touch the ball with the bat (stick) is completed and the player puts the bat on the ground.
- the serving player must run towards the base immediately after the second player hits the ball.

RESULTS AND DISCUSSION

The uniform of the players in the game “Kasharman top”:

Players must wear clean, comfortable clothing (white or blue breeches). Competing teams must wear contrasting colors. On the feet should be light athletic shoes without a heel. The captain of the team puts on the left hand a captain's armband measuring 8 cm with the Latin letter “S”.

Playground size.

The playground is rectangular, 80 meters long and 40 meters wide (for men and women). The marking of the field is done with lines 12 cm wide. At a distance of 80 meters from the Kona line where the ball is hit, a base (point) is established inside the field. Base diameter is 6 meters. In the direction of the base, the players who threw the ball should run (should run as fast as possible and return as quickly as possible).

Bat (stick) for the game “Kasharman top”.

The length of the bat for hitting the ball should be 1 m for boys and 80 cm for girls. The diameter of the handle should be 4 cm, the end of the handle that hit the ball has a thickening of 6 cm. If the players in the field catch the ball flying in the air, they get 3 points, if they hit the opponent with the ball, they get 2 points, after that the players must move for one minute.

Ball for the game “Kasharman top”.

The ball must be round, weigh 30 grams, have a circumference (diameter) of 15 cm. The ball for the game “Kasharman top” must be made only of rubber materials (you can use a tennis ball).

Summing up and results of the game “Kasharman top”.

The team whose players refused to play or did not show up for the meeting is considered the loser and is disqualified. If the player who hit the ball runs around the base, then he can hit the ball 3 times. If the kicker's ball flies over the 30m mark and is caught by a player from the opposing team, a member of that team gets 3 attempts to serve and the team is awarded 3 points.



Replacement of players in each team.

If a player hits the ball at a player who is running towards the base or back, he/she is given 2 attempts to serve, and the team is awarded 2 points.

Determining the winners of the competition.

The team with the most points in the game is the winner. If the teams have an equal number of points, they are given an additional 10 minutes, and if the team knocks the ball over the 30 meter mark three times, they are given one point. The one who scores more points wins.

Terms and order of the game.

Before the start of the game, the players of the two teams take turns greeting each other. Conditions for deciding on the determination of the right to the first service in agreement with the team captains:

- The captains of the teams try to kick the ball from a distance of 10 meters, the team of the captain who was able to touch the ball with the end of the bat will be entitled to the first serve, the team whose captain's bat was close to the ball will receive. According to the direction of the referee, the team captains hold the bat, clasping it with their hands, whose hand will be on top of the bat, his team will be entitled to the first serve.

- The referee puts the captains on the bats, connects them to each other, throws them over his head and throws them back and the team whose captain's bat is over the other's bat gets the first serve. The players of the team who choose the ball in turn are placed on a site that has the shape of a square measuring 12x4m. The players who receive serve enter the playing field.

CONCLUSION

Rules (order) for kicking the ball, serving and catching the ball, interfering with the players.

1. If, when hitting the ball, the bat does not touch the ball or touches it and the ball pours into the playing field, the ball is considered to be in play.

2. Players kicking the ball and catching it must stand at the boundary line at a distance of 1-1.5 m from each other.

3. The player making the serve, without bending the elbow, must throw the ball directly to a height of 1-1.5 meters.

4. The player who hit the ball must calculate the dimensions of the playing area.

5. A player who hits the ball a long distance, runs around the base, gets 3 points.

6. If one of the players on the field catches the kicked ball in the air without dropping it to the ground (only with his hands), then this player gets 3 attempts to fall. If the thrown ball crosses the 30-meter mark and the player catches it in the air, the player is given 3 attempts to fall, and the team is awarded 3 points. In this case, players moving quickly will be added in 1 minute.

7. A player who touches the ball to an opponent in the playing area receives 2 attempts to serve, and the team is given 2 points.

8. The player running around the base during the service of another player will receive 1 point.

9. Players, the teams in which the ball hit, have the right to hit the ball back at the opponents.

10. Players move if they catch the ball in the air: The schedule of some games of the team "Zhayhun" Nukus state pedagogical institute in the championship of Karakalpakstan (as a sample).

№	Teams	1	2	3	4	5	Participation Team	Point	Place
1	Jayhun		2:1 4:0	1:0 1:2	1:0 4:0	3:0 3:0	21-3	21	I
2	Edige	1:2 0:4		0:1 3:0	1:0 3:0	1:1 3:0	13-9	16	II
3	Olympic	1:0 0:4	0:1 3:1		0:1 3:0	4:3 5:2	18-11	17	III
4	Begler	0:1 0:4	1:1 0:3	0:3 3:0		1:3 3:2	8-16	11	IV
5	Turan	1:3 0:3	1:1 0:3	3:4 1:5	2:3 3:1		11-23	5	V

On the first day, teams from the top row do not participate in the competition. In competitions where teams participate, marked with dishonest numbers, they play the game from the bottom row of the table for the most part. In the table drawn up for a team with 11 players, the teams marked with numbers 3-8 start the competition. In the following we will analyze the terminology of the game "Kasharman top":

Dastek (bit) – a stick for knocking out the ball.

Shökelesiw – touching the end of the bat of the ball to obtain the right for the first serve.

Dästeki – team captains wrap their hands around the bat, the captain's team.

Qisimlap – whose hand is higher, gets the right to the first serve.

Uslaw – (holding) gripping the bits with the palms of your hands.



Tayaq taslaw - the referee connects the sticks to each other, throws them over his head and throws them back and the right to the first serve is given to that team, the captain's bit which is above the other's bit.

“S” – is the sign of the team captain.

To’reshi – referee, judge.

Shuyt (miss) – when the ball does not touch the bat.

Ta’rip (base, point) – a place for players to run around during the game.

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IMPACT ASSESSMENT OF SOCIO-ECONOMIC STATUS: A CASE STUDY ON MOHAMMAD BAZAR BLOCK OF BIRBHUM DISTRICT, WEST BENGAL

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ABSTRACT

Impact assessment is a means of measuring the effectiveness of organizational activities and judging the significance of changes brought about by those activities. Impact is a measure of the changes made, and impact assessment seeks to establish a causal connection between inputs and changes in terms of magnitude, scale, or both. Understanding the socioeconomic status of a geographic region is required to assess the impact of agricultural land use and workforce participation in that region. Mohammad Bazar is a community development block; there are 138 villages that are inhabited and 20 villages that are uninhabited among them. Agriculture is the key pillar of the economy in MD Bazar CD Block. However, the research area's principal crops are Aman and Aus paddy. Besides these, the area is cultivated with a good number of other crops like wheat, mustard, potato, til, tomato, etc. However, the study area's production varies depending on local physiographic characteristics (soil depth, texture, available nutrients, human interactions, rainfall, temperature, and so on). This research paper aims to focus on how LU/LC dynamics over the past twenty years have had a deep impact on the livelihood status of the study area.

KEY WORDS: Impact assessment, LU/LC dynamics, Agriculture, Mining

INTRODUCTION

The research site, Mohammad Bazar C.D. Block (23° 56' N-24° 06' N and 87°27' E - 87°40' E), is situated within the western part of the Birbhum district of West Bengal. It has a common boundary with Raniswar C.D. Block in the district of Dumka, Jharkhand within the west section of the research site, while the northern and southern boundary is usual with Rampurhat-I and Suri-I C.D. Block respectively. Similarly, the eastern part is in common with Mayureswar-I and Sainthia C.D. Blocks. The total coverage of the study area is approximately 315.64 square km in size. As per the 2011 Census of India, Mohammad bazar had a total population of 3,090 of which 1,545 (50%) were males and 1,545 (50%) were females. MD Bazar C.D. Block is physiographically a part of the Rarh region of the western part of the West Bengal. The western portion of the region is basically an extension of the Chotonagpur gneissic complex and is characterized by moderately dissected undulating terrain. Mohammad Bazar C.D. Block is partly in the Dwarka-Mayurakshi inter-fluve. This Paper aims to focus on how LU/LC dynamics of twenty years effect on work force participation, fluvial processes and agricultural status of the MD Bazaar C.D. Block.

OBJECTIVES

objectives have been incorporated to fulfill its original dimension:

- (A) To analyze the socio-economic status of the study area.
- (B) To analyze the physiographic characteristic of the study area.
- (C) Find out the status of educational status and literacy rate.
- (D) Try to find out the status of agricultural land use and workforce participation.
- (E) To find out major findings and give some suggestion.

METHODOLOGY

Any research work can be done based on following methodology:

Firstly, author has selected the study area and prepares base maps for the study area for various purposes. Author have been prepared contour maps, slope maps etc. on the basis of information from Topographical maps of 72P/12 issued by the Geological Survey of India (GSI) with the help of remotely sensed data.



Secondly, the author has tried to identify the problems and collect various data to prepare the land use maps related to forestry, irrigated land, cultivable land, waste land etc. The author also prepared the thematic maps related to the percentage of cultivators, agricultural labourer, literacy, schedule tribe, schedule caste etc. The occupational structure maps showing the percentage of main workers, agricultural laborers, cultivator and non worker participation in 1991 and 2011 census have been prepared to show the changes over times.

Thirdly, author has made a field survey because without the knowledge of intense field survey impact assessment of land use land cover not possible.

PHYSIOGRAPHY

MD Bazar C.D. Block is physiographically a part of the Rarh region of the western part of the West Bengal. The western portion of the region is basically an extension of the Chotonagpur plateau fringe or Chotonagpur gneissic complex and is characterized by moderately dissected undulating terrain. Mohammad Bazar C.D. Block is partly in the DwarkaMayurakshi inter- fluve. The greatest altitude of the study area is 60 meters in the north-western and western plateau border regions, while the minimum altitude is less than 10 meters in the eastern half of the alluvial plain, according to this contour map (Fig.1) more than 80% of the research area is bounded by 20-30 meters of contour lines. The whole study area is characterized by moderate slope. The highest elevation is above 30 degree found in the western part of the study area; on the other hand lowest slope value found in the extreme eastern part of the MD Bazar C.D. Block.

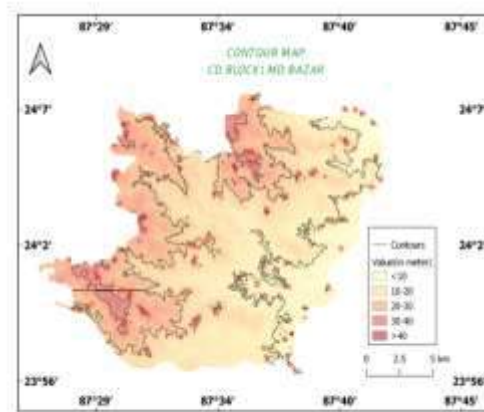


Fig1: Contour Map

GEOLOGY

MD Bazar C.D. Block is an elongated part of Chotonagpur plateau fringe zone. Western and some part of the north-western portion of the study area is falls under Chotonagpur Gneissic Complex (CGC) and Rajmahal trap zone of Birbhum districts. Rajmahal trap area is one of the older geomorphic units of the middle-east India both the perspective of geography and morphological inquiry .Rajmahal highlands are narrate as the concrete base for the study of geology in Indian adherence. Western part of the study area has earliest archean to recent quaternary rocks and sediments. One of an important event in the study area is the volcanic eruption which makes Rajmahal traps or Rajmahal highland. Such a huge volume of basaltic magma on the continental crust has vivid effect on crustal evolution. The Rajmahal series made by 610 meters thick bedded basalts with about 30.5 meters inter-trappean beds consisting of siliceous and porcellanoid carbonaceous clays and sandstones. These intrusive, abundant in the lower Gondwana rocks, have often damage the coal seam near their contacts. The CGC constitutes the oldest litho units of south western Bengal and exposed in the western and north western part of the district.

DRAINAGE

Mayurakshi river originates in Jharkhand's Santal Pargana and enters Birbhum at Haripur village at 70 meters height before leaving the study area at Katunia village at almost 30 meters elevation. On the study area, it runs for roughly 11 kilometers. Mayurakshi runs through the study area's south-eastern corner. Mayurakshi is known as "MOR" among the local community. Dwarka River, like Mayurakshi, is an ephemeral river in nature. This river also originates on the Chotonagpur plateau (23.0000° N, 85.0000° E) in Santhal Pargana and runs through the study area's northwestern and centre east. This river flows in a zigzag pattern for roughly



17.5 kilometers across the MD Bazar C.D. Block. Bholra and Gharmora on the left bank, and Kulia on the right bank, are three significant tributaries of the river Dwarka.

SOIL

The Rajmahal uplands, or the western most half of the research region, are dominated by laterite soils of volcanic origin; low-level laterites are common. In the western half of the research region, the lateritic deposit exists as a cap rock over the basalts and tertiary formations, covering the majority of the study area. The northern section of the research area is covered in forest soil. Ganpur reserve forest, located in the northern section of the research area, is important in the production of forest soil. Older and younger alluvium of river deposition covers the eastern section of the research region. The neighboring alluvium soil gets moist due to seepage. This region's alluvial soil is rich in nutrients and has a high water retention capacity, both of which are critical for agricultural output.

NATURAL VEGETATION

Mohammad Bazar C.D. Block's vegetation is mostly divided into two types and zones. One is linked to the undulating terrain in the western part of the study region, while the other is linked to the flat alluvial plain in the south and southeast. Gully and sheet erosion are especially common in the western section, making the soils there quite poor in terms of depth, accessible water holding capacity, and plant nutrients. The vegetation in this region is semi-arid. Because of the nutrient-rich, very productive soils in the south and east, paddy planting is quite popular. In the northern and north-eastern parts of the research area, degraded forest are found in Chanda, Maubelia, Charicha, Chanpur, and Ghaga, as well as a thick forest at Ganpur. Vegetation / Plants in the forest are sal (*Shorea robusta*) as well as mixed varieties forest which includes khair (*Acacia catechu*), Mahua (*Madhuca longifolia*), Arjun (*Terminalia arjuna*), Palash (*Butea monosperma*) etc, are found.

IMPACT ASSESSMENT AND DISCUSSION

EDUCATIONAL INSTITUTION AND LITERACY: Statistical analysis of census data reveals that educational institution has increased from 1991 to 2011. As well as comparative analysis of correlation indicates that literacy rate of the study area also has increased during the period. Increased rate of literacy has a positive impact on social structure because literacy improves the development of the wider community. Literacy reduces infant mortality rates because it directly affects individual's health and wellbeing. Literacy empowers women and girls, for now a day's women's education is vital for the betterment of the society. Following two sets of maps (Fig 2 & Fig 3) reveals that a large number of educational institutions has made by government or other authority during 20 years of time. Not only government but also many Nongovernmental organizations (NGO) also spent their time on this work. Many schools, computer center, private coaching center has made during this period at very remote villages such as Fullaipur, Srikantapur, Narasinghpur, Bhutura villages etc.

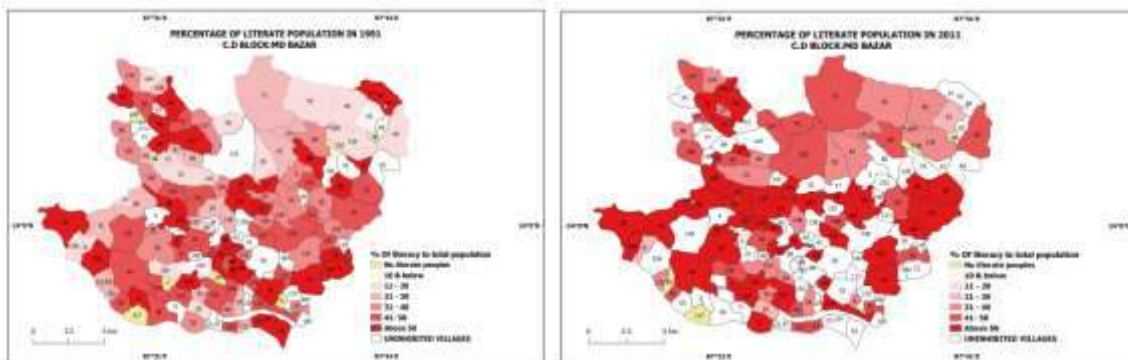


Fig: 2 & 3 showing the change of percentage of rate of literacy

AGRICULTURAL LAND USE AND WORKFORCE PARTICIPATION

The labor force participation rate, also known as the work force participation rate, is the percentage of the working population aged 16 to 64 that are presently employed or looking for work in the economy. Persons who are still undertaking research, homemakers, and people above the age of 64 are not included in the workforce (census of India). The phrase "main workers" was used for employees who worked for the majority of the year. Six months (183 days) or more were the majority of the year. On the other hand, according to the Indian Census, a person was considered a cultivator if he or she was employed as an employer, a single worker, or a family worker in the cultivation of land owned or leased by the government, a private person, or an institution for payment in cash, kind, or crop sharing. Cultivation involved cultivation monitoring or guidance as well. Agricultural labourers are people who work on other people's



land for a living for the most of the year and earn a significant amount of their income as salaries for work done on other people's agricultural fields. Household Industry is defined as an industry conducted by one or more members of the household at home or within the village in rural areas. Those workers who had not worked for the major part of the year were termed as marginal workers, in other words who had worked for less than six month or 183 days (Census of India).

Table:-1 Significance test table

Year	Significance test table	r	r ²	calculated 't' = s/q	Tabulated t value	significance level at 0.01	Remarks
1991	Total main workers vs total main cultivators	0.81	0.66	17.32	2.60	99%	Null hypothesis rejected and alternative hypothesis accepted
	Total main workers vs total agricultural labour	0.73	0.53	13.26			
	Total main workers vs total household industry	0.53	0.28	7.79			
	Total main workers vs total other workers	0.73	0.53	13.26			
	Total main workers vs Total marginal workers	0.56	0.31	8.37			
2011	Total main workers vs total main cultivators	0.59	0.35	9.17			
	Total main workers vs total agricultural labour	0.89	0.79	24.23			
	Total main workers vs total household industry	0.52	0.27	7.60			
	Total main workers vs total other workers	0.81	0.66	17.40			
	Total main workers vs Total marginal workers	0.81	0.65	17.02			

DECLINED IN THE NUMBER OF CULTIVATORS

From 1991 to 2011, correlation statistics show that the relationship between the primary worker and the cultivator has deteriorated. The percentage of cultivators has decreased from 1991 to now, according to the findings. In 1991, the correlation coefficient was 0.81, however in 2011, it was 0.59, indicating significant drops in cultivator rates over the past two decades. There are a variety of causes for this trend, including shrinking average operating holdings, farming being unprofitable, rising agricultural salaries, widespread land sales, and a movement in employment from the agricultural to non-agricultural sectors. In support of it, the following two diagrams have been created.(Fig:)

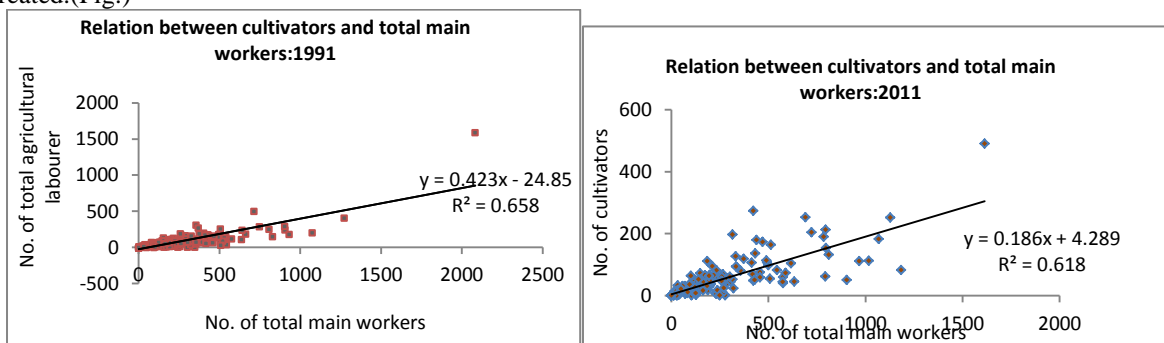


Fig: 4&5 Showing the declination of number of cultivators



INCREASED IN THE NUMBER OF AGRICULTURAL LABOURER

Correlation values indicate that the relation between main worker and Agricultural labourer has increased from 1991 to 2011. The result reveals that the proportion of cultivator's increases from 1991 to present. Co-relation value has increased in the year 2011 which depicts that an increased has occurred in last two decades from 0.73 to 0.89. Following diagram depicts the actual ground truth.

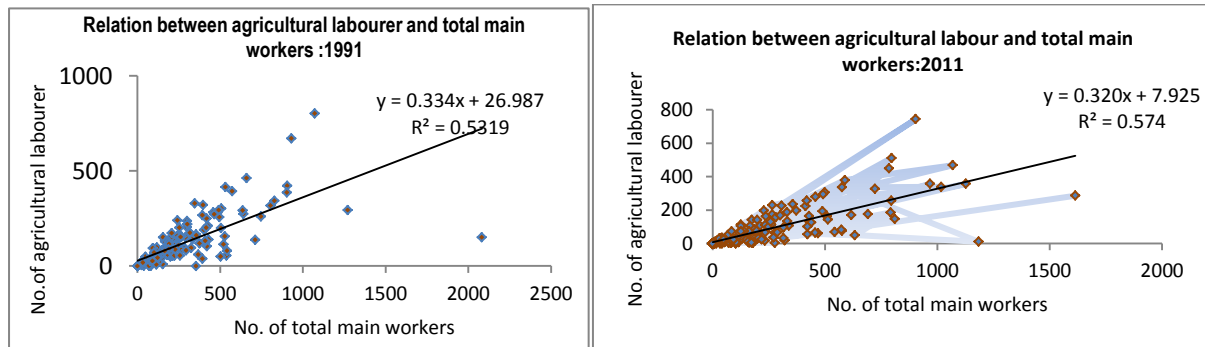


Fig. 6 & 7 Showing the changing pattern of Agriculture and Labourer

INCREASE IN THE NUMBER OF OTHER WORKERS

The study area experienced a major increase in the number of other workers. Other workers are mainly engaged in non-agricultural background like mining, official jobs both governmental and non-governmental etc. Correlation values indicate that the relation between main worker and other workers has increased from 1991 to 2011. The result reveals that rate of contribution has increased in last two decades. There are many reasons for this development. This region is famous for basalt extraction; new mining areas help to increase the employment opportunity.

IRRIGATION AND AGRICULTURAL PRACTICE

A number of changes in LULC have been found in the study area from 1991 to 2011. Village wise comparative study also has been done for the better understanding of the matter of fact. Table reveals that the changes in village wise irrigation facility. The villages which receive more irrigation water than past have converted cultivable waste land to mono cropped area that indicates a positive sign in agricultural aspect in other words agricultural productivity has increase during this period.

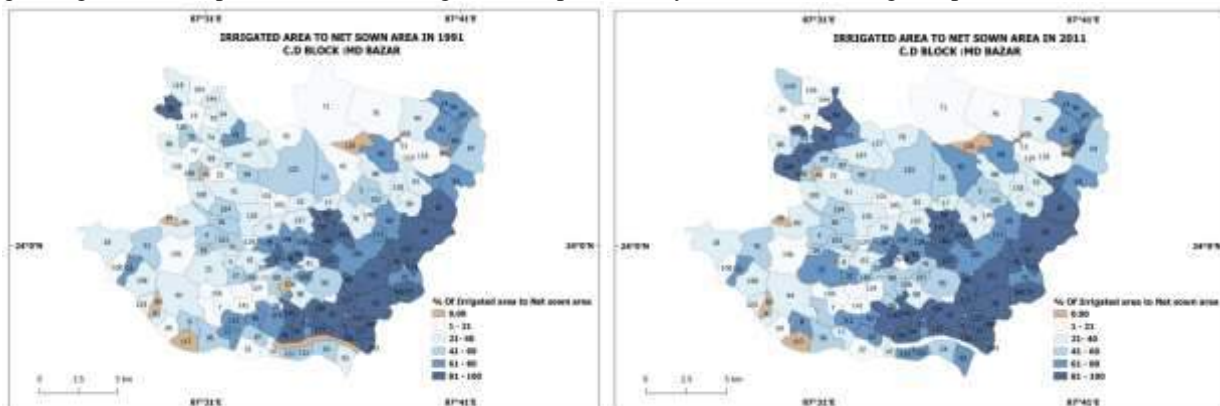


Fig: 8 & 9 Showing changing pattern of irrigated area to net shown area



Fig: 10 An example of Water-lift Irrigation

MINING AND RIVERINE SYSTEM

Mining industries have provided good number of employment and supported the economy in the study area. Mining has created a number of problems like it restrict the run off to meet the river channels. The depth of the mines when increases it forms local storage point for seepage water which supposed to meet the nearest channels. Therefore, the river flow faces problem in recharge process. A good number of basalt mines are caused to restrict the river flow at present. So we can say that the negative impacts in this study area are found like the damage of the riverine system due to mining. The numbers of agricultural laborers are increasing but the numbers of cultivators are decreasing. This situation rises for lake of interest on agricultural practices because of not gaining proper prices of their crop. There are some positive transformations that we can found in this area like increasing the number of educational institution as well as increasing the number of literacy rate in this study area.

MAJOR FINDINGS

After the study or analysis of whole thing author has find something related to the matter of subject. Author has tried to find out some problems and as well as potentiality regarding the subject matter, in other words author has fixed the problems and potential aspect in the study area.

- Mining has created a number of problems like it restrict the runoff process and affect the stream flow system, air pollution in crusher area, health issues in laborer etc. The depth of the mines when increases it forms local storage point for seepage water which supposed to meet the nearest channels. Therefore, the river flow faces problem in recharge process. A good number of basalt mines are caused to restrict the river flow at present.
- The percentage of cultivators has decreased from 1991 to now, according to the findings. In 1991, the correlation coefficient was 0.81, however in 2011, it was 0.59, indicating significant drops in cultivator rates over the past two decades. There are a variety of causes for this trend, including shrinking average operating holdings, farming being unprofitable, rising agricultural salaries, widespread land sales, and a movement in employment from the agricultural to non-agricultural sectors.

PLANNING AND PROPOSAL: Uniform distribution of Net Sown Area at village level is quite unusual as well as the irrigation facility. In general distribution of NSA and irrigated area shows positive relationship with some deviation. The regional disparities in the distribution of irrigation facility influence the crop output in a region which in turn causes regional development disparity in a area which is dominated by agricultural activities specially crop cultivation. The villages having higher concentration of NSA may have less irrigation facility. Therefore, planning for irrigation facility on the basis of priority at village level requires deviation analysis between the distribution of NSA and the same parameter. Hence, an attempt has been taken in this work to show the relationship between Net sown area and irrigation area by using correlation co-efficient. To justify the significance of these two parameters T test can be applied. Z- Score can be used to analyze the deviation fourth quadrant basis.

The distribution and deviation of NSA has been analyzed on the basis of census data 2011. Uneven distribution of NSA is measured by z-score. The z-score value for each village can be +1 or -1 and >1 or <1.

$$Z \text{ score} = \frac{(x-\bar{x})}{\delta}$$

There are some similarity and dissimilarity in the distribution of the Net sown area and irrigated area found by analyzing the standard deviation and Z- Score. Some important observations have come out which are as follows:

The significance of the correlation coefficient is tested by 't' distribution (with n-2 degree of freedom) where at the 99.9% confidence level the calculated value of 't' is 2.69, quite higher than the tabulated value (2.61) with *d.f.* 156. Therefore, null hypothesis (H_0) is rejected and alternative hypothesis (H_a) is accepted at a significance level of 0.001 and it reveals that there is a positive relation between NSA and irrigated area in the selected study area.



Correlation (r) of Z-Score values of between the NSA and irrigated area is 0.21. The difference between the mean and standard deviation values of the net sown area and irrigation area are 9 (63~54) and 11 (22~33) respectively. The result shows the regional disparities exist prominently. Therefore, in the study area planning for irrigation is more important.

The villages that have positive values and if it more than 1 that indicates those villages have net sown area more than the average and irrigation facilities too.

The value less than 1 but positive that indicate well conditions than the less than 1 negative value.

The villages of 1st quadrant are most agriculturally advanced in regional aspect. 30% villages are relatively developed in respect of the total villages of the study area (Fig. & table).

The villages of 2nd quadrant represent positive change in net sown area and negative change in irrigation. So this quadrant is characterized the under developed agricultural region. 27% villages are under this category. If irrigation facilities increase then net sown area will be increased (Fig.).

Villages of the 3rd quadrant are characterized by negative deviation of net sown area and irrigated area both. There are 27% villages which regionally lagging behind to the maximum (Fig.).

The villages of 4th quadrant are needed planning for net sown area because here net sown area negatively but irrigation positively deviated from the mean value. Only 16% of villages are under this category out of the total 158 villages (Fig.).

The facility of irrigation depends on the availability of river water, pond, ground water, etc. nearness from the source of irrigation water controls the abundance of irrigation water. There is a huge range in irrigated area varies from 0% to 100 % to the NSA. The deviation of the irrigated area has been analyzed by mean, standard deviation and jointly by z-score. The highest deviation is found more than 1.3 times than the standard deviation and the lowest deviation is less than 0.01 times. On the basis of z-score it can be mentioned that some of the villages have positive and as well as negative deviation.

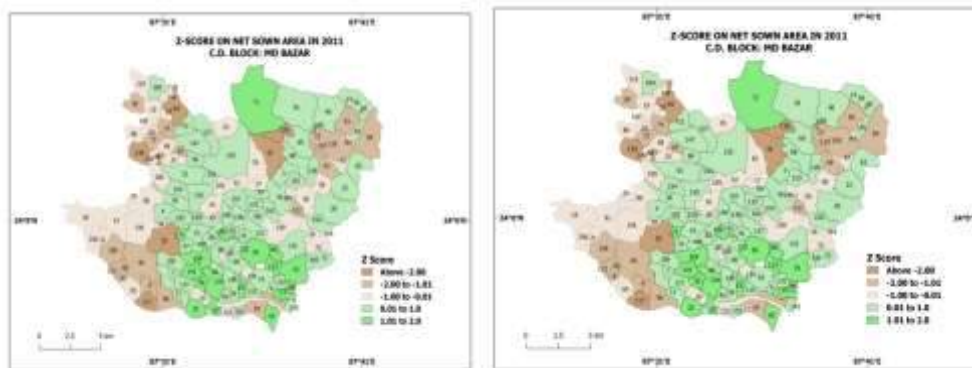


Fig. 11 & 12 Z-Score on net sown area in the year 2011 & 1991

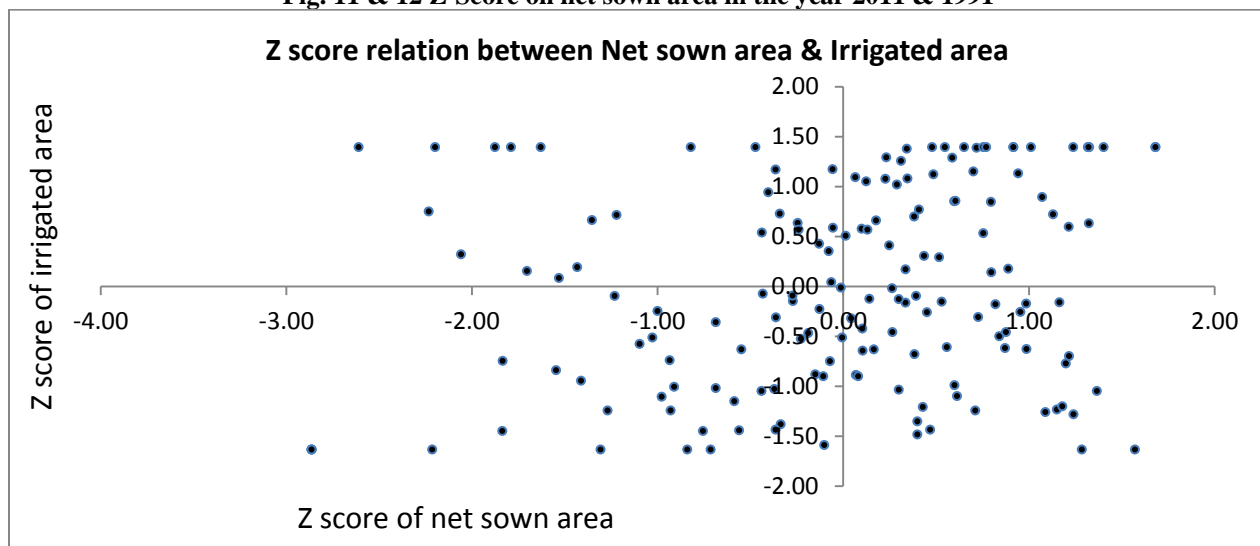


Fig. 13 Z-Score relation between Net sown area & Irrigated area

**Table 2: Identified villages required planning for irrigation and net sown area**

Year 2011	No. of villages	% of villages	Need plan for irrigation	Need plan for net sown area
1 st Quadrant	48	30		
2 nd Quadrant	42	27	J. L. No. 1,3,4,5,6,7,8	
3 rd Quadrant	43	27	,9,11,12,14,15,16,18,20,21,22,24,25,26,27,28,29,30,33,34,35,36,44,48,51,81,102,105,108,110,116,117,124,127,145,146,147,148,149,150,151,152,153,154,155,156,157,158	J. L. No.8,16,17,18,19,21,24,26,29,30,33,35,38,42,43,44,48,49,50,52,53,55,57,58,60,64,65,67,70,74,77,81,82,83,84,86,87,89,90,91,94,96,97,100,105,106,108,110,111,114,117,118,120,121,122,123,126,130,134,136,140,144,146,155,158
4 th Quadrant	25	16		

The overall analysis reveals that only 27% of the villages are getting sufficient irrigation water (more than 80% to the net sown area). The villages located in the eastern side of the Block having a high net sown area (NSA above 80% of the total area). River lift irrigation plays a vital role for the crop cultivation. Spring recharged streams are the main sources of water for irrigation.

CONCLUSION

In Mohammad Bazar Block, the natural and cultural environments are uniquely linked. The physical environment always has an impact on the manner of life of the locals as well as the local economy. Lack of some infrastructure amenities is to some extent a hindrance to economic progress. Careful planning along with the use of contemporary science and technology in a variety of economic areas can lead to the village's integrated growth. The growth of the area's rural community may be aided by the sustainable use of natural resources.

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INTERNAL SECURITY IN INDIA: THREAT PERCEPTION AND FUTURE DIRECTIONS

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ABSTRACT

Contrary to what is commonly believed, the Indian state and its citizens are seriously threatened by internal security challenges. India has had a mixed history handling the myriad internal security concerns it has faced. No other nation has, arguably, ever confronted as many different internal security threats, in different shapes and intensities, as the Indian state. Although the perceived threat from internal security issues has diminished over the past few years, they nonetheless persist. This paper critically engages with the current internal security difficulties that the Indian state faces in light of the urgency of the situation. In doing so, the article illustrates the nature and the degree of danger perception as well as the basic method by which each of these internal security risks operates. The research also assesses the state responses to the internal security challenges by offering a conceptual framework. The study restricts its focus to four primary internal security concerns in India: Left-Wing Extremism (LWE), violent conflicts in the Northeastern states, separatism and terrorism in Jammu and Kashmir (J&K), and intergroup conflict and religious radicalization.

KEY WORD: *internal security, militancy, maoist and extremism*

AN INTRODUCTION TO MAPPING INDIA'S INTERNAL SECURITY

It is crucial to set "internal security" apart from the conventional conception through a "law-and-order" framework in order to provide a more comprehensive conceptual context for the term. While academics struggle to agree on a definition, the Commission of Centre-State Relations' report on "Internal Security, Criminal Justice, and Centre-State Co-operation" provided a generally recognised definition of internal security. The significant points of convergence with the "National Security" discourse were underlined by this Commission as it discussed many aspects of internal security. This paper presents the argument for both national and internal security to be addressed from a common platform, departing from the conventional thinking that restricts the scope of national security to deal with the external threat and economic development. Internal security in India is described in this report as:

"security against threats faced by a country within its national borders, either caused by internal political turmoil, or provoked, prompted or proxied by an enemy country, perpetrated even by such groups that use a failed, failing or weak state, causing insurgency, terrorism or any other subversive acts that target innocent citizens, cause animosity between and among groups of citizens and communities in that country."

A thorough discussion of this definition is warranted. This definition's discussion of the broader meaning of internal security is crucial. It engages with both external and internal issues and stakeholders in comprehending the internal security

discourse, in contrast to the binary we frequently find. In a similar vein, it doesn't restrict the risks to the state alone. Instead, there is a great deal of accommodation made for how the residents and communities perceive the threat. This term goes on to differentiate between terrorism and insurgency. The majority of Western academia approaches terrorism and insurgency from a shared vantage point. One of the numerous similarities between the two is the deployment of a "irregular army" to carry out terrorist acts. Insurgencies and terrorist acts, which are sometimes used synonymously, have various meanings. Insurgencies are purposefully organised violent political movements in which the opposition attempts to overthrow the established order through violent means.

The Maoist war in India can be referred to as an insurgency based on this idea. Similar to this, a small number of militant groups active in the Northeastern states can also be referred to as insurgents. On the other side, terrorism has always been viewed through the lens of external actors or countries, at least in the Indian context. When analysing and discussing the problem of terrorism, it is difficult to overlook Pakistan's role in assisting and maintaining the terrorist actions in India. More importantly, rebels, militants, and terrorists all engage in the same acts while using terror tactics. Despite having some things in common, these groups differ from one another in terms of ideology, goals, and the types of stakeholders they involve. The irregular army's role as a link between terrorism and insurgency does not fit well in the Indian setting. The Maoists and other insurgent organisations continue to conduct their violent activities with a regular (if not conventional) army. Working



through an irregular army may be a given for terrorist organisations.

The subversive actions carried out by the community and criminal groups pose substantial challenges to internal security in addition to insurgency and terrorism. It would be challenging to separate internal security risks in this situation from either criminal activity or from the typical law-and-order issue. For instance, it is impossible to downplay the potential contributions of minor bank robberies or domestic disputes between people of different religions in financing terrorism and riots in communities. When discussing the problems with internal security in the context of India, we frequently have a tendency to neglect converge these difficulties. Therefore, a coherent discourse on internal security would address dangers as affecting the entire country, threats to the state as well as to the people, and should also take into consideration both internal and external causes in handling the threat. The following four significant internal security concerns in India are examined in this study through the lens of this cogent internal security discourse.

THE LARGEST INTERNAL SECURITY THREAT: LEFT WING EXTREMISM

According to the former Indian Prime Minister Manmohan Singh, the Left-wing Extremist movement or the Maoist insurgency led by the Communist Party of India-Maoist

(CPI-Maoist) is the country's greatest internal security threat. The Maoist insurgency began in 1967 in the Naxalbari regions of West Bengal state and has since taken on numerous shapes and colours. The two main stances that are used to fight the Maoist insurgency are those that support the so-called revolutionary violence and refer to the militants who engage in it as fighting for the rights and entitlements of the oppressed and underprivileged, respectively. While the Maoists receive a lot of sympathy from the first group, the Indian government disapproves of the violent activity. The Maoists assert that they are influenced by the political ideologies of Karl Marx, Lenin, and Mao and that their goal is to gain political power and usher in a "New Democracy" through a protracted military conflict. By doing this, the Maoists reject and disparage India's democratic and parliamentary systems of government. These ideological orientations and the romanticization of "revolutionary violence" have allowed the Maoist movement to establish itself over 180 districts in ten states over the past five decades. However, it's now believed that the Maoist movement has only extended to a small number of districts. The Maoist insurgency has existed for more than 50 years, causing widespread violence in the regions where they are present, posing a direct threat to the Indian state, and instilling terror in the minds of the general populace. The table that follows attests to this.

Table 1 (Fatality in Naxal Affected Area)

Year	Civilians	SF's	Maoists	Not Specified	Total
2005	259	147	282	24	712
2006	249	128	343	14	734
2007	218	234	195	25	672
2008	183	214	228	19	644
2009	368	334	299	12	1013
2010	628	267	264	20	1179
2011	259	137	210	0	606
2012	156	96	125	1	378
2013	165	103	151	0	418
2014	127	98	121	4	350
2015	90	56	110	0	256
2016	122	60	250	0	432
2017	109	76	150	0	335
2018	108	73	231	0	412
2019	99	49	154	0	302
2020	61	44	134	0	239
2021	41	48	126	0	164
2022*	21	30	110	0	161
Total	3262	2194	3432	119	9007

Source: SATP(2022*)

In addition to its violent actions, the Maoist insurgency threatens both the government and the populace. Whereby the Maoists questioned the sovereignty of the Indian state by

rejecting democracy and the parliamentary system of government. This part of the security danger is highlighted by the Maoists' murders of citizens, public servants, and members



of the security services. It becomes sense in this situation to refer to it as India's single biggest domestic security danger. The general populace is likewise threatened by the Maoist insurgency. In the many Maoist-affected areas, the Maoists' very presence fosters a climate of terror. The Maoists have taken advantage of the tribal and other marginalised communities' predominance in Chhattisgarh, Jharkhand, Odisha, Andhra Pradesh, and Maharashtra, where the state apparatus is only marginally present, by engaging in acts of violence to sow fear among the populace and win their support. Another significant threat that the Maoists and their over-the-ground followers represent to Indian society and polity is legitimising violence by non-state actors. While the state and the Maoists seem to be the most significant stakeholders, it is vital to remember that a particular segment of the intelligentsia also plays a significant role in legitimising the Maoists.

The Indian government has taken a number of actions in response to the challenges posed by the Maoist insurgency. The twin-track strategy of growth and security has been the most popular solution. Because the Maoists are considered an armed group by the Indian government, a counter-insurgency strategy has been implemented to reduce the likelihood of violence and the perception of a danger. The Central Armed Police Personnel (CAPF), which the individual states deployed alongside security forces in Maoist-affected areas, were successful in reducing Maoist activity. Similar to this, the Indian government's development strategy primarily aims to dissuade the local population from supporting the Maoists. A possible reference point for the Indian government's development attempts is the study on "Development Challenges in the Extremist Affected Areas" from the country's former Planning Commission. In order to develop the areas and, secondly, to address the grievances of the local people in order to woo them away from the Maoists, initiatives such as the Integrated Action Plan (now Central Assistance Scheme) in the worst affected districts, Security Related Expenditure, and Road Construction Initiatives have been launched. As a response to combating the Maoists, the current regime has also implemented a strategy of "ensuring the rights and entitlements of the local communities" in addition to security and development measures. The long-standing demands for land and forest rights that have been made by the local community are met.

The aforementioned approaches have allowed succeeding administrations to significantly contain the Maoists. The Maoists currently only control a small portion of Chhattisgarh, Odisha, Jharkhand, and Maharashtra. Numerous Maoist leaders have either been neutralised or detained, as evidenced by the sharp decline in violent Maoist-related incidents. Although the threat posed by the Maoist insurgency is now perceived as being significantly reduced, it nonetheless persists despite being on a much lower scale. Although there have been less violent occurrences by the Maoists, the banned organisation has been targeting the security forces with surprise attacks under the new leadership of Namballa Keshava Rao, alias Basavaraj, as their general secretary, and Madvi Hidma, as their chief of military affairs. In the past two years, the Maoists have launched four

significant attacks since Basavaraj assumed control of the organisation. In the Gadchiroli district on May 1, 2019, the Maoists murdered fifteen members of the security forces. Prior to the first round of the general election on April 9, 2019, the Maoists ambushed the convoy of Chhattisgarh BJP MLA Bhima Mandavi, killing the MLA and two others. The new leadership is attempting to quash the increasing perception that the Maoist movement is nearing its end by launching these attacks. Given the long-lasting nature of the Maoist insurgency and the lessons learned from history, the government's response to this security danger shouldn't be lawless. Although the state's responses have been successful thus far in combating the Maoists, their sheer existence draws attention to the policy framework's flaws. The government should consider investing in public perception management in addition to the aforementioned answers because it will aid in delegitimizing the movement and those who support it among intellectual circles. The administration ought to consider holding negotiations and peace talks with the Maoists. A discourse between the two groups would aid in reducing the impression of threat because ideological dispute is a significant contributing factor to this violent conflict.

NORTH-EASTERN ETHNIC CONFLICT AND MILITANCY

An important internal security worry for the Indian state has been the persistent militancy and violent ethnic conflicts in certain of the Northeastern states. Contrary to the popular perspective, which views violence and conflicts as a "freedom struggle" against a "homogenising state," the majority of these confrontations are frequently driven by mistaken emotions that cast a shadow over the true problems. These conflicts are correctly categorised by the Standing Committee of the MHA into three main classes: separatist insurgencies that desire independence; autonomous insurgencies that declare sub-regional aspirations; and intra-ethnic conflicts between larger and smaller tribal groups. Long-standing militancy in some Northeastern states has been attributed, among other things, to aggressive identity assertion and a sense of alienation among dominant and minority ethnic groups in different states. The historical causes of alienation stem from colonial rule's failure to unite these states with "mainland" India still exist today in one way or another. The political elites of the Northeastern states frequently link this feeling of alienation to both economic sluggishness and inadequate political representation. Additionally, the Indian state is frequently cited as the common adversary and held accountable in the internal conflicts between the dominant and minority communities. In addition to these, the external effects on militancy and internal conflicts in terms of supporting them and giving them safe havens in their territory have been a significant impact. Even though there has been a sharp decline in violence over the past few years, there are still a number of militant organisations (even though they are relatively tiny in number), and interethnic and intraethnic tensions persist. The violent occurrences and fatalities that occurred in the Northeastern states over the past ten years are highlighted in the following table.


Table 2 (Fatality in North East due to Militancy)

Year	Civilians	SF's	Militants	Not Specified	Total
2011	73	31	138	2	244
2012	99	18	216	1	334
2013	95	21	134	2	252
2014	243	22	204	0	469
2015	64	49	163	3	279
2016	63	20	85	0	168
2017	35	13	58	1	107
2018	20	15	38	0	73
2019	18	5	11	0	34
2020	5	5	17	0	27
2021	11	3	32	0	45
2022*	18	3	27	0	48
Total	744	205	1122	9	2080

Source: SATP(2022*)

Security concerns from militancy and ethnic conflict come in many different forms. First, the sovereignty of the Indian state is contested by separatist militant groups like the National Socialist Council of Nagaland (NSCN) in Nagaland, which includes both the Isak Muivah and the Kahplang factions. The Indian state's territorial integrity and sovereignty are also threatened by the United Liberation Front (UNLF) of Manipur. The sub-regional aspirations that fuel violent ethnic conflicts weaken India's democratic and constitutional values. Furthermore, it is a big source of concern that bordering nations like Myanmar and Bangladesh are harbouring extremist groups. Several Northeastern states have been exposed to drug and human trafficking in addition to violent situations. States like Manipur have been particularly heavily impacted by cross-border trafficking of illegal drugs. Similar to this, there are significant security concerns with the dumping of Chinese commodities into the Northeastern regions via Manipur. The Northeast borders' militancy and ungoverned territories play a significant role in the challenge to the Indian state.

The state has responded to these dangers in four different yet complementary ways. The Sixth Schedule's provisions for guaranteeing local autonomy, the security strategy to combating militancy, peace talks and negotiations with militant organisations, development measures, including special economic packages, are among them. This comprehensive foundation for policy has largely proven to be successful. Some of these answers, nevertheless, have also had unanticipated and negative effects. Security measures taken in reaction to the militancy have significantly reduced violence (refer to Table 2). Similar to this, the ongoing peace negotiations with the vast majority of the well-known militant organisations have produced positive outcomes. For instance, the National Democratic Front of Bodoland (NDFB) signed a deal with the Government in January 2020 and afterwards totally disbanded its armed cadres. In addition, hundreds of armed cadres from eight different militant organisations, including the United Liberation Front of Asom-Independent (ULFA-I), made their surrender in Assam in January 2020. While the peace

negotiations with numerous terrorist organisations are encouraging, such agreements also make the underprivileged and minority groups feel uneasy and encourage them to take up guns. A sign of the increasing fears is the rise of smaller armed organisations in the states of Manipur, Nagaland, and Assam. On the other side, the struggle for domination over resources and territories among the many ethnic groups also fuels ethnic conflicts, raising the stakes for national security. While the succeeding governments have made some progress in addressing these security threats, there are still some shortcomings in their strategies for doing so. These include the ineffective implementation of cease-fire agreements, the involvement of militants in criminal activity, and the protracted nature of peace negotiations. The territory of Myanmar continues to provide some of these extremist groups with safe havens on the outside. A strong bilateral relationship with Myanmar could provide a solution to this issue.

SEPARATISM AND TERRORISM IN JAMMU AND KASHMIR

The difference between internal and external security concerns is muddled by the separatist and terrorist issues in the state of Jammu and Kashmir. In actuality, the internal and external dimensions working together are part of what makes J&K's security concerns so difficult. The external component results from Pakistan's direct involvement in harbouring and supporting terrorist organisations on its soil and financing terrorist actions in J&K. The religious radicalization disguised as Kashmiri nationalism's demand for a separate state can be connected to the internal component of security issues. It is challenging for the Indian state to properly address the security challenges due to the intricate interaction of numerous interconnected issues. According to some academics, the Indian state faces a vicious cycle of security issues due to its geographical defensibility, Pakistan's claim to the same region, and the violent religious nationalism in Kashmir. China may have contributed to the ongoing disputes and violence in addition to Pakistan. The incidents where the Chinese



government issued lenient visas to residents of J&K can be interpreted as measures to weaken Indian sovereignty. According to academics, the Chinese interests are best served by a protracted struggle in Kashmir. To this extent, the Chinese state, together with Pakistan and terrorist organisations funded by Pakistan, has a significant stake in the hostilities in Kashmir.

With Pakistan, China, and terrorist organisations involved, the nature of the security challenges coming from J&K is multifaceted. Direct danger exists to the Indian state's sovereignty and territorial integrity. The increasing religious

radicalization of J&K's youth continues to have detrimental effects on India's secular fabric. The enormous departure of Kashmiri Pandits from their own country has been facilitated by claims of Islamic fanaticism. Additionally, the terrorism and militancy that have existed for decades in Kashmir constitute a major threat to public safety. J&K remains to be one of the most volatile states in India, despite the fact that violence-related occurrences and fatalities have been on a downward trend over the past ten years (see the table below).

Table 3 3 (Fatality in Jammu and Kashmir due to Militancy)

Year	Civilians	SF's	Militant	Total
2012	19	18	84	121
2013	19	53	100	172
2014	28	47	114	189
2015	19	41	115	175
2016	14	88	165	267
2017	54	83	220	357
2018	86	95	271	452
2019	42	78	163	283
2020	33	56	232	321
2021	19	26	129	174
2022*	12	22	125	159
Total	345	607	1718	2670

Source: SATP(2022*)

The security situation in J&K has significantly improved during the past five years. The identification and destruction of domestic and international terrorists, the repeal of Articles 370 and 35A, which ended the state's special status and privileges, and the implementation of development initiatives can all be credited with improving the security situation. India has taken stern action against the militancy and the local backing it receives in Kashmir, and the killing of Hizb-ul-Mujahideen (HuM) leader Burhan Wani on July 8, 2016, is frequently used as a benchmark. Since then, especially after the repeal of Articles 370 and 35A, the security forces in J&K have been effective in neutralising a number of terrorists.

Although the military and police have taken strong measures to combat terrorism in J&K, more must be done to prevent radicalization and anti-Indian sentiment among some segments of the populace. Three themes can be seen as far as the radicalization of Kashmir: pro-Pakistan, pro-Azadi, and pro-Salafist Islam with calls for Nizam-e Mustafa and Khalifat-e Rashida. While terrorist organisations like the HuM, Lashkar-e-Taiba (LeT), and Jaish-e-Mohammed (JeM) are no longer actively involved in carrying out militancy, The Resistance Force (TRF), which is thought to be a LeT offshoot, has been responsible for carrying out the majority of terrorist activities in Kashmir. The Indian state should be ready for all eventualities in the future given the change in guard in the neighbourhood, the Taliban's takeover in Afghanistan, and Pakistan's active participation in the process. The reduction of security threats resulting from militancy and terrorism in J&K would be made possible by the adoption of people-centered development

measures, an ongoing dialogue process with local stakeholders, and a strong security approach.

COMMUNALISM AND RELIGIOUS RADICALISATION

Contrary to the aforementioned problems, it might be challenging to pinpoint the perceived threat posed by communalism. As it is commonly understood, communalism is disagreement about nonreligious matters between two or more religious groups. These disputes between the two religious groups are frequently accepted politically and socially. It is safe to say that in the Indian context, communal violence is frequently socially and politically tolerated as long as it doesn't go too far. It is more difficult to articulate communalism within the broader language of internal security due to the socio-political elites' involvement in its inception, pursuit, and determination as well as its contribution to the political goals of the various groupings. The security dangers that communalism poses to the state and the populace have not been sufficiently grasped, despite the fact that the literature currently in circulation examines it through the lenses of elections, religious intolerance, and social division. It is significant to note that the MHA also excludes communalism and communal riots from its list of internal security concerns. However, this study considers communalism and radicalization as an internal security issue in light of the continuous occurrence of communal disturbances and their effects on religious radicalization.

The history of religious strife and unrest in India is a major contributor to the current communal violence and riots.



The diversity of India is directly threatened by the racial unrest. Additionally, racial tensions that feed religious radicalization pose a serious security risk to the Indian state. Extreme religious beliefs that indoctrinate people and lead to radicalization frequently find their justification in racial tension and rioting. Scholars have noted that terrorist organisations have a penchant for using violence against a certain religious community to attract new members and advance their missions. As an illustration, the “Voice of Hind,” propaganda published by the Islamic State of Syria and Iraq (ISIS) in 2020, aims to recruit and indoctrinate Indian Muslims by stoking concerns and resentments related to the nation’s racial divisions. Additionally, there are instances of the Indian Mujahideen (IM) acting in India by exploiting racial tensions and rioting. Security services have recently drawn attention to how outside parties stoked and profited from the Delhi unrest and the Anti-CAA protest.

CONCLUSION

The dangers to India’s internal security are intricate in design. Contrary to criticism from some scholars, the Indian state’s response has been remarkably resilient in light of this complexity and the part that some external actors have played in amplifying the threat perception. The reduction of militancy and terrorism in J&K, the containment of Maoist violence to a few pockets of central India, the de-escalation of violent-related activities in the Northeastern states, the active pursuit of peace talks with several militant groups in the Northeast, and these actions all attest to the Indian government’s effective internal security strategy. A strong security approach, development initiatives in the impacted areas, resolving grievances through securing rights and entitlements, and peace negotiations with armed organisations can be summed up as the Indian state’s entire response to internal security challenges. However, the state must work successfully to moderate public opinion and deradicalize brainwashed individuals. To gain the confidence of the populace, it is necessary to move quickly with the peace negotiations currently taking place with various armed organisations in the Northeast. The current governments ought to consider emulating the Northeast’s peace talks in the Maoist-affected regions.

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$(1, 2)^*$ - $\pi g \eta$ -CLOSED SETS IN BITOPOLOGICAL SPACES

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ABSTRACT

In this paper, we introduce and investigate a new class of sets called $(1, 2)^*$ - $\pi g \eta$ -closed and some new functions called $(1, 2)^*$ - $\pi g \eta$ -continuous, almost $(1, 2)^*$ - $\pi g \eta$ -continuous functions in bitopological spaces. Moreover we obtain the relationships among some existing closed sets like $(1, 2)^*$ - $\pi g \eta$ -closed, $(1, 2)^*$ -semi-closed, $(1, 2)^*$ - α -closed and $(1, 2)^*$ - η -closed sets and their generalizations. Also we study some basic properties of $(1, 2)^*$ - $\pi g \eta$ -closed sets. Further, we introduce $(1, 2)^*$ - $\pi g \eta$ -neighbourhood and discuss some properties of $(1, 2)^*$ - $\pi g \eta$ -neighbourhood.

KEYWORDS: $(1, 2)^*$ - η -open, $(1, 2)^*$ - $g \eta$ -closed, $(1, 2)^*$ - $\pi g \eta$ -closed sets; $(1, 2)^*$ - $\pi g \eta$ -continuous, almost $(1, 2)^*$ - $\pi g \eta$ -continuous functions.

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1. INTRODUCTION

The study of bitopological space was first initiated by Kelly [5] in 1963. By using the topological notions, namely, semi-open, α -open and pre-open sets, many new bitopological sets are defined and studied by many topologists. In 2004, Ravi and Thivagar [11] studied the concept of stronger form of $(1, 2)^*$ -quotient mapping in bitopological spaces and also introduced the concepts of $(1, 2)^*$ -semi-open and $(1, 2)^*$ - α -open sets. In 2010, Arockiarani [2] introduced $(1, 2)^*$ - $\pi g \alpha$ -closed sets in bitopological spaces and studied some basic properties of $(1, 2)^*$ - $\pi g \alpha$ -closed sets. In 2010, K. Kayathri et al. [4] introduced and studied a new class of sets called regular $(1, 2)^*$ - g -closed sets and used it to obtain a new class of functions called $(1, 2)^*$ - rg -continuous, $(1, 2)^*$ - R -map, almost $(1, 2)^*$ -continuous and almost $(1, 2)^*$ - rg -closed functions in bitopological spaces and also obtained characterizations and preservation theorems for mildly $(1, 2)^*$ -normal spaces. In 2022, H. Kumar [6] introduced the concept of $(1, 2)^*$ - η -open sets and $(1, 2)^*$ - η -neighbourhood and; studied their properties. In 2022, H. Kumar [7] introduced the concept of $(1, 2)^*$ -generalized η -closed sets and studied some basic properties of $(1, 2)^*$ - $g \eta$ -closed sets. In 2022, H. Kumar [8] introduced the concept of regular $(1, 2)^*$ -generalized η -closed sets and $(1, 2)^*$ - $rg \eta$ -neighbourhood and; discussed their properties. Recently, H. Kumar [9] introduced and investigated some new functions called $(1, 2)^*$ - η -continuous, $(1, 2)^*$ - $g \eta$ -continuous, $(1, 2)^*$ - $rg \eta$ -continuous, almost $(1, 2)^*$ - η -continuous, almost $(1, 2)^*$ - $g \eta$ -continuous, almost $(1, 2)^*$ - $rg \eta$ -continuous, $(1, 2)^*$ - η -closed, $(1, 2)^*$ - $g \eta$ -closed, $(1, 2)^*$ - $rg \eta$ -closed, almost $(1, 2)^*$ - η -closed, almost $(1, 2)^*$ - $g \eta$ -closed and almost $(1, 2)^*$ - $rg \eta$ -closed functions in bitopological spaces and obtained characterizations and preservation theorems for mildly $(1, 2)^*$ - η -normal spaces.

2. PRELIMINARIES

Throughout the paper $(X, \mathfrak{T}_1, \mathfrak{T}_2)$, (Y, σ_1, σ_2) and (Z, \wp_1, \wp_2) (or simply X , Y and Z) denote bitopological spaces.

Definition 2.1. Let S be a subset of X . Then S is said to be $\mathfrak{T}_{1,2}$ -open [11] if $S = A \cup B$ where $A \in \mathfrak{T}_1$ and $B \in \mathfrak{T}_2$. The complement of a $\mathfrak{T}_{1,2}$ -open set is $\mathfrak{T}_{1,2}$ -closed.

Definition 2.2 [11]. Let S be a subset of X . Then

(i) the $\mathfrak{T}_{1,2}$ -closure of S , denoted by $\mathfrak{T}_{1,2}\text{-cl}(S)$, is defined as $\cap \{F : S \subset F \text{ and } F \text{ is } \mathfrak{T}_{1,2}\text{-closed}\}$; (ii) the $\mathfrak{T}_{1,2}$ -interior of S , denoted by $\mathfrak{T}_{1,2}\text{-int}(S)$, is defined as $\cup \{F : F \subset S \text{ and } F \text{ is } \mathfrak{T}_{1,2}\text{-open}\}$.

Note 2.3 [11]. Notice that $\mathfrak{T}_{1,2}$ -open sets need not necessarily form a topology.

Definition 2.4. A subset A of a bitopological space $(X, \mathfrak{T}_1, \mathfrak{T}_2)$ is called

- (i) **regular $(1, 2)^*$ -open** [11] if $A = \mathfrak{T}_{1,2}\text{-int}(\mathfrak{T}_{1,2}\text{-cl}((A))$.
- (ii) **$(1, 2)^*$ - π -open** [2] if A is the finite union of $(1, 2)^*$ -regular-open sets.



- (iii) $(1, 2)^*$ -semi-open [11] if $A = \mathfrak{T}_{1,2}\text{-cl}(\mathfrak{T}_{1,2}\text{-int}(A))$,
 (iv) $(1, 2)^*$ - α -open [11] if $A \subset \mathfrak{T}_{1,2}\text{-int}(\mathfrak{T}_{1,2}\text{-cl}(\mathfrak{T}_{1,2}\text{-int}(A)))$.
 (v) $(1, 2)^*$ - η -open [6] if $A \subset \mathfrak{T}_{1,2}\text{-int}(\mathfrak{T}_{1,2}\text{-cl}(\mathfrak{T}_{1,2}\text{-int}(A)) \cup \mathfrak{T}_{1,2}\text{-cl}(\mathfrak{T}_{1,2}\text{-int}(A)))$.

The complement of a regular $(1, 2)^*$ -open (resp. $(1, 2)^*$ - π -open, $(1, 2)^*$ -s-open, $(1, 2)^*$ - α -open, $(1, 2)^*$ - η -open) set is called **regular $(1, 2)^*$ -closed** (resp. **$(1, 2)^*$ - π -closed**, **$(1, 2)^*$ -s-closed**, **$(1, 2)^*$ - α -closed**, **$(1, 2)^*$ - η -closed**).

The $(1, 2)^*$ -s-closure (resp. $(1, 2)^*$ - α -closure, $(1, 2)^*$ - η -closure) of a subset A of X is denoted by $(1, 2)^*\text{-s-cl}(A)$ (resp. $(1, 2)^*\text{-}\alpha\text{-cl}(A)$, $(1, 2)^*\text{-}\eta\text{-cl}(A)$), defined as the intersection of all $(1, 2)^*$ -s-closed (resp. $(1, 2)^*$ - α -closed, $(1, 2)^*$ - η -closed) sets containing A .

The family of all regular $(1, 2)^*$ -open (resp. regular $(1, 2)^*$ -closed, $(1, 2)^*$ -s-open, $(1, 2)^*$ -s-closed, $(1, 2)^*$ - α -open, $(1, 2)^*$ - α -closed, $(1, 2)^*$ - η -open, $(1, 2)^*$ - η -closed) sets in X is denoted by $(1, 2)^*\text{-RO}(X)$ (resp. $(1, 2)^*\text{-RC}(X)$, $(1, 2)^*\text{-SO}(X)$, $(1, 2)^*\text{-SC}(X)$, $(1, 2)^*\text{-}\alpha\text{-O}(X)$, $(1, 2)^*\text{-}\alpha\text{-C}(X)$, $(1, 2)^*\text{-}\eta\text{-O}(X)$, $(1, 2)^*\text{-}\eta\text{-C}(X)$).

Remark 2.5. We have the following implications for the properties of subsets:

$$\begin{array}{ccccc}
 \text{regular } (1, 2)^*\text{-open} & \Rightarrow & (1, 2)^*\text{-}\pi\text{-open} & \Rightarrow & \mathfrak{T}_{1,2}\text{-open} \\
 \Downarrow & & \Downarrow & & \Downarrow \\
 (1, 2)^*\text{-}\eta\text{-open} & \Leftarrow & (1, 2)^*\text{-s-open} & \Leftarrow & (1, 2)^*\text{-}\alpha\text{-open}
 \end{array}$$

Where none of the implications is reversible as can be seen from the following examples:

Example 2.6. Let $X = \{a, b, c, d\}$, $\mathfrak{T}_1 = \{\emptyset, \{a\}, X\}$ and $\mathfrak{T}_2 = \{\emptyset, \{b\}, \{a, b, c\}, X\}$. Then

- (i) The $\mathfrak{T}_{1,2}$ -open sets are : $\emptyset, \{a\}, \{b\}, \{a, b\}, \{a, b, c\}, X$.
 (ii) The regular $(1, 2)^*$ -open sets are : $\emptyset, \{a\}, \{b\}, X$.
 (iii) The $(1, 2)^*$ - π -open sets are : $\emptyset, \{a\}, \{b\}, \{a, b\}, X$.
 (iv) The $(1, 2)^*$ -semi open sets are : $\emptyset, \{a\}, \{b\}, \{a, b\}, \{a, c\}, \{a, d\}, \{b, c\}, \{b, d\}, \{a, b, c\}, \{a, b, d\}, \{a, c, d\}, \{b, c, d\}, X$.
 (v) The $(1, 2)^*$ - α -open sets are : $\emptyset, \{a\}, \{b\}, \{a, b\}, \{a, b, c\}, \{a, b, d\}, X$
 (vi) The $(1, 2)^*$ - η -open sets are : $\emptyset, \{a\}, \{b\}, \{a, b\}, \{a, c\}, \{a, d\}, \{b, c\}, \{b, d\}, \{a, b, c\}, \{a, b, d\}, \{a, c, d\}, \{b, c, d\}, X$.

Example 2.7. Let $X = \{a, b, c\}$, $\mathfrak{T}_1 = \{\emptyset, \{b\}, X\}$ and $\mathfrak{T}_2 = \{\emptyset, \{c\}, X\}$. Then

- (i) The $\mathfrak{T}_{1,2}$ -open sets are : $\emptyset, \{b\}, \{c\}, \{b, c\}, X$.
 (ii) The regular $(1, 2)^*$ -open sets are : $\emptyset, \{b\}, \{c\}, X$.
 (iii) The $(1, 2)^*$ - π -open sets are : $\emptyset, \{b\}, \{c\}, \{b, c\}, X$.
 (iv) The $(1, 2)^*$ -semi-open sets are : $\emptyset, X, \{b\}, \{c\}, \{a, b\}, \{a, c\}, \{b, c\}$.
 (v) The $(1, 2)^*$ - α -open sets are : $\emptyset, X, \{b\}, \{c\}, \{b, c\}$.
 (vi) The $(1, 2)^*$ - η -open sets are : $\emptyset, \{b\}, \{c\}, \{a, b\}, \{a, c\}, \{b, c\}, X$.

Example 2.8. Let $X = \{a, b, c, d\}$ with $\mathfrak{T}_1 = \{\emptyset, X, \{a\}, \{b\}, \{a, b\}, \{b, c, d\}\}$ and $\mathfrak{T}_2 = \{\emptyset, X, \{c\}, \{a, c, d\}\}$. Then

- (i) The $\mathfrak{T}_1\mathfrak{T}_2$ -open sets are : $\emptyset, X, \{a\}, \{b\}, \{c\}, \{a, b\}, \{a, c\}, \{b, c\}, \{a, b, c\}, \{a, c, d\}, \{b, c, d\}$.
 (ii) The regular $(1, 2)^*$ -open sets are : $\emptyset, X, \{a\}, \{b\}, \{c\}, \{a, b\}, \{a, c, d\}, \{b, c, d\}$.
 (iii) The $(1, 2)^*$ - π -open sets are : $\emptyset, X, \{a\}, \{b\}, \{c\}, \{a, b\}, \{a, c\}, \{b, c\}, \{a, b, c\}, \{a, c, d\}, \{b, c, d\}$.
 (iv) The $(1, 2)^*$ -semi open sets are : $\emptyset, X, \{a\}, \{b\}, \{c\}, \{a, b\}, \{a, c\}, \{b, c\}, \{c, d\}, \{a, b, c\}, \{a, b, d\}, \{a, c, d\}, \{b, c, d\}$.
 (v) The $(1, 2)^*$ - α -open sets are : $\emptyset, X, \{a\}, \{b\}, \{c\}, \{a, b\}, \{a, c\}, \{b, c\}, \{a, b, c\}, \{a, c, d\}, \{b, c, d\}$.
 (vi) The $(1, 2)^*$ - η -open sets are : $\emptyset, X, \{a\}, \{b\}, \{c\}, \{a, b\}, \{a, c\}, \{b, c\}, \{c, d\}, \{a, b, c\}, \{a, b, d\}, \{a, c, d\}, \{b, c, d\}$.

3. $(1, 2)^*$ -RG η -CLOSED SETS IN BITOPOLOGICAL SPACES

Definition 3.1. A subset A of a bitopological space $(X, \mathfrak{T}_1, \mathfrak{T}_2)$ is called

- (i) $(1, 2)^*$ -generalized closed (briefly $(1, 2)^*$ -g-closed) [12] if $\mathfrak{T}_{1,2}\text{-cl}(A) \subset U$ whenever $A \subset U$ and U is $\mathfrak{T}_{1,2}$ -open in X .
 (ii) $(1, 2)^*$ - π -generalized closed (briefly $(1, 2)^*$ - π g-closed) [13] if $\mathfrak{T}_{1,2}\text{-cl}(A) \subset U$ whenever $A \subset U$ and U is $(1, 2)^*$ - π -open in X .
 (iii) regular $(1, 2)^*$ -generalized closed (briefly $(1, 2)^*$ -rg-closed) [4] if $\mathfrak{T}_{1,2}\text{-cl}(A) \subset U$ whenever $A \subset U$ and $U \in (1, 2)^*\text{-RO}(X)$.
 (iv) $(1, 2)^*$ - α -generalized closed (briefly $(1, 2)^*$ - α g-closed) [11] if $(1, 2)^*\text{-}\alpha\text{-cl}(A) \subset U$ whenever $A \subset U$ and U is $\mathfrak{T}_{1,2}$ -open in X .
 (v) $(1, 2)^*$ - π -generalized α -closed (briefly $(1, 2)^*$ - π g α -closed) [2] if $(1, 2)^*\text{-}\alpha\text{-cl}(A) \subset U$ whenever $A \subset U$ and U is $(1, 2)^*$ - π -open in X .



- (vi) **regular $(1, 2)^*$ -generalized α -closed** (briefly **$(1, 2)^*$ -rg α -closed**) [14] if $(1, 2)^*$ - α -cl(A) \subset U whenever $A \subset U$ and $U \in (1, 2)^*$ -RO(X).
- (vii) **$(1, 2)^*$ -generalized semi-closed** (briefly **$(1, 2)^*$ -gs-closed**) [13] if $(1, 2)^*$ - α -cl(A) \subset U whenever $A \subset U$ and U is $\mathfrak{S}_{1,2}$ -open in X.
- (viii) **$(1, 2)^*$ - π -generalized semi-closed** (briefly **$(1, 2)^*$ - π gs-closed**) [14] if $(1, 2)^*$ - α -cl(A) \subset U whenever $A \subset U$ and U is $(1, 2)^*$ - π -open in X.
- (ix) **regular $(1, 2)^*$ -generalized semi-closed** (briefly **$(1, 2)^*$ -rgs-closed**) [12] if $(1, 2)^*$ - α -cl(A) \subset U whenever $A \subset U$ and $U \in (1, 2)^*$ -RO(X).
- (x) **$(1, 2)^*$ -generalized η -closed** (briefly **$(1, 2)^*$ -g η -closed**) [7] if $(1, 2)^*$ - η -cl(A) \subset U whenever $A \subset U$ and U is $\mathfrak{S}_{1,2}$ -open in X.
- (xi) **$(1, 2)^*$ -generalized η -closed** (briefly **$(1, 2)^*$ - π g η -closed**) if $(1, 2)^*$ - η -cl(A) \subset U whenever $A \subset U$ and U is $(1, 2)^*$ - π -open in X.
- (xii) **regular $(1, 2)^*$ -generalized η -closed** (briefly **$(1, 2)^*$ -rg η -closed**) [8] if $(1, 2)^*$ - η -cl(A) \subset U whenever $A \subset U$ and $U \in (1, 2)^*$ -RO(X).

The complement of a $(1, 2)^*$ -g-closed (resp. $(1, 2)^*$ - π g-closed, $(1, 2)^*$ -rg-closed, $(1, 2)^*$ - α g-closed, $(1, 2)^*$ - π g α -closed, $(1, 2)^*$ -rg α -closed, $(1, 2)^*$ -gs-closed, $(1, 2)^*$ - π gs-closed, $(1, 2)^*$ -rgs-closed, $(1, 2)^*$ -g η -closed, $(1, 2)^*$ - π g η -closed, $(1, 2)^*$ -rg η -closed) set is called **$(1, 2)^*$ -g-open** (resp. **$(1, 2)^*$ - π g-open, $(1, 2)^*$ -rg-open, $(1, 2)^*$ - α g-open, $(1, 2)^*$ - π g α -open, $(1, 2)^*$ -rg α -open, $(1, 2)^*$ -gs-open, $(1, 2)^*$ - π gs-open, $(1, 2)^*$ -rgs-open, $(1, 2)^*$ -g η -open, $(1, 2)^*$ - π g η -open, $(1, 2)^*$ -rg η -open).**

We denote the set of all $(1, 2)^*$ -rg η -closed (resp. $(1, 2)^*$ -rg η -open) sets in $(X, \mathfrak{S}_1, \mathfrak{S}_2)$ by $(1, 2)^*$ -rg η -C(X) (resp. rg η -O(X)).

Theorem 3.2. Every $\mathfrak{S}_{1,2}$ -closed set is π g η -closed.

Proof. Let A be any $\mathfrak{S}_{1,2}$ -closed set in $(X, \mathfrak{S}_1, \mathfrak{S}_2)$ and $A \subset U$, where U is $(1, 2)^*$ - π -open set. So $(1, 2)^*$ -cl(A) = A. Since every $\mathfrak{S}_{1,2}$ -closed set is $(1, 2)^*$ - η -closed, so $(1, 2)^*$ - η -cl(A) \subset $(1, 2)^*$ -cl(A) = A. Therefore, $(1, 2)^*$ - η -cl(A) \subset A \subset U. Hence A is $(1, 2)^*$ - π g η -closed set.

Theorem 3.3. Every $(1, 2)^*$ -g-closed set is $(1, 2)^*$ -rg η -closed.

Proof. Let A be any $(1, 2)^*$ -g-closed set in $(X, \mathfrak{S}_1, \mathfrak{S}_2)$ such that $(1, 2)^*$ -cl(A) \subset U whenever $A \subset U$, where U is $(1, 2)^*$ - π -open set, since every $(1, 2)^*$ - π -open set is $\mathfrak{S}_{1,2}$ -open. So $(1, 2)^*$ - η -cl(A) \subset $(1, 2)^*$ -cl(A) \subset U. Therefore $(1, 2)^*$ - η -cl(A) \subset U. Hence A is $(1, 2)^*$ - π g η -closed set.

Theorem 3.4. Every $(1, 2)^*$ - π g-closed set is $(1, 2)^*$ - π g η -closed.

Proof. Let A be any $(1, 2)^*$ - π g-closed set in $(X, \mathfrak{S}_1, \mathfrak{S}_2)$ such that $(1, 2)^*$ -cl(A) \subset U whenever $A \subset U$, where U is $(1, 2)^*$ - π -open set. So $(1, 2)^*$ - η -cl(A) \subset $(1, 2)^*$ -cl(A) \subset U. Therefore $(1, 2)^*$ - η -cl(A) \subset U. Hence A is $(1, 2)^*$ - π g η -closed set.

Theorem 3.5. Every $(1, 2)^*$ - α -closed set is $(1, 2)^*$ - π g η -closed.

Proof. Let A be any $(1, 2)^*$ - α -closed set in $(X, \mathfrak{S}_1, \mathfrak{S}_2)$ and $A \subset U$, where U is $(1, 2)^*$ - π -open set. Since every $(1, 2)^*$ - α -closed set is $(1, 2)^*$ - η -closed, so $(1, 2)^*$ - η -cl(A) \subset $(1, 2)^*$ - α -cl(A) = A. Therefore $(1, 2)^*$ - η -cl(A) \subset A \subset U. Hence A is $(1, 2)^*$ - π g η -closed set.

Theorem 3.6. Every $(1, 2)^*$ - α g-closed set is $(1, 2)^*$ - π g η -closed.

Proof. Let A be any $(1, 2)^*$ - α g-closed set in $(X, \mathfrak{S}_1, \mathfrak{S}_2)$ such that $(1, 2)^*$ - α -cl(A) \subset U whenever $A \subset U$, where U is $(1, 2)^*$ - π -open set, since every $(1, 2)^*$ - π -open set is $\mathfrak{S}_{1,2}$ -open. Given that A is $(1, 2)^*$ - α g-closed set such that $(1, 2)^*$ - α -cl(A) \subset U. But we have $(1, 2)^*$ - η -cl(A) \subset $(1, 2)^*$ - α -cl(A) \subset U. Therefore $(1, 2)^*$ - η -cl(A) \subset U. Hence A is $(1, 2)^*$ - π g η -closed set.

Theorem 3.7. Every $(1, 2)^*$ - π g α -closed set is $(1, 2)^*$ - π g η -closed.

Proof. Let A be any $(1, 2)^*$ - π g α -closed set in $(X, \mathfrak{S}_1, \mathfrak{S}_2)$ such that $(1, 2)^*$ - α -cl(A) \subset U whenever $A \subset U$, where U is $(1, 2)^*$ - π -open set. Given that A is $(1, 2)^*$ - π g α -closed set such that $(1, 2)^*$ - α -cl(A) \subset U. But we have $(1, 2)^*$ - η -cl(A) \subset $(1, 2)^*$ - α -cl(A) \subset U. Therefore $(1, 2)^*$ - η -cl(A) \subset U. Hence A is $(1, 2)^*$ - π g η -closed set.

Theorem 3.8. Every $(1, 2)^*$ -semi-closed set is $(1, 2)^*$ - π g η -closed.

Proof. Let A be any $(1, 2)^*$ -semi-closed set in $(X, \mathfrak{S}_1, \mathfrak{S}_2)$ and $A \subset U$, where U is $(1, 2)^*$ - π -open set. Since every $(1, 2)^*$ -semi-closed set is $(1, 2)^*$ - η -closed, so $(1, 2)^*$ - η -cl(A) \subset $(1, 2)^*$ -s-cl(A) = A. Therefore $(1, 2)^*$ - η -cl(A) \subset A \subset U. Hence A is $(1, 2)^*$ - π g η -closed set.

Theorem 3.9. Every $(1, 2)^*$ -gs-closed set is $(1, 2)^*$ - π g η -closed.

Proof. Let A be any $(1, 2)^*$ -gs-closed set in $(X, \mathfrak{S}_1, \mathfrak{S}_2)$ such that $(1, 2)^*$ -s-cl(A) \subset U whenever $A \subset U$, where U is $(1, 2)^*$ - π -open set, since every $(1, 2)^*$ - π -open set is $\mathfrak{S}_{1,2}$ -open. Given that A is $(1, 2)^*$ -gs-closed set such that $(1, 2)^*$ -s-cl(A) \subset U. But we have $(1, 2)^*$ - η -cl(A) \subset $(1, 2)^*$ -s-cl(A) \subset U. Therefore $(1, 2)^*$ - η -cl(A) \subset U. Hence A is $(1, 2)^*$ - π g η -closed set.



Theorem 3.10. Every $(1, 2)^*$ - π gs-closed set is $(1, 2)^*$ - π g η -closed.

Proof. Let A be any $(1, 2)^*$ - π gs-closed set in $(X, \mathfrak{T}_1, \mathfrak{T}_2)$ such that $(1, 2)^*$ - s -cl(A) \subset U whenever $A \subset U$, where U is $(1, 2)^*$ - π -open set. Given that A is $(1, 2)^*$ -gs-closed set such that $(1, 2)^*$ - s -cl(A) \subset U . But we have $(1, 2)^*$ - η -cl(A) \subset $(1, 2)^*$ - s -cl(A) \subset U . Therefore $(1, 2)^*$ - η -cl(A) \subset U . Hence A is $(1, 2)^*$ - π g η -closed set.

Theorem 3.11. Every $(1, 2)^*$ - η -closed set is $(1, 2)^*$ - π g η -closed.

Proof. Let A be any $(1, 2)^*$ - η -closed set in $(X, \mathfrak{T}_1, \mathfrak{T}_2)$ and $A \subset U$, where U is $(1, 2)^*$ - π -open set. Since A is $(1, 2)^*$ - η -closed. Therefore $(1, 2)^*$ - η -cl(A) = $A \subset U$. Hence A is $(1, 2)^*$ - π g η -closed set.

Theorem 3.12. Every $(1, 2)^*$ -g η -closed set is $(1, 2)^*$ -rg η -closed.

Proof. Let A be any $(1, 2)^*$ -g η -closed set in $(X, \mathfrak{T}_1, \mathfrak{T}_2)$ such that $(1, 2)^*$ - η -cl(A) \subset U whenever $A \subset U$, where U is $(1, 2)^*$ - π -open set, since every $(1, 2)^*$ - π -open set is $\mathfrak{T}_{1,2}$ -open. Given that A is $(1, 2)^*$ -g η -closed set such that $(1, 2)^*$ - η -cl(A) \subset U . Therefore $(1, 2)^*$ - η -cl(A) \subset U . Hence A is $(1, 2)^*$ - π g η -closed set.

Corollary 3.13. Every regular $(1, 2)^*$ -closed set is $(1, 2)^*$ - π g η -closed.

Proof. Since every regular $(1, 2)^*$ -closed set is $\mathfrak{T}_{1,2}$ -closed. So by Theorem 3.2, every $\mathfrak{T}_{1,2}$ -closed set is $(1, 2)^*$ - π g η -closed.

Corollary 3.14. Every $(1, 2)^*$ - π -closed set is $(1, 2)^*$ - π g η -closed.

Proof. Since every $(1, 2)^*$ - π -closed set is $\mathfrak{T}_{1,2}$ -closed. So by Theorem 3.2, every $\mathfrak{T}_{1,2}$ -closed set is $(1, 2)^*$ - π g η -closed.

Remark 3.15. We have the following implications for the properties of subsets:

$$\begin{array}{ccccccc}
 (1, 2)^*-\pi\text{-closed} & \Leftarrow & \text{regular } (1, 2)^*\text{-closed} & & & & \\
 \Downarrow & & \Downarrow & & & & \\
 \mathfrak{T}_{1,2}\text{-closed} & \Rightarrow & (1, 2)^*\text{-g-closed} & \Rightarrow & (1, 2)^*\text{-}\pi\text{g-closed} & \Rightarrow & (1, 2)^*\text{-rg-closed} \\
 \Downarrow & & \Downarrow & & \Downarrow & & \Downarrow \\
 (1, 2)^*\text{-}\alpha\text{-closed} & \Rightarrow & (1, 2)^*\text{-g}\alpha\text{-closed} & \Rightarrow & (1, 2)^*\text{-}\pi\text{g}\alpha\text{-closed} & \Rightarrow & (1, 2)^*\text{-rg}\alpha\text{-closed} \\
 \Downarrow & & \Downarrow & & \Downarrow & & \Downarrow \\
 (1, 2)^*\text{-s-closed} & \Rightarrow & (1, 2)^*\text{-gs-closed} & \Rightarrow & (1, 2)^*\text{-}\pi\text{gs-closed} & \Rightarrow & (1, 2)^*\text{-rg}\alpha\text{-closed} \\
 \Downarrow & & \Downarrow & & \Downarrow & & \Downarrow \\
 (1, 2)^*\text{-}\eta\text{-closed} & \Rightarrow & (1, 2)^*\text{-g}\eta\text{-closed} & \Rightarrow & (1, 2)^*\text{-}\pi\text{g}\eta\text{-closed} & \Rightarrow & (1, 2)^*\text{-rg}\eta\text{-closed}
 \end{array}$$

Where none of the implications is reversible as can be seen from the following examples:

Example 3.16. Let $X = \{a, b, c, d\}$ with $\mathfrak{T}_1 = \{\emptyset, X, \{a\}, \{b\}, \{a, b\}, \{b, c, d\}\}$ and $\mathfrak{T}_2 = \{\emptyset, X, \{c\}, \{a, c, d\}\}$. Then

(i) regular $(1, 2)^*$ -closed : $\emptyset, X, \{a\}, \{b\}, \{c, d\}, \{a, b, d\}, \{a, c, d\}, \{b, c, d\}$.

(ii) $(1, 2)^*$ - π -closed : $\emptyset, X, \{a\}, \{b\}, \{d\}, \{a, d\}, \{b, d\}, \{c, d\}, \{a, b, d\}, \{a, c, d\}, \{b, c, d\}$.

(iii) $\mathfrak{T}_{1,2}$ -closed sets : $\emptyset, X, \{a\}, \{b\}, \{d\}, \{a, d\}, \{b, d\}, \{c, d\}, \{a, b, d\}, \{a, c, d\}, \{b, c, d\}$.

(iv) $(1, 2)^*$ -g-closed sets : $\emptyset, X, \{a\}, \{b\}, \{d\}, \{a, d\}, \{b, d\}, \{c, d\}, \{a, b, d\}, \{a, c, d\}, \{b, c, d\}$.

(v) $(1, 2)^*$ - π g-closed sets : $\emptyset, X, \{a\}, \{b\}, \{c\}, \{d\}, \{a, d\}, \{b, d\}, \{c, d\}, \{a, b, d\}, \{a, c, d\}, \{b, c, d\}$.

(vi) $(1, 2)^*$ -rg-closed sets : $\emptyset, X, \{a\}, \{b\}, \{d\}, \{a, c\}, \{a, d\}, \{b, c\}, \{b, d\}, \{c, d\}, \{a, b, c\}, \{a, b, d\}, \{a, c, d\}, \{b, c, d\}$.

(vii) $(1, 2)^*$ - α -closed sets : $\emptyset, X, \{a\}, \{b\}, \{d\}, \{a, d\}, \{b, d\}, \{c, d\}, \{a, b, d\}, \{a, c, d\}, \{b, c, d\}$.

(viii) $(1, 2)^*$ - α g-closed sets : $\emptyset, X, \{a\}, \{b\}, \{d\}, \{a, d\}, \{b, d\}, \{c, d\}, \{a, b, d\}, \{a, c, d\}, \{b, c, d\}$.

(ix) $(1, 2)^*$ - π g α -closed sets : $\emptyset, X, \{a\}, \{b\}, \{c\}, \{d\}, \{a, d\}, \{b, d\}, \{c, d\}, \{a, b, d\}, \{a, c, d\}, \{b, c, d\}$.

(x) $(1, 2)^*$ -rg α -closed sets : $\emptyset, X, \{a\}, \{b\}, \{d\}, \{a, c\}, \{a, d\}, \{b, c\}, \{b, d\}, \{c, d\}, \{a, b, c\}, \{a, b, d\}, \{a, c, d\}, \{b, c, d\}$.

(xi) $(1, 2)^*$ -s-closed sets : $\emptyset, X, \{a\}, \{b\}, \{c\}, \{d\}, \{a, b\}, \{a, d\}, \{b, d\}, \{c, d\}, \{a, b, d\}, \{a, c, d\}, \{b, c, d\}$.

(xii) $(1, 2)^*$ -gs-closed sets : $\emptyset, X, \{a\}, \{b\}, \{c\}, \{d\}, \{a, b\}, \{a, d\}, \{b, d\}, \{c, d\}, \{a, b, d\}, \{a, c, d\}, \{b, c, d\}$.

(xiii) $(1, 2)^*$ - π gs-closed sets : $\emptyset, X, \{a\}, \{b\}, \{c\}, \{d\}, \{a, b\}, \{a, d\}, \{b, d\}, \{c, d\}, \{a, b, d\}, \{a, c, d\}, \{b, c, d\}$.

(xiv) $(1, 2)^*$ -rgs-closed sets : $\emptyset, X, \{a\}, \{b\}, \{c\}, \{d\}, \{a, b\}, \{a, c\}, \{a, d\}, \{b, c\}, \{b, d\}, \{c, d\}, \{a, b, c\}, \{a, b, d\}, \{a, c, d\}, \{b, c, d\}$.

(xv) $(1, 2)^*$ - η -closed sets : $\emptyset, X, \{a\}, \{b\}, \{c\}, \{d\}, \{a, b\}, \{a, d\}, \{b, d\}, \{c, d\}, \{a, b, d\}, \{a, c, d\}, \{b, c, d\}$.

(xvi) $(1, 2)^*$ -g η -closed sets : $\emptyset, X, \{a\}, \{b\}, \{c\}, \{d\}, \{a, b\}, \{a, d\}, \{b, d\}, \{c, d\}, \{a, b, d\}, \{a, c, d\}, \{b, c, d\}$.

(xvii) $(1, 2)^*$ - π g η -closed sets : $\emptyset, X, \{a\}, \{b\}, \{c\}, \{d\}, \{a, b\}, \{a, d\}, \{b, d\}, \{c, d\}, \{a, b, d\}, \{a, c, d\}, \{b, c, d\}$.



(xviii) $(1, 2)^*$ -rg η -closed sets : $\phi, X, \{a\}, \{b\}, \{c\}, \{d\}, \{a, b\}, \{a, c\}, \{a, d\}, \{b, c\}, \{b, d\}, \{c, d\}, \{a, b, c\}, \{a, b, d\}, \{a, c, d\}, \{b, c, d\}$.

Example 3.17. Let $X = \{a, b, c\}$ with $\mathfrak{T}_1 = \{\phi, X, \{b\}\}$ and $\mathfrak{T}_2 = \{\phi, X, \{c\}\}$. Then

- (i) regular $(1, 2)^*$ -closed : $\phi, X, \{a, b\}, \{a, c\}$.
- (ii) $(1, 2)^*$ - π -closed : $\phi, X, \{a\}, \{a, b\}, \{a, c\}$.
- (iii) $\mathfrak{T}_{1,2}$ -closed sets : $\phi, X, \{a\}, \{a, b\}, \{a, c\}$.
- (iv) $(1, 2)^*$ -g-closed sets : $\phi, X, \{a\}, \{a, b\}, \{a, c\}$.
- (v) $(1, 2)^*$ - π g-closed sets : $\phi, X, \{a\}, \{a, b\}, \{a, c\}$.
- (vi) $(1, 2)^*$ -rg-closed sets : $\phi, X, \{a\}, \{a, b\}, \{a, c\}, \{b, c\}$.
- (vii) $(1, 2)^*$ - α -closed sets : $\phi, X, \{a\}, \{a, b\}, \{a, c\}$.
- (viii) $(1, 2)^*$ - α g-closed sets : $\phi, X, \{a\}, \{a, b\}, \{a, c\}$.
- (ix) $(1, 2)^*$ - π g α -closed sets : $\phi, X, \{a\}, \{a, b\}, \{a, c\}$.
- (x) $(1, 2)^*$ -rg α -closed sets : $\phi, X, \{a\}, \{a, b\}, \{a, c\}, \{b, c\}$.
- (xi) $(1, 2)^*$ -s-closed sets : $\phi, X, \{a\}, \{b\}, \{c\}, \{a, b\}, \{a, c\}$.
- (xii) $(1, 2)^*$ -gs-closed sets : $\phi, X, \{a\}, \{b\}, \{c\}, \{a, b\}, \{a, c\}$.
- (xiii) $(1, 2)^*$ - π gs-closed sets : $\phi, X, \{a\}, \{b\}, \{c\}, \{a, b\}, \{a, c\}$.
- (xiv) $(1, 2)^*$ -rgs-closed sets : $\phi, X, \{a\}, \{b\}, \{c\}, \{a, b\}, \{a, c\}, \{b, c\}$.
- (xv) $(1, 2)^*$ - η -closed sets : $\phi, X, \{a\}, \{b\}, \{c\}, \{a, b\}, \{a, c\}$.
- (xvi) $(1, 2)^*$ -g η -closed sets : $\phi, X, \{a\}, \{b\}, \{c\}, \{a, b\}, \{a, c\}$.
- (xvii) $(1, 2)^*$ - π g η -closed sets : $\phi, X, \{a\}, \{b\}, \{c\}, \{a, b\}, \{a, c\}, \{b, c\}$.
- (xviii) $(1, 2)^*$ -rg η -closed sets : $\phi, X, \{a\}, \{b\}, \{c\}, \{a, b\}, \{a, c\}, \{b, c\}$.

Example 3.18. Let $X = \{a, b, c, d\}$ with $\mathfrak{T}_1 = \{\phi, X, \{a\}\}$ and $\mathfrak{T}_2 = \{\phi, X, \{b\}, \{a, b, c\}\}$. Then

- (i) regular $(1, 2)^*$ -closed : $\phi, X, \{a, c, d\}, \{b, c, d\}$.
- (ii) $(1, 2)^*$ - π -closed : $\phi, X, \{c, d\}, \{a, c, d\}, \{b, c, d\}$.
- (iii) $\mathfrak{T}_{1,2}$ -closed sets : $\phi, X, \{d\}, \{c, d\}, \{a, c, d\}, \{b, c, d\}$.
- (iv) $(1, 2)^*$ -g-closed sets : $\phi, X, \{d\}, \{a, d\}, \{b, d\}, \{c, d\}, \{a, b, d\}, \{a, c, d\}, \{b, c, d\}$.
- (v) $(1, 2)^*$ - π g-closed sets : $\phi, X, \{c\}, \{d\}, \{a, c\}, \{a, d\}, \{b, c\}, \{b, d\}, \{c, d\}, \{a, b, c\}, \{a, b, d\}, \{a, c, d\}, \{b, c, d\}$.
- (vi) $(1, 2)^*$ -rg-closed sets : $\phi, X, \{c\}, \{d\}, \{a, b\}, \{a, c\}, \{a, d\}, \{b, c\}, \{b, d\}, \{c, d\}, \{a, b, c\}, \{a, b, d\}, \{a, c, d\}, \{b, c, d\}$.
- (vii) $(1, 2)^*$ - α -closed sets : $\phi, X, \{c\}, \{d\}, \{c, d\}, \{a, c, d\}, \{b, c, d\}$.
- (viii) $(1, 2)^*$ - α g-closed sets : $\phi, X, \{c\}, \{d\}, \{a, d\}, \{b, d\}, \{c, d\}, \{a, b, d\}, \{a, c, d\}, \{b, c, d\}$.
- (ix) $(1, 2)^*$ - π g α -closed sets : $\phi, X, \{a\}, \{c\}, \{d\}, \{a, c\}, \{a, d\}, \{b, c\}, \{b, d\}, \{c, d\}, \{a, b, c\}, \{a, b, d\}, \{a, c, d\}, \{b, c, d\}$.
- (x) $(1, 2)^*$ -rg α -closed sets : $\phi, X, \{c\}, \{d\}, \{a, b\}, \{a, c\}, \{a, d\}, \{b, c\}, \{b, d\}, \{c, d\}, \{a, b, c\}, \{a, b, d\}, \{a, c, d\}, \{b, c, d\}$.
- (xi) $(1, 2)^*$ -s-closed sets : $\phi, X, \{a\}, \{b\}, \{c\}, \{d\}, \{a, c\}, \{a, d\}, \{b, c\}, \{b, d\}, \{c, d\}, \{a, c, d\}, \{b, c, d\}$.
- (xii) $(1, 2)^*$ -gs-closed sets : $\phi, X, \{a\}, \{b\}, \{c\}, \{d\}, \{a, c\}, \{a, d\}, \{b, c\}, \{b, d\}, \{c, d\}, \{a, b, d\}, \{a, c, d\}, \{b, c, d\}$.
- (xiii) $(1, 2)^*$ - π gs-closed sets : $\phi, X, \{a\}, \{b\}, \{c\}, \{d\}, \{a, c\}, \{a, d\}, \{b, c\}, \{b, d\}, \{c, d\}, \{a, b, c\}, \{a, b, d\}, \{a, c, d\}, \{b, c, d\}$.
- (xiv) $(1, 2)^*$ -rgs-closed sets : $\phi, X, \{a\}, \{b\}, \{c\}, \{d\}, \{a, b\}, \{a, c\}, \{a, d\}, \{b, c\}, \{b, d\}, \{c, d\}, \{a, b, c\}, \{a, b, d\}, \{a, c, d\}, \{b, c, d\}$.
- (xv) $(1, 2)^*$ - η -closed sets : $\phi, X, \{a\}, \{b\}, \{c\}, \{d\}, \{a, c\}, \{a, d\}, \{b, c\}, \{b, d\}, \{c, d\}, \{a, c, d\}, \{b, c, d\}$.
- (xvi) $(1, 2)^*$ -g η -closed sets : $\phi, X, \{a\}, \{b\}, \{c\}, \{d\}, \{a, c\}, \{a, d\}, \{b, c\}, \{b, d\}, \{c, d\}, \{a, b, d\}, \{a, c, d\}, \{b, c, d\}$.
- (xvii) $(1, 2)^*$ - π g η -closed sets : $\phi, X, \{a\}, \{b\}, \{c\}, \{d\}, \{a, c\}, \{a, d\}, \{b, c\}, \{b, d\}, \{c, d\}, \{a, b, c\}, \{a, b, d\}, \{a, c, d\}, \{b, c, d\}$.
- (xviii) $(1, 2)^*$ -rg η -closed sets : $\phi, X, \{a\}, \{b\}, \{c\}, \{d\}, \{a, b\}, \{a, c\}, \{a, d\}, \{b, c\}, \{b, d\}, \{c, d\}, \{a, b, c\}, \{a, b, d\}, \{a, c, d\}, \{b, c, d\}$.

Example 3.19. Let $X = \{a, b, c, d\}$ with $\mathfrak{T}_1 = \{\phi, X, \{a\}, \{b\}, \{a, b\}, \{a, b, c\}\}$ and $\mathfrak{T}_2 = \{\phi, X, \{a, b, d\}\}$. Then

- (i) regular $(1, 2)^*$ -closed : $\phi, X, \{a, c, d\}, \{b, c, d\}$.
- (ii) $(1, 2)^*$ - π -closed : $\phi, X, \{c, d\}, \{a, c, d\}, \{b, c, d\}$.
- (iii) $\mathfrak{T}_{1,2}$ -closed sets : $\phi, X, \{c\}, \{d\}, \{c, d\}, \{a, c, d\}, \{b, c, d\}$.
- (iv) $(1, 2)^*$ -g-closed sets : $\phi, X, \{c\}, \{d\}, \{c, d\}, \{a, c, d\}, \{b, c, d\}$.
- (v) $(1, 2)^*$ - π g-closed sets : $\phi, X, \{c\}, \{d\}, \{a, c\}, \{a, d\}, \{b, c\}, \{b, d\}, \{c, d\}, \{a, b, c\}, \{a, b, d\}, \{a, c, d\}, \{b, c, d\}$.
- (vi) $(1, 2)^*$ -rg-closed sets : $\phi, X, \{c\}, \{d\}, \{a, b\}, \{a, c\}, \{a, d\}, \{b, c\}, \{b, d\}, \{c, d\}, \{a, b, c\}, \{a, b, d\}, \{a, c, d\}, \{b, c, d\}$.
- (vii) $(1, 2)^*$ - α -closed sets : $\phi, X, \{c\}, \{d\}, \{c, d\}, \{a, c, d\}, \{b, c, d\}$.
- (viii) $(1, 2)^*$ - α g-closed sets : $\phi, X, \{c\}, \{d\}, \{c, d\}, \{a, c, d\}, \{b, c, d\}$.



- (ix) $(1, 2)^*$ - $\pi g\alpha$ -closed sets : $\phi, X, \{c\}, \{d\}, \{a, c\}, \{a, d\}, \{b, c\}, \{b, d\}, \{c, d\}, \{a, b, c\}, \{a, b, d\}, \{a, c, d\}, \{b, c, d\}$.
- (x) $(1, 2)^*$ - $rg\alpha$ -closed sets : $\phi, X, \{c\}, \{d\}, \{a, b\}, \{a, c\}, \{a, d\}, \{b, c\}, \{b, d\}, \{c, d\}, \{a, b, c\}, \{a, b, d\}, \{a, c, d\}, \{b, c, d\}$.
- (xi) $(1, 2)^*$ -s-closed sets : $\phi, X, \{a\}, \{b\}, \{a, c\}, \{a, d\}, \{b, c\}, \{b, d\}, \{c, d\}, \{a, c, d\}, \{b, c, d\}$.
- (xii) $(1, 2)^*$ -gs-closed sets : $\phi, X, \{a\}, \{b\}, \{c\}, \{d\}, \{a, c\}, \{a, d\}, \{b, c\}, \{b, d\}, \{c, d\}, \{a, c, d\}, \{b, c, d\}$.
- (xiii) $(1, 2)^*$ - $\pi g s$ -closed sets : $\phi, X, \{a\}, \{b\}, \{c\}, \{d\}, \{a, c\}, \{a, d\}, \{b, c\}, \{b, d\}, \{c, d\}, \{a, b, c\}, \{a, b, d\}, \{a, c, d\}, \{b, c, d\}$.
- (xiv) $(1, 2)^*$ -rgs-closed sets : $\phi, X, \{a\}, \{b\}, \{c\}, \{d\}, \{a, b\}, \{a, c\}, \{a, d\}, \{b, c\}, \{b, d\}, \{c, d\}, \{a, b, c\}, \{a, b, d\}, \{a, c, d\}, \{b, c, d\}$.
- (xv) $(1, 2)^*$ - η -closed sets : $\phi, X, \{a\}, \{b\}, \{c\}, \{d\}, \{a, b\}, \{a, c\}, \{a, d\}, \{b, c\}, \{b, d\}, \{c, d\}, \{a, c, d\}, \{b, c, d\}$.
- (xvi) $(1, 2)^*$ - $g\eta$ -closed sets : $\phi, X, \{a\}, \{b\}, \{c\}, \{d\}, \{a, b\}, \{a, c\}, \{a, d\}, \{b, c\}, \{b, d\}, \{c, d\}, \{a, c, d\}, \{b, c, d\}$.
- (xvii) $(1, 2)^*$ - $\pi g\eta$ -closed sets : $\phi, X, \{a\}, \{b\}, \{c\}, \{d\}, \{a, b\}, \{a, c\}, \{a, d\}, \{b, c\}, \{b, d\}, \{c, d\}, \{a, b, c\}, \{a, b, d\}, \{a, c, d\}, \{b, c, d\}$.
- (xviii) $(1, 2)^*$ - $rg\eta$ -closed sets : $\phi, X, \{a\}, \{b\}, \{c\}, \{d\}, \{a, b\}, \{a, c\}, \{a, d\}, \{b, c\}, \{b, d\}, \{c, d\}, \{a, b, c\}, \{a, b, d\}, \{a, c, d\}, \{b, c, d\}$.

4. PROPERTIES OF $(1, 2)^*$ - π -GENERALIZED η -CLOSED SETS

In this section, we study some basic properties of $(1, 2)^*$ - $\pi g\eta$ -closed sets. Also, we introduce $(1, 2)^*$ - $\pi g\eta$ -neighborhood (shortly $(1, 2)^*$ - $\pi g\eta$ -nbd in bitopological spaces by using the notion of $(1, 2)^*$ - $\pi g\eta$ -open sets. We prove that every nbd of x in $(X, \mathfrak{T}_1, \mathfrak{T}_2)$ is $(1, 2)^*$ - $\pi g\eta$ -nbd of x but not conversely.

Theorem 4.1. The union of two $(1, 2)^*$ - $\pi g\eta$ -closed sets of $(X, \mathfrak{T}_1, \mathfrak{T}_2)$ need not be an $(1, 2)^*$ - $rg\eta$ -closed set of $(X, \mathfrak{T}_1, \mathfrak{T}_2)$.

Proof. This can be seen from the following example.

Example 4.2. Let $X = \{a, b, c, d\}$ with $\mathfrak{T}_1 = \{\phi, X, \{a\}, \{b\}, \{a, b\}, \{b, c, d\}\}$ and $\mathfrak{T}_2 = \{\phi, X, \{c\}, \{a, c, d\}\}$. Let $A = \{a\}$ and $B = \{c\}$ be $(1, 2)^*$ - $\pi g\eta$ -closed sets but $A \cup B = \{a, c\}$ is not an $(1, 2)^*$ - $\pi g\eta$ -closed set.

Theorem 4.3. The intersection of two $(1, 2)^*$ - $\pi g\eta$ -closed-sets in $(X, \mathfrak{T}_1, \mathfrak{T}_2)$ is also a $(1, 2)^*$ - $rg\eta$ -closed set in $(X, \mathfrak{T}_1, \mathfrak{T}_2)$.

Proof. Easy to proof.

Theorem 4.4. If a subset A is $(1, 2)^*$ - $\pi g\eta$ -closed, then $(1, 2)^*$ - η -cl(A) - A does not contain any non-empty $(1, 2)^*$ - π -closed set.

Proof. Suppose that A is $(1, 2)^*$ - $\pi g\eta$ -closed. Let F be an $(1, 2)^*$ - π -closed subset of $(1, 2)^*$ - η -cl(A) - A . Then $F \subset [(1, 2)^*$ - η -cl(A) \cap (X - A)] and so $A \subset [X - F]$. But A is $(1, 2)^*$ - $\pi g\eta$ -closed. Therefore $(1, 2)^*$ - η -cl(A) \subset $[X - F]$. Consequently, $F \subset [X - (1, 2)^*$ - η -cl(A)]. We already have $F \subset (1, 2)^*$ - η -cl(A). Hence $F \subset [(1, 2)^*$ - η -cl(A) \cap $X - (1, 2)^*$ - η -cl(A)] = ϕ . Thus $F = \phi$. Therefore $(1, 2)^*$ - η -cl(A) - A contains no non-empty $(1, 2)^*$ - π -closed set.

Example 4.5. The converse of Theorem 4.4 is not true. This can be seen from the following example.

Example 4.6. Let $X = \{a, b, c, d\}$ with $\mathfrak{T}_1 = \{\phi, X, \{a\}, \{b\}, \{a, b\}, \{a, b, c\}\}$ and $\mathfrak{T}_2 = \{\phi, X, \{a, b, d\}\}$. Let $A = \{a, b, c\}$. We have that $(1, 2)^*$ - η -cl(A) - $A = X - \{a, b, c\} = \{d\}$ does not contain any non-empty $(1, 2)^*$ - π -closed set. However, A is $(1, 2)^*$ - $\pi g\eta$ -closed in X .

Theorem 4.7. For an element $x \in (X, \mathfrak{T}_1, \mathfrak{T}_2)$, the set $(X, \mathfrak{T}_1, \mathfrak{T}_2) - \{x\}$ is $(1, 2)^*$ - $\pi g\eta$ -closed or $(1, 2)^*$ - π -open.

Proof. Suppose $(X, \mathfrak{T}_1, \mathfrak{T}_2) - \{x\}$ is not $(1, 2)^*$ - π -open set. Then $(X, \mathfrak{T}_1, \mathfrak{T}_2)$ is the only $(1, 2)^*$ - π -open set containing $(X, \mathfrak{T}_1, \mathfrak{T}_2) - \{x\}$. This implies $(1, 2)^*$ - η -cl($(X, \mathfrak{T}_1, \mathfrak{T}_2) - \{x\}$) \subset $(X, \mathfrak{T}_1, \mathfrak{T}_2)$. Hence $(X, \mathfrak{T}_1, \mathfrak{T}_2) - \{x\}$ is $(1, 2)^*$ - $\pi g\eta$ -closed set in $(X, \mathfrak{T}_1, \mathfrak{T}_2)$.

Theorem 4.8. Let A be a $(1, 2)^*$ - $\pi g\eta$ -closed subset of X . If $A \subset B \subset (1, 2)^*$ - η -cl(A), then B is also $(1, 2)^*$ - $\pi g\eta$ -closed in X .

Proof. Let $U \in (1, 2)^*$ - $\pi g\eta$ -O(X) with $B \subset U$. Then $A \subset U$. Since A is $(1, 2)^*$ - $\pi g\eta$ -closed, $(1, 2)^*$ - η -cl(A) $\subset U$. Also, since $B \subset (1, 2)^*$ - η -cl(A), $(1, 2)^*$ - η -cl(B) $\subset (1, 2)^*$ - η -cl(A) $\subset U$. Hence B is also $(1, 2)^*$ - $\pi g\eta$ -closed subset of X .

Remark 4.9. The converse of the **Theorem 4.8** need not be true in general. Consider the bitopological space $(X, \mathfrak{T}_1, \mathfrak{T}_2)$ where $X = \{a, b, c, d, e\}$ with topology $\mathfrak{T}_1 = \{\phi, \{a, b\}, \{a, b, c, d\}, X\}$, $\mathfrak{T}_2 = \{\phi, \{c, d\}, \{a, b, c, d\}, X\}$, Let $A = \{b\}$ and $B = \{b, c\}$. Then A and B are $(1, 2)^*$ - $\pi g\eta$ -closed sets in $(X, \mathfrak{T}_1, \mathfrak{T}_2)$ such that $A \subset B$ but $B \not\subset (1, 2)^*$ - η -cl(A) = $\{a, b\}$.

Theorem 4.10. Let A be a $(1, 2)^*$ - $\pi g\eta$ -closed in $(X, \mathfrak{T}_1, \mathfrak{T}_2)$. Then A is $(1, 2)^*$ - η -closed if and only if $(1, 2)^*$ - η -cl(A) - A is an $(1, 2)^*$ - π -open.



Proof. Suppose A is a $(1, 2)^*$ - η -closed in $(X, \mathfrak{T}_1, \mathfrak{T}_2)$. Then $(1, 2)^*$ - η -cl(A) = A and so $(1, 2)^*$ - η -cl(A) - $A = \phi$, which is $(1, 2)^*$ - π -open in $(X, \mathfrak{T}_1, \mathfrak{T}_2)$.

Conversely, suppose $(1, 2)^*$ - η -cl(A) - A is an $(1, 2)^*$ - π -open set in $(X, \mathfrak{T}_1, \mathfrak{T}_2)$. Since A is $(1, 2)^*$ - π g η -closed, by **Theorem 4.4** $(1, 2)^*$ - η -cl(A) - A does not contain any nonempty $(1, 2)^*$ - π -open in $(X, \mathfrak{T}_1, \mathfrak{T}_2)$. Then $(1, 2)^*$ - η -cl(A) - $A = \phi$. Hence A is $(1, 2)^*$ - η -closed set in $(X, \mathfrak{T}_1, \mathfrak{T}_2)$.

Theorem 4.11. If A is $(1, 2)^*$ - π -open and $(1, 2)^*$ - π g η -closed, then A is $(1, 2)^*$ - π g η -closed set in $(X, \mathfrak{T}_1, \mathfrak{T}_2)$.

Proof. Let U be any $(1, 2)^*$ - π -open set in $(X, \mathfrak{T}_1, \mathfrak{T}_2)$ such that $A \subset U$. Since A is $(1, 2)^*$ -open and $(1, 2)^*$ - π g η -closed, we have $(1, 2)^*$ - η -cl(A) $\subset A$. Then $(1, 2)^*$ - η -cl(A) $\subset A \subset U$. Hence A is $(1, 2)^*$ - π g η -closed set in $(X, \mathfrak{T}_1, \mathfrak{T}_2)$.

Theorem 4.12. If a subset A of bitopological space $(X, \mathfrak{T}_1, \mathfrak{T}_2)$ is both $(1, 2)^*$ - π -open and $(1, 2)^*$ - π g η -closed, then it is $(1, 2)^*$ - η -closed.

Proof. Suppose a subset A of bitopological space $(X, \mathfrak{T}_1, \mathfrak{T}_2)$ is both $(1, 2)^*$ - π -open and $(1, 2)^*$ - π g η -closed. Now $A \subset A$. Then $(1, 2)^*$ - η -cl(A) $\subset A$. Hence A is $(1, 2)^*$ - η -closed.

Corollary 4.13. Let A be $(1, 2)^*$ - π -open and $(1, 2)^*$ - π g η -closed subset in $(X, \mathfrak{T}_1, \mathfrak{T}_2)$. Suppose that F is $(1, 2)^*$ - η -closed set in $(X, \mathfrak{T}_1, \mathfrak{T}_2)$. Then $A \cap F$ is an $(1, 2)^*$ - π g η -closed set in $(X, \mathfrak{T}_1, \mathfrak{T}_2)$.

Proof. Let A be a $(1, 2)^*$ - π -open and $(1, 2)^*$ - π g η -closed subset in $(X, \mathfrak{T}_1, \mathfrak{T}_2)$ and F be closed. By **Theorem 4.12**, A is $(1, 2)^*$ - η -closed. So $A \cap F$ is a $(1, 2)^*$ - η -closed and hence $A \cap F$ is $(1, 2)^*$ - π g η -closed set in $(X, \mathfrak{T}_1, \mathfrak{T}_2)$.

Theorem 4.14. If A is both open and $(1, 2)^*$ -g-closed set in $(X, \mathfrak{T}_1, \mathfrak{T}_2)$, then it is $(1, 2)^*$ - π g η -closed set in $(X, \mathfrak{T}_1, \mathfrak{T}_2)$.

Proof. Let A be an open and $(1, 2)^*$ -g-closed set in $(X, \mathfrak{T}_1, \mathfrak{T}_2)$. Let $A \subset U$ and let U be a $(1, 2)^*$ - π -open set in $(X, \mathfrak{T}_1, \mathfrak{T}_2)$. Now $A \subset A$. By hypothesis $(1, 2)^*$ - η -cl(A) $\subset A$. That is $(1, 2)^*$ - η -cl(A) $\subset U$. Thus A is $(1, 2)^*$ - π g η -closed in $(X, \mathfrak{T}_1, \mathfrak{T}_2)$.

Theorem 4.15. A set A is $(1, 2)^*$ - π g η -open if and only if the following condition holds:

$$F \subset (1, 2)^*$$
- η -int(A) whenever F is $(1, 2)^*$ - π -closed and $F \subset A$.

Proof. Suppose the condition holds. Put $[X - A] = B$. Suppose that $B \subset U$ where U is $(1, 2)^*$ - π -open. Now $X - A \subset U$ implies $F = [X - U] \subset A$ and F is $(1, 2)^*$ - π -closed, which implies $F \subset (1, 2)^*$ - η -int(A). Also $F \subset (1, 2)^*$ - η -int(A) implies $[X - (1, 2)^*$ - η -int(A)] $\subset [X - F] = U$. This implies $[X - ((1, 2)^*$ - η -int($X - B$))] $\subset U$. Therefore $[X - ((1, 2)^*$ - η -int($X - B$))] $\subset U$ or equivalently $(1, 2)^*$ - η -cl(B) $\subset U$. Thus B is $(1, 2)^*$ - π g η -closed. Hence A is $(1, 2)^*$ - π g η -open.

Conversely, suppose that A is $(1, 2)^*$ - π g η -open, $F \subset A$ and F is $(1, 2)^*$ - π -closed. Then $[X - F]$ is $(1, 2)^*$ - π -open. Then $(X - A) \subset (X - F)$. Hence $(1, 2)^*$ - η -cl($X - A$) $\subset (X - F)$ because $(X - A)$ is $(1, 2)^*$ - π g η -closed. Therefore $F \subset (X - (1, 2)^*$ - η -cl($X - A$)) = $(1, 2)^*$ - η -int(A).

Definition 4.16. Let $(X, \mathfrak{T}_1, \mathfrak{T}_2)$ be a bitopological space and let $x \in (X, \mathfrak{T}_1, \mathfrak{T}_2)$. A subset N of $(X, \mathfrak{T}_1, \mathfrak{T}_2)$ is said to be a **$(1, 2)^*$ - π g η -neighbourhood** (briefly **$(1, 2)^*$ - π g η -nbd**) of x iff there exists an $(1, 2)^*$ - π g η -open set G such that $x \in G \subset N$.

Definition 4.17. A subset N of a bitopological space $(X, \mathfrak{T}_1, \mathfrak{T}_2)$, is called a **$(1, 2)^*$ - π g η -nbd** of $A \subset (X, \mathfrak{T}_1, \mathfrak{T}_2)$ iff there exists a $(1, 2)^*$ - π g η -open set G such that $A \subset G \subset N$.

Theorem 4.18. Every nbd N of $x \in (X, \mathfrak{T}_1, \mathfrak{T}_2)$ is a $(1, 2)^*$ - π g η -nbd of $(X, \mathfrak{T}_1, \mathfrak{T}_2)$.

Proof. Let N be a nbd of point $x \in (X, \mathfrak{T}_1, \mathfrak{T}_2)$. To prove that N is a $(1, 2)^*$ - π g η -nbd of x . By definition of nbd, there exists an open set G such that $x \in G \subset N$. As every open set is $(1, 2)^*$ - π g η -open such that $x \in G \subset N$. Hence N is $(1, 2)^*$ - π g η -nbd of x .

Remark 4.19. In general, a $(1, 2)^*$ - π g η -nbd N of $x \in (X, \mathfrak{T}_1, \mathfrak{T}_2)$ need not be a nbd of x in $(X, \mathfrak{T}_1, \mathfrak{T}_2)$, as seen from the following example.

Example 4.20. Let $X = \{a, b, c, d, e\}$ with topology $\mathfrak{T}_1 = \{\phi, \{a, b\}, \{a, b, c, d\}, X\}$ and $\mathfrak{T}_2 = \{\phi, \{c, d\}, \{a, b, c, d\}, X\}$ Then $(1, 2)^*$ - π g η -O(X) = $\{\phi, X, \{a\}, \{b\}, \{c\}, \{d\}, \{a, b\}, \{a, d\}, \{b, c\}, \{b, d\}, \{c, d\}, \{a, b, c\}, \{a, b, d\}, \{a, b, e\}, \{a, c, d\}, \{b, c, d\}, \{c, d, e\}, \{a, b, c, d\}, \{a, b, d, e\}, \{a, c, d, e\}, \{b, c, d, e\}\}$. The set $\{a, d\}$ is $(1, 2)^*$ - π g η -nbd of the point a , there exists an $(1, 2)^*$ - π g η -open set $\{a\}$ is such that $a \in \{a\} \subset \{a, d\}$. However, the set $\{a, d\}$ is not a nbd of the point a , since no open set G exists such that $a \in G \subset \{a, d\}$.



Theorem 4.21. If a subset N of a space $(X, \mathfrak{T}_1, \mathfrak{T}_2)$ is $(1, 2)^*$ - $\pi g\eta$ -open, then N is a $(1, 2)^*$ - $\pi g\eta$ -nbd of each of its points.

Proof. Suppose N is $(1, 2)^*$ - $\pi g\eta$ -open. Let $x \in N$. We claim that N is $(1, 2)^*$ - $\pi g\eta$ -nbd of x . For N is a $(1, 2)^*$ - $\pi g\eta$ -open set such that $x \in N \subset N$. Since x is an arbitrary point of N , it follows that N is a $(1, 2)^*$ - $\pi g\eta$ -nbd of each of its points.

Definition 4.22. Let x be a point in a space $(X, \mathfrak{T}_1, \mathfrak{T}_2)$. The set of all $(1, 2)^*$ - $\pi g\eta$ -nbhd of x is called the **$(1, 2)^*$ - $\pi g\eta$ -nbd system** at x , and is denoted by $(1, 2)^*$ - $\pi g\eta$ - $N(x)$.

Theorem 4.23. Let $(X, \mathfrak{T}_1, \mathfrak{T}_2)$ be a bitopological space and for each $x \in (X, \mathfrak{T}_1, \mathfrak{T}_2)$. Let $(1, 2)^*$ - $\pi g\eta$ - $N(x)$ be the collection of all $(1, 2)^*$ - $\pi g\eta$ -nbds of x . Then we have the following results.

(i) $\forall x \in (X, \mathfrak{T}_1, \mathfrak{T}_2)$, $(1, 2)^*$ - $\pi g\eta$ - $N(x) \neq \phi$.

(ii) $N \in (1, 2)^*$ - $\pi g\eta$ - $N(x) \Rightarrow x \in N$.

(iii) $N \in (1, 2)^*$ - $\pi g\eta$ - $N(x)$, $M \supset N \Rightarrow M \in (1, 2)^*$ - $\pi g\eta$ - $N(x)$.

(iv) $N \in (1, 2)^*$ - $\pi g\eta$ - $N(x)$, $M \in (1, 2)^*$ - $\pi g\eta$ - $N(x) \Rightarrow N \cap M \in (1, 2)^*$ - $\pi g\eta$ - $N(x)$.

(v) $N \in (1, 2)^*$ - $\pi g\eta$ - $N(x) \Rightarrow$ there exists $M \in (1, 2)^*$ - $\pi g\eta$ - $N(x)$ such that $M \subset N$ and $M \in (1, 2)^*$ - $\pi g\eta$ - $N(y)$ for every $y \in M$.

Proof. (i) Since $(X, \mathfrak{T}_1, \mathfrak{T}_2)$ is a $(1, 2)^*$ - $\pi g\eta$ -open set, it is a $(1, 2)^*$ - $\pi g\eta$ -nbd of every $x \in (X, \mathfrak{T}_1, \mathfrak{T}_2)$. Hence there exists at least one $(1, 2)^*$ - $\pi g\eta$ -nbd (namely $(X, \mathfrak{T}_1, \mathfrak{T}_2)$) for each $x \in (X, \mathfrak{T}_1, \mathfrak{T}_2)$. Hence $(1, 2)^*$ - $\pi g\eta$ - $N(x) \neq \phi$ for every $x \in (X, \mathfrak{T}_1, \mathfrak{T}_2)$.

(ii) If $N \in (1, 2)^*$ - $\pi g\eta$ - $N(x)$, then N is a $(1, 2)^*$ - $\pi g\eta$ -nbd of x . So by definition of $(1, 2)^*$ - $\pi g\eta$ -nbd, $x \in N$.

(iii) Let $N \in (1, 2)^*$ - $\pi g\eta$ - $N(x)$ and $M \supset N$. Then there is a $(1, 2)^*$ - $\pi g\eta$ -open set G such that $x \in G \subset N$. Since $N \subset M$, $x \in G \subset M$ and so M is $(1, 2)^*$ - $\pi g\eta$ -nbd of x . Hence $M \in (1, 2)^*$ - $\pi g\eta$ - $N(x)$.

(iv) Let $N \in (1, 2)^*$ - $\pi g\eta$ - $N(x)$ and $M \in (1, 2)^*$ - $\pi g\eta$ - $N(x)$. Then by definition of $(1, 2)^*$ - $\pi g\eta$ -nbd $x \in G_1 \cap G_2 \subset N \cap M \Rightarrow$ (i). Since $G_1 \cap G_2$ is a $(1, 2)^*$ - $\pi g\eta$ -open set, (being the intersection of two $(1, 2)^*$ - $\pi g\eta$ -open sets), it follows from (i) that $N \cap M$ is a $(1, 2)^*$ - $\pi g\eta$ -nbd of x . Hence $N \cap M \in (1, 2)^*$ - $\pi g\eta$ - $N(x)$.

(v) If $N \in (1, 2)^*$ - $\pi g\eta$ - $N(x)$, then there exists a $(1, 2)^*$ - $\pi g\eta$ -open set M such that $x \in M \subset N$. Since M is a $(1, 2)^*$ - $\pi g\eta$ -open set, it is $(1, 2)^*$ - $\pi g\eta$ -nbd of each of its points. Therefore $M \in (1, 2)^*$ - $\pi g\eta$ - $N(y)$ for every $y \in M$.

5. SOME $(1, 2)^*$ - $\pi g\eta$ -BITOPOLOGICAL FUNCTIONS

In this section, we shall recall the definitions of some functions used in the sequel. Further we introduce some $(1, 2)^*$ - $\pi g\eta$ -continuous functions in bitopological spaces.

Definition 5.1. A function $f: X \rightarrow Y$ is said to be

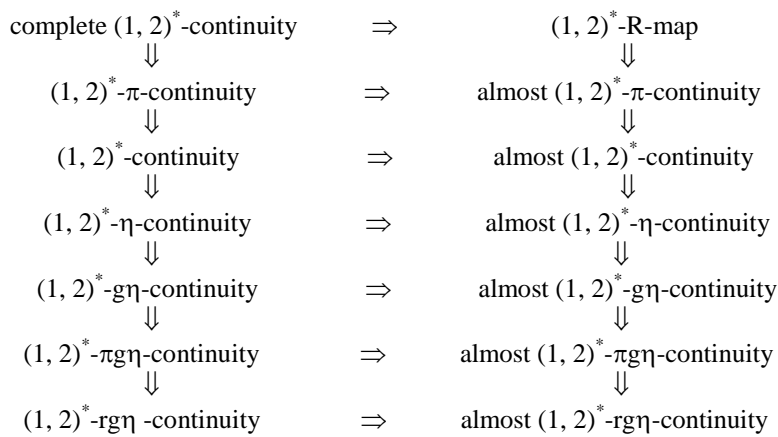
- (i) **$(1, 2)^*$ - η -continuous [9]** if $f^{-1}(F)$ is $(1, 2)^*$ - η -closed in X for every $\mathfrak{T}_{1,2}$ -closed set F of Y ;
- (ii) **$(1, 2)^*$ - $g\eta$ -continuous [9]** if $f^{-1}(F)$ is $(1, 2)^*$ - $g\eta$ -closed in X for every $\mathfrak{T}_{1,2}$ -closed set F of Y ;
- (iii) **$(1, 2)^*$ - $\pi g\eta$ -continuous** if $f^{-1}(F)$ is $(1, 2)^*$ - $\pi g\eta$ -closed in X for every $\mathfrak{T}_{1,2}$ -closed set F of Y ;
- (iv) **$(1, 2)^*$ - $rg\eta$ -continuous [9]** if $f^{-1}(F)$ is $(1, 2)^*$ - $rg\eta$ -closed in X for every $\mathfrak{T}_{1,2}$ -closed set F of Y ;
- (v) **$(1, 2)^*$ - R -map [4]** if $f^{-1}(F) \in (1, 2)^*$ - $RO(X)$ for every $F \in (1, 2)^*$ - $RO(Y)$;
- (vi) **completely $(1, 2)^*$ -continuous [4]** if $f^{-1}(F) \in (1, 2)^*$ - $RO(X)$ for every $\mathfrak{T}_{1,2}$ -open set F of Y .
- (vii) **$(1, 2)^*$ - π -continuous [2]** if $f^{-1}(F)$ is $(1, 2)^*$ - π -closed in X for every $\mathfrak{T}_{1,2}$ -closed set F of Y ;

Definition 5.2. A function $f: X \rightarrow Y$ is said to be

- (i) **almost $(1, 2)^*$ -continuous [4]** if $f^{-1}(F)$ is $\mathfrak{T}_{1,2}$ -open in X for every $F \in (1, 2)^*$ - $RO(Y)$;
- (ii) **almost $(1, 2)^*$ - π -continuous [2]** if $f^{-1}(F)$ is $(1, 2)^*$ - π -closed in X for every $F \in (1, 2)^*$ - $RC(Y)$;
- (iii) **almost $(1, 2)^*$ - η -continuous [9]** if $f^{-1}(F)$ is $(1, 2)^*$ - η -closed in X for every $F \in (1, 2)^*$ - $RC(Y)$;
- (iv) **almost $(1, 2)^*$ - $g\eta$ -continuous [9]** if $f^{-1}(F)$ is $(1, 2)^*$ - $g\eta$ -closed in X for every $F \in (1, 2)^*$ - $RC(Y)$;
- (v) **almost $(1, 2)^*$ - $\pi g\eta$ -continuous** if $f^{-1}(F)$ is $(1, 2)^*$ - $\pi g\eta$ -closed in X for every $F \in (1, 2)^*$ - $RC(Y)$;
- (vi) **almost $(1, 2)^*$ - $rg\eta$ -continuous [9]** if $f^{-1}(F)$ is $(1, 2)^*$ - $rg\eta$ -closed in X for every $F \in (1, 2)^*$ - $RC(Y)$;



Remark 5.3. From the definitions stated above, we obtain the following diagram:



The following examples enable us to realize that none of the implications in the above diagram is reversible.

Example 5.4. Let $X = \{a, b, c\}$, $\mathfrak{T}_1 = \{\phi, X, \{a\}, \{a, c\}\}$ and $\mathfrak{T}_2 = \{\phi, X, \{c\}\}$. Let $Y = \{a, b, c\}$, $\psi_1 = \{\phi, Y, \{a\}\}$ and $\psi_2 = \{\phi, Y, \{b\}\}$. Define $f: X \rightarrow Y$ as $f(a) = c$; $f(b) = b$; $f(c) = a$. Clearly f is almost $(1, 2)^* \text{-rg}\eta$ -continuous but not almost $(1, 2)^* \text{-}\pi\text{g}\eta$ -continuous.

Example 5.5. Let $X = \{a, b, c\}$, $\mathfrak{T}_1 = \{\phi, X, \{a\}, \{a, c\}\}$ and $\mathfrak{T}_2 = \{\phi, X, \{c\}\}$. Let $Y = \{a, b, c\}$, $\psi_1 = \{\phi, Y, \{a\}\}$ and $\psi_2 = \{\phi, Y, \{b\}\}$. Define $f: X \rightarrow Y$ as $f(a) = a$, $f(b) = c$, $f(c) = b$. Clearly f is $(1, 2)^* \text{-continuous}$ as well as $(1, 2)^* \text{-rg}\eta$ -continuous but it is not completely $(1, 2)^* \text{-continuous}$.

Example 5.6. Let $X = Y = \{a, b, c\}$, $\mathfrak{T}_1 = \{\phi, X, \{a\}\}$ and $\mathfrak{T}_2 = \{\phi, X, \{a, b\}\}$. Let $\psi_1 = \{\phi, Y, \{a\}\}$ and $\psi_2 = \{\phi, Y, \{a, c\}\}$. Define $f: X \rightarrow Y$ as $f(a) = b$; $f(b) = c$; $f(c) = a$. Clearly f is both $(1, 2)^* \text{-}\pi\text{g}\eta$ -continuous and almost $(1, 2)^* \text{-}\pi\text{g}\eta$ -continuous but it is neither $(1, 2)^* \text{-}\eta$ -continuous nor $(1, 2)^* \text{-g}\eta$ -continuous. It is not $(1, 2)^* \text{-continuous}$.

Example 5.7. Let $X = Y = \{a, b, c\}$, $\mathfrak{T}_1 = \{\phi, X, \{a\}\}$ and $\mathfrak{T}_2 = \{\phi, X, \{a, b\}\}$. Let $\psi_1 = \{\phi, Y, \{a\}\}$ and $\psi_2 = \{\phi, Y, \{a, c\}\}$. Define $f: X \rightarrow Y$ as $f(a) = c$, $f(b) = a$, $f(c) = b$. Clearly f is both $(1, 2)^* \text{-}\pi\text{g}\eta$ -continuous and almost $(1, 2)^* \text{-}\pi\text{g}\eta$ -continuous. But it is neither $(1, 2)^* \text{-continuous}$ nor $(1, 2)^* \text{-}\eta$ -continuous.

Example 5.8. Let $X = Y = \{a, b, c\}$, $\mathfrak{T}_1 = \{\phi, X, \{a\}\}$ and $\mathfrak{T}_2 = \{\phi, X, \{b\}, \{a, b\}\}$. Let $\psi_1 = \{\phi, Y, \{a\}\}$ and $\psi_2 = \{\phi, Y, \{b\}\}$. Define $f: X \rightarrow Y$ as $f(a) = b$; $f(b) = a$; $f(c) = c$. Clearly f is almost $(1, 2)^* \text{-continuous}$ as well as almost $(1, 2)^* \text{-}\pi\text{g}\eta$ -continuous.

Example 5.9. Let $X = Y = \{a, b, c\}$, $\mathfrak{T}_1 = \{\phi, X, \{a\}\}$ and $\mathfrak{T}_2 = \{\phi, X, \{b, c\}\}$. Let $\psi_1 = \{\phi, Y, \{b\}, \{c\}, \{b, c\}\}$ and $\psi_2 = \{\phi, Y, \{a, b\}\}$. Define $f: X \rightarrow Y$ as $f(a) = a$; $f(b) = c$; $f(c) = b$. Clearly f is almost $(1, 2)^* \text{-g}\eta$ -continuous as well as almost $(1, 2)^* \text{-}\pi\text{g}\eta$ -continuous but it is neither almost $(1, 2)^* \text{-continuous}$ nor almost $(1, 2)^* \text{-}\eta$ -continuous. It is neither $(1, 2)^* \text{-continuous}$ nor $(1, 2)^* \text{-}\eta$ -continuous.

Definition 5.10. A space X is said to be $(1, 2)^* \text{-}\pi\text{g}\eta\text{-T}_{1/2}$ if every $(1, 2)^* \text{-}\pi\text{g}\eta$ -closed set of X is $(1, 2)^* \text{-}\pi$ -closed in X .

Definition 5.11. A function $f: X \rightarrow Y$ is said to be $(1, 2)^* \text{-}\pi\text{g}\eta$ -irresolute if $f^{-1}(F)$ is $(1, 2)^* \text{-}\pi\text{g}\eta$ -closed in X for every $(1, 2)^* \text{-}\pi\text{g}\eta$ -closed set F of Y .

6. CONCLUSION

In this paper, we introduce and investigate a new class of sets called $(1, 2)^* \text{-}\pi\text{g}\eta$ -closed and some new functions called $(1, 2)^* \text{-}\pi\text{g}\eta$ -continuous, almost $(1, 2)^* \text{-}\pi\text{g}\eta$ -continuous functions in bitopological spaces. Moreover we obtain the relationships among some existing closed sets like $(1, 2)^* \text{-}\pi\text{g}\eta$ -closed, $(1, 2)^* \text{-semi-closed}$, $(1, 2)^* \text{-}\alpha$ -closed, $(1, 2)^* \text{-}\eta$ -closed sets and their generalizations. Also we study some basic properties of $(1, 2)^* \text{-}\pi\text{g}\eta$ -closed sets. Further, we introduce $(1, 2)^* \text{-}\pi\text{g}\eta$ -neighbourhood and discuss some basic properties of $(1, 2)^* \text{-}\pi\text{g}\eta$ -neighbourhood. The $(1, 2)^* \text{-}\pi\text{g}\eta$ -closed sets can be used to derive a new decomposition of unity, closed map and open map, homeomorphism, closure and interior and new separation axioms. This idea can be extended to ordered topological, ordered bitopological and fuzzy topological spaces etc.



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EXPLORING THE ELASTIC BEHAVIOR OF RUBBER BANDS AT DIFFERENT TEMPERATURES

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ABSTRACT

The chains of molecules in rubber (Hevea Braziliensis) have a natural elasticity: they can stretch when pulled but when the pulling force is removed, the elastic polymers in rubber spring back to their original length. This work demonstrates that rubber bands obey Hooke's law. It also reveals that rubber bands become more elastic when heated to a higher temperature especially when weight is added. The result of our work reveals that, at lower temperatures (say, 0°C to 40°C) the difference in extension between 100g weight and 500g weight was significantly less than the difference in extension between the same amounts of weight at higher temperatures. The heated rubber bands were the most elastic; stretching to the farthest extends of 21.40±/0.05cm at 100°C. Thus, an experimental proven of the fact that, increase in temperature increases the elasticity of the rubber band.

KEYWORDS: Elasticity – Rubber bands – Temperature – Weight

1. INTRODUCTION

All matter is made up of atoms, such as carbon, hydrogen or oxygen. Atoms are linked together to form larger compounds called molecules. Some molecules are made by stringing together repeated subunits, such as molecules called polymers. Rubber is an example of natural polymers, the chains of molecules in rubber have a natural elasticity, they can stretch when pulled but when the pulling force is removed, and the elastic polymers in rubber spring back to their original length (Punmanee et al., 2011).

Natural rubber is obtained as latex from tree called "Hevea Braziliensis". It has a long chain-like molecule containing repeating subunits. It is also called polyisoprene (elastomer). Natural rubber is a polymer of isoprene meaning it is built of repeating isoprene units derived from conjugated diene monomers. It is from the monomer isoprene (2-methyl-1,3-butadiene) (Anonymous, 2022). Natural rubber is used extensively in many applications and products either alone or in combination with other materials. In most of its forms, it has large stretch ratio and high resilience and is extremely water proof (Marisa, 2021).

A rubber band (also known as an elastic band, gum band or lacky band) is a loop of rubber, usually ring or oval shaped,

and commonly used to hold multiple objects together. The rubber band was patented in England on March 17, 1845 by Stephen Perry (Loadman and James, 2009). Most rubber bands are manufactured out of natural rubber or, especially at larger sizes, an elastomer, and are sold in a variety of sizes. Rubber bands are made by extending the rubber into long tube to provide its general shape, putting the tube on mandrels, curing the rubber with heat and then slicing it across the width of the tube into little bands (Karen, 2018). A rubber band is usually measured in three basic dimensions: length, width, and thickness. Its length is defined as half its circumference while thickness is the distance from the inner surface to the outer surface, and its width is the distance from one cut edge to the other (Bonnie, 2020)

Elasticity is the ability of a body to resist a distorting force or influence and return to its original size and shape when the force or influence is removed. Solid objects are capable of deforming when adequate forces are applied to them. If a material is elastic, the object will return to its original shape and size when these forces are removed (Sadd, 2004). At room temperature, a rubber band snaps back due to its elastic molecular properties. The stands that make up the rubber band pull them back to their original shape (Legner et. al., 2010).



Temperature affects the elasticity of a rubber band in unusual way. Heating causes the band to contract and cooling causes its expansion (Brown, 1963).

2. AIM OF THE STUDY

The aim of this work is to study the elasticity of rubber bands and its restoring force or elastic force as they vary with temperature.

3. MATERIALS AND METHODS

3.1 MATERIALS

The following are the list of materials used in the carrying out this study: Bunsen burner, hot plate, water, ice blocks, retort stand with double clamp, thermometer, meter rule, rubber bands, 100g weight hook / hanger, tongs, wire gauze, metal hook, medium rubber container, carbon sheet, sharp knife, and 100g weights.

3.2 METHOD

The first action was to create a contraption with the aid of the medium container and the carbon sheets were used to lag the container. Afterwards, the container was opened at one end and perforated at the other end. The contraption was hanged on the left hand clamp of the retort stand, which helped in determining the elasticity of the rubber bands and the amount of weight placed on them.

On the top of the contraption, we fastened a metal hook that extended downward from the middle of the apparatus, at the down end of the metal hook, the rubber was anchored and 100g weight hook to hold the weights was hanged on the rubber band.

We fastened a meter rule to the second clamp of the retort stand, in order to measure how much the rubber band stretched.

After the contraption was built, we heated the rubber bands to achieve the desired temperature of the rubber band. We dipped a different set of rubber bands in a container containing ice, so as to get the temperature of rubber band to 0°C. The first rubber band was picked from the ice container with the aid of the tong, anchored on the metal hook and 100g weight hook, the ground state was measured, the elasticity of the rubber band at 100g, 200g 300g, 400g, and 500g were measured respectively. The procedure for different temperatures (0°C, 20°C, 40°C, 60°C, 80°C and 100°C) were repeated using different rubber band. Then, we measured the extension made by rubber bands after adding weights to the initial of 100g to the hook. The extension made by varying the different masses and different temperature were calculated by subtracting their values from the initial value of the extension made by the rubber bands at that temperature with the 100g weight hook, that is, without any added mass on the hook.

4. RESULTS AND ANALYSIS

The data gotten from the experiment proved that the effect temperature had on the elasticity of rubber bands was amplified under more weight. From our result, at lower temperatures (say, 0°C to 40°C) the difference in extension between 100g weight and 500g weight was significantly less than the difference in extension between the same amounts of weight at higher temperatures. The tables below gives the summary of results obtained from the experiment.

Table 1. Extensions made by rubber bands with 100g at different temperatures

Temperature $\pm 1(^{\circ}\text{C})$	0	20	40	60	80	100
Weight(g)	100	100	100	100	100	100
Extension $\pm 0.05(\text{cm})$	1.6	1.7	2.0	2.3	1.9	2.3

Table 2. Extensions made by rubber bands with 200g at different temperatures

Temperature $\pm 1(^{\circ}\text{C})$	0	20	40	60	80	100
Weight(g)	200	200	200	200	200	200
Extension $\pm 0.05(\text{cm})$	4.3	4.2	5.4	6.6	4.9	6.6

Table 3. Extensions made by rubber bands with 300g at different temperatures

Temperature $\pm 1(^{\circ}\text{C})$	0	20	40	60	80	100
Weight(g)	300	300	300	300	300	300
Extension $\pm 0.05(\text{cm})$	8.2	8.0	9.4	11.7	9.2	12.3

Table 4. Extensions made by rubber bands with 400g at different temperatures

Temperature $\pm 1(^{\circ}\text{C})$	0	20	40	60	80	100
Weight(g)	400	400	400	400	400	400
Extension $\pm 0.05(\text{cm})$	12.2	11.7	13.5	14.1	13.3	17.2



Table 5. Extensions made by rubber bands with 500g at different temperatures

Temperature $\pm 1(^{\circ}\text{C})$	0	20	40	60	80	100
Weight(g)	500	500	500	500	500	500
Extension $\pm 0.05(\text{cm})$	15.2	14.7	16.8	19.4	17.0	21.4

In the table above, it was observed that increase in temperature increases the elasticity of the rubber band. However, the extensions of the rubber band keep fluctuating due

to the fact that the rubber bands vary in thickness and width and some unavoidable errors that occurred.

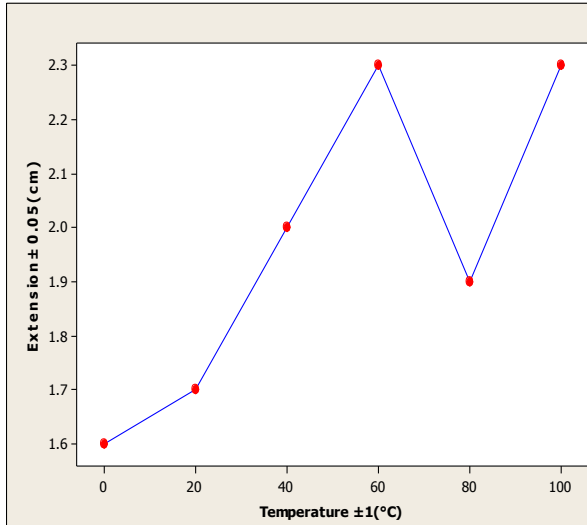


Fig. 1 Graph of Extension vs Temperature for 100g weight

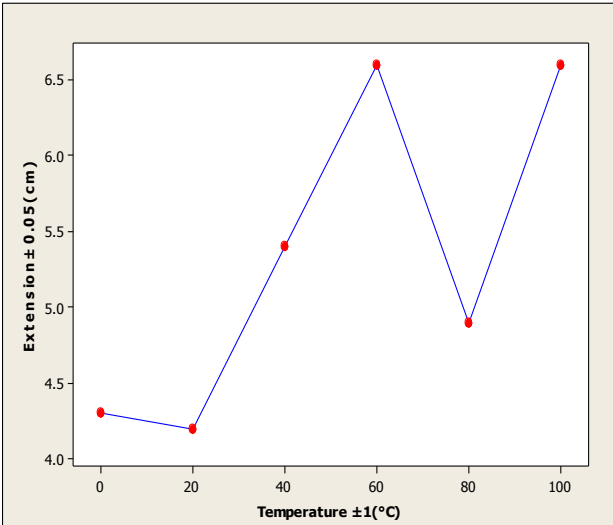


Fig. 2 Graph of Extension vs Temperature for 200g weight

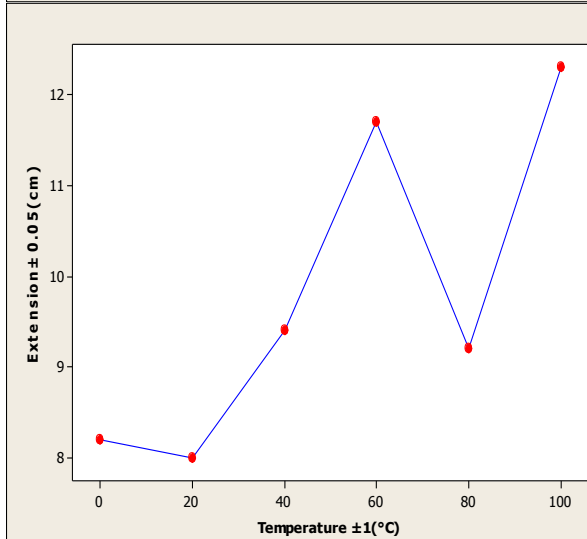


Fig. 3 Graph of Extension vs Temperature for 300g weight

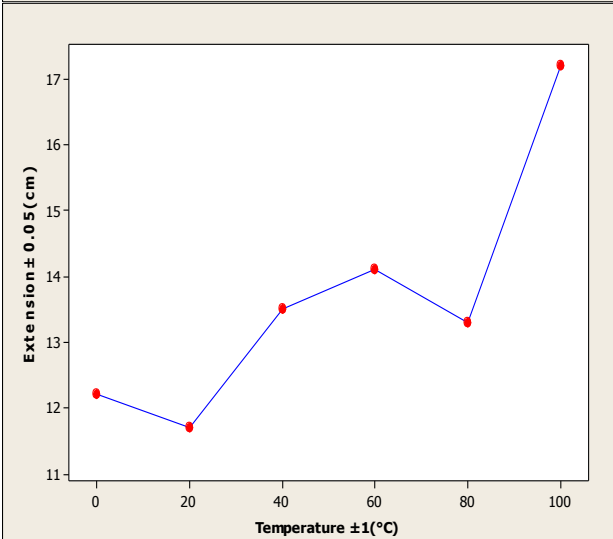
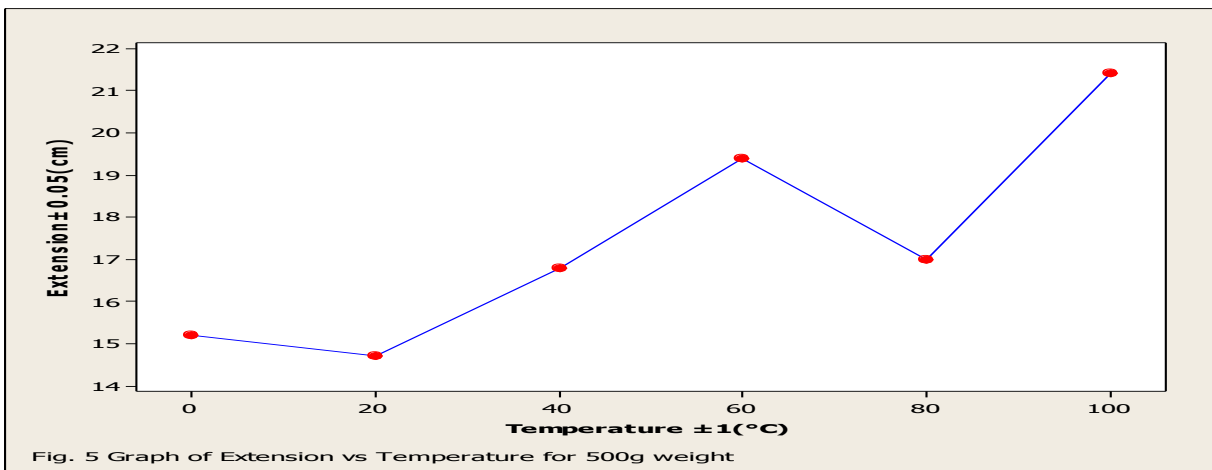


Fig. 4 Graph of Extension vs Temperature for 400g weight



At a cursory look on the graphs above, it is observed that they have similar shape with a unique drop in the extension at about 80°C for all the weights and a maximum extension at about 100°C. In all, this study conforms to the fact that rubber bands pass through a glass transition at a temperature below their melting point. Hence, this goes with the fact that, when a rubber band is stretched out, there are not as many ways the individual molecules can arrange themselves as they are when the rubber band is not stretched. For there to be more ways to arrange the molecules, the entropy will be higher. When a rubber band is stretched, entropy dictates that the rubber band will want to contract again. When the temperature is higher, the molecules are more excited, and want even more to be in a random state thereby making the rubber band easier to stretch out.

5.2 CONCLUSION

The experiment conducted gave a clear prove that temperature has an inevitable effect on rubber band. The heated rubber bands were the most elastic; stretching to the farthest extends of 21.40 ± 0.05 at 100°C. The rubber bands in freezing water were the consistent, providing a reliable conclusion to the project. Thermal expansion caused the rubber bands to react as they did. When the rubber bands were heated, the particles stretched out, making them more elastic and able to withstand greater force. When frozen, the particles contracted, adding strength and increasing resistance to force. Our results showed that the effect temperature had on the elasticity of the rubber bands was amplified under more weight. At lower temperatures the difference between light and heavy weights was significantly less than the difference between the same amounts of weight at higher temperatures.

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MODIFICATION OF LIQUID GLASS WITH VARIOUS ORGANIC SUBSTANCES AND INVESTIGATION OF ITS PHYSICO-CHEMICAL PROPERTIES

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ABSTARCT

Today, substances based on silicon and organic compounds are widely used in the chemical industry. From them, modified materials with many properties are synthesized. Such materials are highly resistant to deformation, temperature, fire and various external influences. With this in mind, the modification of liquid glass was carried out with the participation of various local organic raw materials (crotonaldehyde, HYPAN and formaldehyde, active dyes, etc.). The physicochemical properties of liquid glass were studied before and after modification. The areas of use of the obtained modified product were studied.

KEYWORDS: refractometer, viscometer, cryoscopy, density, liquid glass, modification, adhesion, cohesion

INTRODUCTION

Solving the durability problem and improving the physical and mechanical properties of building materials used in the national economy today, as well as obtaining composite materials resistant to chemical effects and using them, is one of the urgent problems[1-3]. According to their mechanical, technical and economic indicators, polymer silicate compositions are actively used in the construction industry. Therefore, a number of studies are being carried out to change the structure and properties of silicate materials by adding polymer additives of different nature. Modification of liquid glass with various substances creates a basis for the use of local raw materials[4-6]. Another way to improve the properties of products made of polymer silicate compositions is to improve their production technology. Today's new trend in the technology of silicate, ceramic and inorganic composites is the creation of materials from solutions by sol-gel processes[6-9]. The essence of such a process is the use of metal oxides and oxyhydrates, which have the ability to transform from liquid systems into solid products[10-12].

MATERIALS AND METHODS

Industrial application finds a method of preliminary preparation of the gel and its subsequent peptization. Sodium silicate and silicic acid are reacted to obtain sol from silicates. After the mixture is washed from the salts formed by the reaction, the newly precipitated gel is mixed with an aqueous solution of ammonia. The resulting mixture is peptized under a temperature and pressure of 185-195 °C. In the ash stabilized with alkali to pH 7.8-8, polymerization proceeds to a certain value corresponding to a specific surface area of 480-510 m²/g, which corresponds to a particle size of 4÷5.5 mm. The polycondensation reaction between the silanol groups during the aging process of the sol leads to an increase in pH. A number of physicochemical properties of the polycondensation product obtained in the presence of liquid glass with croton aldehyde and HYPAN were investigated.

RESULTS

Viscosity and light absorption index of modified liquid glass were determined in laboratory conditions. For this, refractometer (DR301-95) and automatic viscosity determination (HAAKE viscotester 1 plus and 2 plus) devices were used. The obtained results are presented in Tables 1 and 2.



Table 1.
Concentration dependence of viscosity of liquid glass modified with HAAKE viscometer

Modified liquid glass	Temperature, °C	Solution concentration, %	Viscosity, dPas
Liquid glass+croton aldehyde+HYPAN	29.6	25	0.04
Liquid glass+croton aldehyde+HYPAN	29.4	30	0.05
Liquid glass+croton aldehyde+HYPAN	29.5	50	0.08
Liquid glass+croton aldehyde+HYPAN	29.5	75	1.48
Liquid glass+croton aldehyde+HYPAN	29.7	90	1.56

Table-2.
Light absorption indicators of modified liquid glass solutions with different concentrations at 28 °C

Modified liquid glass	Temperature, °C	Solution concentration, %	Light absorption, nD
Liquid glass+croton aldehyde+HYPAN	28	10	1.3945
Liquid glass+croton aldehyde+HYPAN	28	20	1.3865
Liquid glass+croton aldehyde+HYPAN	28	30	1.3798
Liquid glass+croton aldehyde+HYPAN	28	40	1.3760
Liquid glass+croton aldehyde+HYPAN	28	50	1.3664
Liquid glass+croton aldehyde+HYPAN	28	60	1.3597
Liquid glass+croton aldehyde+HYPAN	28	70	1.3537
Liquid glass+croton aldehyde+HYPAN	28	80	1.3430

As can be seen from the above tables, the viscosity and light absorption indicators of the modified products of liquid glass changed depending on the concentration. The viscosity increased to 0.04 dPas when the concentration was 25%, and to 1.56 dPas when it was 90%. The light absorption index changed from 1.3945 nD when the concentration was 10% to 1.3430 nD when it was 80%. As a result, the concentration increased, the viscosity increased, and the light absorption index decreased.

CONCLUSION

In conclusion, it can be said that today the use of polymer materials based on water-soluble silicates with organic additives, resistant to acidic and neutral environments and high temperature effects, has begun to develop. Such polymers are cheap, easy to manufacture, non-toxic and, most importantly, non-flammable. There is a certain perspective for organic matter and liquid-glass based bonding composite materials.

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DEVELOPMENT OF PROFESSIONAL COMPETENCE OF FUTURE PHYSICAL EDUCATION TEACHERS

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ABSTRACT

The article describes the development of professional competence of future physical education teachers, the social essence of the pedagogic profession, and the abilities specific to the pedagogic profession. The essence of the concept of pedagogical competence, the specific aspects of the formation of pedagogical competence are explained.

KEYWORDS: *physical education teachers, interest, ability, talent, belief, practical skills, lateral development, pedagogue, competence, didactic, communicative, perceptive*

INTRODUCTION

One of the important components of the education of the perfect generation is the level of modern development of any society and its future, which can manifest its identity with its internal capabilities, creative initiative potential, can prove itself in acceptance and recognition by society, and become a real subject of its own destiny. It is the development of people with inquisitiveness and creativity.

Pedagogical profession is of great social importance. After all, the pedagogue is the architect of the maturity of young souls. Today, while training young people ideologically and politically, and teaching them about nature, society, development of thought, laws, first of all, it is necessary to prepare the young generation for future work, help them acquire professions, and focus on solving important social and economic tasks for the society.

Optimum-pedagogical methods are being sought to improve the work style of physical education teachers working in the field of education in our republic. But these attempts remain fruitless due to the following shortcomings:

— "Physical education" classes, which are included in the block of specialized subjects in the preparation of future physical education teachers for professional activities, are not modernized;

—the pedagogical process is not adapted to meet the educational needs of students, within the framework of research;

—physical education teachers do not sufficiently evaluate the possibilities of using the technology of designing physical exercises in providing modern education to students;

—it is not enough to strive to form the educational needs of students, to create conditions for their satisfaction;

— the use of didactic situational tasks in the physical direction to students is not conducted in an orderly and regular manner;

—the performance of physical-cultural-educational activities in addition to the auditorium of this content is not at the required level;

— the design technology for students in the field of physical culture in their future specialties is often implemented at the expense of using random exercises (their content is considered outside of the form, not expressed in relation to each other, and the form is observed to be carried out separately from the content);

— future teachers of physical education — teachers of general secondary education schools of tomorrow need recommendations on the modern methodological and theoretical bases of this problem (especially theoretical-pedagogical) [3].

In order to prevent this, future physical education teachers are encouraged to constantly improve their professional skills, to create various conditions for them, to provide necessary material and scientific-methodical support, and to increase the teacher's creative initiative. A modern pedagogue should have the following skills:

1. Organizational ability is seen in uniting students, assigning tasks, sharing responsibility, and completing common tasks.

2. Didactic ability is manifested in the selection and preparation of educational material, exhibitions, stimulation of students' interest and needs in relation to knowledge, and increase in educational activity.

3. Perceptive ability - the ability to enter the spiritual world of the student, to determine and objectively assess his mental and emotional state, is seen in pedagogical intuition and empathy.

4. Communicative ability - establishing a relationship with students, colleagues and management in accordance with the pedagogical purpose, quick communication, manifested in extroversion.

5. Suggestive ability - it is seen in the ability to have an emotional volitional influence on students, to convince them of their capabilities.

6. Scientific-research ability - the skills of studying and evaluating pedagogical situations and processes are understood.



7. Speech ability - to have a clear and reliable, emotional, cultured, vocabulary-rich speech technique. Human qualities of the pedagogue are of particular importance in the educational process.

These qualities include humanity, justice, kindness, patience, correctness, truthfulness, responsibility, fairness, obligation, objectivity, generosity, love for people, respect, high spirituality, optimism, emotional restraint, the need for communication, concern for the life of students, interest, nobility, self-criticism, friendship, temperance, dignity, patriotism, religious faith, principle, emotional culture, etc.

The preparation of the future physical education teacher for professional activity is as follows: predicting the success of the intended innovation as a whole and its individual stages; to compare the innovation with other innovations, to select the most effective one, to determine their most significant and accurate level; checking the level of success of innovation implementation. The preparation of teachers for professional activity is carried out in three stages:

1. Analysis of the activity of the teacher in the period before the application of the innovation in pedagogical activity.

2. Analysis of the period of active formation of professional activity.

3. Analysis of activity in the period after the introduction of innovation into the pedagogical process [2].

In professional activity, a teacher should be an advanced, productive creative person, with wide-ranging interests, a rich inner world, and be open to pedagogical innovation. Professional activity consists of motivational, technological and reflexive parts [4]. This process is carried out in two directions: formation of professional preparation for perception of innovation and teaching to act in a new way. Cognitive activity of students and its management are of particular importance in the organization of professional activity.

CONCLUSION

Based on the organization of educational processes on a scientific basis, ensuring the activity of students and coordinating their activities, we can define future physical education teachers as who are based on modern approaches in ensuring the quality and efficiency of pedagogical processes, who have high moral qualities, who can analyze and objectively evaluate themselves and their activities, who has a rich philosophical and spiritual worldview, psychological-pedagogical and organizational-technological potential, as well as the ability to collect, analyze, objectively evaluate, process and exchange information, ensure the activity of learners in problematic situations that arise in pedagogical processes and coordinate their activities, having the pedagogical skills to foresee the effectiveness of the educational process and organizing and managing the activities of the subjects of the educational process on a scientific basis, who has the necessary knowledge, skills and qualifications in the direction of coordination and activity provision a competent teacher.

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LINGUISTIC PHENOMENA OF RADIO SPEECH

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ABSTRACT

The dynamics of linguistic development in our society is palpable, which leaves no one indifferent among the linguistic community among journalists and publicists. An integrated approach to the study of the problem of modern radio is also seen in the preparation of original developments, in the implementation or use of which specialized enterprises and organizations are interested. Of scientific interest is the actual speech factor, which is most clearly manifested in the activities of broadcasting. It is the speech characteristics of communication that determine the vectors of meanings and the style of public communication, influence a person's behavior, and update his life values.

KEYWORDS: communication, radio, speech, journalism, journalism, media language, communication

The modern system of mass communication cannot be imagined without broadcasting. Possessing the characteristics of universality, publicity, accessibility, radio has become a characteristic feature of the life of modern man. The rapid development of technical means ensures the wide and ubiquitous dissemination of radio broadcasting as one of the channels of mass communication.

As one of the main ideas of radio journalism, it indicates that the communication process through conversational broadcasting is aimed at reflecting the surrounding reality: "Radio programs open the doors of the audience to the polyphony of the sound world, by selecting, ordering, enlarging its parts, finding relationships and returning them to listeners. This communication, which is its main limitation in the process of social communication, significantly activates the visual essence of the channel, auditory perception, turns into imagination and gives a strong impetus to the image of the viewer" [1, 172].

The need to transmit information by radio creates a strong trend towards direct communication. This also indicates that the speech activity of any participant in a communicative act consists of informational and factual units.

The study of radio speech as a linguistic phenomenon shows that it has not found its deep scientific understanding. Therefore, it is necessary to study radio speech as a type of cultural speech and take into account ethical principles. The skill of conducting a live conversation depends on how confidently a radio journalist holds the reins of the air. Direct communication on the air creates an indirect psychological reaction of listeners to the audio program. When referring to general scientific sources devoted to the study of radio language, it was found that they can be divided into three main categories:

- 1) articles and brochures devoted to the normative and stylistic analysis of language practice in radio broadcasts;
- 2) publications describing the features of radio speech, different from other types of speech;
- 3) essays by radio journalists, written in a common language, containing valuable information about the linguistic

aspects of radio programs identified in the course of daily work [2, 210].

According to experts, radio text is a complex phenomenon in terms of content, which is mainly determined by the presence of various channels that transmit information on the air. According to the content in the text of information and universal radio channels, acoustic harmony has priority over voice and sound [3, 94].

The authors believe that modeling is one of the ways to represent the discursive field of radio as a functional whole (lat. modulo - measure, sample, norm). The essence of the modeling process is to build a special model of the object under study based on the important characteristics of the object. The model should transparently show the relationship of any element with a system of other components.

Modeling the discursive space of radio communication allows:

- 1) going beyond the limits of a certain text work for the speech activity of speech subjects;
- 2) like a separate discourse, the entire system of its discourse (discursive space) in an algorithmic way reflects the mechanism of meaning creation and self-development;
- 3) taking into account not only internal factors of discursive development, but also external factors objectified by the dynamics of the sociocultural context;
- 4) to create a scheme of discursive formation, bringing closer to understanding the discourse of a media source as a complex functional whole.

The word spoken on the radio has a great impact because it is a vowel, which means that when it was pronounced, the speaker put into it some part of the thoughts that became the public expression of his feelings. As estonian researcher I. Trikel said, "live speech is the most difficult means of expression on the radio, because it must reflect thoughts and actions, feelings, character and visual presence" [4, 73]

In addition, we can say that live vocabulary is a tool that organizes radio communication and reveals the inner world of the participants.



A.A. Sherel shows that sound and the word expressed through sound have a unique quality:

- appeal to the listener (a necessary condition for communication);
- emotionality and direct appeal (conditions for creating the illusion of participation);
- search for an idea, combining the search process with its acoustic verbal expression;
- the influence of non-verbal means of expression on the process of persuading the listener and mastering the thought;
- a constant impact on the compliance of radio listeners with the norms of pronunciation and accent [5, 117].

In oral speech on the radio there are such phatic features that according to T. G. Vinokur, this is manifested in the fact that "any object can express the mutual solidarity of interlocutors as a tool". Spoken speech, in essence, is the culmination of the roles of the individual, psychological type, social group, language community. Therefore, it has a layer of various functional options. They, in turn, are stylistically adapted to colloquial speech to varying degrees; neutralizes, mixes or separates. But in the end, this adaptation occurs in favor of the style of speech. After all, colloquial speech is not limited in subject matter, it is a circle of communication that knows no boundaries, so it has a much higher level of tolerance compared to other stylistic elements [6, 93].

Speaking about the radio text, the researchers note that it is "a mental-verbal complex, complex with a polycode nature of implementation, created in an institutionally organized information and communication environment, reflecting social reality and being influenced by its context" [7, 132], embodying the image of the addressee and creating in his mind certain fragments - forms views, beliefs, values, reflects the center of communicative, cognitive and sociocultural projections, which includes the removal of these dynamic layers in the explanatory key of the study, the presentation of the results of media speech activity as a multicomponent model. Radio talk is a form of speech in which the speaker embodies language based on the listener's response. Ethereal speech is the vocal distribution of the text, regardless of whether it is prepared or spontaneous - unprepared, sporadic (sudden) in nature.

Another constant characteristic of radio speech and broadcasts is the natural rate of speech. The acceptance of the text in terms of quantity and quality largely depends on it. In addition, such psychological parameters as tempo and rhythm were determined in radio speech (according to S. M. Bernshtein). These features depend on their sequence within sentences, the length of physical and psychological pauses, the intonation of separate and undivided parts of the text, and not on the number of words and syllables per unit of time. It is the tempo and rhythm that determine the level of expressiveness of the speaker in speech communication [8, 64].

Radio conversations can be viewed in three forms:

- 1) the process of using the spoken language of the radio;
- 2) speak clearly on the radio over time;
- 3) any speech heard on the radio [9, 83].

The radio audience is the recipient of the message and its source (the environment in which ideas, knowledge,

ideological stamps, speech stamps are created). Feedback is generated each time and added to a new post. It turns out that our knowledge of the world is discursive (institutional) - information about the world that we receive from the media - language, a way of representation (media), journalistic experience, an ideological, political channel for transmitting relations repeatedly serves as a tool.

Voice communication on the radio is often embodied in the form of dialogue or polylogue communication, presented in the form of communication in the form of "exchange of texts, and each text is a real lecture situation, interconnected with the speaker and the listener" [10, 75].

The main factor in the formation of the text of a public message, including through radio, is the principle of authorship, which is expressed in the selection of facts, their interpretation, composition, personal approach to reflecting reality. Its semantic context and means of achieving the goal of a journalistic work.

Establishing contact with the viewer is possible only when the journalist who hosts the program declares himself as a person, when he acts in every word as a person with certain cultural and psychological characteristics, when he reveals the features of his worldview, his moral and value signs. After all, the task of any meaningful text is to have a targeted impact on the audience, to form in it informational ideas about reality. With the help of speech on the radio, a special information and communication environment is formed. It is based on the speech-cognitive activity of a person and the oral nature of speech.

Text (lat. *textum* - "connection, connection") is:

- "successive placement of symbols that make up a single semantic completed work" [11, 73];
- "the formation of complex and diverse systemic features" [11, 61];
- an independent author's work, "expressed using a certain system of symbols";
- "informativeness of the document, program, message" [12, 142];
- a component that forms the structure of the media;
- a universal component (means) of mass communication.

The text in radio journalism is a journalistic work specially created for radio broadcasting and having an oral, oratorical form of expression; mainly based on the lexical means of the literary language, often relying on the language of living, oral speech; expressed in monologue or dialogic form. Each individual work that was broadcast on the air can be called a microtext of the program.

Thus, radio text can be understood in a broader sense, like all audio materials listened to on the radio: music signals, jingles (short logos of a radio program or radio channel), any non-publicistic output (advertising, music, radio). broadcast presentation). All topics and issues of a particular program (for example, a morning radio channel, an analytical talk show, a talk show or a radio magazine) can be called the macrotext of the program. Identifying the causes of evolutionary changes in speech behavior in the process of open communication requires the development of scientifically based recommendations on the use of language cultures and etiquette formulas on the air.



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MEDICAL TERMINOLOGY IN THE TERMINOLOGY SYSTEM

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ABSTRACT

Medicine is constantly evolving, and the issue of regulating the terms of this area does not lose its relevance. The fact that most of the medical terms are in Latin and that they form an international system serves as a means to ensure that all representatives of medical science in the world can easily understand each other. Medical terms are considered one of the most complete and complex systems in terms of concept and content. This, in turn, helps to identify lexico-semantic groups within the framework of medical terminology. Also, medical terminology includes a whole layer of terms based on affectivity.

KEY WORDS: *term, medicine, vocabulary, system, assimilation, terminology, word, group.*

To date, the lexicology of the scientific language is one of the most actively developing areas of modern linguistics. It relies on industry terms in addition to general scientific vocabulary. A term is a word or phrase that serves to clearly define (name) the special scientific meaning of special concepts in a particular system. At the same time, the process of formation and development of medical terminology has its own characteristics.

It should be noted that the regulation of medical terminology is one of the urgent problems of modern linguistics. The study of the formation of medical terminology helps not only to expand the level of knowledge, but also to look into the future, using the modern system of knowledge and, in a sense, the laws of dialectics. After all, "... medical art merges with a system of religious, philosophical and folk knowledge, which aims not only to transfer information from generation to generation, but also to improve humanity [1, 35]. In this, of course, the stages and features of the formation of medical vocabulary play an important role.

In the development of any area, its most changeable, fast-moving part is the terms, and in the development of this area, its vocabulary is enriched with new terms. This, in turn, creates the basis for the enrichment of the national language.

Based on the modern scientific description of any field of knowledge, it becomes necessary to study the layer of assimilation of a system of terms or a group of terms. In this process, it is very important to take into account not only the vocabulary of the national language, but also take into account the models and semantic features of the source of the emergence, formation and enrichment of terms in the medical terminology of national languages. related to different systems. The method of term formation, which requires the identification of the main patterns and structural and semantic features of the models of assimilation of medical terms, is the organizing principle in the systemic formation of domestic medical terminology, and "... the need to form domestic terminology in certain areas of knowledge, defining a new

phenomenon, when necessary, cannot but involve to the assimilation of terms is not" [2, 72].

The fact that it is impossible to determine when the medical vocabulary appeared gives rise to the hypothesis that medicine appeared in the history of mankind in connection with the need to live and survive, which made the formation of medical terminology possible. Many myths and religions mention the creation of man, his health and longevity, but suffering, illness and death due to his inaction. Ibn Sina considered medicine as a science that treats the human body and heals the sick.

The classification of medical terms according to the principle of type and category is widely used in microsystems of terms. Classification on one basis is not always successful. It is known that the classification of concepts in terminology is usually carried out on the basis of a common division, that is, a change in the most important feature can lead to the fact that objects belonging to the same type belong to different types.

One of the most important features of the term - to occupy a clearly defined place in the structure of relations within the system of terms - is fully manifested when the requirements are consistently met. But due to a number of reasons, these requirements are not fully met within the framework of complex microterminological systems, for example, medical ones.

Scientific terminology is mainly based on the international Latin language and its forms. This vocabulary should be equally understood by educated people all over the world. Of course, most medical or scientific terms are unique and therefore little known. But the most common group of words in the international vocabulary are the most common words that should be known and understood by everyone, mainly those that have social or political significance.

Medical terminology strictly obeys the laws of use of any terminological system. Its main principle is to create a term that is the result of a theoretical generalization and accurately reflects the essence of the phenomenon. The



formation of the terminological apparatus is inevitably influenced by general language processes, the law of consistency, in turn, the law of linguistic tradition, the law of economy of speech, which conflicts with the law of linguistic analogy [3, 49].

Medical terminology can be divided into:

1) morphological methods of term formation;

2) lexico-semantic methods of term formation, including intersystem assimilation of lexemes and assimilation of foreign language lexemes, term elements, termination of the concept of a common term;

3) syntactic way of term formation.

Thus, medical terms are one of the important and specific objects of linguistic research.

When forming medical terms in languages, each source requires its own methods of term formation. These are: affixal, lexico-semantic and syntactic methods. Each source and each method of term formation in the field of medicine determines the basic semantic structure of the created term. This, in turn, allows you to determine the scope of its application.

It should be noted that medical terms occupy a special place in the language layer. It is clear that accuracy, adequacy and unambiguity are considered important when using the term.

In research, we consider the basic "term", which forms the concepts of terminology and medical terminology, as a nominative word or phrase adopted to denote general concepts. By "terminology" we mean a set of terms denoting concepts in any field of activity. Accordingly, "medical terminology" is a set of terms used in medicine.

Medical terms are areas of medicine, such as general medicine, pediatrics, clinic, medical prevention, dentistry, surgery, neurology, pharmacy, cardiology, oncology, ophthalmology; phenomena and processes are special words and phrases used to denote their features and characteristics. Examples of medical terms include virus, allergy, coma, anemia, cyst, antiseptic, embryo, stress.

Interest in studying the terminological system of various fields and thematic groups of medicine is natural, because the theory and practice of medicine is one of the developing sciences in the world. At the same time, the presence of many "merged" areas of other sciences related to medical science is the reason that medical terminology is constantly filled with hundreds of new concepts.

We believe that interest in the study of medical terms is associated with the following situations:

1) medical terminology reflects a set of strictly defined professional concepts;

2) terms, term systems, the terminological field are considered universal means of acquiring, storing and expressing special knowledge, their analysis helps to understand medical evolution, and this, in turn, leads to a deep understanding of the diagnostic meaning of clinical terms, the development of clinical thinking, future doctors in professional plan will undoubtedly help in his work;

3) the regulation of medical terminology is of great importance for mutual understanding of specialists in the field, training of scientific and medical personnel, publication of

scientific and information literature, planning and accounting in the field of healthcare;

4) medicine is constantly developing and is connected with other branches of science, therefore, the volume of its terminology is increasing;

5) the protection and maintenance of health is one of the most important problems of concern to mankind for centuries.

Information about the quantitative composition of medical terminology varies significantly. According to some reports, the medical lexicon, including related disciplines, has several hundred thousand words and phrases [4, 81]. But at the same time, according to some reports, modern medical terminology includes about 170-200 thousand terms (80-100 thousand names of drugs and pharmaceutical terms, 10 thousand anatomical names, 20 thousand signs of organ functions, 60 thousand names of the disease, methods of examination and surgical tactics) [5, 124].

F.Kh.Kasimova considers medical terms as "words and phrases that embody the nomenclature of the medical industry, a tool that shows all the "facets" of the medical world, the richest and rather complex terminological system among the units of medical scientific and technical field" [6, 63].

The definition of terms in the field of medicine raises controversial questions about their place in the language. Medical terminology covers a whole layer of terms based on affectivity. It is at the level of basisity that "there is an associative connection between the semantic elements of the nominative unit and the corresponding lexical meaning" [7, 110].

Many medical terms reflect the essence of certain hypotheses, theories, views, concepts. Separate terms, together with other "submicrosystems of terms" within the discipline, become a kind of markers for one or another subsystem of existing terms [8, 94]. However, in the leading fields of medicine there are still no complete hierarchical classification schemes of concepts, "each of which can be expressed in clearly understandable and applicable terms, and this is another reason for the difficulties in meeting terminological requirements" [9, 34].

So, in microsystems of terms, the classification of medical terms according to the principle of type and category is widely used. But, in our opinion, the classification on one basis will not always be successful. The classification of concepts is usually made on the basis of a general division, i.e., a change in the most important feature can lead to the fact that objects belonging to the same type belong to different types. The study of terms in the field of medicine is important for mutual professional communication of specialists, increasing their vocabulary in the preparation of medical personnel, publishing professional scientific literature, developing scientific relations with foreign health professionals, obtaining and exchanging information. and creation of industry dictionaries.



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TECHNOLOGY OF TEACHING GRAPHICS OF FREE MECHANICAL VIBRATION USING "MICROSOFT EXCEL" SOFTWARE

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ANNOTATION

In this article, harmonic oscillations of a mathematical and spring pendulum are considered, and graphs of the dependence of speed and acceleration on time and coordinates were obtained using the Microsoft Excel software tool.

KEY WORDS: *the equation of motion, velocity, acceleration, amplitude, circular oscillation, the period of oscillation, constant of proportionality, mass, pendulum, spring.*

Annotatsiya: Ushbu maqolada matematik mayatnik va prujinai mayatniklarning garmonik tebranishi hamda tezlik va tezlanishning vaqtga va koordinataga bog'lanish grafiklari "Microsoft Excel" dasturiy vositasi yordamida yoritilgan.

Kalit so'zlar: harakat tenglamasi, tezlik, tezlanishi, amplituda, siklik chastota, tebranish davri, bikrlilik, massa, mayatnik, prujina.

Аннотация: В данной статье рассмотрены гармонические колебания математического и пружинного маятника, а также были получены графики зависимости скорости и ускорения от времени и координат, с использованием программного средства "Microsoft Excel".

Ключевые слова: уравнение движения, скорость, ускорение, амплитуда, циклическая частота, период колебаний, жесткость, масса, маятник, пружина.

Informatization of the educational system, the use of modern information technologies and various software tools in the teaching process is one of the urgent issues of today. In particular, in military-academic lyceums and in particular in the "Temurbek maktabi", teaching with the help of computer technologies, showing their graphics using various software tools in the explanation of physical phenomena is an incentive to expand the imagination of the students about the structure of the universe and to form a scientific outlook on objective reality. will be Below we cover the subject of "Harmonic vibrations" which belongs to the "Mechanics" department of physics using the software tool "Microsoft Excel". Usually, in academic lyceums, the topics "Mathematical Pendulum" and "Spring Pendulum" related to the chapter "Mechanical Vibrations and Waves" and the topic of harmonic vibrations are covered extensively. Although the movement of these pendulums is one of the events that happen before our eyes, and all the information about it seems familiar to the readers, there are some aspects that are of special importance. For example, students are familiar with changes of mathematical or spring pendulums only in coordinate axes. However, in this process, not all students are aware of the changes of quantities such as speed and acceleration over time, as well as the laws of connection of these quantities to coordinates. That's why in the article, we will consider in detail all the laws and relationships listed above about information technologies. A mathematical pendulum and also a physical pendulum $x = A \cos \omega t$ or $x = A \sin \omega t$ according to the law of harmonic oscillation, we know very well from the science itself. In this A – vibration amplitude; ω – is the cyclic



(circular) frequency of vibration, which is for the mathematical pendulum $\omega = \sqrt{\frac{g}{\ell}}$ from the formula, and for the spring

pendulum $\omega = \sqrt{\frac{k}{m}}$ is determined using the formula. And the periods of oscillation of these pendulums

$$T = 2\pi\sqrt{\frac{\ell}{g}} \quad \text{va} \quad T = 2\pi\sqrt{\frac{m}{k}}$$

determined using formulas.

If the movement of a ball on a pendulum or a ball attached to a spring starts from the most extreme position from the equilibrium position, then the oscillation is according to the cosine law, that is $x = A \cos \omega t$ it happens according to the law.

To investigate the time dependence of free harmonic oscillations $x=x(t)$ we will need to graph the function. We can do this by taking into account the age and psychology of the students, and in order to avoid the complexity of mastering the simplicity of the program, simply by using the Microsoft Excel spreadsheet, which is familiar to all of us. Let's remind, "Microsoft Excel" spreadsheet — there are A, B, C, D, E, ... Columns marked with Latin capital letters such as and 1, 2, 3, 4, ... is an electronic table consisting of lines given by natural numbers such as In this case, each cell comes as an address defined by a column and a row. Each cell contains a number, a word, a logical symbol or a calculation formula. For example, C2 in the cell =2*4+6 if we write, the result of the calculation will be 14.

Now let's get acquainted with how to create a graph of free harmonic oscillations using this "Microsoft Excel" spreadsheet. This opens an electronic window in which the electronic cells initially have constant values for each pendulum. A, g, ℓ and A, m, k let's say letters B2, C2, D2 and F2, G2, H2 let's write in the cells. Under the same cells, that is B3, C3, D3 and F3, G3, H3 the values of these quantities corresponding to the cells, let's say 0,05; 9,8; 1 and 0,05; 1; 100 enter numbers. Then, for each pendulum, the cyclic frequency ω and the oscillation period T B5, C5 and F5, write in cells G5 and calculate their formulas at the bottom B6, C6 and F6, G6 into the cells (1-picture). As the independent variable of the function, we give different positive values equal to the shares of period T to time t in a separate column, this is starting from cells B9 and F9 downwards. And in the adjacent columns C and G, starting from cells C9 and G9 downwards, the function of the arbitrary variable x, let's say $x = A \cos \omega t$ function is introduced. Then the corresponding values of voluntary and non-voluntary variables are obtained in adjacent columns. Having marked these columns, the button "Graphic" is selected from the panel window, and from there the option " Pinpoint" is clicked. Then we get the graphs in Figure 1 below. The diagrams in Figure 1 below show how the mathematical and spring pendulums oscillate over time. Since the pictures are exactly similar, we can generalize our idea and say that the graphs in Picture 1 are the vibrational view of all harmonically vibrating bodies. The greater the number of values in one period, the smoother and clearer the graph will be.

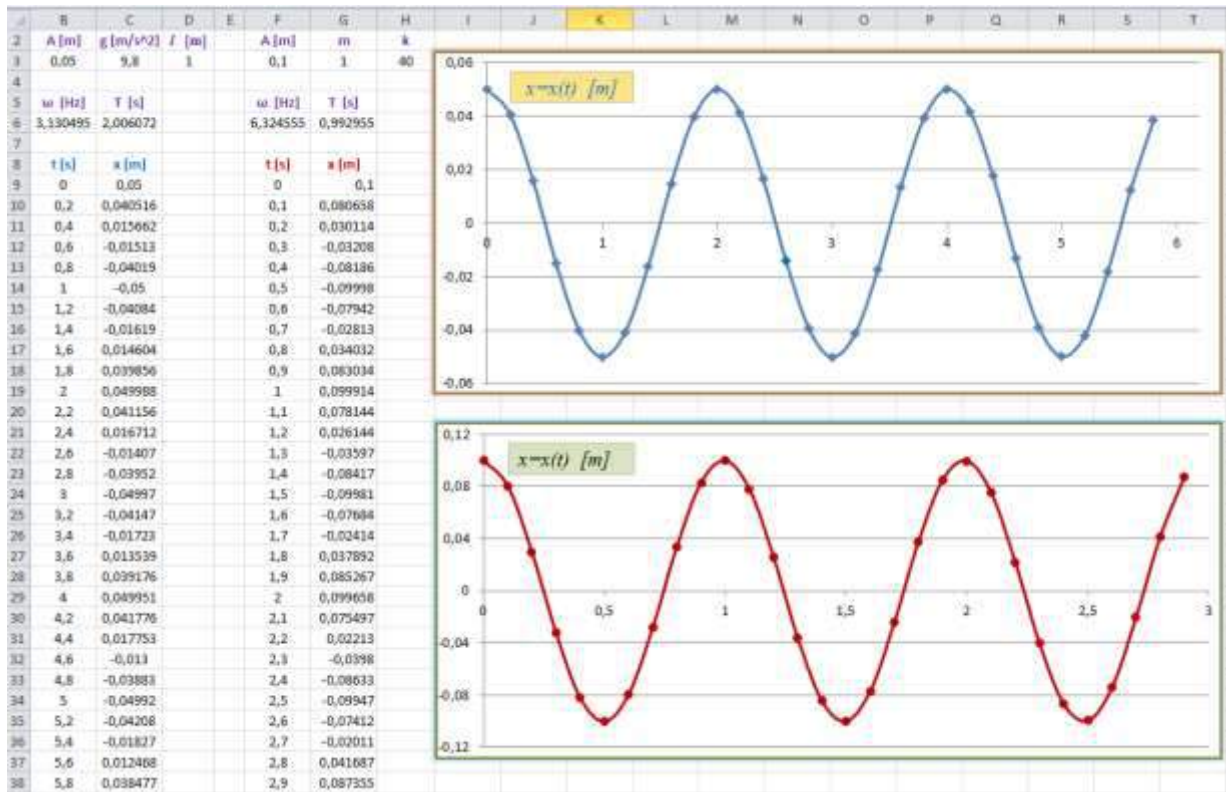


Figure-1

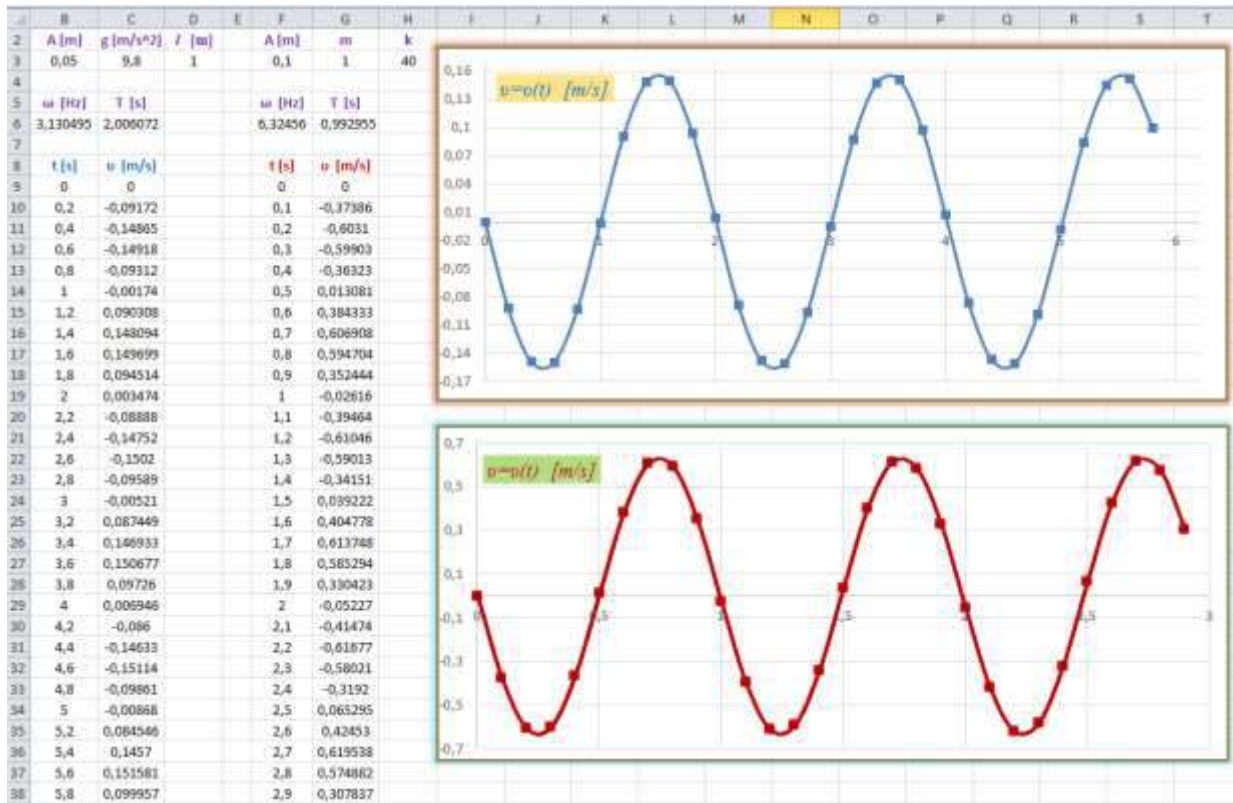
Now let's see how the graphs of speed and acceleration versus time look like.

If the movement of a ball on a pendulum or a ball attached to a spring starts from the most extreme position from the equilibrium position, then the oscillation is according to the cosine law, this is $x = A \cos \omega t$ it happens according to the law. In this case the velocity functions

$$v = -A\omega \sin \omega t = -A\sqrt{\frac{g}{l}} \sin\left(\sqrt{\frac{g}{l}} t\right) \quad \text{and} \quad v = -A\omega \sin \omega t = -A\sqrt{\frac{k}{m}} \sin\left(\sqrt{\frac{k}{m}} t\right)$$

and acceleration functions $a = -A\omega^2 \cos \omega t = -\frac{gA}{l} \cos\left(\sqrt{\frac{g}{l}} t\right)$ and $a = -A\omega^2 \cos \omega t = -A\frac{k}{m} \cos\left(\sqrt{\frac{k}{m}} t\right)$

it will look like. We can generate graphs of these using the Microsoft Excel spreadsheet, just like the equation of motion.



Then we have the graphs in Figure 2 for the velocity equation and in Figure 3 for the acceleration equation.

Figure-2

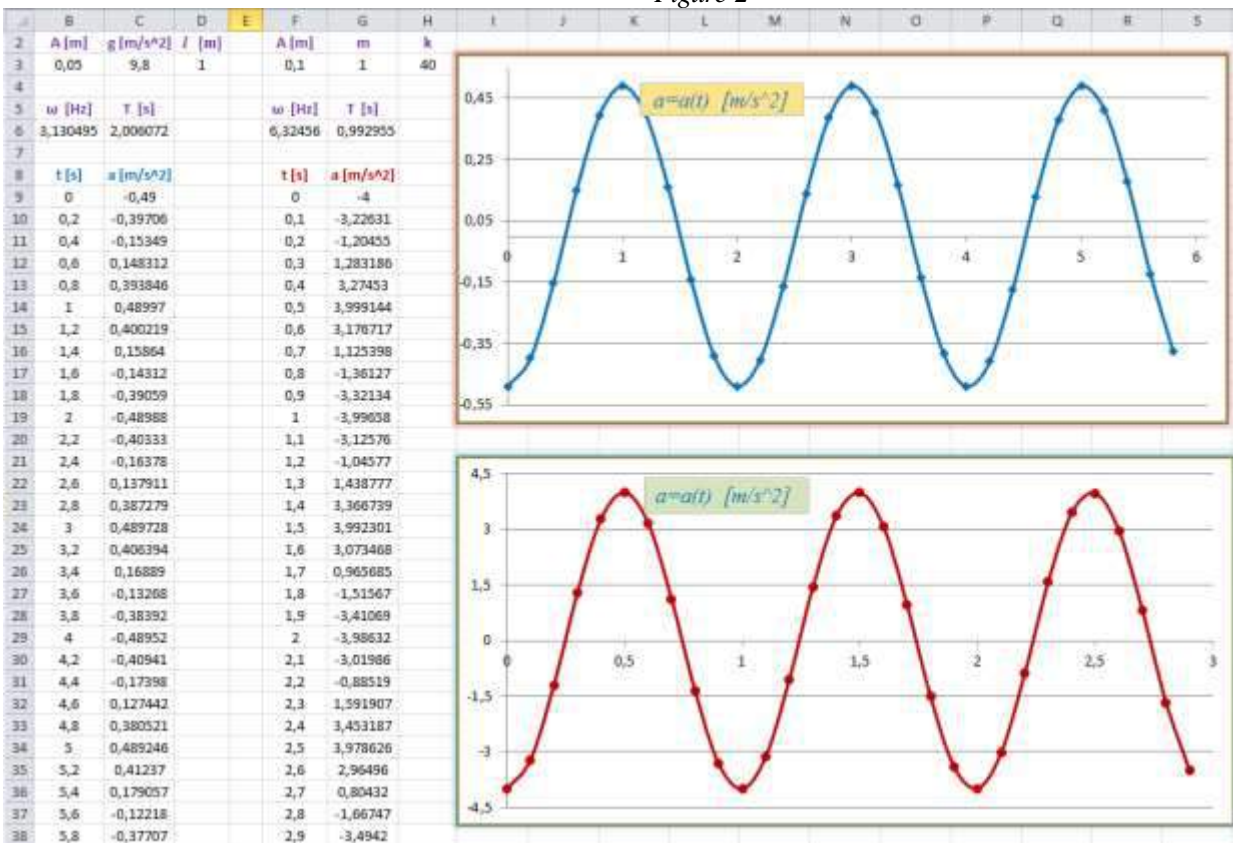


Figure-3



From the figure 1 above and the figures 2 and 3 below, which we have seen, it can be seen that coordinate, velocity and acceleration fluctuations do not occur in exactly one phase. The difference between the oscillation phases of coordinate and velocity and velocity and acceleration is equal to $\pi/2$. And the distance between the phases of coordinate and acceleration oscillations differs by π , that is, they oscillate in the opposite phase. In addition, it is necessary to pay special attention to the fact that, regardless of whether it is a mathematical pendulum or a spring pendulum, the equations of motion, speed and acceleration of all harmonically vibrating bodies are similar. Now let's look at how the graphs of the magnitudes of speed and acceleration look like.

To do this, we need to convert the connection of speed and acceleration to time into the form of connection to the coordinate. In this case, we use the trigonometric equation familiar to us from "Trigonometry".

$$\sin^2 \alpha + \cos^2 \alpha = 1, \quad \Rightarrow \quad \begin{cases} \sin \alpha = \pm \sqrt{1 - \cos^2 \alpha} \\ \cos \alpha = \pm \sqrt{1 - \sin^2 \alpha} \end{cases}$$

In addition, the equation of motion of the pendulum $x = A \cos \omega t$ from $\cos \omega t = \frac{x}{A}$ we create and use it as well.

$$v = -A\omega \sin \omega t = -A\omega \left(\pm \sqrt{1 - \cos^2 \omega t} \right) = \mp A\omega \sqrt{1 - \left(\frac{x}{A} \right)^2} = \mp \omega \sqrt{A^2 - x^2}$$

$$a = -A\omega^2 \cos \omega t = -A\omega^2 \frac{x}{A} = -\omega^2 x$$

Thus, the connection of the speed of the mathematical pendulum and the spring pendulum to the coordinate

$$v = \mp \omega \sqrt{A^2 - x^2} = \mp \sqrt{\frac{g}{\ell}} (A^2 - x^2) \quad \text{va} \quad v = \mp \omega \sqrt{A^2 - x^2} = \mp \sqrt{\frac{k}{m}} (A^2 - x^2)$$

on the basis of regularity and connection of acceleration to the coordinate $a = -\omega^2 x = -\frac{g}{\ell} x$ and $a = -\omega^2 x = -\frac{k}{m} x$

as it changes based on the law. In the velocity equation $v = \mp \dots$ In the first half of the signs, the (-) sign is selected, and in the second half, the (+) sign is selected.

The connection of velocity and acceleration to the coordinate given above, this is $v=v(x)$ va $a=a(x)$ if we make the graphs of the equations using the values given above for myatniks, we will have pictures 4 and 5. In this x coordinate value $-A \leq x \leq A$ we have it.

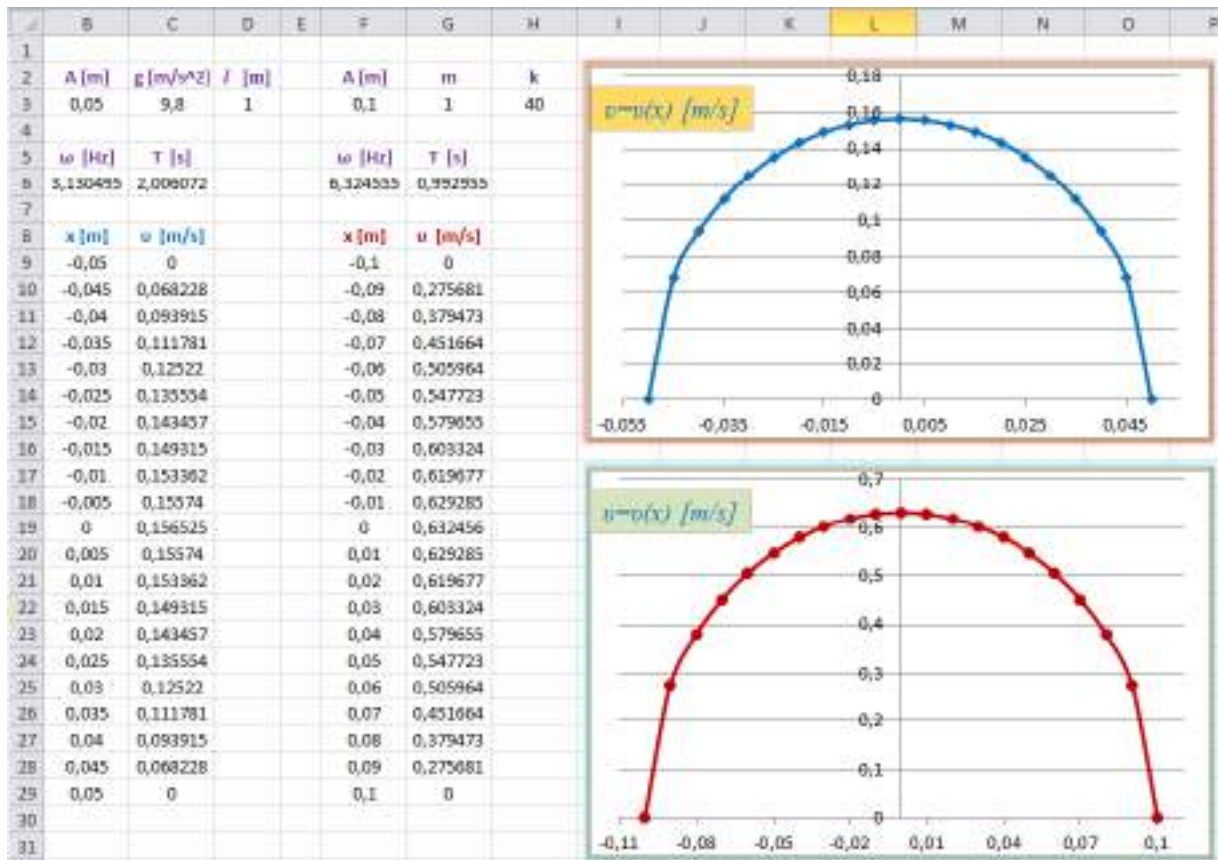


Figure-4

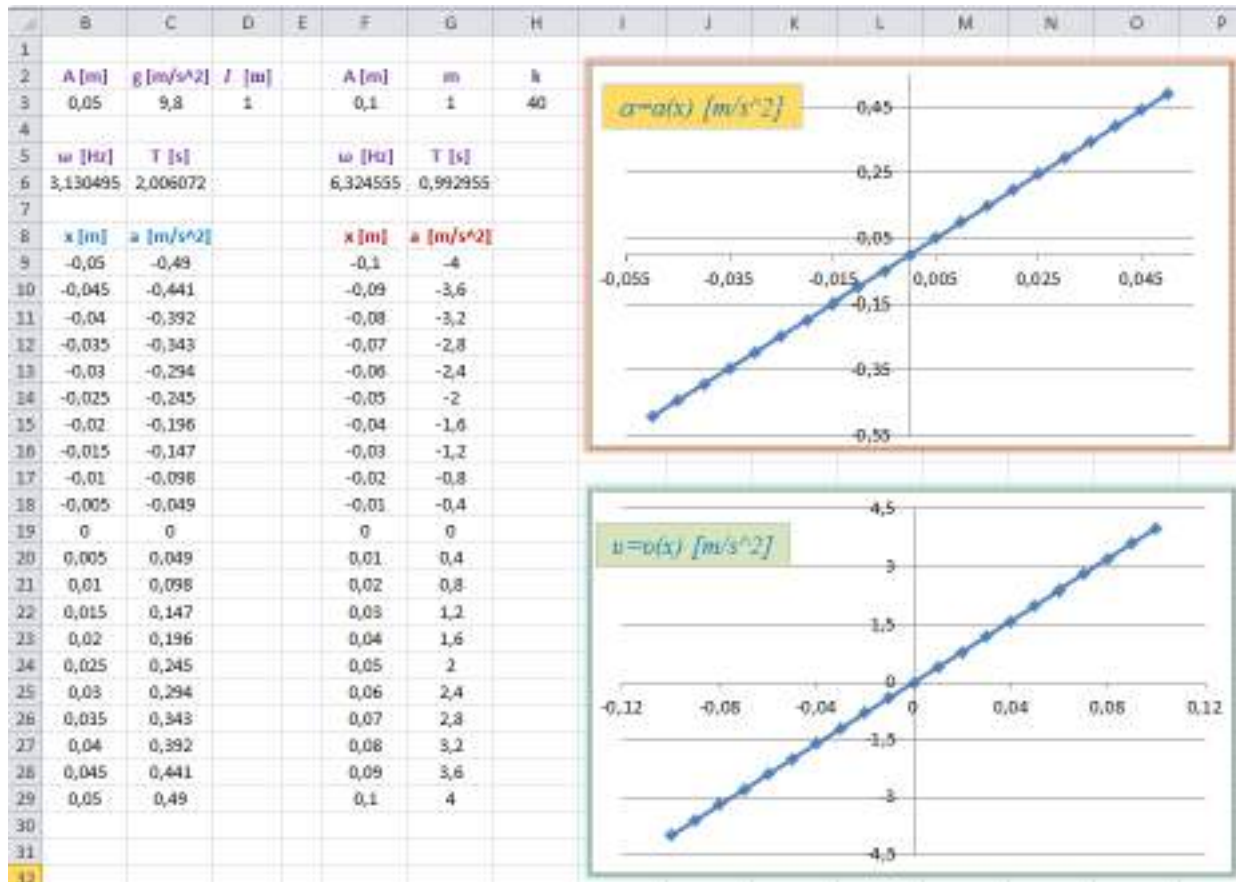


Figure-5

Figures 4 and 5 show that any pendulum (mathematical or spring or other type) with free harmonic oscillation for $\vartheta = \vartheta(x)$ the graph of the function is in the form of a circular arc, $a = a(x)$ and the graph of the function is in a linear view.

Thus, we learned how to create graphs of the movement, speed and acceleration of harmonically vibrating bodies using the Microsoft Excel software tool, and we learned that the shape of the graphs does not depend on the type of pendulum. In general, there are many and various software tools that can be used to create these graphs and calculate various quantities in these oscillatory processes. However, from the point of view of the fact that it is easier for students of academic lyceums to understand and master, we chose the software tool "Microsoft Excel".

Advantages of teaching the subject using various modern software tools:

- serves to expand students' thinking and imagination about vibrational processes;
- trains students to use information technologies;
- simplifies calculations and saves time;
- achieved a clear result.

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THE IMPORTANCE OF USING MONTESSORI EDUCATION IN THE FORMATION OF CREATIVE ABILITIES OF PRESCHOOL CHILDREN

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ABSTRACT

This article presents ideas about the importance of using Montessori education in the formation of creative abilities of preschool children. Recommended for use by educators and parents.

KEYWORDS: *Observation, daily notes, lagging behind, free creativity, analysis, synthesis, ornament, combination, collection of specific material*

It is the humanization of education and the opening of human abilities, as well as the satisfaction of its various needs in relation to education, ensuring the priority of national and universal values, and the harmony of human, society and environment interactions. That is why, today, in order to develop the pedagogy of preschool education, a number of advanced methods are being implemented. One of them is Maria Montessori technology. This is essentially a "natural" method learned from life, popularized by its all-round perfection in child rearing. As the Minister of Preschool Education A. Shin noted: "Humanity's talent should be revealed right from childhood." Maria Montessori's technology is a set of methods that promotes this idea, and plays an important role in educating a mature, independent thinker and a person who always strives for success. We can achieve the intended goal only if we combine this technology with the national cultural and historical heritage of our people and universal values in the education of preschool children. Creating the foundations of such education is our main goal today. A new approach to the field of education in pre-school educational organizations, proper organization of work in terms of quality and content is the demand of the times. The teacher should remember that there are additional ways to get information about the child. Additional sources of information about the child's individual characteristics, interests and needs include: information received from parents; conversations, interviews, analysis of children's activity products, special pedagogical situations organized by pedagogues and specialists.

It is possible to witness that there are mentally normal children who are very shy (dauntless) in drawing, both in the family and in the kindergarten. If we leave such children at the disposal of their perception (judgments) and a clean white sheet, they will not start drawing for a long time. They are left behind in the sense of satisfying the desire to know the

relationship of time and space that exists in every person. What to do with such children? Should we leave them on their own and wait for them to engage in "free creativity" independently, or should we come to their aid, that is, put Montessori's geometric shapes in front of them and explain how to use them? I followed the way Montessori preached, says Julia Ivanovna Fausek, a follower of Maria Montessori in Russia. Maria Montessori and Julia Fausek met twice in Rome. These two researchers wrote many books and achieved success in the field of pedagogy. Yuliya Fausek says that every educator has different options: from complete non-interference to real teaching, that is, to help, in this case it is necessary to turn to this end. Other children, on the other hand, are quick to describe and draw what all little children draw. Some of them draw in this way for a long time and do not quickly get used to geometric shapes, while others draw by themselves for some time and quickly begin to draw using geometric shapes. Daily notes are notes for educators who record the main events and impressions at the end of the day. They are useful for tracking some achievements and failures, daily events or important events. Such notes may describe what the child is doing, but they must be factual and free of opinion to be useful in assessing the child's development. Observation should become an ongoing practice, part of all interactions and actions, and a way to observe small changes and individual characteristics. Regular monitoring allows you to act in advance and prevent problems. It is recommended to take notes during and after the lessons. It's easy to forget the different situations that are happening. Notes make it easier to identify patterns and growth. Although the teacher's notes are primarily intended for the teacher's own use, the diary can be shared with colleagues and parents. Here are some examples of child observation for teachers from Julia Fausek's children's diary:



1. "Lena K. — 5 years old, daughter of a junior postmaster. He was admitted to kindergarten in November. November-December. Taking paper and pencils, he quickly began to draw: he simply colored the paper with different pencils. It only lasted one day. Red dominates in his paintings, and only by the last days (December 12-17), he began to add fiery, yellow and green colors (in chromatic games he always chooses red, sometimes fiery)."

2. "Shura S. - 5 years old. A capable, but very timid (shy) girl. Received in November. He loves to draw and draws a lot. He immediately (immediately) began to draw houses, but the very next day he was obsessed with geometric shapes."

3. Yura V. - 3 years old, son of a teacher. He was accepted in November, and he started painting at the beginning of January. For the whole month, he was engaged only in drawing on paper with red and blue pencils in different directions. At the beginning of February, Yura took geometric shapes and drew roads on one sheet many times, coloring most of them with one color pencil. On March 20, Yura came to me with a triangle and said: "Teach me." We sat together. With my help (I held the frame) Yura drew a triangle and a frame and painted the finished picture with red and blue pencils.

4. Genya B. Genya started trying to learn the combination in April. Not satisfied with one form, he began to combine 2 - 3 forms. At first, his favorite shape was the triangle, and later he began to add others. The hand, which was weak before, is now determined, the short and vague strokes in the colored pencil are now longer and more reliable, (faster) and do not go out of bounds.

5. "Kolya P. On January 27, Kolya suddenly said again, "I don't draw, I can't draw." I convinced him and said, "You know how to draw." He went to work (based on geometric shapes), repeated the same picture several times, and for some time did not draw anything at all or very little. Gradually, the need for development appeared in it, but how? Neither he nor I know this yet. March 24. "I want to draw a star!" We sat down and I helped her draw the star, which meant I held the triangle and the frame while she drew the shape. The next day, he came up with a combination of three shapes. April-May. Many combination pictures of shapes.

6. Shura S. - 5 years old. In April, after a long practice of individual painting, he accidentally placed an iron circle on a square and began to work independently. "This is how I draw!" he said. He repeatedly repeated the combination of two shapes (a square and a circle) in different forms. Interested in making patterns, uses all 10 shapes. By watching them, you can see that when he creates patterns, when he places the first or second form on paper, when he changes it, he thinks about it, looks carefully, and sometimes, when he is not satisfied with the result, he abandons the work he started and starts combining new forms. He repeats his favorite combination 2-3 times. He observes full symmetry when painting.

7. Yura. V. - 3 years old. March. Yura came to me in a triangular shape. A triangle was drawn on his paper. "I want a star." I showed him how to place the iron triangle on the drawn triangle on the paper so that the star would come out. Yura drew a triangle with a pencil and painted the resulting

picture with pleasure. The next day he said, "I want another star." This process was repeated again. After that, Yura began to draw stars independently. They made a lot of noise, but he was very happy.

"I started collecting pictures of children when I had the opportunity to observe them more under the influence of external conditions," says Yu. Fausek. But both the earliest observation and the most recent observation to date give the same result. This type of drawing, that is, drawing using geometric shapes, primarily serves as an additional factor in the development of children's writing. I will repeat that if we look at many children's drawings of this type, we will see that first the lines and colors go beyond the limits, and then they are done keeping within the strict limits. Through these pictures, it is possible to observe the improvement (improvement) of the child's hand muscle apparatus. Due to the existence of boundaries that children define themselves, they coordinate the movements of their hands and fingers. Only then is he freer than drawing sticks on a ruler or drawing a line on a white paper with no boundaries. In the first case, it is compressed by a very large inertia, in the second - its complete absence creates free movement. If we observe this type of drawing in a row in a number of children for some time, in the exercises, children are not satisfied with the image of one geometric shape, but begin to make 2 or more combinations of one shape from different angles. Some children approach this combination independently, while others imitate their friends. It can be said that at the beginning of this work, the child does not have a preconceived goal, that is, he does not have a clear picture in his imagination. He gains experience based on samples, as a result of which one or another pattern emerges by chance. If such a random combination turns out to be lucky (good), the child repeats it several times, and sometimes many times. Every time a well-made example brings great pleasure to the child. "Look what I came up with", "I drew them in such a way that the result is a star", says the child, showing the triangle in different positions. Most children's favorite geometric shape is a circle. They like to hold it in their hands, touch it with their fingers, turn it around on the table, and finally draw endlessly with a pencil.

After observing children's drawing in Montessori kindergarten for a long time, we notice that all children go through three stages of drawing. In the first period, they draw what they want, then they spend a lot of time creating patterns, coloring outlines, and then there is a period when they are devoted only to shapes. At the same time, some leave "optional pictures" and are given only such pictures. Others return to "optional pictures" from time to time. And finally, there comes a time when children seem to feel a new strength in themselves, and they start drawing voluntarily again. This process happens in all children: (all children behave this way) those who draw a lot, those who draw little, and those who don't draw at all. Even children who do not draw at all begin to draw. His next drawings are very different from the previous ones. Children draw not only flat geometric shapes, but also geometric objects and other objects (cubes, pictures, plates, boxes, etc.) that are among the didactic materials of Montessori. Based on them, they happily discover familiar



shapes. "Discovering geometric shapes in objects," says Montessori, "they enjoy seeing familiar things." For them, it ends up not simply observing the subjects, but synthesizing them through analysis and interpretation. It is the sameness that outwardly appears diverse, or, to be more precise, the real limitation of forms." This desire of children to identify traces of objects not only on paper, but also on clay, sand, soil, wax and other surfaces is familiar to every observant person who lives with them not only in kindergarten, but also in life. They look with surprise and interest, for example, at footprints in wet sand or snow, at the trail of fallen leaves in autumn gardens. I have observed such phenomena hundreds of times. Who hasn't seen children making traces of various objects in clay, wax, or snow? Stamping on melted plasticine is a passion of many children. By drawing a flat geometric figure, the child performs the same analysis: he creates something abstract from a concrete object. By repeating such analyzes many times, the child gradually moves to a combination of forms that pass into synthesis. Later, when he observes the result of his work, he analyzes it more deeply. He creates a combination by adding other geometric shapes to the geometric shapes he has drawn. The child is able to interpret each picture, no matter how difficult it is. "I took a triangle and placed it like this," he says, placing the triangle on top of the picture.

"I took a triangle and placed it like this," he says, placing the triangle on top of the picture. "Then I took this circle and put it like this, then a small circle" and so on. They practice making ornaments for a long time (and we can emphasize from our experience that children are devoted to this for a long time, always and carefully). Most of the children can understand and analyze the ornaments that were not made by them. Among the ready-made contours that we give children to paint, there are also ornaments, or, as children say, "patterns". If you ask a child to explain such a picture, he will look for all the geometric shapes included in the picture and place them in its contours. Some see shapes and recognize them without geometric shapes. Sometimes children do this on their own without our prompting. In addition, children begin to see ornaments in the environment around them, pay attention to them, and begin to understand them well.

No matter what 5-6-7-year-olds draw, except for some really gifted ones, none of them are creative or elaborate. For the development of children's imagination, there is a need for real material collected from the environment. If you don't collect enough and accurate material, you won't be able to create. If the correct vision and manual mechanism are not developed, if there is no means to rework the material with great mental work and renew it, then there will be no such opportunity. Only when all of this is established in some sense, we can think about the level of development of the child's impression. But we shouldn't label their work as "reworked" or "creative." After all, we are not judges in this sense, we can be very wrong without knowing anything. Children are not creative, each of them is preparing to be creative in their own way. The creator is naturally gifted with great talent. They become creative even without our intervention and without our efforts to develop "child's creativity". We need to use scientifically based methods in each part of the Montessori system, paying

particular attention to saving their energy in the formation of children's creative abilities in the future.

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EVOLUTION OF VALUABLE ECONOMIC CHARACTERISTICS OF SYSTEMS MADE BY INTROGRESSIVE METHODS OF COTTON

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ABSTRACT

This article reveals the results of the study on precocity of cotton lines, such as opening rate of cotton bolls of introgressive lines that were found to ripen 2-13 days earlier than a model sample C-6524 cotton variety. Particularly, in T-PCM line the vegetation period made 109 days that was noted to be precocious for 12,3 days than a model sample variety. The selected lines according to their cotton weight in one boll were determined to have high indicators, as well as on germinability of plant seeds. The results of the cluster analysis by economic traits in the lines showed that according to the economic traits, the first cluster included lines T-24 and T-138 were found to be closely related to each other. The line T-PCM was included to the third cluster, and it was found that this line was among the varieties with high indicators on all valuable economic traits. As a result of comparative analysis of lines, a new medium-fiber cotton cultivar "Niso" was created with productivity of 38,3-56,5 c/ha, cotton weight in one boll 6,0-6,7 g, precocity of 109,0-112,0 days, fiber, the weight of 1000 seeds 118,0-120,0 g, fiber length of 34,0-35,9 mm, fiber yield of 36,9-41,4 %, relative tensile strength of 34,6 cN/tex.

KEY WORDS: cotton, genome, cultivar, boll, fiber, yield, introgressive line

INTRODUCTION

The research of today aimed to improving the economic and quality indicators of upland cotton in the world focuses particularly on a wide use of wild species, especially the involvement of interspecific hybridization, obtaining rare genetically enriched hybrids using experimental polyploidy methods and creating new varieties with high economic and quality indicators from the existing cultivars under cultivation presently. Recently, rare amphidiploids, recombinants, families, and lines have been obtained using wild species of cotton *G.harknessii* Brandg., *G.klotzschianum* Anderss., *G.raimondi* Ulb., *G.laxum* Phill., *G.bickii* Prokh., *G.australe* F.Mull, and other species. One of the urgent tasks on the study of these lines is to determine the genetic regulations of morphological-economic traits, such as heredity, variability and correlation [1-17].

At present, as a result of the creation of new varieties of cotton with a new genotype, interspecific hybridization with the participation of intergenomic cultural and wild species, as well as the use of experimental polyploidy methods, native scientists A.A. Abdullaev et al. (2020), B.Kh.Amanov et al. (2020), Kh.A.Muminov (2020), B.A.Sirojiddinov (2020) and also foreign scientists, Wendel, J.F., R.C. Cronn (2003), H.Benbouza et al., (2010), Yu Chen et al., (2014), J.Sh. Shavkiyev et al. (2020, 2021) have created unique hybrid forms with high economic characteristics, primary sources resistant to stress factors based on the hybridization of wild species of cotton with cultural varietal samples and isolated new genetically enriched genotypes, as well as recommended primary donors for practical selection. For example, B.A.Sirojiddinov (2020) created new interspecific complex hybrids based on hybridization of complex (*G. thurberi* Tod.x *G. raimondii* Ulbr.) *G. arboreum*

L.x *G.hirsutum* L. amphidiploids with cultural varieties *G.hirsutum* L. and *G.barbadense* L. involving 4 and 5 cotton species, and also he determined the formation and variability of main valuable economic traits.

B.A Sirojiddinov (2020) made a comparative assessment of the inheritance, degree of variability and formation of valuable economic traits in polygenomic hybrids created using interspecific hybridization and experimental polyploidy methods. It should be emphasized that the research on obtaining introgressive forms using the hybridization of multi-genomic wild cotton species and experimental polyploidy methods, on the formation of morphological features in the lines on the basis of the obtained forms, and as well as on their correlation is of scientific importance.

MATERIALS AND METHODS

Cotton lines T-24, T-PCM, T-138, T-141 obtained under intergenomic introgressive methods were used as an object of the study. As well as, zoned model sample C-6524 variety was used to compare and analyze the lines obtained by experimental polyploidy method of three-genome Tashkent - 1 x (*G. raimondii* x *G. thurberi*), Tashkent - 1 x (*G. harknessii* x *G. raimondii*) hybrid combinations belonging to *Gossypium* L. family. The study was carried out in Genetics and Experimental Plant Biology Institute and Genetics and evolution biology department of Chirchik state pedagogical institute in Tashkent region.

RESULTS AND DISCUSSION

It is known that one of the most important indicators of the precocity of cotton is the period from the date of germination to the opening of 50% of the pods. When comparing the trait on vegetation period by results of 2017-



2019 in multi-genomic lines, a significant difference was not observed in this trait. In C-6524 variety which was studied as a model, this trait showed average 119,4-122,1 day by years. According to the trait of vegetation period, an average three-year data in the lines constituted 109,2-117,7 days, that is, 1,7-12,9 days earlier (precocious) than in model C-6524 variety. In particular, there was a slight change in studied T- PCM line over the years, i.e., according to the results of 2018-2019, this line was found superior over all lines and its average rate was ± 109.2 days.

In our study, a comparative analysis of the trait on the first joint of plant with yielding branch was made according to the results of 2017-2019, no sharp differences were observed on this trait in the introgressive lines, and in model C-6524 variety it was average 5,1-5,5 joints over the years, with a coefficient of variation of 13,5–17,3% respectively. The average rate in the lines on this trait was 3,9-5,5 joints. It was noted that a good result on the trait of the joint of plant with the first yielding branch was 4,2 joints in T- PCM line, and the coefficient of variation was 19,0%, and a slightly lower value on this trait was 6,2 joints on T-138 line, that is a lower result than in C-6524 variety.

When the trait on cotton weight in one ball was studied comparatively by the results of the years 2017-2019, this trait in model sample C-6524 variety was average 5,2-5,5 grams by years. In the lines the rate was average 5,7-7,1 grams on this trait, that is, comparing to model C-6524 variety the lines were found to have 0,3-1,6 gr heavier cotton weight in one boll.

According to the results of 2017, cotton weight in one boll in multigenomic lines made 5,8-6,4 gr. The highest indicator on this trait was noted in T-PCM line, 6,4 grams with variation coefficient of 7,8 %, and a slightly lower indicator was observed in T-138 line, 5,8 grams, but showed +0,6 higher indication than in model variety C-6524. By the results of the second and the third years (2018-2019), analogue indicators were recorded on the trait of cotton weight in one boll. The aforementioned large-boll lines, T-PCM (6,7 g), T-24 (7,1 g) are recommended to be used in practical selection process as a primary material.

A comparative analysis of the trait on fiber length by the results of 2017-2019, which is one of the important indicators of cotton, showed similar results in the lines on this trait. Fiber length trait was noted to be average 33,6-35,9 mm, comparing to model C-6524 variety 0,5-2,8 mm higher indication was found. The highest result on fiber length trait was observed in T-PCM line, 35,9 mm with variation coefficient of 4,37%.

According to the second and the third year (2018-2019) results, similar rates were recorded on fiber length trait. For example, on the results of 2019, T-141 line showed 33,6 mm, variation coefficient of 3,6%, lower than other lines, while T-PCM line had the highest indication - 35,1 mm among other lines.

The above analyzes showed that the fiber length trait of the 4 lines was superior to the model variety. This indicates that the results of the lines on the fiber length trait fully complies with the requirements for type IV fiber, and in further research to increase the lines it assures that the yield and fiber length trait will not decrease.

When the results for 2017-2019 on the fiber yield trait were analyzed comparatively, some lines had differences on this trait. In particular, if we look at the results of the analysis in 2017, a lower figure was observed than in 2018-2019. On fiber yield trait, the lines had average 36,8-38,5%, that is, 1,9-3,6% higher indication was recorded comparing to model C-6524 variety.

According to the research analysis of the second and third (2018-2019) years, as a result of the proper conduct of individual selection work, very good results were obtained on the fiber yield trait. For example, when the results of 2018 were analyzed, average 40,3-41,7%, variation coefficient 4,0-6,1% were recorded on this trait, it indicated 5,1-6,5% more fiber than in model variety. As well as, in T-141 line the highest indication 41,7% was noted by fiber yield, with variation coefficient of 4,0%, lower indicator on fiber yield trait was observed in T-PCM line, average 40,3%, with variation coefficient of 6,1%.

When the lines were comparatively analyzed by the trait of the weight of 1000 seeds according to the results of 2017-2019, no significant differences were observed in the lines on the three-year data. The trait of the weight of 1000 seeds in model C-6524 variety over the years made average 115,6-117,0 grams, while the variation coefficient of 1,2-4,2% respectively. In the lines, this rate was found to be average 109,1-120,3 grams, that is, 0,3-5,5 grams heavier than in model C-6524 variety. The analysis of the results of the study showed that the degree of variability of multi-genomic lines on this trait was not significantly different from each other, that is at the level of the model variety, and also showed that the lines were stabilized on the trait of 1000 seeds weight.

The quality indicators of cotton fiber are analyzed using modern HVI equipment. Therefore, in our research, the quality indicators of new lines of cotton made based on different genomic species were determined using HVI equipment at the Republican Center "Sifat" (Quality) and the data obtained on some quality indicators of fiber were compared with the data on fiber of zoned model variety C-6524.

When micronaire indicator of the cotton lines was analyzed in 2017-2019 in the center "Sifat", it was found to be between 4,1-4,8 mic. In 2017, the best result on micronaire trait was recorded in T-24 line (4,3 mic), which matched to the "base" interval application. Micronaire indication of cotton fiber was within 4,6 mic in 2 lines out of 4, constituting 50,0 % of all studied lines. Only in T-138 line this indicator was 4,4 mic, which was determined to be equal with the indication of model variety C-6524. No micronaire, less than 3,4 mic and more than 5,0 mic, which is one of the qualitative characteristics of the different genomic lines, were recorded, i.e., the lines that met the "discount" criteria were not recorded. According to the second and third year data, analogue indicators on the micronaire trait were recorded. For example, in the T- PCM cotton line analyzed under this trait, there was a slight positive change over the years, i.e., according to the results of 2018-2019, this line with 4.1 mic matching "premium" interval application was found to be superior to all lines on this trait. The micronaire trait of the lines is significantly positive than that of the model C-6524 variety, which fully complies with the requirements for type

III-IV cotton fiber belonging to the medium-fiber cotton varieties on the micronaire index.

In our research, from the fiber quality indicators, the specific tensile strength (Str) - strength of cotton fiber was also analyzed. The fiber strength is expressed in the HVI Calibration Cotton of this calibrated cotton, in cN / tex. According to the results for 2017, the trait of the specific tensile strength of fiber was between 32,1 cN/tex (T-141) and 35,4 cN/tex (T-35,4) in all analyzed multigenomic lines and the difference from a model variety made 7,8-11,1 cN/tex. In 2018-2019, positive results were recorded on the trait of the specific tensile strength (Str) in all multigenomic lines. In C-6524 variety which was taken as a model sample, the specific tensile strength made 24,3-27,0 cN/tex.

Analysis of the results obtained on the quality of cotton fiber shows that the indicators of all different genomic lines were found to be positive in terms of fiber quality and fully meet the current requirements for the quality of cotton fiber. One of the main reasons for this is a good fiber quality of cultivated and wild species of cotton involved in the production of lines, the separation of transgressive forms of introgressive plants obtained on the basis of experimental polyploidy and the proper selection process, as well as the creation of new lines with high fiber quality.

In our experiments, the division of the lines into clusters was determined using the Euclidean distance as a measure of genetic proximity in the Statgraphics computer program, and the Ward method as a method of combining. In particular, D. Heilegiorgis, Kh.Muminov, Z. Ernazarova, B.Amanov [2020] determined by cluster analysis method the occurrence of genetic variability among the genotypes in a significant degree in order to evaluate yield traits genetically,

this case, accordingly, shows the availability of increasing the yield at the expense of using the genotypes found in clusters for the hybridization of genotypes.

Quantitative traits of multigenomic lines were used for cluster analysis. The economic traits of these lines were studied, and the parameters on the weight of cotton in one boll, weight of 1000 seeds, fiber length, fiber yield were determined and statistically analyzed in laboratory and field conditions.

From the studied samples, the highest rate on the trait of the weight of cotton in one boll was noted in T-PCM line (6,4 gr), while lower rate on this trait was in the plants of T-138 line (5,9 gr). In the remaining lines, an average rate on this trait ranged between 6,2-6,3 gr. The minimum number of cluster to which the lines combined was 2, the maximum number was 4. When the division of lines into the clusters was analyzed, the third cluster was found optimal for the determination of proximity of cultivars by their valuable economic traits (fig.1).

An analysis of the results obtained shows that although the lines T-24 and T-138 which were included in the first cluster, differed from each other in the size of their bolls, it was found that they were closely related lines on their valuable farm traits. The economic traits of T-141 line, which is included in the second cluster group of the cluster system, is higher than other samples and plays an important role in the creation of medium-fiber high-yielding varieties. T-PCM line was included in the third cluster, and it was found among the high-yielding varieties by its all valuable economic traits, and it was determined that these lines could be used in the selection process.

Dendrogram

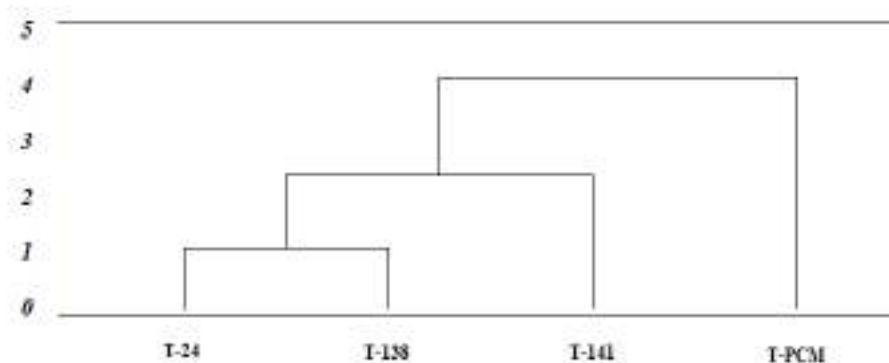


Figure 1. Diagram of division of the lines into cluster by their economic traits.

If more than two populations were obtained to determine fiber quality indicators, then the genotypes were divided into 3 groups according to their proximity to each other. For this purpose, the cluster analysis method was used to determine the degree of diversity of these introgressive lines on qualitative traits and to combine them according to their relative proximity.

Fiber quality traits of introgressive lines were used for cluster analysis. In these lines, the quality characteristics and micronaire, specific tensile strength, fiber upper half mean length were determined and statistically analyzed by planting the lines under the same conditions. When we analyzed the quality characteristics of the lines, the minimum number of combined clusters was 1 and the maximum was 3.

When analyzing the division into these groups, it was found that a 3-cluster analysis was most moderate to determine the proximity of the varieties on valuable economic traits.

One of the most important tasks in the world cotton growing is to increase the efficiency of primary raw materials that are resistant to various adverse factors, diseases and pests.

As a result of comparative study and analysis of valuable economic traits and features of the lines obtained on the basis of introgressive methods, the research was continued to bring the remarkable lines to the varietal level and their introduction into production. During the study, the selection of the line T-PCM resulted in the creation of new medium-fiber cotton cultivar "Niso", and the parameters on valuable economic traits of this new cultivar were submitted to small



variety testing in Zangiota Experimental Base of the Institute of Genetics and Experimental Plant Biology at the Academy of Sciences of the Republic of Uzbekistan and the State Variety Testing Center of agricultural crops. The new

medium-fiber cotton cultivar “Niso” successfully passed ground control in 2019 and since 2020 is being tested at VTC branches in the country (Table 1).

Table-1
Reference of Variety Testing Center branches for “Niso” cultivar
(comparing to model cultivars for 2020 on average indicators)

Cultivars	Average yield, c/ha	Vegetation period, day	Cotton weight in one boll, g	Fiber yield, %
Fergana variety testing branch				
C-8290 model	45,5	126,0	6,0	35,7
Niso	56,5	124,0	6,5	36,9
Khatirchi variety testing branch				
Bukhara-6 model	40,8	115	6,3	33,4
Niso	41,5	110	6,4	37,1
Mingbulok variety testing branch				
C-6524 model	40,5	118	5,6	35,4
Niso	42,5	118	6,1	36,5
Termez variety testing branch				
Beshkahramon model	37,5	111	4,7	34,6
Niso	38,3	110	5,9	38,1

As a result of the research conducted, it was found that the new medium-fiber cotton variety “Niso” is integrated in terms of economic and quality traits, and is now competitive with the regionized varieties of medium-fiber cotton in the country. The new medium-fiber “Niso” cotton variety has high fiber yield and quality indicators, technological properties and the quality of the fiber fully comply with the requirements of type IV, as well as its high yield, disease- and drought –resistance traits indicate its superiority over other regionized varieties, gives high results in production after introduction.

CONCLUSION

Analysis of the results obtained showed that the rate of boll opening of the introgressive lines was 2–13 days earlier than that of the model C-6524 variety. It was found that the lines selected by weight of cotton in one boll had high performance, which was significantly superior to the model variety. Under the influence of strains of pathogen fungi *Fusarium oxysporum* f.sp. *vasinfectum* on plant seed germination, T-138 line showed strong resistance, and the lines T-PCM and T-138 were found to have 80,0-100,0% tolerance to *Verticillium dahliae* fungi. It was also observed that T-PCM, T-141 lines didn't get damaged by *Fusarium solani*, and the biomaterials of leaf samples of T-24 and T-PCM lines were not infected with *Verticillium dahliae* phytopathogen fungi. The results of the cluster analysis of valuable economic traits in the lines showed that the T- PCM line was included in the third cluster, and that this line was among the varieties with high rates by all economic traits, which could be used in the selection process. As a result of comparative analysis of the lines, a new medium-fiber cotton cultivar “Niso” has been created with the indicators of plant height 100,0-110,0 cm, productivity 38,3-42,5 c/ha, cotton weight in one boll 6,0-6,7 g, precocity 109,0-112,0 days, fiber

of IV type, weight of 1000 seeds 118,0-120,0 g, fiber length 34,0-35,9 mm, fiber yield 36,9-41,4 %, relative tensile strength 34,6 cN/tex.

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GROWTH OF DIGITAL PAYMENT APPS IN INDIA-A STUDY

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ABSTRACT

The world has been shifting toward all things digital for a very long time. But the year 2020 made clear how critical it is to quickly adopt new technology. This modification took place fairly immediately after the lockdown was put into place, especially in India for digital payments. Since demonetization in 2016 the Indian government has aggressively promoted and spread online payments. The myriad economic and financial considerations that compelled Indians to change online payments were all motivated by the idea of "Digital India." Making sure there is financial equality becomes a matter of the utmost significance in a country like India where differences might occasionally be different.

KEY WORDS: Digital, Payment, Technology, Government and India

1. INTRODUCTION

The use of cutting-edge technology for customising solutions, such as artificial intelligence (AI), machine learning (ML), and big data, has expanded in the Indian fintech business. The use of digital payments has risen in India as a result of demonetization and COVID-19. As of March 2020, India has more than 50 crore smart phone users and about 100 crore active mobile connections, which is one of the main reasons why digital payment systems have exploded there. In addition to being safer than a cash transaction, becoming cashless also takes less time. Additionally, it aids in keeping track of all completed transactions. These applications are being used by a growing number of people every day. Many people Are Drawn To These Apps By Their Wallet Functionality.

2. REVIEW OF LITERATURE

Anuja Erandekar et al (2020) Within the previous two decades, the banking industry has undergone a transformation. With the emergence of digital channels, branch operations have undergone a radical transformation. Banks currently provide a variety of services in addition to lending money and taking deposits. With the advent of mobile and internet banking, the nature of the services offered by banks has completely altered. The present generation makes every effort to avoid visiting the actual bank branches as much as possible because time and location are no longer restrictions for accessing the bank's services.

Papadopoulos (2007) It is generally acknowledged that new technologies in electronic money (e-money) offer creative solutions, boost convenience, and save costs, while in retail payments, they raise the prospect of a society with no need for cash. Cash is still the cheapest and most anonymous option for small-value transactions, despite the fact that it has a long history of importance.

Pushpa Bhatt (2019) has evaluated the market for digital payments and its many divisions. In order to provide light on potential business prospects for service providers, behavioural elements of these groups are investigated. The digital payment industry in India has been reviewed by **Hyma Goparaju (2020)**, who referred to it as a sunrise industry because technological advancements in mobile devices and financial applications (apps) would drive the adoption of digital payments. The Porter's Five Forces Analysis of the Indian digital payment industry was also examined. Smartphone use, developed financial infrastructure, and consumer interest in payment innovation are the main factors pushing digital payments through mobile applications.

Sanghita Roy et al (2014) noted that although India's e-payment system has experienced significant progress, there is still more that needs to be done to enhance utilisation. Still, cash is used in 90% of transactions. Technology Acceptance Model was employed for the investigation. They observed that the four variables that help to enhance the electronic payment system are innovation, incentive, consumer convenience, and legal framework.

Rakesh H M (2014) They attempted to investigate the variables that affect consumers' acceptance of online banking in their study paper, "A Study on Factors Influencing Consumer Adoption of Internet Banking in India." Baghla, Ashish (2018) After demonetization was announced on November 8, 2016, the Indian government promoted digital payments. The primary goal of the Digital Payments project was to eventually develop a cashless society. It was getting more challenging to obtain the statement of transactions and transfers made by persons to other parties due to the rising corruption and black money in India. The government started the "Digital India" programme to promote governance and boost operational transparency.



Dr. Kota Sreenivasan Murthy (2019) He said that digital payments in India's digital banking system bring about improvements in transparency, scalability, and accountability. In order to create a "cashless" society, RBI is promoting these innovative payment and settlement methods.

Ridam Verma et al (2019) have investigated how Demonetization would affect digital payments. They have discovered a few characteristics of digital payments and are using a multi regression model to analyse how these characteristics affect user preference. Pre and post digitization effects on cash and non-cash transactions has been done by **Aniruddha Ghosh and Ashish Srivastav (2019)**.

B. Angamuthu (2020) Digital payment systems provide convenience, transactional simplicity, and security. This analytical research focuses on the rise of digital payments from 2012–2013 to 2018–2019 in terms of transaction volume and value. According to this survey, overall digital payments have increased in volume (24.11%) and value (15.84%) during the past seven years throughout the nation. Furthermore, in 2020–2021, the nation is predicted to generate 28,000 lakh transactions worth more than INR 15,20,000 billion in digital transactions.

2.1. Research Gap-

Given that this is a rapidly evolving industry, we require the most recent information in order to identify the holes in the payments system. No field research has been done, and there are no consumer testimonials or comments available. As a result, this study aims to fill all of the gaps identified, and research objectives can be defined.

1. Research Objectives:

- To research the Indian digital payment system's operation and evaluate the country's payment system advancements.
- To grasp the many opportunities and their effects on payment applications during COVID-19 and Demonetization.
- To get knowledge on customer preferences and interactions with the available digital payment options.
- To have some concept of how digital payments are projected to develop in India.

3. RESEARCH METHODOLOGY

3.1 Research Design

Most of the analyses in the study is descriptive. The target population's pattern of use of digital and monetary items will be shown through descriptive statistics and data frequency. Other metrics, such as percentage analysis, will be used to characterize the variances in the data before and after the COVID-19 and demonetization growth periods. The methods used include surveys to characterize the current situation, correlation studies to look into the link between variables, and developmental studies to track changes through time. There are three primary categories of descriptive methods: observational, case-study, and survey. In order to determine the growth of digital payment applications in India, a survey approach, or questionnaire method, has been employed in this research study.

3.2 Data & Data Collection

Our target demographic ranges from 15 to 55 years old. The target audiences come from a range of age groups, familial situations, and work environments. The study limitations must be understood, as must the target lifestyle, behaviour, habits, etc., in order to obtain reliable data.

Due to time and resource limitations, 81 people from the entire population will be included in the sample size for the survey. Quota sampling will be used as the sampling technique for this study, and SPSS will be used to analyse the data. Personal interactions and survey data were used as the major data sources (Google survey form).

For the Secondary data is obtained from different sources:

- Journals (such as EBSCO, Netscribes publications, SAGE Journals, International journal of Research, Google Scholar, PWC report, S&P Journals (such as EBSCO, Netscribes publications, SAGE Journals, International journal of Research, Google Scholar, PWC report, S&P Global)
- Books (such as Payment and settlement systems India (Journey in the second decade of the millennium, DIGITAL PAYMENTS -Trends, Issues and Opportunities)
- Newspaper Articles (such as Entrepreneur.com, Mint.com, and Quint) Websites (Wikipedia, Google, Quora).

4. DATA ANALYSIS & INTERPRETATION

4.1 DATA ANALYSIS

A poll was conducted, and participants answered questions on how they see the electronic payment system. The majority of the questionnaire's questions were influenced by earlier studies. However, a number of questions were independently created specifically for this study in order to address significant ideas that were not covered in earlier research. Some comments were rated on a five-point Likert scale, from fully agree (1) to utterly disagree (5). The survey also asks about sociodemographic information (gender, age), prior usage of financial services, and the use of digital payment applications for transactions.

The samples may reflect the entire population because they were chosen at random. Studying the significance of electronic payment methods in comparison to other channels is crucial, as is identifying any issues and coming up with suggestions that will help the channels get better. To improve the respondents' variety, the quantity of returned surveys, and the geographic accessibility of the survey, it was conducted both in-person and electronically. 200 questionnaires were sent out to respondents to gauge their thoughts on the expansion of the payment system. 100 of them were returned because the form wasn't



available or accessible.

4.2 DATA INTREPRETATION

OBJECTIVE (2)- To grasp the many opportunities and their effects on payment applications during COVID-19 and Demonetization

- **OBJECTIVE (3)-** To get knowledge on customer preferences and interactions with the available digital payment options.

According to the results from the data collected through questionnaire method(primary source) we can analyze that-

TABLE-1-Target population’s Age group

	Frequency	Percentage
15-25	39	48%
25-35	19	24%
35-45	11	14%
45-55	12	14%
Total	81	100%

INTERPRETATION- According to the survey result, we can see that, of the target audience, the bulk of respondents were from urban regions and were between the ages of 15 and 25. Out of 81, 54% were the most frequent users of digital payment portals, followed by 24% of those between 25 and 35.

TABLE-2-Gender

	Frequency	Percentage
Female	32	40%
Male	49	60%
Total	81	100.0%

INTERPRETATION- According to Table 2 above, of the total respondents, 40% are women, showing that the gender gap in digital literacy is larger for men than for women.

TABLE-3-Place of residence

	Frequency	Percentage
Metropolitan: 10 lakh and above	21	26%
Rural: population less than 10,000	4	5%
Semi-Urban: 10,000 and above and less than 1 lakh	13	16%
Urban: 1 lakh and above and less than 10 lakhs	43	53%
Total	81	100.0%

INTERPRETATION- Here, the respondents from rural regions are the least likely to utilise digital portals (using just 5% of them), whereas respondents from urban areas are more likely to do so (53%).

TABLE-4

How often do you use mobile payment methods? Analysis by AgeGroup

		Payment Methods			Total	%
		Never	Occasionally	Regular		
Age Group	15-25	0	5	34	39	48%
	25-35	0	4	15	19	24%
	35-45	0	3	8	11	14%
	45-55	3	4	5	12	14%
Total		3	16	62	81	100%
Percentage		4%	20%	76%	100%	

INTERPRETATION- The age range 15–25 is the most active presence in the above table, followed by the group 25–35 by 24%, demonstrating their support for the change in the payment system.

People in the age range of 45 to 55 are still cautious to use payment applications, which suggests that the expansion of digitalization is being driven by this demographic.



TABLE- 5
How often do you use mobile payment methods? - Analysis by location

		Payment Methods			Total	%
		Never	Occasionally	Regular		
Place of Residence	Metropolitan: 10 lakh and above	0	4	18	22	26%
	Rural: population less than 10,000	1	4	2	7	8%
	Semi-Urban: 10,000 and above and less than 1 lakh	0	3	9	12	17%
	Urban: 1 lakh and above and less than 10 lakhs	2	4	34	40	49%
Total		3	15	63	81	100%
Percentage		4%	19%	77%	100%	

INTERPRETATION- According to the study data, urban dwellers contribute the most to the digitalization process by 49%. We can also see that in urban locations, where 22 out of the residents are prone to use online payment methods, On the other hand, rural areas with slow growth have the fewest consumers.

TABLE- 6
How often do you use mobile payment methods? By Gender

		How often do you use mobile payment methods?			Total	%
		Never	Occasionally	Regular		
Gender	Female	1	5	26	32	40%
	Male	2	10	37	49	60%
Total		2	15	70	81	100%

INTERPRETATION- In terms of overall percentage, less use by female respondents than by male respondents might be attributed to a lack of interest or alternatives. When it comes to frequent usage, males and females are 75% identical in type.

TABLE -7
Transfer money among friends, family or others using the payment apps by Age Group analysis

		Do you transfer money among friends, family or others using the payment apps		Total
		No	Yes	
Age Group	15-25	4	35	39
	25-35	3	16	19
	35-45	2	9	11
	45-55	4	4	12
Total		14	67	81
Percentage		17%	83%	100%

INTERPRETATION- According to Table 7, almost 83% of respondents often send money to their family or other people using various payment applications. If there is a difference by age factor, people in the 45–55 age range are attempting to adapt new ways as about 50% of them are still not comfortable using applications.

TABLE- 8
Preferred payment app for transfer of money? Analysis by Age

		Preferred payment app for transfer of money					Total
		AmazonPay	BHIM	GooglePay	Paytm	PhonePe	
Age Group	15-25	1	2	22	4	10	39
	25-35	2	4	5	2	6	19
	35-45	0	2	3	1	5	11
	45-55	1	2	4	2	3	12
Total		4	10	34	9	24	81
Percentage		5%	12%	42%	11%	30%	100%



INTERPRETATION- According to the Table above, Google Pay is the most popular app among the target audience for transferring money, with 42% of the vote, followed by Phone Pe (30%) and BHIM (12%). However, the majority of users (those between the ages of 15 and 25) prefer Google pay the most. Some of the responders aged 35 to 45 use both Google Pay and Phone Pe.

TABLE -9

		Preferred payment app for bills and utilities					TOTAL
		Amazon Pay	BHIM	GooglePay	Paytm	PhonePe	
Age Group	15-25	2	3	17	4	13	39
	25-35	0	3	6	3	7	19
	35-45	1	2	4	1	3	11
	45-55	1	3	3	3	2	12
Total		4	11	30	11	25	81
%		5%	13%	37%	14%	31%	100%

INTERPRETATION- According to the above table, 37% of the target demographic consider Google Pay as their top app for paying bills and utilities, while 5% of them regard Amazon Pay as their least favourite app. However, the majority of customers, who are between the ages of 15 and 25, favour both Phone Pay and Google pay. The Old users (45–55 years old) like the BHIM app for transactions.

OBJECTIVE 4- To understand various opportunities and its impact on payment apps during Demonetization and COVID-19.

TABLE -10

Do you support digitization of payment apps?

	Frequency	Percent
No	5	6.2
Yes	76	93.8
Total	81	100.0

INTERPRETATION- Table 10 shows that 93.8% of the target demographic in India supports the digitalization of payment applications, while just 6.2% are opposed to it.

TABLEE-11

Integration of payment services in popular non-banking mobile applications such as WhatsApp, Apple Pay, Amazon Pay and Ola Money is one of the driving forces in growth of e-payments.

	FREQUENCY	PERCENT
Highly Agree	35	43.3%
Agree	23	28.3%
Neutral	9	11.2%
Disagree	7	8.6%
Highly Disagree	7	8.6%
TOTAL	81	100%

INTERPRETATION- According to data from the Likert scale, which was used to gauge responses, the majority of respondents (43.3%) and 28.3%, respectively, highly agree that the integration of payment services in well-known non-banking mobile applications is the key factor driving the expansion of e-payments.

TABLE -12

Did you use online payment apps in lockdown?

	Frequency	Percentage
Online Payments	78	96.3%
Other paymentoptions	3	3.7%

INTERPRETATION- Table-12 indicates that around 96.3% of the respondents began using online payment apps during the lockdown. As seen in the tables above, India observed a growth in the adoption of e-payment apps like PhonePe, Amazon Pay, and BHIM.



TABLE-13
What nudges you to make an online payment through an app?

	Frequency	Percent
Cashback and Offer	29	35.8%
Ease of payment, History, Lack of change	2	2.4%
Lack of cash	27	33.3%
Lack of change	13	16.04%
Nothing	2	2.4%
Shopkeeper insists to pay through app	8	9.8%
Total	81	100.0%

INTERPRETATION- We can see that Table-13 lists a number of factors, including cashback offers, which account for 35.8% of the reasons why customers choose online payment methods over physical ones.

Due to a paucity of change and currency during demonetization and COVID-19, consumers began to move to online platforms for a better, more hassle-free experience.

TABLE –14
Preference and perception on cash and digital payment systems[Privacy/Security]

	Frequency	Percent
Safe & Security	5	6.17%
Privacy	29	35.80%
Convenience	47	58.02%
Total	81	100.0%

INTERPRETATION- Table 14 shows the different preferences that target users have developed as a result of using mobile payment apps.

Payment apps are listed as having the lowest security ratings out of all payment methods, while being extremely handy (58.02%).

5. FINDINGS, LIMITATIONS AND DIRECTIONS FOR FUTURE RESEARCH

Findings from the primary research study: The lengthy research investigation yielded the following key conclusions:

- 1) The integration of payment services into popular non-banking mobile applications like PhonePe, WhatsApp, Google Pay, Amazon Pay, and BHIM is one of the causes fueling the expansion of e-payments.
- 2) The introduction of COVID-19 and demonetization has promoted the growth of digital payment services.
- 3) According to the respondents, the three most popular payment options for this age group are PhonePe, Google Pay, and BHIM.
- 4) The survey also points to a lack of knowledge on the expansion of payment apps, a lack of data security, a problem with client trust, or digital crimes.

The following are the findings from the secondary research study for objective (1) & (4):

1. The barter system was the first known Payment and Settlement System (PSS). As time went on, people began to pay their economic transactions using coins and currency notes. Payment services like Apple pay, PayPal, and Phone pay were widely utilized, as were third-party wallets.
2. Global trends point to heightened client demands for value-added services, increasing competition brought on by FinTech's rise, new technology, and a revolutionary payment situation.
3. According to the report, India's whole digital payment sector would reach \$1 trillion by FY23E, spurred by an increase in mobile payments. Mobile payments are predicted to increase from US\$10 billion in FY18E to US\$190 billion in FY23E. India's digital payments are anticipated to increase by more than three times to Rs 7,092 lakh crore by 2025. Government policies around financial inclusion.
4. **FUTURE POTENTIAL-** It is apparent that a new, digital India is taking shape, and that in the future, the country's payment system will undergo a number of significant developments. India seems to require some time to make the switch to a cashless society. Priorities should be given to education and computer literacy issues. Additionally, cashback promotions are currently effective, but to increase digital transactions in India and achieve transaction transparency, the eradication of black money, and long-term economic development through a cashless society, it will take a dedicated, secure, and highly reliable payments network. By doing this, we can ensure that digital payments in India have a bright future.



5.1 Limitations and Recommendation for future research:

The aforementioned study has the following limitations as well. Since the information used to determine customer preferences came from a self-report survey that drew responses from people of various backgrounds, there is a chance that the data was biased toward responses that were socially acceptable. Second, the study's length was quite brief. Therefore, if we can research over a longer time horizon, the outcomes may change.

Other researchers may use this study as a springboard to investigate additional independent factors and latent variables that may have an impact on the demand for digital payment systems. As a result, it provides room for more statistical analysis and some recommendations for the government authorities to run training programmes to teach everyone how to utilise digital payments.

5.2 Conclusion

We may deduce from a thorough research study that India has given the 2010–20 decade the moniker "decade of payments." Payment methods are rapidly developing and changing all the time. It is important to stay up with any changes or advancements made to the payment procedure. According to our research, payments have also grown much more fast, widespread, and convenient as a result of the high demand for digitalized payment methods, and this trend is only expected to intensify as technology develops.

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FRACTURE OF THE FIFTH METATARSAL. BIBLIOGRAPHIC REVIEW

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SUMMARY

Introduction: fractures of the fifth metatarsal have various forms of treatment, depending on the type of injury and the person who suffered it. They have great importance and frequency in athletes. They usually occur due to different trauma mechanisms. They were first described in 1902. They are the most prevalent metatarsal fractures and need to be recognized and treated in a timely and appropriate manner.

Objective: to detail the current information related to the fifth metatarsal fracture, classification, description, treatment, recovery time as well as the different surgical techniques.

Methodology: a total of 29 articles were analyzed in this review, including review and original articles, as well as clinical cases, of which 19 bibliographies were used because the other 10 articles were not relevant for this study. The sources of information were PubMed, Google Scholar and Cochrane; the terms used to search for information in Spanish, Portuguese and English were: fractura de pie, 5th metatarsal fracture, Jones fracture. Fracture of the fifth metatarsal, fratura do quinto metatarso.

Results: the anatomical division system of Lawrence and Bottle is still used. CT and MRI could be considered in the case of delayed healing, stress fracture with normal radiographs or in nonunion. Surgical options include intramedullary screw fixation, bone grafting procedures or a combination of both. Surgical treatment of fractures of the base of the fifth metatarsal in professional athletes offers good clinical results.

Conclusions: Regarding the current information related to the fracture of the fifth metatarsal, we note the importance of classification, clinical and social history of the patient, for the appropriate choice of treatment, both conservative and surgical. As for the recovery time in conservative treatment varies depending on the affected area. In delayed union or nonunion, surgical intervention should be performed.

KEY WORDS: metatarsal, fifth, fracture, Jones, treatment.



INTRODUCTION

Fractures of the fifth metatarsal are injuries of the foot that occur due to several varieties of injuries and therefore have several forms of treatment, starting from conservative therapy to surgical treatment depending on the type of injury and the person who has suffered it. These injuries have great importance and frequency in elite athletes and active people. Fractures of the fifth metatarsal usually occur due to different trauma mechanisms, with twisting and inversion injuries being the most common. In the face of a mild injury that produces a fracture of the fifth metatarsal, we must be oriented to a stress fracture(1). Fractures of the fifth metatarsal are among the most common in feet, its anatomy and blood supply makes them at high risk of delayed healing or lack of healing(2-4).

Thanks to Sir Robert Jones, an orthopedic surgeon, fractures of the fifth metatarsal were described for the first time in 1902. Currently, they are the most prevalent metatarsal fractures, being more common between the third decade of life in men and the seventh decade of life in women. There is a strong correlation between female gender, zone 1 fractures and ballerina fractures. These injuries need to be recognized and treated in a timely and appropriate manner in order to avoid inadequate clinical outcomes such as poor bone healing(5).

METHODOLOGY

A total of 29 articles were analyzed in this review, including review and original articles, as well as cases and clinical trials, of which 19 bibliographies were used because the information collected was not important enough to be included in this study. The sources of information were Cochrane, PubMed and Google Scholar; the terms used to search for information in Spanish, Portuguese and English were: fractura pie, 5th metatarsal fracture, Jones fracture, fractura del quinto metatarsiano, fratura do quinto metatarso.

The choice of bibliography exposes elements related to the fifth metatarsal fracture; besides this factor, several other important factors related to its different treatments are also included.

LITERATURE REVIEW

The classification of fractures of the fifth metatarsal is essential for its management, for which we can use the division used by Lawrence and Bottle, which is divided according to the base or proximal part of the fifth metatarsal in 3 zones:

Table 1. Lawrence and Bottle classification for fifth metatarsal fractures.

TYPE	ANATOMICAL ZONE
Zone I	Tuberosity (Pseudo Jones Fractures)
Zone II	Metaphyseal-diaphyseal junction (Jones fractures).
Zone III	Diaphyseal area within 1.5 cm of the tuberosity.

Source: the authors.

Figure 1. Division of the fifth metatarsal into its anatomical zones.



Source: Rev Esp Ortop Traumatol. 2018;62:348-58 (6)

Pseudo Jones or zone 1 fractures are usually due to avulsion of the tuberosity. They occur when the rearfoot is forcibly inverted during plantar flexion, such as after a bad fall following a jump. These are classic of a twisting injury and are the most common fracture of the base of the fifth metatarsal(5).

Jones or zone 2 fractures usually occur from a significant adduction force of the foot with the heel raised or from a sudden

change of direction by an athlete. These fractures affect the fourth and/or fifth metatarsal joints and have pseudarthrosis rates of up to 15-30%(5). An under-diagnosed pathology that can be mistaken for a Jones fracture is Iselin's disease which consists of osteochondrosis of the fifth metatarsal process generated by repeated traction of the lateral peroneus brevis muscle in young athletes between the ages of 9 and 14 years(7).



Zone 3 fractures are usually chronic or stress injuries, caused by repetitive microtrauma, which leads to increased pain with the performed activity for months. We have to suspect a stress fracture when there is previous pain, in addition, pain of quality or duration that worsens with time. Physical examination may reveal tenderness to palpation, swelling and ecchymosis at the site of injury. This type of fracture presents a high risk of pseudarthrosis(5).

There are also shaft fractures, more than 1.5 cm distal to the tuberosity, the so-called dancer's fracture or also known as

long spiral fracture of the distal metatarsal, which is frequent when performing maneuvers by a dancer rolling on his foot while in the midfoot position or held while landing a jump(3,5).

It is usually difficult to differentiate soft tissue injury and fracture of the base of the fifth metatarsal as the swelling and pain of the two injuries lie just below the lateral malleolus. Thus, a thorough examination and proper assessment is needed in cases of metatarsal injuries(4).

Image 1. Radiographs of the right foot with fracture of the fifth metatarsal.



Source: The Authors.

According to the Torg classification, which is a system based on radiographic appearance, stress fractures of the base of the fifth metatarsal are divided into three types:



Table 2. Torg's radiological classification system

TYPE	CHARACTERISTICS
I	<ul style="list-style-type: none"> ● Early ● No intramedullary sclerosis ● Acute fracture line without flaring ● Minimal cortical hypertrophy ● Minimal periosteal reaction
II	<ul style="list-style-type: none"> ● Delayed ● Evidence of intramedullary sclerosis. ● Widened fracture line with involvement of both cortices. ● Periosteal reaction present
III	<ul style="list-style-type: none"> ● No union ● Complete obliteration of the medullary canal by sclerotic bone ● Wide fracture line with new periosteal bone

Source: The Authors.

CT and MRI, could be considered in the case of delayed healing, high index of suspicion of a stress fracture with a normal radiograph or in nonunion, however these are not routine studies(5).

The correct choice of treatment will depend on the anatomical site of injury, as for the clinical and social history of the injured patient, as well as the radiographic signs of recovery(5).

Treatment varies according to the area where the lesion occurs and can be conservative or surgical.

Non-displaced zone 1 injuries tend to use conservative treatment with protected weight bearing in a hard-soled shoe, walking boot or walking cast. Progression to weight bearing, to tolerance, may be initiated depending on the patient's pain and discomfort, this usually disappears within 3 to 6 weeks. However, fractures involving 30% of the articular surface or with an articular step greater than 2mm are treated with open reduction and internal fixation, closed reduction, percutaneous pinning or excision of the fragment(5).

Zone 2 nondisplaced injuries, or also known as Jones fractures, can be treated conservatively with 6 to 8 weeks of non-weight bearing with a short leg cast. Weight-bearing status can advance as signs of bone healing are evident radiologically. Indications for surgical interventions include a high-performance athlete, displaced fractures, or a patient electing to continue surgical treatment, for an early recovery. There are a number of surgical techniques, including tension band and plate construction, intramedullary screw fixation and low-profile screws. Surgical treatment of high-performance athletes minimizes the risk of pseudarthrosis and allows early return to physical activity(5,8,9).

It is recommended to present patients with several treatment alternatives, the patient should be part of the decision of the procedure to be performed since it has a direct impact on the time for recovery and return to activities(10).

There is a large repertoire of surgical methods for the treatment of the proximal fifth metatarsal fracture. For Zone II and Zone III fractures, the percutaneous intramedullary screw is the treatment of choice(2).

There is no agreement as to the ideal screw; however, the literature recommends intramedullary devices with a diameter of at least 4.5mm(11).

Stress fractures of the diaphyseal zone 3 represent a more complicated picture. As a first line of treatment, conservative management without weight bearing in a short leg cast could be initiated, however, before radiological healing is observed, immobilization for up to 20 weeks may be necessary, and even then, it is not uncommon to see the development of pseudarthrosis. High-performance athletes or individuals with Torg type II or III fractures may require surgical interventions. Surgical options include intramedullary screw fixation, bone grafting procedures or a combination of both(5).

A clinical trial conducted in Chile showed that surgical treatment with a 4.0 mm diameter cancellous bone screw with partial thread, solid, stainless steel, and with a head is an effective and safe alternative for synthesizing fractures of the base of the fifth metatarsal in zones 2 and 3, in addition to presenting a low rate of complications(11).

The bone insertion technique requires the removal of a rectangular area of bone measuring 0.7 cm by 2.0 cm at the fracture site and replacing it with an autogenous cortico-cancellous bone graft of the same size taken from the anteromedial distal tibia. The medullary cavity has to be scraped or drilled until all the sclerotic bone has been removed and the medullary canal reestablished before placing the donor graft(5).

Surgical treatment of fractures of the base of the fifth metatarsal in professional athletes offers good clinical results, who return to their sport activities faster compared to other types of fractures. But even with good surgical technique and good postoperative management, delayed healing and refracture can



occur. However, it should be taken into account that an efficient rehabilitation, without compromising the whole process of consolidation and recovery of the patient, reduces the risk of presenting refractures and the presence of pseudarthrosis. Among the studies reviewed, it was evidenced that the following variables were not influential factors for a favorable recovery: surgical time, healing time, Torg classification and if they use a graft during the surgical procedure(12-14).

Conservative treatment is used for dancer's fracture without displacement and other fractures of the diaphysis and neck of the fifth metatarsal, as in zone 1 injuries without displacement. If delayed union or nonunion is evident, surgical

intervention should be performed. In case of displacement greater than 3 mm or an angulation exceeding 10 degrees, the fracture should be reduced and immobilized. If there is no improvement of the fracture reduction or if there is evidence of reduction failure on subsequent radiographs, surgical intervention with percutaneous pinning or plate and screw fixation should be considered(5).

Those who are treated with bone graft inlay technique or intramedullary screw fixation should be kept non-weight bearing with a plaster splint or short leg cast for six weeks in order to gradually return to sport or activity(5).

Image 2. X-Ray of fracture of the Fifth Metatarsal.



Source: The Authors.

Mismanagement of these fractures can lead to poor clinical outcomes and alterations in lifestyle. Urgent referral to orthopedic surgery is necessary for treatment of an open fracture. Traditionally, the use of intramedullary screw fixation has been an option when surgery is warranted, but newer techniques with flat plates have been shown to be successful in elite athletes(9,15-17).

Orthobiologically enhanced surgical fixation of Jones fractures is becoming increasingly common in athletes, regardless of the deficiency of comparative studies corroborating this practice. Biologically enhanced fixation of Jones fractures results in higher fracture healing rates than fixation alone(18).

Other surgical treatment alternatives include tension band wire, percutaneous pinning and external fixation. Avulsion

fractures involving a small part of the tuberosity can also be treated by excision. In situations where fractures evidencing a displacement of more than 2 mm and involving more than 30% of the joint should be corrected by surgical treatment(4).

In patients initially treated conservatively, it was shown that NSAIDs have a negative effect on the healing of the fifth metatarsal fracture. Therefore, NSAIDs are a negative prognostic factor for recovery when treated non-surgically(19).

CONCLUSIONS

Regarding the current information related to the fifth metatarsal fracture, we note the importance of the classification, clinical and social history of the patient, for the appropriate choice of treatment, both conservative and surgical.



The anatomical division system of Lawrence and Bottle is still used. Pseudo Jones or zone 1 fractures are generally due to avulsion of the tuberosity and caused by inversion during plantar flexion, being the most common fracture of the base of the fifth metatarsal. Jones or zone 2 fractures are mostly caused by a force of adduction of the foot with the heel raised or by a sudden change of direction. Zone 3 fractures are usually chronic or stress injuries caused by repetitive microtrauma. In stress fractures of the base of the fifth metatarsal, the Torg classification can be used.

CT and MRI could be considered in the case of delayed healing, stress fracture with normal radiography or in nonunion.

The recovery time in conservative treatment varies depending on the affected zone, being generally from 3 to 6 weeks in zone I, from 6 to 8 weeks in zone II and in zone III diaphyseal stress fractures, immobilization can reach up to 20 weeks, and pseudarthrosis is not infrequent.

Surgical options include intramedullary screw fixation, bone grafting procedures or a combination of both. Zone I fractures involving 30% of the articular surface or with an articular step greater than 2mm are treated surgically. For Zone II and Zone III fractures, the percutaneous intramedullary screw is the treatment of choice. Surgical treatment of fractures of the base of the fifth metatarsal in professional athletes offers good clinical results. In non-displaced dancer's fractures and other fractures of the diaphysis and neck of the fifth metatarsal, conservative treatment is used. If delayed union or nonunion is evident, surgical intervention should be performed. Other surgical treatment alternatives include: tension band wire, percutaneous pinning and external fixation.

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CONTRIBUTE TO RAISING AWARENESS IN A COMMUNITY

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Although society endeavors to improve the living conditions of different marginalized communities, hate crimes persist as constant problems that underlie broader social issues of power imbalances and marginalization. The criminal justice system requires major reform to ensure that resources are distributed with equity among the vulnerable populations to receive the support of law enforcement. However, certain states face significant problems of hate crime underreporting, which requires changing state policies in accordance with community needs. An examination of hate crime underreporting in Wyoming illustrates the lack of confidence in the police and the presence of distrust that prevents individuals from reporting such crimes. However, a comprehensive change that includes revised police training and a distinctly outlined hate crime policy complemented by police-community engagement would improve the situation.

PROBLEM STATEMENT

Whereas several states, such as California, witness surges in hate crimes, other states do not report similar trends. When law enforcement recognizes that the rates of hate crimes elevate, this problem draws the public's attention. It potentially incites decision-makers to act to positively influence the situation and change the status quo. On the contrary, the underreporting of hate crimes leads to the misrepresentation of the problem and potentially reflects the profound mistrust people experience toward the police and other governmental institutions. Wyoming is a state with a deeply rooted philosophy of conservatism that prevents vulnerable individuals and communities from seeking the help and support that they require (Davis & O'Neill, 2016). Davis and O'Neill (2016) mention that Wyoming reported only four hate crimes in one year and clarified that low numbers of such crime reporting signify the lack of acknowledgment hinders stakeholders from achieving justice.

As the mentioned Wyoming statistics come from a rather outdated source, it is useful to analyze how the situation has changed over the past several years. For example, the U.S.

Department of Justice (2020) used the Uniform Crime Reporting (UCR) Program by the Federal Bureau of Investigation (FBI) to identify that 17 crimes against persons were committed in Wyoming, with the motivation being mostly related to race, ethnicity, or ancestry, while other hate crimes were related to religion, sexual orientation, gender, and gender identity. Although more hate crimes were reported in the state in 2020 than in 2016, the number remains significantly small, pointing to a reporting gap that occurs due to the actions of both the police and the victims.

Wyoming has gained a negative reputation as a state where a cruel crime was perpetrated against a gay student in 1998. Although much time has passed, many LGBT (lesbian, gay, bisexual, and transgender) individuals feel unsafe due to anti-trans bills and discrimination (Camdessus, 2022). Liberal-leaning stakeholders put effort into promoting activism in Wyoming in pride parades and other activities; however, the state has many more changes to overcome. Addressing the hate crime underreporting must become one of the priorities for practitioners and policy-makers as the mistrust toward law enforcement harms communities and the police, who should protect people from discrimination and unfair treatment.

Therefore, the chief concerns and complaints about hate crimes in Wyoming are associated with their underreporting. Pezzella et al. (2019) emphasize that this problem is evident from the comparison of data from different sources; for example, the UCR included a nationwide average of 8,770 incidents in 2004-2012, while the National Crime Victimization Survey revealed a nationwide average of 269,000 incidents in the same period. This statistical discrepancy reveals the underreporting of hate crimes. As a major public concern, the issue might cause more bullying and violent behavior targeted at people from diverse groups.

POLICY REFORM RECOMMENDATIONS

Policy reform recommendations are based on the necessity for people living in Wyoming to understand the antecedents of the problem and accept the proposed solutions.



As mentioned earlier, the state gained a negative reputation due to the murder of a gay college student; this case likely dissuaded many individuals from expressing their identities. In particular, Matthew Shepard was kidnapped, driven to a secluded area, beaten, and left to die due to his sexual orientation (Camdessus, 2022). Although the perpetrators were arrested, convicted, and incarcerated, the crime demonstrated that the lack of controls and preventative measures allowed this crime to occur. Hate crimes directed at people of different races, ethnicities, sexual orientations, genders, and gender identities should be prevented to avoid deadly violence. Shepard's murder occurred in the political and social context when the public was particularly against HIV-positive individuals, associating them with the LGBT community only (Sikk & Meyer, 2019). This revelation demonstrates that the history of homophobia and violence against gay people created a foundation for further injustices, including the hate crime gap.

The proposed policy reform should include a comprehensive approach combining the reimagining of justice-informed training and the community action that unites the efforts of police officers and public members to overcome the divide about hate crimes. The strategies and methods adopted should consider the reasons for underreporting to resolve this problem. Specifically, Pezzella et al. (2019) unveil that victims of hate crimes often view the police as illegitimate, which leads them to have no confidence in law enforcement and to make disclosures to other officials. The research results accentuate the mistrust people experience toward law enforcement since they consider the police inefficient in handling hate crimes.

The policy reform recommendation dwells on the necessity to change and improve law enforcement training. Training may be insufficient to contribute to positive change; however, it remains a crucial component that provides officers with guidance to identify crimes motivated by biases related to race, ethnicity, sexual orientation, and other diverse identities. The FBI and the Anti-Defamation League (ADL) have developed training opportunities that help state and local law enforcement institutions to improve officers' awareness of the context and related factors predetermining hate-motivated crimes (Pezzella et al., 2019). Such improvement endeavors are paramount, as Lantz et al. (2019) explain, that inadequate police training prevents officers from understanding the full scope of hate-motivated violence since ethnicity, race, sexual orientation, and gender identity are highly diverse in different cultural realities. For this reason, the policy reform should include revising current training practices. Wyoming law enforcement officers should acquire new information that would prepare them to detect hate-motivated crimes.

The training should also take a personalized approach for officers to identify their prejudices and biases that must not become a reason for them to avoid labeling a crime as a hate crime since biased policing is a problem affecting the reporting of such cases (Lantz et al., 2019; Murphy et al., 2018). As

training would help officers identify their limitations and mitigate the subsequent damages of biased thinking, alternative courses of action should also be embraced. The approach to eliminating prejudice from the police's service should be based on the written hate crime policy (Pezzella & Fetzer, 2021). The development of such a document offers stakeholders a guide to dealing with correct crime identification.

Furthermore, the policy reform would create an alternative course of action by creating prerequisites that improve opportunities for communities to mobilize and act. Community action should be supported by cooperation with law enforcement as this strategy will decrease the mistrust of people toward police officers. The combined efforts from law enforcement officers and community members would strengthen the attempts to close the hate crime reporting gap. Nguyen (2019) warns against instrumentalizing social workers, educators, and healthcare workers as the continuation of law enforcement's power prejudiced against people belonging to minority groups. With this idea in mind, community action projects should contribute to the development of initiatives that unite police officers and regular citizens to discuss issues related to hate crimes. Community and police relationships should become symbiotic by creating opportunities for forging the trust necessary for hate crime reporting (Pezzella & Fetzer, 2021). The creation of informational campaigns on social media could improve by raising awareness and demonstrating that law enforcement has accepted the necessity to identify biased crimes.

MAJOR IMPLICATIONS

The identified course of action has major implications for the community and law enforcement. The combination of revised training programs and community-police cooperation may change the status quo in Wyoming related to hate crimes, especially their underreporting. Changes to the status quo are important as the current situation promotes the inequities observed in the accessibility of the criminal justice system, including the inequitable distribution of resources associated with addressing crimes (Lantz & Wenger, 2022). The comprehensive approach to changing the underreporting situation would help two major stakeholder groups. On the one hand, police officers would improve their service by becoming more considerate of the community's needs. Law enforcement would receive vast information for prejudice detection and mitigation. At the same time, a written policy reform on hate crimes would guarantee the clarity of definition and crime identification standards. On the other hand, the proposed policy reform would give the public more confidence in the police departments in the state. Particularly, police-community cooperation projects would forge understanding and open communication that may encourage victims to report state crimes.



These major implications have significance specifically for the case of Wyoming. As the state has a low percentage of hate crimes reported, it is anticipated that the community will experience an improvement in the confidence people feel about law enforcement. Revised training, a written hate crime policy, and police-community cooperation may solve problems in the community by encouraging victims to report hate crimes and prompting law enforcement officers to label these crimes as such in their respective reports. This change may become a paradigmatic shift for people in Wyoming to start viewing hate crimes as a serious issue that must be reported. It will also enable the police officers in the state to realize the importance of improving the credibility of their agencies to ensure victims and witnesses have confidence in the police, which motivates them to report hate crimes. Ultimately, such a change will likely improve the presence and treatment of social problems. As many people from minority groups feel unsafe in modern society, the state's strong position on the unacceptable nature of hate crimes would contribute to the feelings of safety and confidence among the different marginalized individuals.

CONCLUSION

In conclusion, the tendency to underreport hate crimes by victims or police officers signals that the state of Wyoming must change its approach to the controversial topic. The lack of trust and confidence in law enforcement should be addressed with the help of a multidimensional policy change plan. It should embrace the need for revised training for officers to recognize their biases and learn to identify hate crimes. Another component of this plan is a written hate crime document; as the last step in this pursuit, police and community engagement would improve the current mistrustful relationships and change the treatment of hate crimes while eliminating social disparities.

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LEADERSHIP STYLES AND THEIR DESCRIPTION

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ABSTRACT

The article describes the mixing of subjective and objective elements of the leadership style in the activity of each leader. Subjective elements of the leader: diligence and personal qualities; customer, ability and interest; knowledge, skills and abilities; opinions are expressed about the qualities such as entrepreneurship and initiative.

KEY WORDS: *Leader, method, organization, charisma, management, style.*

Today, it is important to form and implement a management strategy based on modern requirements, to influence the creative potential of both the leaders themselves and the members of the working groups subordinate to them, and other similar management methods or methods.

"Style" is a vague concept that is widely used in human resource management. The styles differ depending on the leader's culture, entrepreneurial ability, character and a number of other factors. According to the "Leadership Theory", it is accepted to distinguish between the main focus of the leader: work or people. Douglas McGregor is considered the author of this approach, and his theories "X" and "Y" exist. "According to Theory X, autocrats who focus on work, give specific tasks to the group, establish strict control over subordinate employees and exert psychological pressure on them are the best leaders."¹

According to the "Y" theory, the best leader is a democratic leader who can successfully apply the theory of human relations in practice. According to this approach, work is a natural process, people are not only capable of taking responsibility, but also strive for it. In our opinion, modern leaders achieve high efficiency in management processes by conducting their work according to the "Y" theory.

Another important requirement for leaders is that they have their own charisma. According to Nikolaus Enkelman, charisma is the ability to attract and retain the attention of others.² A charismatic person has the ability to dominate others, which is reflected in their influence on their thoughts and actions. This effect does not have a coercive character, in most cases it is manifested in the simplest way to stimulate the value of a person, because if a person is praised, he tends to perform more than expected.

Instructional approach is best when follower maturity is below desired level. In this method, the leader should use more administrative methods and always monitor the activities of his followers.

The persuasive method is best in situations where followers are relatively low in maturity. This method requires an administrative approach on the one hand, and support for those who want to work on the other. The leader who uses this method explains the importance of completing the assigned task to the employees and encourages them to do so.

Participatory approach has the desired effect when followers are relatively mature. Those who are able to work, but do not want to, hope that the leader will be able to partner with them and find factors that will interest them in work. Leaders give such employees the

² Nikolaus Enkelma. Leaders in the sphere of management. 3rd edition. 2017. 31-p.

¹ Douglas McGregor Human Side Of Enterprise // Management Review. № 11. 1957. 41-49 pp.



opportunity to participate in decision-making and make them want to complete the task. The delegation method is the best way to lead mature followers. This method is mainly aimed at supporting employees. It encourages the followers to take full responsibility to complete the assigned task.

Leadership style has a certain interaction with management methods. The management method also consists of a set of methods and ways of implementing management activities, effective and purposeful influence on the management system, that is, a mechanism for the implementation of management functions. For comparison, it can be said that although the music note is the same for everyone, musicians have different ways of playing. We can see this in the following examples. All managers should use the economic method of management in order to motivate employees. But some managers try to allocate more funds to individual incentives, and other managers to the incentives of the team. Some managers prefer to reward based on quarterly results, while others prefer to reward based on annual results. Leaders also use different organizational and administrative methods of management, such as issuing orders and orders. Even without these, issuing commands and vice versa, control functions can be successfully performed without commands. Thus, different leaders approach the implementation of certain methods with their own individual style.

The practice of evaluating the work ethic and moral-cultural qualities of leaders shows that the first place is faith, a sense of personal responsibility for the assigned work, honesty, conscientiousness, kindness and attention to people. . The ability to make informed decisions independently and quickly, to be personally disciplined, hardworking, organized, and to be able to establish and maintain discipline in a team is highly valued.

All leaders can be divided into three types depending on the leadership style, character and attitude towards subordinates. The mentioned leadership styles are not pure. Each leader's style of work in life is different, but one of the above three styles is more noticeable. It is necessary to use the positive aspects of leadership in relation to different employees in different production situations. The leader should act according to

the actual situation and treat subordinates taking into account their unique personal feelings.

Psychologists distinguish four different ways in the development of work teams under leaders:

1. The way to unite. Cohesion is the gathering of skills, abilities and interests of members based on the need for cooperation. The activity of satisfying personal needs makes people compact. In the course of his work, the leader gathers people into one team, taking into account their knowledge, profession, skills, and age. This shows the leader's organizational skills.

2. The team's way of finding content. The leading team begins to determine the attitude of each member to work. Whoever deeply understands the social importance of the activity, mobilizes all his strength and creativity. The leader ensures the activity of the team by changing their place, changing their attitude to work, encouraging them to show interest in their work and initiative. The leader carries out these tasks along with monitoring, controlling, evaluating the activities of subordinates, and comparing the results of work.

3. Each member's way to adapt to the team. The personal interests and needs of the employees overlap and adapt to the team's activities. Activeness and interest in the profession take a stable form in the work team where a pure moral and spiritual environment is created. Hope for the future appears in a person, the desire to meet goals and needs, hard work increases. Enjoying collaborative work improves interpersonal relationships.

4. The way to achieve human values. At this stage, the feelings of the team are united towards one goal. Collective activity is created, traditionalism is decided. People connect their interests and aspirations to community life. Confidence in others increases, friendship and love bonds are strengthened. In these processes, a great burden of responsibility falls on the leader. In this, the leader's unique way of working, management skills, organization, and the ability to conduct educational activities are clearly demonstrated.

At each of the above stages, the leader's desire to create his own image is gradually formed, and such a personal image is created based on the image of the team.

In conclusion, it can be noted that in the improvement of the personnel system and leadership styles in organizations, management through economic methods implies the creation of a system of material and



moral stimulation of labor - the use of various forms and systems of salaries, position salaries, the development of reward systems, etc. In order to achieve high personal and collective performance in labor activities, the organization of labor incentives encourages each employee to use working time wisely, to master advanced work methods and methods, to better organize workplaces, to ensure the necessary accuracy and organization in work. should be focused on interest.

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METHODS OF IMPROVING THE REFLECTIVE SKILLS OF PRESCHOOL CHILDREN

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ANNOTATION

This article shows the quality preparation of preschool children for school education and the development of their reflexive activities, information about the activity of the educator in the implementation of reflective processes, and game exercises for the development of memory.

KEY WORDS: *reflection, reflective processes, reflective activity, pedagogical skill, social psychologist, corrective exercises, reflexive training.*

In today's rapidly developing education system, pre-school education is also given great attention. The main reason for this is the cultivation of mature, potential, high-quality personnel for preschool education organizations and the development of children's interests and abilities, the use of educational technologies, methods and methods in preparing them for high-quality school education, and at the same time, the use of the experiences of developed foreign countries.

The most important component in the structure of the teacher's innovation activity is reflection. Reflection is considered to be the ability to define and analyze the child's own mind and activity, to look at his thoughts and actions from the outside.

In the literature on pedagogy, it is said that there are two traditions of explaining reflective processes:

- Reflective analysis of consciousness that leads to the interpretation of the essence of objects and their construction;

- Reflection of understanding the meaning of interpersonal communication;

In this regard, pedagogic scientists distinguish the following reflective processes:

- understanding oneself and others;
- evaluate oneself and others;
- Descriptive analysis of oneself and others.

Reflection (Latin reflexio - return) is considered as the process of knowing the subject's own (inner) mental feelings and states. In the literature on philosophy and pedagogy, reflection is written as a process of thinking about changes in a person's own consciousness. The psychological dictionary gives the following explanation: "Reflection is not only the subject's self-knowledge and understanding, but also means that others determine the knowledge and understanding of his personal qualities, feelings and cognitive (cognitive) perceptions.

Classes in preschool educational organizations start at 9:00 a.m., and the duration of one educational activity should not exceed 10-15 minutes in small groups and 25-30 minutes in large and preparatory groups. Refreshing and tiring games are played with children between classes. At the end of the month for each direction, the implementation-control sessions are held with children and the extent to which the children mastered the tasks of the program is analyzed. In "Educational games" (sensory education) included in the 1st subgroup schedule, it is recommended to widely use one of the modern pedagogical technologies - Maria Montessori methodology.

The correct planning of the educational work of the educator must first of all be directed to the organization and improvement of the pedagogical



process according to the types of activities. Based on the state requirements for the development of preschool children: physical development, socio-emotional development of preschool children, preparation for speech, reading and literacy, as well as the process of cognition, acquiring and understanding knowledge about the environment 1st semester (September, October, November, December), 2nd semester (January, February, March), April, May). At the end of each month, the teacher prepares a control exercise. The analysis of the control exercise will be conducted in the last days of this month. A report on the training analysis is written, and tasks are assigned to each educator according to the training results. Twice during the academic year (1st half-year, 2nd half-year) children's development indicators are analyzed based on the state requirements.

Educators of preschool educational organizations (MTT) should prepare for the development of children's reflexive activities, which in turn will expand the scope of the educators' professional interests, that is, from reading literature to theoretical psychological - creates opportunities for pedagogical and fundamental research. Good scientific-pedagogical training ensures the effectiveness of innovative activities. An educator pedagogue actively participating in innovative processes becomes a catalyst for regular self-development and improvement of the pre-school education system, that is, plays an important role in the acceleration of these processes.

In general, objective and subjective factors lead to the organization of innovative activities of educators in MTT. Objective factors include the state's new educational policy, fundamental and applied research in the field of education, and the experiences of educational organizations in the direction of innovative activity. Examples of subjective factors are socio-territorial needs, the development process of MTT activity, the knowledge, skills and qualifications of educators, the development of scientific potential, the growth of the potential of the educational organization, and the change in management characteristics.

In the conditions of the current society, culture and educational development, there was a need for the educator's innovative activity. The effective

implementation of innovative activity of the educator depends on a number of conditions. It includes the appointed communication of the educator, impartial attitude towards opposing opinions, readiness to radiate recognition of the rational situation in various situations.

Because, at the current stage of development of the educational system, rapid changes are taking place in preschool education, which is considered its first link. These changes play an important role in self-activation, creativity, self-awareness and creativity in the activity of a teacher of MTT. This gives an opportunity to form the creativity of the educator. An important condition for innovation is to create a new situation of communication. From the psychological point of view, it is necessary for the teacher of MTT to constantly improve his knowledge. Because this is the main feature of educational work. As the pedagogue is always among people, he should first of all correctly explain the truth, which has been interesting to people for a long time, according to his views. For example, some parents have negative experiences of being in a kindergarten and sometimes feel uncomfortable in the circle of educators. Others believe that educators always know "how it should be" and that there is no need to negotiate with them. Also, caregivers sometimes have a negative experience of interacting with parents who give advice on how to raise children. Such situations can interfere with the establishment of moderate communication. It is necessary to talk with parents about the importance of family information and explain it to them. Being able to listen attentively is an important condition for open communication. "What does the captain like to do at home?" or "What does Madina tell you about kindergarten?" by asking open-ended questions, educators should create an opportunity for parents to tell stories about their children, and when communicating, educators should use language that is understandable and clear for parents and give them the opportunity to ask questions.

Independent knowledge acquisition of a teacher of MTT means that he constantly fills his knowledge with professional and general cultural information and constantly updates his individual social experience on a large scale. Usually, most MTT educators understand the need for independent



knowledge and use it successfully in situations like the above.

The motives for this are usually formed as a result of understanding the problems that arise in front of the educator in the process of communication in pedagogical activities. In many cases, such motives are formed in connection with the latest achievements of the science, the need to improve one's pedagogical skills, in the form of wishes about how to train and educate MTT educators.

This fact should be well understood by all MTT educators, regardless of their age, pedagogical skills, and what kind of training they have. Because the pedagogical process aimed at ensuring comprehensive development of preschool children is complex and diverse. The successful implementation of educational activities depends on the correct organization of the pedagogical process and each type of activity in preschool educational organizations.

It is extremely important for a skilled pedagogue to be in close contact with families regarding children and their behavior in order to successfully operate in preschool education organizations. The MTT and the family are closely related, and the better the relationship between them, the more support the child will receive and the more likely his early learning experience will be successful. It is not always easy to find time for constant contact with the family in a busy work environment, but if the caregivers consider it very important for the child's success, it becomes part of the daily routine.

Each child grows and develops individually, but nevertheless all children go through stages of development in a certain sequence. In each of these stages, characteristics common to children of the same age are observed. Whatever psychological and physiological characteristics a child experiences at any age, they are highly dependent on their family. It is very important that the educators of MTT recognize the priority position of the family as the first educator of the child. A modern MTT educator cannot be a social psychologist. That is why it is necessary to be able to establish mutual relations between students, to know how to use socio-psychological mechanisms in the children's group.

By the time a child starts attending preschool, the family will have learned to enjoy listening to stories while teaching them everything from basic movements to throwing a ball. It is very difficult to adequately assess the importance of the family in the early development of a child. Children are brought up in a family, the events that happen in it have a great impact on them.

Communicating with the family through the child is an important part of the responsibilities of the coaching team. All families are interested in the happiness of their children and want them to study well and enjoy themselves. Therefore, family members want to know about his achievements. Educators should be happy to discuss the child's situation at home and in MTT, his strengths and weaknesses, all aspects of concern in order to deepen their understanding of the child and work as effectively as possible with parents.

A skilled MTT educator adheres to the following principles when communicating with families:

- Finds time, opportunities and supports parents to share their thoughts, joys, concerns and intentions.
- Chooses a place where the conversation can be done face-to-face and always treats information as confidential.
- Families share the most personal information with educators, so it is important to keep it confidential.

Leading psychologists admit that many educators try to use the time when they bring their children to kindergarten or pick them up from kindergarten to communicate with parents. At this time, they can inform the parents about the day's events, the child's progress, remind them about the planned meeting and other things (but not about any problems the child has (if any). It is better not to open it). At the beginning and end of the run, parents can communicate with each other, ask questions to educators, ask about the meeting, play with children, read books to them.

A teacher working on himself and constantly improving his skills can also use letters and diaries. Also, the way of sending letters to parents through the child helps to ensure closeness between families and the team of pedagogues. It can also be a short message about the child's new achievements or a thank you note.



Parents usually read such letters with interest and try to send a reply.

The leading activity of preschool children is play. The question of play activities of children of kindergarten age has attracted the attention of many scientists for centuries. Children of preschool age strive to reflect all aspects of our busy life in their play activities. It is known that as the age of the child grows and the possibility of independent action increases, his worldview of things and events around him expands.

Children's play activities are the only means for their harmonious physical and mental development. Play is such a multifaceted activity in children's lives that adult labor, thinking about various things, imagination, relaxation and cheerfulness are all evident in play. It should also be noted that the game is not only a means of learning about the phenomena of the external environment, but also a powerful means of education. In creative and plot games, children's individual characteristics are formed together with all mental processes.

Another feature of children's play activities is that the child's actions and roles during the game often have a general character. It should be understood in the way that the child in his various games does not only the behavior of a single driver, doctor, policeman, educator, pilot that he knows, but also of drivers, doctors, educators and pilots in general. reflects behavior. Of course, young children (sometimes children of a small group) with a limited range of life experiences and activities only reflect concrete people and their actions in their games. For example, his mother, father, brother, tutor and so on. And in the games of children of middle or senior kindergarten age, such images begin to have a character of generality.

In addition to being a tool for learning about things and events around them, preschool children's games are also of high social importance. In other words, play is a powerful educational tool. Through children's games, it is possible to educate socially useful, that is, high human qualities. If we observe children's game activities from the outside, we will see that all their personal qualities (who is more interested in what, ability, will, temperament) are clearly manifested during

the game. Therefore, children's play activities are a very convenient tool for their individual learning.

Visual art is very important among the creative activities of preschool children. According to the character of the child's imagination, it is possible to evaluate how he perceives the world around him, memory, imagination and thinking. The pictures drawn by older preschool children also reflect their inner experiences, mental states, dreams, hopes and needs, children of this age are extremely interested in drawing. Drawing is a unique form of play activity for children. The child first draws what he sees, and then what he knows, remembers and invents.

Competitions are very important for older preschoolers, and it is in such games that the motivation to achieve success is formed and strengthened. The most enjoyable time for children of this age is the importance of competitive games, where winning and success are also very important.

In older preschool age, building games gradually turn into work. In the game, the child begins to acquire simple labor skills and competencies. He begins to understand the properties of objects, and develops practical patterns of thinking.

The importance of music as an artistic and creative activity in the mental development of 3-7-year-old children is also very great. Through music, children learn to sing and make rhythmic movements in tune with the music. In the period of 3-7 years, the main activities of children take place in the following sequence:

- study subjects;
- Individual object games, team plot-role games;
- Individual and group creativity;
- Competition games;
- Communication games;
- Domestic work.

Corrective-developmental games with children of preschool age (for children under 3-5 years old)

"Xotira o'yini"

Place some objects on the table. They should not exceed six or seven. Cover the objects while giving the children a few minutes to look at them. Children have to say what objects are on the table after a few seconds.



1. After the children have looked at the objects for a few minutes, close their eyes and take one object and switch the rest. Children will have to say the name of the removed object.

3. Without removing one of the objects on the table, on the contrary, add another object. This game helps children not only to improve their attention, but also to develop their memory. The interesting thing is that not only children, but also adults can check their attention and memory with this game method.

In the evening, when all the family members are gathered together, it will be very interesting for them to check the attention and memory of adults.

1. "Gift" game

At the beginning of the game, the teacher asks: "Children, who likes to receive gifts? What do you like? Today we will play with you an invented game of giving and receiving gifts. Imagine that you you can present any gift you want to your friend. Look at your friend, what would you give him as a present? Let's present gifts to each other through actions in a circle. Received a gift Don't forget to give thanks." After the children have given gifts to each other, you can ask the children which gift was the nicest, whether it is nice to give or receive a gift.

"Do it like me"

Children stand in a row. The hand of each child behind is on the shoulder of the child in front. At the first signal of the leader, the first child raises his right hand, at the second signal, the second child raises his hand, and so on.

After all the children have raised their right hands, they are invited to raise their left hands in the same order. With the next gesture, the children first lower their right hands, then their left hands. The game is repeated twice, the second time the speed is increased, the child who made a mistake is out of the game. Exercise increases attention involuntarily.

When determining the indicators of the teacher's readiness to implement a person-oriented approach in preschool education, it is necessary to take into account 3 areas: individual, activity-based and reflexive.

Training as a person is pedagogical thinking (gnostic, i.e. mental abilities - skills to distinguish scientific information, correct application of scientific

knowledge in practical activities, competent solution of pedagogical tasks); setting a pedagogical goal (organizational skills - the skills of creating optimal conditions for teaching and repetition, choosing the necessary forms of training, the correct distribution of time, providing the educational process with the necessary inventory equipment; organizing one's own work planning and holding any events (mornings, literary evenings, etc.); pedagogical orientation (communicative skills: the ability to present information in a general form for a certain category of learners, information depending on the situation correcting the methods and methods of giving information, the ability to convince someone, competently organize professional communication at the levels of "pedagogue-pedagogue", "pedagogue-parent", "pedagogue-manager", "pedagogue-child"; positive in the children's team creating a psychological microclimate, etc.).

Reflexive training: pedagogical reflection (reflexive skills include 3 types of sensitivity: feeling the object: how real reality resonates with children, to what extent children's interests and needs are manifested in it, "to adapt them to the requirements of the pedagogical system special sensitivity of the pedagogue to the coming"; sense of the norm and tact is manifested in a special sensitivity to the degree of changes occurring in the child's personality and activity under the influence of various pedagogical influence tools, what kind of feeling in general changes are taking place, whether they are positive or negative, according to which signs it is possible to talk about them; the feeling of commitment is defined by the sensitivity of the pedagogue's personal activity shortcomings, criticality and responsibility for the educational process).

The above indicates that in the implementation of the person-oriented approach, not the individual development of the child and the pedagogue, but the development of the whole subject of the educational process, the realization of its reflexive activity. Improving the reflexive activities of the preschool child, developing his memory, gives him the opportunity to be active in school education. Comprehensive development of children, quality preparation for school education is the main goal of preschool education.



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IN PARTICULAR OF SOME UNITS OF SPEECH

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ANNOTATION

This article discusses the opinion of scientists about the specific characteristics of occasional words and the most important feature of occasional words, that is, their dependence on speech as a speech unit.

KEYWORDS: *speech, occasional words, occasionalism, emotional-expressive color, abnormality, abnormal-irregularity, expressiveness, rules of word formation, personal-creative formation, historical-modern adaptation.*

The language is constantly enriched by new lexical units. No word is born without a communicative need. But new words differ according to their position in the language. Any new linguistic units may or may not have a place in the language system. There are words that are unique to a single (individual) speech without having their place in the vocabulary and remain only within that speech (text), created randomly, that is, extraordinary and often used only once in the process of linguistic communication. is distinguished by being outside. Such words are created by people and language creators. In linguistics, the words created by the people are called occasionalisms of oral speech, and the words created by certain creators are called individual - specific to a single speech, that is, artistic occasionalisms.

Occasional words are created by the speaker or creators in order to express their thoughts and goals in a unique and clear way, to show all aspects of a person, thing, object, event that they are describing, and to clearly express their attitude towards them, that is, their feelings, and is applied. Occasionalisms are created when the possibilities of the language in describing the object of the image do not satisfy the speaker.

A speech phenomenon that is an individual creation of the creator, which is rarely used, sometimes not yet known and does not exist, due to a specific speech need based on a specific speech pattern, is called an occasional word [1]. The most important characteristic of such words is that they are closely related to the text and cannot be understood outside the text [2].

According to E.A. Zemskaya, one of the characteristic features of occasional words is the specificity of the text, and others are that they are not assimilated into the language and differ from neologisms by maintaining their novelty. The researcher points to the violation of language norms in order to ensure the emotional expressiveness of speech as one of the reasons for the emergence of occasional words [3].

Mamatov studied occasional words in Uzbek linguistics from the point of view of their relation to the literary norm. He also distinguishes speech specificity as one of the main features of occasional words and emphasizes that one of the main conditions in their creation is to give speech variety. The researcher shows seven signs of Uzbek occasional words. They are: 1) relevance to speech; 2) abnormality, 3) single use; 4) creation by speakers or writers; 5) expressiveness; 6) follow the rules of word formation; 7) historical-modern adaptation [4]. The researcher does not take into account the nominative sign. In our opinion, this sign is characteristic of occasional words, because they are also the names of existing things - objects, events and actions.

For example, kumzor, yazloq, guzapoyahokim, futbolgoh, qishboy, khopchi, joker, etc. name either a place or a person.

S. Mominov compares neologisms and occasionalisms and shows their characteristic features. He mentions the following as important features of occasionalisms: 1) relationship of occasionalisms to the vocabulary layer; 2) characteristic of an individual



(occasional meaning); 3) a single-use speech unit, often with an emotional-expressive color; 4) serve for a specific artistic speech situation; 5) to be motivated [5].

S. Toshaliyeva in her candidate's dissertation on the topic "Occasional word formation in Uzbek" shows the following characteristics of occasional words: Occasionalisms: 1) speech phenomenon; related to the text and speech situation; 2) abnormal-irregular; 3) intended for one-time use; 4) personal-creative production - related to word creativity; 5) related to word formation and word usage; 6) manufacturing process, manufacturing method, reason for use; 7) the usual and unusual relations related to morpheme division and composition are clearly understood; 8) use and creation require a certain environment (microtext); 9) related to certain linguistic-conscious perceptions and transformations; 10) appears as a speech term (naming) and a method of text creation [6].

Although such words are used on the basis of equal rights with other words (common words considered as a linguistic unit) in the course of their speech, they differ from them only by their unique characteristics. One of such important signs is dependence on speech (text).

This sign is the most important sign of occasional words. In a certain speech situation, there are such speech units that are more necessary than ordinary language units in terms of content and emotionality, which are created in the text to which they belong, are used in this text and live with it. It is not necessary for such words to be accepted into the language vocabulary and become common.

The units included in the vocabulary of a particular language are stable words, and their dependence on the text is relative. Because stable words can be used repeatedly in speech alone, in phrases, one-word sentences and similar forms. And the dependence of occasional words on the text is absolutely necessary in most cases, and they cannot live separately, outside the text. The lexical meaning of an occasional word taken outside the text (for example, *uvadaband*, *uzaytirimak*, *damkash*, *sizim*, *nursiramak*, *rangdosh*) has a probabilistic character and is clarified by the text, and

this situation gives the occasional word the opportunity to be used alongside stable words in speech.

Consequently, while the stable word depends on the text, it itself predetermines and shapes it. In other words, a stable word is an active factor that creatively shapes the text. An occasional word does not have the characteristics of creating a text by itself. For example: We are a spiritual organization - "Ranjkom", that is, it is our job to hurt others. (A. Oripov)

The word *ranjkom* in this text is incapable of any meaning and completely unintelligible without reference to a much wider text of stable words.

An occasional word can be defined as follows: an occasional word is an expressive speech unit that incorporates the features of synchronic-diachronic confusion, abnormality, speech style or nomination occurring at the same moment of communication.

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EVALUATION OF CURRENT SITUATION, CRISIS MANAGEMENT STRATEGIES AND POST-PANDEMIC PROSPECTS OF TAIWAN YOUTH HOSTEL DURING COVID-19 PANDEMIC

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ABSTRACT

In 2020, COVID-19 affected almost all countries, it has governments faced with difficult trade-offs given the health, economic and social challenges it raises. More than half of the world's population had experienced a lockdown with strong containment measures. The regional and local impact of the COVID-19 crisis is highly heterogeneous, with significant implications for crisis management and policy responses.

This study is qualitative research adopted interviews to collect the data. The research focused on the changes in the operation of youth hostels due to the pandemic, the method which they comply to respond, and the future prospects of the youth hostel industry.

As a result, it was found that youth hostel operators are slow in responding to crisis due to the lack of awareness, and do not have immediate effective methods to response to the impacts. According to the views of the three participants from the youth hostel operators, the strategies include cost reduction, reducing prices, modification of booking and cancellation policy, develop new customer group segments, revitalize of space and expand the alliance effect was comply in order to cope with the impact of the pandemic.

It is suggested that the operators to emphasize on establishing an effective crisis management system with enhancing their awareness of crisis and risks. Developing customer from different categories is an issue to concern in order to avoid over relying on single customer group to make the youth hostel industry more sustainable.

KEYWORDS: Covid-19, youth hostel, crisis management, post-pandemic prospect

INTRODUCTION

Tourism industry play an important role in human economic activities, according to The Travel and Tourism: Global Economic Impact and Trends 2021 released by World Travel and Tourism Council (WTTC, 2021), the tourism industry gross domestic product (GDP) growth rate is higher than the overall GDP growth rate of the global economy for 9 consecutive years since 2011. The report also shows that before the outbreak of COVID-19, the global tourism industry's GDP in 2019 was US\$9.17 trillion, which is 10.4% of global GDP, 334 million jobs were created and involved in tourism industry's which accounting for 10.6% of global jobs.

In 2020, in order to prevent and control a rapid growth in infections of the COVID-19 pandemic, countries around the world have implemented policies such as countrywide lockdown, full closure of borders, quarantine all arriving travellers, wherefore resulting drastic changes in the global economy and society. It has dealt a serious blow and resulting in heavy losses to the tourism industry. WTTC pointed out that the GDP of the tourism industry in 2020 decreased by 49.1% compared to 2019, with a loss of up to US\$4.5 trillion globally (WTTC, 2021).

In Taiwan, according to the statistics of the Tourism Bureau of Taiwan (2021), COVID-19 pandemic has caused a great economic impact on Taiwan's major industries, including tourism, aviation and hospitality industries. On 19

March 2020, authorities of Taiwan prohibited the entry of foreign tourists, resulted international tourism was suspended. Compared to 2019, number of foreign visitors in 2020 had a dropped of 88.39% from 11.86 million to 1.378 million. By 2021, the situation did not improve, and as of November of the year, there were only 130,000 foreign visitors to Taiwan, a decrease of 98.78% compared with before the pandemic. Taiwan hospitality industry annual report also showing that the scale of the industry hit a decade low in 2020, with decrease of 32.4% compared to 2019 (Yao, 2021).

In the hospitality industry, youth hostels have been the hardest hit during the pandemic due to the feature of providing large scale of communal spaces, such as shared bathroom and kitchen. The recovery of youth hostels from pandemic has been relatively slow compared to other forms of accommodation, because people were generally preferring to choose general hotels that provide separated rooms during the pandemic.

This study analyses the changes in the operation of youth hostels due to the pandemic, the method which they comply to respond, and the future prospects of the youth hostel industry. The research questions addressed in this paper are therefore:

1. How has COVID-19 pandemic changed the youth hostel industry?



2. What are the contingency methods youth hostel complying to cope with the impact of COVID-19 pandemic?
3. What are the future prospects to the youth hostel industry in the post-pandemic?

In the study, in-depth interviews were conducted with current operators or persons in charge of youth hostels in Taiwan who were still able to operate during COVID-19 pandemic. The researcher hopes to make contribution to the youth hostel industry with helping them to find effective strategies and methods to cope with systemic crisis similar to the COVID-19 pandemic. Moreover, the study provides recommendations for youth hostels and policymakers.

LITERATURE REVIEW

The origin and evolution of youth hostel

The origins of youth hostel stem from Richard Schirrmann, a German teacher. In 1909, Richard Schirrmann spent the night in a school building sheltering from a storm during a school trip, led him to the idea of providing young hikers with cheap place to sleep (Liu, 2011; Pai, 2020).

The first youth hostel opened on June 1, 1912 in Altena Castle by Schirrmann in north-western Germany (Liu, 2011; Pai, 2020). Meanwhile, the original rooms have been turned into a museum, but guests are still welcome at Altena Castle. Youth hostels were originally mainly operated in schools for students, due to the high demand it began to move to general public buildings and allow for public lodging, slowly evolve become youth hostels at the present day (Liu, 2011; Pai, 2020).

Features of the hostel

Youth hostel often give the impression as a low-cost accommodation that is very popular amount backpackers or solo travellers. The feature of providing communal spaces, such as shared bathroom and kitchen discern youth hostel from general hotel. Unlike ordinary hotels that focus on guest rooms, youth hostels emphasize the concept of shared space. It creates an environment for interaction and communication between peoples.

In terms of service, youth hostels are basically self-service, guests can enjoy simple self-served breakfast provided by the hostel. Youth hostels provide basic cooking utilities for guests to prepare food, guests need to change bed linen by own during check-in and check-out.

One of the greatest pleasures of staying at a youth hostel is that the guests are allow to participate in special events or local celebrations at common space and social hall set up by the hostel.

Overview of the development of youth hostels in Taiwan

Taiwan youth hostel originated from activity centres and cottages built by China Youth Corps throughout Taiwan in 1961, the building was construct to provide venues and facilities for youth activities (Chen, 2015). In 2006, the China Youth Corps Youth Activity Centre and the Chinese Taipei Youth Hostel Association (CTYHA) become member of International Youth Hostel Federation (IYHF), officially integrating Taiwan youth hostel industry into international extent (Chen, 2008).

Currently, the youth hostels in Taiwan can be divided into two groups, member of Taiwan Youth Hostel Association which mostly are general hotels that getting the membership to attract different customer groups. The other is youth hostels that never joined any organization, but they are actually the majority of the industry.

Besides, currently there does not have specific category of regulations for youth hostels in Taiwan, youth hostels can only choose between hotel or homestay licenses to run the business, even though they are differences in the point of business methods and facilities and services that provided (Fu, Zhang, Hsieh, 2016). Therefore, there does not have any statistical data that precisely reflected the development situation of youth hostel industry in Taiwan.

METHODOLOGY

This research adopts the qualitative research method. Qualitative research is a process of begin from a holistic point of view, after comprehensively constructing to achieve deeply comprehension in social phenomena. Researchers need to finely study the participants' life world in the natural situation, closely interact with them, and collect data through one or more methods, in the process of research to observe and learn the cognitions and views of the participants, as well as recognize and tolerate, and have a more comprehensive and in-depth understanding of the social phenomena or behaviours studied (Pan, 2003).

Covid-19 pandemic is a world crisis the likes of which hasn't been seen in 100 years. The crisis has forced to the shutdown of economy activities globally. Even though Taiwan government have reacted quickly in the crisis management and recovery, but operators from hospitality industry may have expressed different opinions, which is difficult to make in-depth statements through quantitative methods. Therefore, it is reasonable to use qualitative research to discuss such issues.

In-depth interview method was adopted during the research, through the conversation between the researcher and the participants to achieves the exchange and construction of opinions, deeply analyses the impacts of the Covid-19 pandemic on Taiwan's youth hostels and the coping strategies of youth hostel operators, data was collected and compiles for analysis. Through qualitative in-depth interviews, we can explore facts, causality, individuality and particularity. This research method is a face-to-face social interaction process between the interviewer and the interviewee, and the interview data is the product of social interaction (Hu, 2008)

The selection of research participants is an extremely important part, research participants should have experience, willingness and expression ability, so as to grasp the validity and complete the data collection. Therefore, research participants chosen are current managers or person in charge of youth hostels in Taiwan, whom have experienced the changes in various stages of the pandemic and dealing with the impact due to the pandemic. During interviews with the participants, through their sharing and discussion, the study can better understand the real face and actual situation of the youth hostel industry.



RESULTS

Background of youth hostels and business conditions before and after the pandemic

Youth Hostel A

Mr. Chen is the owner of Youth Hostel A, who was employed in the civil engineering industry before starting the business at the end of 2017. The hostel is located at commercial district near Taipei Main Station, equipped with 20 beds, which is a typical small model of youth hostel. Due to the strategic location, around 80% of the guests of Youth Hostel A were foreign tourists, of which round 30% were from western country, the rest were from China, Hong Kong, Japan, South Korea and Southeast Asia, while only about 20% were local Taiwanese. Youth Hostel A lost all foreign guests during the pandemic, and only able to maintain around 10~20% of accommodation rate and most of whom were local Taiwanese regular guests.

Mr. Chen said that he had underrated the treat from Covid-19 when the virus was first introduced, because there was never happened with such a worldwide pandemic in his experienced, and the impact seem to be mild as there were still a lot of foreigners staying in Taiwan at the moment, he took a "wait and see" approach and think that the pandemic won't last for long, until boarder control policy was implemented and instantly prohibiting tourists to enter Taiwan.

Since Taipei is a metropolis-type city, most guests of Youth Hostel A travel to Taipei are due to participating activities such as concerts or exhibitions, interview or examinations, business meetings or conferences, rarely in view of tourism purpose.

Youth Hostel B

Youth Hostel B is a sharing brand which has 6 youth hostels operating as in coalition in northern and eastern Taiwan. It was first operated in Taipei Beitou area in 2013, followed by Jiufen (2014), Hualien (2015) and Taitung (2016). Coalition members at Yuli and Duran start to operate after the outbreak of the Covid-19 (February 2020 and April 2021). The size of the coalition members are varies, ranging from small-sized hostel which able to host around 10 guests to medium-sized hostel with 40 or 50 beds space.

Mr. Kuo is the founder of Youth Hostel B with more than 10 years of experience in managing youth hostel. Since 2011, he had put in efforts urging the policymakers to improve youth hostel management regulations and standards. Later in 2014, with his influence, the "Taiwan Youth Hostel Entrepreneurship Alliance" was established as a platform for industry players to share entrepreneurial experience and accelerate the development of the youth hostel industry in Taiwan.

Before the Covid-19 pandemic, customer group of each alliance store was differed from each other. More than half of Beitou store's booking was made by domestic tourists. Jiufen store was having more than 70% of domestic tourists in summer, but in winter, on the contrary, over 70% were foreign tourists. And in the east coast, domestic tourists are always the majority since it is very popular for local group to participate in round island tour, peak and off-peak season is clearly on the basis of festival and holidays. Besides, Youth Hostel B were

able to maintain a higher proportion of direct orders of about over half of the total number of reservations, which shows that Youth Hostel B has already achieve a certain level of brand awareness in the market.

Mr. Kuo reveal that the impact of the pandemic could be extreme at different stages of the pandemic. For example, Hualien and Taitung store had recorded busiest summer in 2020 as the government began to relax the pandemic prevention policy. This makes manpower scheduling getting tricky, he was forced to cope with a higher workload under the situation of manpower shortage. It was on the other way in 2021, when the alert level throughout the country was raised to level three in the four-tier system, that making people avoiding to travel.

Another major change in practice is that the booking or reservation lead time has become very short. Before Covid-19 pandemic, as the demand is higher in general, travellers will need to make accommodation reservation in advance to guarantee the booking. However, the situation had change, and making it getting difficult to use floating pricing strategies to attract guests.

Youth Hostel C

Youth Hostel C was founded in 2010 and has two stores located in Kaohsiung and Taichung presently, both of which are self-owned properties with around 80 and 120 beds respectively. The founder Madam Liu, formerly service in information technology industry. Due to her background in the technology industry, Madam Liu emerge modern technology to manage the hostel such as keyless check-in and online remote monitoring system.

With the idea to make use of innovative technology, in 2016 Madam Liu work together with hostel operators from Tainan and Chiayi, co-founded the "I See You Taiwan Hostel Alliance" (hereinafter referred to as "I See You"). Currently, members of the alliance had increased to a total of 17 high-quality youth hostels around Taiwan, including hostels from outlying island. Through the use of a dedicated mobile app, "I See You" has launched an online membership system that allow members to collect points through direct booking, using the mobile app to obtain benefits such as special accommodation promotion packages, points redemption of free nights and special gifts.

Madam Liu said that in addition to the cash flow difficulties caused by Covid-19 pandemic, the major problem caused is the different understanding of hostel culture in the nature between domestic tourists and foreign customers. Taiwanese guests have misunderstood youth hostels as low-cost hotel, and do not realize that youth hostels are different to ordinary hostels, that is, a kind of accommodation that need to share room with others, and also the needs of sharing bathrooms and other public spaces. That's why since Covid-19 pandemic, they often receive complaints and even negative comments from guests on social media platforms on sharing of facilities.

Youth hostel crisis handling and response strategies

In order to cope with the impact of the pandemic, following methods and strategies was comply by the youth hostel operators.



1. Cost Reduction

This is the most common method that was complied by the youth hostel operators. Due to the inaccessibility of foreign tourists, youth hostels facing dramatic drop of booking rate and turnover. In order to survive, operators trying to cut down employee cost with reducing working hours and changing rosters, enforce annual leave by encouraging employees to take their annual leave instead of accumulating it. Besides, reduce material expenses, cutting overhead fees, and postpone maintenance schedule which is lower priority are also helpful to reduce routine operation cost.

2. Reducing prices

In order to strive for the customers from limited market demand during the pandemic time, price slashed competition happened amount the hospitality industry. Youth hostel operators have no choice but to follow and reducing prices. Due to the result is not as good as expected since peoples are avoiding to travel, price slashed was not lasting for long.

3. Modification of booking and cancellation policy

Before the pandemic, in order to avoid loss caused by the no-show of guests, most youth hostel adopted credit card login system on the reservation platform. In order to encourage and increase guests' willingness to make reservations, operators have made changes on the booking and cancellation policies with allowing guests to book without using a credit card, remove collection of advance deposit, and accept cancellations without charges.

4. Develop new customer group segments

In order to make up for the loss of foreign tourists due to the pandemic, youth hostel operators have inventing potential new customers group segments. For example, in consideration of the fact that instead of leaving beds empty, Youth Hostel A has launched a long-stay package that is different from the previous rate calculation on a per-stay day basis to win over guests who originally long-stayed at low-cost hotels. In addition, Mr. Chen also actively contacted the participating groups of the events held in Taipei City, and provided corresponding accommodation packages. As a result, Mr. Chen had successfully obtained reservation from long-stay guests and event participant groups. Besides, Madam Liu had also discovered accommodation demand from elderly groups.

5. Revitalize of space

The so-called revitalize of space is to make value-added intervention on existing space resources of the hostel to create revenue. For example, Youth Hostel B making attempt at Beitou store tried several times with freeing up the public area at lobby area for merchants to set up temporary market or pop-up store for a few days. Few groups of merchants participated, and some of them did achieve some results. Hualien store also used to work with baristas setting up a weekend coffee pop-up shop program.

6. Expand the alliance effect

During the pandemic, youth hostel with alliance such as "I See You" which allying numbers of hostels, being working together with members revealing several marketing promotion activities. For example, both Youth Hostel B Youth Hostel C had launch promotion program with accommodation vouchers which allow voucher holder to enjoy discounted price for second night staying at alliance hostels. Furthermore, "I See You" had also actively developed and improved the functions of the mobile app system, to establish cross-industry alliance projects, working with partner from other industry such as Tiger Airways and Ubus to provide vary of promotional packages and value-added services for consumers through the system.

Prospects for youth hostels in the post-pandemic era

Relies on the government's epidemic prevention policies

Mr. Chen believes that under the pandemic, Taipei's economic activities largely depend on the tightening or relaxation of the government's epidemic prevention policies. If the relevant authorities allowing organize of concerts, exhibitions and other events, it can significantly improve commercial activities and increase the demand and booking rate of hostel in Taipei.

If the relevant authorities further open the border to allow international tourism activity and no longer prohibiting foreign tourists from entering the country, the epidemic prevention strategy will also need to be revised to effectively help the youth hostel industry recover from the pandemic.

Recovery is in doubt and uncertain

Mr. Kuo is less optimistic about the overall recovery of the youth hostel industry after the pandemic, believing that will involve a lot of uncertainty.

First of all, Mr. Kuo felt that comparing to the global situation, although Taiwan's local impact on the pandemic is relatively mild, but the relevant authorities have mainly used the budget and resources to give subsidies, rather than making good use to improve and enhance Taiwan's tourism resources and facilities such as strengthening the mass transportation system.

Moreover, Taiwan authority is very cautious with deregulation the epidemic prevention policy, it is difficult for the tourism industry to gain the dividends of early opening up of international tourism. The recent relative strength of the Taiwan currency has increased the cost of foreign tourists to travel to Taiwan, which has further weakened the competitiveness of Taiwan's tourism industry.

The factors such as air tickets do not return to low fares in the short term, or even because of social distancing factors, making Mr. Kuo is in doubt with how much was the consumer behaviour of travellers had changed after a few years of interruption during the pandemic? Carvalho (2020) points out the same point in his research, that is, as the epidemic slowly progresses, the behaviour pattern of tourism has slowly changed.



Surviving from the crisis with transformation

At the beginning of the pandemic, Madam Liu realized that the tourism industry would receive a major blow and the impact would last for some time. She points out that in order to survive from the pandemic, the operators should put more effort to find out and strengthen their strong points, at the same time making improvement to rectify the weaknesses. However, since the pandemic had indirectly made elimination with those who was lack of competitiveness, Taiwan hospitality industry would be benefit from the significantly improved in overall quality.

Taking "I See You" as an example, even though the pandemic had causing them to postpone the plans of making expansion allying with youth hostels from other countries, "I See You" actively conceived plans to expand the alliance during the pandemic, including inviting potential high-quality youth hostel partners to join the alliance; developing cooperation proposals with different industry, such as F&B and souvenir outlets, to provide consumers more value-added services. The alliance not only survive from the pandemic, but continue growing and getting stronger.

CONCLUSION AND DISCUSSION

The three youth hostels participating in this study have different business scale and operating models, including common private youth hostel in the northern area; youth hostels operating as in coalition with several allied member in northern and eastern region; and co-founder of the youth hostel alliance which consist of member from Taiwan main island and outlying islands.

Researcher have found that in the early stage of the pandemic, youth hostel operators do not have immediate effective method to response to the impact other than relying on their past experience. The research result showing that youth hostels are lacked of awareness and had underrated the impairment of the crisis, especially Mr. Chen from Youth Hostel A once thought that the pandemic would end in a short time. This is corresponding to Zhou (2007) research which had pointed out that tour operators are generally react slow in responding to crisis due to the lack of awareness, it show that tourism industries are vulnerable to unexpected crisis such as natural disaster or regional conflict.

Youth hostel operators need to put effort to establish an effective crisis management system with enhancing their awareness of crisis and risks, so that they can handle crisis in a timely manner to avoid irreparable consequences. Youth hostel operators should also standardize crisis management with standard operation procedures so that they can ensure effective implementation, and can apply latest technology to improve the management capabilities.

Due to the loss of foreign tourists, youth hostels can only rely on local tourists, especially regular customers. In this case, only by establishing a positive image and branding to get the favour of guests to come back again. Therefore, improving the service level will help maintaining consistent income. Developing customer from different categories and create diversified customer groups is a topic that youth hostel operators must look into to avoid over relying on single customer group. From the case that Mr. Chen and Madam Liu

had successfully obtained new customer groups like long-stay guests, event participant groups and elderly groups, it shown that youth hostel still remain as a popular option for traveller even in the need of keeping social distance during the pandemic.

From the case of Youth Hostel B and Youth Hostel C, we can find that setting up co-working relationship through alliance, making clear result on organizing marketing programs to create branding effects, improve the revenue and performance of organization members, the result to work with peers is greater than being solo player.

Researcher believe that the youth hostel industry needs more attention from the policymakers, as Huang (2018) pointed out in his research, the Taiwan authorities need to analyse the demand for tourism in Taiwan from a different perspective. It is important to face up to the fact that the youth hostel is different from ordinary hotel and homestay, which are highly different in terms of business philosophy, services provided and targeted customer groups. It is hoped that the relevant authorities will formulate appropriate regulations so that both operators and consumers can receive the rights and protections they deserve.

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WOMEN EMPOWERMENT THROUGH PARTICIPATION IN ANIMAL HUSBANDRY ACTIVITIES IN ADAMAWA STATE OF NIGERIA

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ABSTRACT

This paper seeks to examine socio-economic benefits of participation in animal husbandry activities among women in Adamawa state of Nigeria. Women empowerment through animal husbandry activities which is the focus of this paper is a mechanism through which Northern Nigerian women are able to increase self-reliance in order to promote their well-being as it is believed agricultural development is a field that saddles its recipients with income generation. A sample of 154 women involved in the animal husbandry activities from the study area were selected from a study population of 255, through sample random from the seven local government areas of Adamawa State of Nigeria and a schedule was designed and administered among the respondents. The result revealed that respondents have opportunities through their participation in animal husbandry activities to enjoy some socio-economic benefits which include increase in their income, purchasing power and improved life. Most of the participants have no formal education which directly informed their participation in the programme. The study finds out that there is high rate of involvement of women in animal husbandry activities in the study area, hence most of the respondents emphasized positive changes in their socio-economic well-being. The paper therefore concludes that women involvement in animal husbandry activities is a mechanism for women empowerment and poverty alleviation in Northern Nigeria. It also concludes that the practice is a field that saddles on how to be employable and to be useful to themselves and the society.

1.0 INTRODUCTION

Women all over the world are considered as an extremely pivotal point in the process of change in the rural areas and that is why today in most of the developing countries like Nigeria, more emphasis is laid on the need for the development of women and their greater volunteerism and active participation in the main stream of development process (Singh, 2009 & Rajamani & Julius, 2012).

Nigerian Women have limited access to socio-economic rights and privileges. They enjoy lower social status and are encumbered by traditional practices to exhibit their potentials. They suffer discrimination and marginalization through denials of rights, land ownership, access to credit facilities and farm input. Women are isolated and restricted at the community levels through traditional and religions practices which hamper their development.

Adamawa state is basically an agrarian federating unit of the Federal Republic of Nigeria. The high level of poverty in this area has become a source of concern.

Women have been known to play important functions to the development of any nation. As such, there is an emerging need to improve women status which should start with socio-economic empowerment through animal husbandry activities. This would enable them to develop self-esteem, collective bargaining power and also improve their well-being and self-reliance. Thus, the increasing awareness and importance of women participation in animal husbandry activities and benefits drive calls for an in-depth study of women involved in animal husbandry activities in Adamawa state of Nigeria.

The aim of this paper therefore, is to understand and describe the socio-economic benefits accrued to women participating in animal husbandry activities in the study area.

1.1 Empowerment – A Theoretical Postulation

Empowerment had two interrelated aspects that can be summarized as individual empowerment and collective empowerment. Each aspect has its own component (Mann, 2006). Individual empowerment relates to the way people think about themselves as well as the knowledge, capacities, skills and mastery they actually possess (Stapple, 1999). A set of four components, including meaning, competence, self-determination and impact, were found in individual empowerment. The goal of individual empowerment is to achieve a state of liberation strong enough to impact one's power of life, community and society.

Empowerment therefore develops from individual and a critical consciousness to collective action (Boehn & Stapples, 2008). Individual empowerment develops when people attempt to develop the capabilities to overcome their psychological and intellectual obstacles and attain self-determination, self-sufficiency, self-confidence and decision-making abilities (Becker & Korach, 2004). While collective empowerment refers to the process by which individuals join together to break their solitude and silence, help one another, learn together, and develop skills for collective action (Boehn & Fatterson, 2004). Empowerment process is therefore not a constant, but rather a continuing development that involves many changes and



whereby an individual or group is able to strengthen and exercise the ability to act to gain control and mastery over life, community and society.

Empowerment thus is understood as a multi-dimensional process where people take control over their lives, gaining skills, building self-confidence and solving problems. Thus, women empowerment especially through animal husbandry activities would be able to develop self-esteem and confidence to improve their well-being. Therefore, the involvement of women in animal husbandry activities can lead to empowerment where they can gain control over their lives because agricultural development is a field that saddles its recipients with skills on how to be employable and useful to themselves and the society.

1.2 Aim and Objectives of Study

The aim of the paper was to examine the extent of women empowerment through participation in animal husbandry activities by women from Adamawa state of Nigeria.

The Specific Objectives are to:-

- i. Determine empowerment benefits (social and economic) through participation in animal husbandry practice
- ii. Identify the constraints mitigating against women participation in animal husbandry activities

2.0 METHODOLOGY

The study was carried out in Adamawa state of Nigeria. The study is descriptive in nature as it has attempted to describe the socio-economic benefits derived through participation in animal husbandry activities among women in the study area. The sample size of this study came from a population of 255 women who are involved in animal husbandry activities from the study area. The sample size of 154 was selected for the

study. The research instrument for data collection for this study was through questionnaire. The suggest items in measuring socio-economic empowerment were originally developed by past researchers and reported high rating in validity and reliability (Mann 2006, Kabeer, 2010). The volume of each response in these items as measured with four-point Likert scale (1. Strongly Disagree 2. Disagree 3. Agree 4. Strongly Agree). Data obtained from the respondents were coded, computed and analyzed using statistical package for social sciences (SPSS Version 20).

3.0 RESULTS

While trying to examine the dynamic of women empowerment through participation in animal husbandry activities in the study area, socio-economic benefits derived from the practice as well as challenges faced by the respondents were identified important variables as the respondents of this study are women that would explain better what they felt about animal husbandry practice and this is shown in tables 1-3.

3.1 Economic Empowerment Derived through Animal Husbandry Practices

The main idea behind this section (Table 3.1) was to measure the level of economic benefits derived by the respondents through participation in animal husbandry activities.

The analysis showed that the overall score of women economic empowerment was 2.53 and majority of the respondents are really privileged to enjoy many economic benefits. These include increased purchasing power and improved living condition. The overall frequency thus indicated that women who participated in animal husbandry activities have moderate level of economic empowerment.

Table 3.1 Items of Women Economic Empowerment (N154) Mean 2.53

S/N	Items	Mean	SD	Low (1 – 2)	Mod (2 – 3)	High (3 – 4)
1	I can solve my financial problems	3.77	0.51	1.2%	31.0%	70.2%
2	My living condition has improved	3.67	0.49	1.1%	38.8%	65.2%
3	My income has increased	3.52	0.47	1.2%	40.2%	59.4%
4	I can manage my resources	3.32	0.29	1.5%	80.4%	72.1%
5	I can save money now	3.30	0.27	1.4%	85.2%	70.2%
6	I have access to assets	2.99	0.32	9.2%	83.2%	1.4%
7	I can assist others financially	2.89	0.42	12.8%	84.0%	3.2%
8	I solve personal issues	2.60	0.62	43.3%	51.1%	5.7%
9	I have access to credit facilities	2.07	0.38	88.7%	11.3%	0.7%
10	I have gained more experience	1.80	0.50	95.0%	2.5%	1.4%

Source: Field Work 2022

3.2 Social Empowerment Derived Through Animal Husbandry Activities

This section (table 3.2) was used to measure respondents' level of social empowerment through their involvement in animal husbandry practices. The analysis showed that the overall mean was 2.62 and that most of the respondents of this

study who participate in animal husbandry have got a lot of social benefits. Based on the analysis in table 3.2 below, respondents got social benefits such as access to children education and better decision-making ability among others. Thus, the result showed that respondents who participate in animal husbandry activities from this study area generally have moderate empowerment.

**Table 3.2 Analysis of Women Social Empowerment (N154) Mean 2.62**

S/N	Items	Mean	SD	Low (1 – 2)	Mod (2 – 3)	High (3 – 4)
1	My life has improved	3.80	0.61	1.2%	38.5%	65.2%
2	I know much about the society	3.63	0.60	1.2%	39.2%	58.2%
3	I can act on my own	3.40	0.42	3.4%	70.2%	19.2%
4	I have access to children education	3.04	0.44	7.8%	80.1%	15.2%
5	I perform my social responsibilities	2.92	0.52	9.3%	78%	9.2%
6	I am happy now	2.76	0.50	12.2%	70.3%	6.7%
7	I feel better making decisions	2.75	0.49	7.8%	69.2%	5.2%
8	I have access of information	2.68	0.48	6.7%	66.3%	5.0%
9	I have friends now	2.52	0.45	3.5%	58.2%	4.0%
10	I learn many things now	2.50	0.60	46.6%	48.2%	2.8%

Source: Field Work 2022

3.3 Women Constraints in Animal Husbandry

The main idea behind this section (table 3.3) was to measure women obstacles in animal husbandry activities. The

analysis showed that majority of respondents of this study has faced some challenges. Some of these challenges include lack of enough initial capital, lack of financial support from the government and lack of enabling environment.

Table 3.3: Items of Analysis of Women Constraints (N154) Mean 1.90

S/N	Items	Mean	SD	Low (1 – 2)	Mod (2 – 3)	High (3 – 4)
1	I have enough capital	1.31	0.58	86.5%	12.4%	1.1%
2	I have support from others	2.31	0.63	65.5%	31.2%	3.2%
3	I have good market	1.70	0.61	96.0%	2.5%	1.5%
4	Government provide good environment	1.59	0.60	97.0%	2.5%	1.5%
5	I have access to tools	1.58	0.59	98.0%	1.0%	1.0%
6	I have support from government	1.57	0.57	96.0%	1.0%	1.0%
7	I have loan	1.58	0.59	97%	2.5%	1.5%
8	I have customers	1.70	0.61	96.05%	2.5%	1.5%
9	Some people work with me	2.36	0.67	61.05%	3.4%	3.2%
10	I have other facilities	1.70	0.60	68.02%	1.2%	3.1%

Source: Field Work, 2022.

4.0 DISCUSSION

The study was designed to understand the socio-economic impact of animal husbandry activities on members. The result obtained from this study has shown the benefits and changes that respondents of this study have experienced in their lives as a result of their animal husbandry practice. The outcome of this study showed that most of the respondents of this study have benefitted considerably in terms of socio-economic empowerment. It is evident that economically, the respondent has opportunities through their participation in animal husbandry activities to enjoy some economic benefits which include increase in their income. Most of them felt strong enough to meet unexpected financial challenges as a result of the increase in their purchasing power, secondly, the outcome indicated that the respondents have got a lot of social benefits; most of them felt that there is improved life and access to new skills of income generation. To this end, respondents are able to make good decisions about themselves. They are able to articulate own strategy for change.

The findings of this study are consistent with previous studies (Pretty 1995, Bharathi 2005 & Ndas 2014) who observed that animal husbandry practice has the potential of establishing capacity building and self-efficiency among women in socio-economic development.

Although the respondents of this study faced some challenges in this practice. These includes lack of initial capital, lack of government support and many others, but the respondents were able to record moderate successes. It can be concluded that poverty and unemployment are the compelling forces for the women to participate in animal husbandry activities and the practice has proved to be a good strategy to alleviate poverty and women development. It is understood from this study that animal husbandry activities are playing a vital role in empowering northern Nigeria women as most of the respondents have emphasized changes in their well-being.



5.0 CONCLUSION

The outcome of this study indicated that women in the area of study sees animal husbandry practice as major means of livelihood and therefore, put high expectation of returns on the practice. And as such, have benefitted considerably in terms of socio-economic development. The practice has clearly created impact upon the life pattern of Nigerian women especially those from Adamawa State of Nigeria.

6.0 RECOMMENDATION

The paper recommends the following;

1. Federal government should come out with mass enlightenment programme through ministries of agriculture and women affairs on the need for active participation of women in animal husbandry activities irrespective of educational status
2. There is need for the three tiers of government to give support to women engaged in animal husbandry activities

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IMPROVING THE ETHOD OF MANAGING DATA ON THE LAND ACCOUNT WITH THE HELP OF A MOBILE APPLICATION

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ABSTRACT

This article talks about the problems of improving the transmission of information about land in an interactive way today and its solution. There is talk of a mobile application that transmits data about users offline

KEY WORD: agricultural land, mobile application, Java programming language, “QR-code”, ID, “Information Land Use”

Enter. What is happening in the world analysis of events , changes and processes and prediction of future work on a very large scale requires a database. This means collecting a large amount of information, gathering it in one place and transferring it to the necessary bases for data processing .

Today’s news technology is human of activity all fields , including from the ground field of use as well come in came _ This is about the land collect information in a single database, storage and update , especially land _ quality and amount requires the implementation of indicators using special programs in accordance with the requirements of the time. It is important to perform these

tasks using a single mobile application on mobile devices or tablets, working in an interactive way.

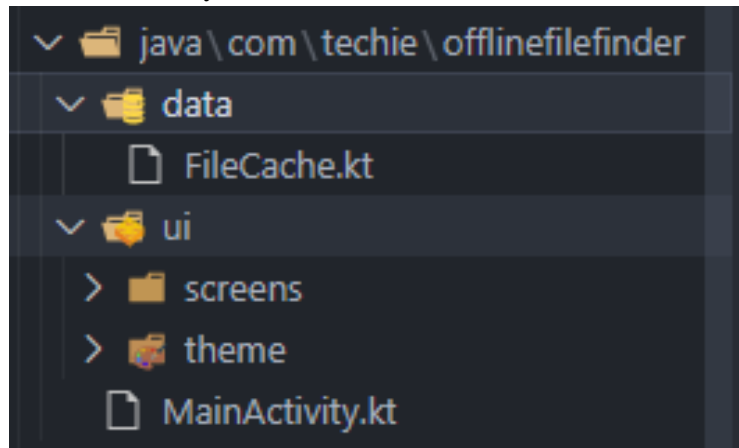
In the course of the research, it is planned to develop a special mobile application for smart communication devices running on the Android system to connect the tablets organized on the basis of the “QR-code” system to the database and to create the possibility of reading information. This mobile application was implemented using the “**Information Land Use**” software. The main advantage of the “**Information Land Use**” **program, which is** proposed to improve the land accounting method, is its offline operation. This mobile application was developed by the researcher, in which the sequence of the development process was shown:



Picture 1. A structural view of the code

The structural view of the program code is shown in the picture above. All the dependent parts of the program are located inside the main folder. Inside the “main” folder are the “assets” “java” and “res” folders. The “Res” folder mainly stores necessary resources,

variables, etc. The purpose of keeping all variables in the “res” folder is to make the program more understandable and easy to modify. In the “Assets” folder, the necessary files are stored.



Picture 2. Structural view of “java” folder

picture above (picture 2), the “java” folder is also composed of 2 folders, the first is “data” and the second is “ui”. Inside the “Data” folder there is a “FileCache.kt” file, where the program defines the relationships between the necessary data.

It is needed to read ViewModel Files from the database. The findFilesById method, given an Id, returns

the user a list of files matching the Id. The “getFileFromAssets” function retrieves files from the “assets” folder. In this way, it receives the “Id” entered by the users and releases the file to the user. It will look like this.



Picture 3. The main window of the “Information Land Use” program

“Id” numbers were formed for all users of Alisher Navoi massif, Guzor district, Kashkadarya region .

Picture 3 shows the main window of the program. In this window, enter the “Id” number on the

map in the “Enter file id” line, and the corresponding “pdf” file will appear in the window, and by clicking on the file, the download process will be performed . The information in the downloaded file looks like this:



Picture 4. View the information in the downloaded file

In conclusion, through the proposed “Information Land Use” mobile application, it is possible to have information about each farm. For this, it is enough to enter the “Id” number assigned to the land user in this application. The advantage and advantage of the application is that it is designed to work even in areas where the Internet does not work, that is, in offline mode.

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THE LEVEL OF STUDY OF THE SCIENTIFIC HERITAGE OF ABU HAFS NASAFI

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АБУ ҲАФС НАСАФИЙ ИЛМИЙ МЕРОСИНИНГ ЎРГАНИЛГАНЛИК ДАРАЖАСИ

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Аннотация

Ушбу мақолада Абу Ҳафс Насафийнинг илмий мероси дунё ва маҳаллий тадқиқотчилар томонидан қай даражада ўрганилгани очиқ берилди. Олимнинг илмий мероси ҳар замон ва маконда долзарб бўлгани, турли соҳаларда ижод қилгани боис кўплаб уламолар унинг илмий меросидан фойдаланган ва қайсидир маънода унинг кенг тарқалишига ўз ҳиссасини қўшган. Шундай бўлсада, алломанинг барча ёзган асарлари ҳали тўлиқ ўрганилмаган деган хулосага келинди.

Калит сўзлар: Китоб-ул-қанд, Минуфия университети, ал-ақоид-ан-насафия, рисола, тафсиришунослик, усул, мерос, шарқишунослик, Миср Маданият маркази.

Қомусий олим Абу Ҳафс Насафий илмий мероси олим яшаган даврдан тортиб ҳозирги кунимизгача тадқиқотчиларнинг тадқиқот объекти бўлиб келмоқда. Хусусан, олим билан бир даврда яшаган, лекин у билан учраша олмаган Абу Саъд Абдулкарим Самъоний (в.1167) ўзининг “Китоб ал-ансоб” асарида Абу Ҳафс Насафийнинг номини 27 ўринда келтириб ўтган [1;11]. Олимнинг “Китоб ал-қанд” асари мингдан кўп Самарқандлик уламоларнинг ҳаётини ўзида жамлаган бўлсада, кейинги даврда келган табақот ёки библиографик жанрда ижод қилган тадқиқотчилар учун асосий манба вазифасини бажарган. Ҳатто ислом оламида машҳур бўлган Заҳабий [2;126] ва Ибн Ҳажар Асқалоний каби олимлар ҳам ушбу асардан фойдаланганлар. Абу Ҳафс Насафийнинг ҳаёти ва илмий меросига эътибор қаратган олимларни қуйидаги тартибда келтириш мумкин: Самъоний “ат-Таҳбир” [3;527], Ёқут Ҳамавий “Муъжам-ул-удабо” [4;70-71], Заҳабий “ал-Ибар” [5;102], Ёфийий “Мирьот-ул-жинон” [6;268], Ибн Ҳажар “Лисон-ул-

мезон” [7;327], Довудий “Табақот-ул муфассирин” [8;5-7], Тошкўпирзода “Мифтоҳ-ус-саъодат” [9;127-128], Ибн Имод “Шазарот-уз-заҳаб” [10;115], Абдулқодир Қураший “Жавохиру-л-музия фи табақоти-л-ҳанафия” [11;394-395], Қосим ибн Қутлубғо “Тоҷу-т-тарожим фи табақоти-л-ҳанафия” [12;34-35], Жалолiddин Суютий “Табақоту-л-муфассирин” [13;27], Ҳожи Халифа “Кашфу-з-зунун” [14;247], Абдулҳай Лакнавий “ал-Фавоиду-л-баҳия фи табақоти-л-ҳанафия” [15;149-150], Умар Ризо Каҳола “Муъжам-ул-муаллифин” [16;305-306] каби асарларида Абу Ҳафс Насафийнинг илмий мероси ҳақидаги маълумотлар мавжуд.

Кейинги даврларда олимнинг илмий меросига доир тадқиқотлар олиб борилди. Назар Муҳаммад Форёбий 1991 йилда Абу Ҳафс Насафийнинг машҳур “Китоб-ул-Қанд” асарини тадқиқ этиб нашрга тайёрлаган. Тадқиқотчи асарни нашрга таёрлаш жараёнида библиографик жанрда китоб ёзган олимларни санаб ўтган ва Абу Ҳафс



Насафий “Китоб ал-қанд”ни ёзишда қайси манбаларга мурожаат қилганини келтириб ўтган[17;14].

Яна бир тадқиқотчи Юсуф ал-Ҳодий ҳам 1999 йилда Абу Ҳафс Насафийнинг “Китоб-ул-Қанд” асарини тадқиқ этиб нашрга тайёрлаган. Тадқиқотчи асарни нашрга тайёрлашда икки қадимий кўлёзмага таянганини алоҳида таъкидлаб ўтган. Бири Париж миллий кутубхонасидаги, иккинчиси Истанбул кутубхонасида сақланган кўлёзма нусхалар эди. Айнан Истанбул нусхасидан Назар Муҳаммад Форёбий фойдаланган. Юсуф ал-Ҳодийнинг изланишларига кўра Назар Муҳаммад Форёбий кўлёзмадан фойдаланишда бир нечта хатоларга йўл қўйган[18;11].

Дамашқлик тадқиқотчи Холид Абдурахмон Акк 1995 йилда Абу Ҳафс Насафийнинг “Тилбат-ут-талаба фи-л-истилоҳот-ил-фикҳийя”[19;65] асарини ўрганиб нашрга тайёрлаган. Тадқиқотчи асарни нашрга тайёрлаш жараёнида дастлаб китобнинг аҳамияти хусусида муқаддима келтирган. Оятларнинг қайси сурада экани, уларнинг рақами, муаллиф келтирган ҳадисларнинг даражаси, китоб матнида баъзи сўзларнинг ҳаракатларини қўйиш, изоҳталаб сўзларни шарҳлаш, асарда келган олимларнинг таржимаи ҳоли каби маълумотларни ҳам келтириб ўтган”[19;65].

Бир нечта тафсир китобларини таҳқиқ қилиб нашрга таёрлаган Мохир Адиб Ҳаббуш 2019 йилда Абу Ҳафс Насафийнинг “ат-Тайсир фи-т-тафсир” асарини нашр қилди. Тадқиқотчи асарни нашрга тайёрлаш асносида китобнинг ҳақиқатдан ҳам муаллифга тешгишли экани, ушбу тафсир китоби ҳақида келган манбалар, бошқа тафсирлардан ажралиб турадиган хусусиятлари, тафсирни ёзишда ёндашилган услуб, тадқиқот жараёнида таянилган кўлёзма нусхалар ҳақида маълумот бериб ўтган[20;37].

Миср Араб Республикасининг Минуфия университети ўқитувчиси доктор Аммода Ҳасан Марзуқ 2016 йилда Абу Ҳафс Насафийнинг “Матлаъ-ун-нужум ва мажмаъ-ул-улум” асарининг кўлёзма нусхасини тадқиқ қилиб чиққан. Тадқиқотчи 2012-2013-йиллар мобайнида Тошкентдаги Миср Маданият Марказида фаолият олиб борган вақтларида Ўзбекистон фанлар академияси Абу Райҳон Беруний номидаги Шарқшунослик кўлёзмалар институтида 1462 рақам остида

сақланаётган кўлёзмани ўрганиб чиққанини айтган[21;3]. Ушбу асарнинг ўганилиши ниҳоясига етмаган.

Шунингдек, доктор Исмоил Абдаббос 2018 йилда Абу Ҳафс Насафийнинг “Шарҳу мадор-ил-усул” асари устида тадқиқот олиб бориб, нашр этган. Тадқиқотчи изланишларида ушбу асарнинг асоси Имом Кархий томонидан ишлаб чиқилган қирқта фикҳий қоидаларни Абу Ҳафс Насафий шарҳлаганини келтириб ўтган[22;9]. Ушбу асарни Самих Туқодий 2021 йилда “Шарҳу усул-ил-Кархий” деган ном билан тадқиқ қилиб нашр этган. Тадқиқотчи ушбу ишни бажаришда тўртта кўлёзма манбаларга таянганини айтиб ўтган. Аслини олиб қараганда ҳар иккиси бир китоб бўлиб, Абу Ҳафс Насафий ушбу асарида Имом Кархий томонидан тузилган қирқта фикҳий қоидаларни шарҳлаган.

Алломанинг илмий меросини ўрганишга ўз хиссасини қўшган тадқиқотчилардан яна бири доктор Аммода Қадрий Иёзий бўлиб, у Абу Ҳафс Насафийнинг “Ҳаср-ул-масоил ва қаср-уд-далоил” асарини тадқиқ қилган. Аслида ушбу китоб олимнинг “ал-Манзума фи-л-хилофиёт” китобининг шарҳи ҳисобланади. Муаллиф шеърини услубдаги китобини ёзиб бўлганидан сўнг биринчилардан бўлиб ўзи унга шарҳ ёзади. Тадқиқотчи асарни ўрганишда асосан иккита кўлёзма нусхага таянганини айтиб ўтган[23;26]. Шунингдек, тадқиқотчи Алоуддин Муҳаммад ибн Абдулҳамид Асмандий Самарқандий томонидан ушбу асарга ёзилган шарҳга мурожаат қилган. Ушбу олим ҳам ўз шарҳига “Ҳаср-ул-масоил ва қаср-уд-далоил” деб ном қўйган. Икки китобнинг ўхшашлик жиҳатлари кўп. Асарда келган олимларнинг таржимаи ҳоли, тушунарли сўзларнинг шарҳи, оятларнинг рақами ва ҳадисларни ким ривоят қилгани каби изланишларни олиб борган.

Абу Ҳафс Насафийнинг илмий мероси билвосита бошқа асарлар зимнида ҳам тадқиқ қилинган. Хусусан, аллома Саъдуддин Тафтазонийнинг “ал-Ақоид-ун-Насафийя”га ёзган шарҳи 1988 йилда Аҳмад Ҳижозий Саққо томонидан ўрганилиб нашр қилинди. Шунингдек, ушбу асарни Суриялик тадқиқотчи Муҳаммад Аднон Дарвеш ҳам 2020 йил тадқиқ этиб нашр қилган.

Абу Ҳафс Насафийнинг илмий меросини тадқиқ этган изланувчилардан яна бир Оиша Ҳумайро Аслантурк бўлиб, у 1995 йилда Туркиянинг Мармара



университетида “Абу Ҳафс Умар Нажмиддин Насафийнинг “ат-Тайсир фи-т-тафсир” номли асарининг таҳлили ва ал-бақара сурасининг танқидли наشري” мавзусида докторлик ишини ҳимоя қилган.

Ана шундай изланувчилардан яна бири Заид ал-Бадарен 2019 йилда Туркиянинг Трабзон университетида “Абу Ҳафс Нажмиддин Умар ан-Насафининг “ат-Тайсир фи-т-тафсир” номли асарининг таҳқиқ ва таҳлили (Нисо сураси)” мавзусида докторлик ишини ҳимоя қилган.

Абу Ҳафс Насафийнинг ушбу “ат-Тайсир фи-т-тафсир” асарининг биринчи жилди 2019 йил доктор Муҳаммад Жошқун томонидан турк тилига таржима қилинган. Таржима асносида асарнинг араб тилидаги матни ҳам келтирилиб, бошқа нусхалар билан қиёсий таҳлил олиб борилган.

Ўзбекистон мустақилликка эришгандан сўнг кўплаб соҳалар қатори қадимий қўлёзмалар ва илмий меросни ўрганишга катта эътибор қаратди. Шулар қаторида Абу Ҳафс Насафийнинг илмий мероси ҳам алоҳида аҳамият касб этади. Аллома турли соҳаларга доир юздан ортиқ асарлар тасниф этгани унинг илмий салоҳияти қай даражада юқори эканини кўрсатади[1;19]. Кейинги давр уламолари Абу Ҳафс Насафийнинг илмий меросидан кенг фойдалангани эса, унинг аҳамиятини янада оширади.

Бу борада биринчилардан бўлиб Ўзбекистон Халқаро ислом академияси ўқитувчиси т.ф.н. доц. Д.Раҳимжонов “Абу Ҳафс ан-Насафийнинг “китоб ал-қанд фи ма‘рифат ‘уламо’ самарқанд” асари – Самарқандда ҳадис илми тарихи бўйича муҳим манба” мавзусида тадқиқот олиб борди. Тадқиқотчи “Абу Ҳафс ан-Насафий ва унинг “Китоб ал-қанд” асари” деб номланган биринчи бобни муаллифининг ҳаёти, ижоди, илмий фаолияти, унинг ҳадис илмида тутган ўрни ҳамда унинг “Китоб ал-қанд” асари ва унинг қўлёзмалари, босма нашрлари ҳақида батафсил маълумот беришга бағишлаган[1;9-48].

“Ҳадис илмининг Самарқандга кириб келиши ва ривожланиши (VIII-X асрлар)” деб номланган иккинчи боб шаҳарнинг илк исломлашувидан Қорахонийлар (999-1219) даврига қадар бўлган ҳадис илмининг ҳолатини таҳлил этишга бағишланган.

“XI-XII асрларда ҳадис илми” деб номланган учинчи бобда Қорахонийлар даврида муҳаддисларнинг Самарқанд ижтимоий-сиёсий

ҳаётида тутган ўрни, ҳадис илмининг тарихи ҳақида сўз боради.

Тадқиқот давомида Д.Раҳимжонов диссертацияда асосан Назар Муҳаммад Форёбийнинг 1991 йилда “ал-Қанд фи зикр уламо Самарқанд” номи остида нашрга тайёрлаган иши ҳамда Юсуф ал-Ҳодийнинг 1999 йилда “Китоб-ул-Қанд фи зикр уламо Самарқанд” номи билан нашрга тайёрлаган асардаги маълумотларга таянгани маълум бўлди[1;10].

Абу Ҳафс Насафийнинг илмий меросини ўрганган ўзбекистонлик мутахассислардан яна бири С.А.Муҳаммадаминов бўлиб, у 2012 йил Абу Райҳон Беруний номидаги Шарқшунослик институтида “Абу Ҳафс ан-Насафийнинг “Матла‘ ан-нужум ва мажма‘ ал-‘улум” асари ва унинг Марказий Осиё ислом илмлари ривожидида тутган ўрни (XI аср охири – XII аср ўрталари)” мавзусида тарих фанлари номзоди илмий даражасини олиш учун диссертацияни ҳимоя қилди.

Тадқиқотчи “XI аср охири – XII аср Асрларда Мовароуннаҳрда диний муҳит” деб номланган биринчи бобида олим яшаган даврда Мовароуннаҳрда ислом илмлари тараққиёти ва унинг ҳаёти ва илмий меросини ўрганган[29;14-51].

“Абу Ҳафс ан-Насафийнинг “Матла‘ ан-нужум ва мажма‘ ал-‘улум” асари” деб номланган иккинчи бобда эса, “Матла‘ ан-нужум ва мажма‘ ал-‘улум” асарининг кодикологик хусусиятлари ва асарнинг таркибий тузилишини очиб берган.

Тадқиқотчи учинчи бобни “Матла‘ ан-нужум ва мажма‘ ал-‘улум” асаридаги ислом илмлари таҳлилига ажратиб, унда калом, тасаввуф, куръон, фикҳ ва ҳадис илмлари унга хос жиҳатларини ёритган.

Абу Ҳафс Насафийнинг илмий меросини ўрганган яна бир тадқиқотчи А.А.Аллоқулов 2018 йил Ўзбекистон халқаро ислом академиясида “Абу Ҳафс Насафийнинг “Ақоид” асари ва унинг шарҳлари таҳлили” мавзусида фалсафа фанлари доктори (PhD) илмий даражасини олиш учун диссертацияни ҳимоя қилган.

Тадқиқотчи “Абу Ҳафс Насафий меросининг ислом илмлари ривожидида тутган ўрни (XI-XII асрлар)” деган биринчи бобида XI-XII асрларда Мовароуннаҳрнинг ижтимоий-сиёсий, маданий ва илмий муҳити, Мовароуннаҳр илмий ҳаётида Абу



Ҳафс Насафийнинг тутган ўрни, Олимнинг илмий мероси ва асарлари таснифини ўрганган.

“Абу Ҳафс Насафий “Ақоид” асарининг кодикологик хусусиятлари ва қиёсий таҳлили” деган иккинчи бобда ҳанафий-мотуридийлик таълимоти ривожда “Ақоид” асарининг аҳамияти, “Ақоид” асари қўлёзмаларининг манбашунослик тавсифи, “Фикху-л-акбар” ва “Ақоид” асарларининг қиёсий таҳлили каби мавзуларни ёритган.

“Ақоид” асарининг шарҳлари ва ихтилофли ақидавий масалалар талқини” деган учинчи бобда “Ақоид” асарига ёзилган шарҳларнинг манбашунослик таҳлили, асар матни таржималари ва замонавий шарҳлари тавсифи, “Ақоид” асари шарҳларининг дин ниқоби остидаги экстремистик оқимларга қарши курашдаги ўрнини очиб берган.

Абу Ҳафс Насафийнинг илмий меросини ўрганган тадқиқотчилардан яна бири А.Муратов 2021 йилда Ўзбекистон халқаро ислом академиясида “Абу Ҳафс Насафий “Тайсир фи-т-тафсир” асарининг манбашунослик тадқиқи” мавзусида диссертация ишини ҳимоя қилди.

Тадқиқотчи “Абу Ҳафс Насафий илмий меросини ўрганишнинг илмий-назарий асослари” деган биринчи бобда Мовароуннаҳрда тафсирнинг ишорий услуби ва унинг ўзига хос жиҳатлари, “Тайсир фи-т-тафсир” асарининг Мовароуннаҳр тафсиршунослигидаги аҳамияти, асарда Қуръоншуносликка доир сабаби нузул ва қироат илмларининг ёритилиши каби мавзуларни очиб берган[31;14-57].

“Абу Ҳафс Насафий “Тайсир фи-т-тафсир” асарининг кодикологик хусусиятлари” деган иккинчи бобда “Тайсир фи-т-тафсир” қўлёзмаларининг манбашунослик тадқиқи, асарнинг манбалари ва уларнинг қиёсий таҳлили ва ушбу китоб манба бўлиб хизмат қилган асарлар ҳақида маълумотлар ўрганилган.

“Тайсир фи-т-тафсир”нинг замонавий диний-маърифий ҳаётдаги аҳамияти” деган учинчи бобда эса, асарда ижтимоий масалаларнинг ёритилиши, калом илмига оид тушунчаларнинг қиёсий таҳлили ҳамда мўътадил тасаввуфий қарашларнинг тафсирдаги ўзига хос хусусиятлари баён этилган.

Тадқиқотчи олимнинг тафсир илмига оид қарашларини ўрганишга катта урғу қаратган. Бу

борада нафақат тафсир илми балки, қироатларга ҳам мурожаат қилиб асарда уларнинг талқин этилишини ўрганган.

Абу Ҳафс Насафийнинг илмий жамоатчиликка маълум бўлмаган асарлари ҳам кейинги давр тадқиқотчилари томонидан аниқланмоқда. Ҳ.Аминов ва С.Муҳаммадаминовлар томонидан олимнинг “Таҳсили усул ал-фикх” деган асари мавжуд экани исботланди[32;22]. Ушбу икки олим асарнинг танқидий матнини таёрлаб, ўзбек тилидаги таржимаси билан нашр этишди. Уларнинг таъкидлашича шу вақтга қадар олимнинг усул ал-фикхга доир “Шарҳи усул ал-Кархий” асари бор деб айтилган. А.Мўминовнинг ёзишича олим бу асарда Кархийнинг “Рисола” асаридаги 39 та фикҳий қоидани шарҳлаган[33;68]. Ушбу асарнинг замонавий нашрларига қаралса, фикҳий қоидалар 40 тани ташкил қилади. Балки, А.Мўминов фойдаланган манбада 39 та фикҳий қоида деб кўрсатилган бўлса, тадқиқотчи шунга асосланиб маълумот келтирган. Ҳ.Аминов ва С.Муҳаммадаминовлар эса, А.Мўминов келтирган маълумотларга асосланган.

Ушбу асарга туркиялик тадқиқотчи Баҳаддин Каракуш ҳам эътибор қаратган ва унинг танқидий матнини нашрга тайёрлаган. Унинг аниқлашича ушбу асарнинг иккита нусхаси бўлиб, бири Ҳиндистонда, иккинчиси Ўзбекистонда сақланади. Тадқиқотчи Ҳиндистондаги нусхадан фойдалана олмагани, Ўзбекистондаги нусхадан фойдаланганини таъкидлаб ўтган[34;157]. Ўзбекистонлик ва туркиялик тадқиқотчилар тайёрлаган матн қиёсий таҳлил қилинганда туркиялик тадқиқотчининг иши сифатли эканини кўриш мумкин.

Юқоридаги тадқиқотдан маълум бўладики, Абу Ҳафс Насафийнинг илмий меросига олимлар томонидан эътибор берилган ва бу изланишлар давом этмоқда. Тадқиқотимиз объекти қилиб олинган “ал-Явоқит фи-л-мавоқит” асари ҳам олимнинг ҳали ўрганилган асарларидан бири ҳисобланади. Ушбу асарнинг қўлёзма нусхалари дунё фондларида кам сонда сақланаётгани, ЎзФА Абу Райҳон Беруний номидаги шарқшунослик қўлёзмалар институтида сақланаётган нусхаси эса, ноёб эканлиги билан тадқиқотнинг аҳамиятини оширади.



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APPLICATION OF COMPOSITE MATERIALS ON THE BASIS OF WASTE FOR ANCHORING THE SANDS OF THE ARAL REGION

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ANNOTATION

In article are considered some possibility of the syntheses and using, new polymeric composition material on base lignin in region Aral epidemic deatnes. It is shown that problem dry Aral epidemic deatnes is a global problem to contemporaneity. Polymeric preparations are received on baselignosulphonats with phosphor containing join. Called on field and experimental studies have shown that designed polymeric composition material and after three years of the field test did not lose their own applied characteristic.

KEY WORDS: *Aral Sea, reagent, problem, salt, removal, polymer.*

INTRODUCTION

The problem of the drying up of the Aral Sea is a global problem of our time. This problem is aggravated by the fact that the moving sands of the dried bottom of the Aral Sea are highly saline, contain a huge amount of various harmful chemical reagents that are part of various mineral fertilizers and dust. One of the serious factors in the deterioration of the ecological situation in the Aral Sea region is the removal of salts and dust from the territory of these regions [1].

In this context, the problem of fixing the saline sands of the dried bottom of the Aral Sea, the creation of strong surface structures that do not interfere with plant growth and protect against weathering due to strong aerodynamic flow, is the most urgent problem of modern polymer chemistry and ecology in general [2].

It is known that the dried bottom of the Aral Sea is covered with a layer of saline moving sands with an area of more than 5500 thousand hectares. The content in them of water-resistant macrostructures greater than 0.25 mm, which are important for the cultivation of salt-resistant plants on these sands, is insignificant and often does not exceed 5-7% of the total mass of sand, as a result of which their rational use in the agricultural sector of the economy is difficult. In this connection, the problem of fixing sands from wind erosion through the creation of a strong surface crust is important, which ensures the fixation of mineral particles and salts in the places of their formation in order to prevent deflation [3].

In this aspect, the purpose of our recent research work is to protect moving sands from wind erosion by chemical fixing with the help of high-molecular composite additives

obtained on the basis of industrial waste from chemical enterprises of our republic.

OBJECTS AND METHODS OF RESEARCH

Sand from the dried bottom of the Aral Sea, hydrolytic lignin, which was processed into a modified preparation "AMU-2" and Gipan, were taken as the initial raw material. Light gray sand, density - 2.67 g/cm³, bulk density - 1.42 g/cm³, specific surface area - 760 cm²/g, porosity - 44.0%, filtration coefficient - 4.2 m/day. The study of the sands of the Muynak deposit showed the following results: density - 2.55 g/cm³, bulk density - 1.40 g/cm³, specific surface 790 cm²/g, porosity 46.5%, filtration coefficient - 4.8 m/day. The presence in the sands of pores of various radii and discrete in distribution has been established.

Hydrolytic lignin is a waste product from the processing of sawdust and vegetable waste from agriculture in the process of hydrolysis production. Hydrolysis lignin is a poly-disperse product with a particle size of up to 1 cm.

Technical hydrolysis lignin contains 64-78%, polysaccharide residues 20%, monosaccharides - 2.5%, mineral and organic acids - 1.5%, ash substances 4.5%. It is hygroscopic and has a moisture content of up to 65%. As a plasticizer and an additive that increases the water resistance of the coating after analyzing the properties of the binder, Gipan was chosen, which is a viscous white product. This product is produced by Navoiyazot JSC.

In accordance with the tasks set in the work, a complex of modern research methods was used. These include a group of methods that make it possible to investigate: the physico-chemical and chemical properties of sands, the processes of



formation of structures in aqueous dispersions, binder; electrochemical properties of the sand surface in the process of interaction with binders; change in the strength of contacts between sand particles in a structural system.

The presence of various functional groups in the chains of binder molecules was revealed by IR, NMR and UV spectroscopy. The studies were carried out both on liquid and solid samples. The thickness of the liquid samples ranged from a few millimeters to 0.02 mm. Feitron".

The wind erosion resistance of crusts and coatings was determined by blowing them with air in a wind tunnel. For the mathematical description of the considered process of formation of the structure of the developed material, the results of experiments carried out by the Matlab method were used.

RESULTS AND ITS DISCUSSION

An analysis of articles and patents on the use of lignin, performed in Japan, reviewed in the journal Chemical Abstracts, showed the constant interest of researchers in the problem of using lignin in agriculture [4]. This issue was devoted to 6% (total 600 publications), and for a later period - 7.8% (total 190 publications) of the total number of publications on the use of lignin [5].

Lignin and products derived from it are proposed to be used as fertilizers, plant growth stimulants, insecticides, herbicides, agents that improve soil structure, additives to the diet of animals. Materials on the use of lignin in agriculture are also reflected in a number of review articles and monographs [6].

In intensive agriculture, soil organic matter ensures the ability of the soil to absorb, accumulate, and evenly supply plants with water and nutrients introduced with fertilizers, as well as maintain optimal water-air and sanitary conditions of the soil, preserving it as the most important element of the biosphere [7].

Long-term field experiments on soddy-podzolic soils in England, Russia, Germany, Belarus and other countries have convincingly shown that with the optimal dose of mineral fertilizers and advanced agricultural technology, it is impossible to increase the reserves of organic matter only at the expense of crop residues [8]. Analysis of experimental data from numerous field experiments carried out in some European countries have shown that there is a close relationship between the reserves of humus in soils and the yield of agricultural crops, primarily cereals [9].

Thus, the introduction of 8-10 tons of organic fertilizers per 1 ha annually stops the loss of humus. In addition, there are vast tracts of land to be developed. These are unproductive upland meadows and pastures overgrown with shrubs, forest clearings, burnt areas, etc., which need organic fertilizers. The use of lignin as organic fertilizers, with additives necessary for these soils (nitrogen, calcium), can give a positive effect with a long aftereffect, since lignin humification occurs much more slowly than conventional organic fertilizers.

Attempts to use lignin as an organic additive in agriculture have been made for a long time. Japanese researchers studying the decomposition of sulfite liquor in the soil found

that the purified lignosulfonate is quite resistant to decomposition. In numerous experiments simulating the processes of humification of various herbaceous vegetation, it has been shown that the lignin of plant residues remains unchanged for a long time, and only after a year does its decomposition begin very slowly.

The study of the process of transformation of lignin in soils allows you to develop ways to use lignin as a fertilizer. It has now been established that all components of plant (and animal) tissue, as resistant to microbial action, take part in the formation of humic substances. Linearly constructed associates were found in undecomposed plant remains, however, the substances formed during the microbiological decomposition of the remains are of greater importance. This process is more or less intensive, therefore, for the formation of a stable lumpy structure, easily decomposing substances must be regularly supplied to the soil. In this context, it was of interest to study the properties of sands from the dried bottom of the Aral Sea and to develop optimal compositions and study their properties.

For this purpose, we have developed new polymer compositions based on phosphorylation of lignin by the Friedel-Crafts reaction. The lignin phosphorylation process was carried out under mild and accessible conditions. The product of the reaction of lignin phosphorylation, which we called the drug "AMU-2", is a brown viscous product, odorless, stable during long-term storage. The composition and structures of phosphorylated lignophosphonate "AMU-2" were identified by modern physicochemical methods of analysis.

The IR spectra of the product of lignin phosphorylation have a wide band at 3200-3400 cm⁻¹, indicating the presence of OH groups included in hydrogen bonds: 1710-1720 cm⁻¹ C=O bonds in carbonyl and carboxyl groups 1620-1600 and 1530-1500 cm⁻¹ - vibrations of the aromatic ring, as well as bands indicating the presence of ether bonds - 1120 and 1230 cm⁻¹. Sand can be represented as a dispersed system in which the dispersed phase is sand particles, and the dispersion medium surrounding each grain of sand is water or air. Given that sands must be treated with aqueous solutions of polymers, structure formation will occur in the sand-water-binder system, it is of interest to study the electrical conductivity of a sand dispersion in water.

The study of the electrical conductivity of the sand dispersion in various media revealed the surface dissolution of its grains with the appearance of neoplasms that form a contact zone at the sand-binder interface, and with an increase in the pH of the medium, the solubility increases. We present data from studies of the acid-base properties of the surface of sand that has been in contact with the atmosphere for a long time at 20°C and heated to 70°C.

These two states cover different degrees of surface hydration and characterize its properties in various technological processes. It has been established that contact with the atmosphere at 20°C leads to complete hydration of the sand surface and screening of its active centers by an adsorption layer. In this state, the surface has slightly acidic (pH=6.3) and weakly

basic (pH=7.1) properties. Strongly acidic and strongly basic indicators are not ionized when adsorbed on a hydrolyzed surface; therefore, the spectra of indicators with a pH transition of 7.2 contain only acidic bands, and with pH 6.3 - bands of the basic form.

At 70°C, partial dehydration of the sand surface occurs, accompanied by an increase in weakly acid centers with pH = 3.2-1.7. Strongly acid sites with negative pH values remain shielded by residual water molecules. Investigation of the surface of sands made it possible to reveal the negative effect of water adsorbed by the quartz surface, which shields strongly acidic and strongly basic centers and prevents their interaction with the binder.

A monolithic protective coating should perform its functions up to 1.8-2.5 years, provided that mechanical influences are excluded from it. Its durability depends entirely on the weather resistance of the binder. Astringent sandy layer, in addition to weather resistance, must have the ability to pass atmospheric moisture through itself and retain sand moisture, which is very important especially in arid and extra-arid conditions. If the coating has a combination of these properties, then phytomelioration will have increased efficiency.

The kinetics of the formation of a polymer-sand structure is associated with the rate of interaction between sand and polymer, in particular, with adsorption, which determines the

adhesive properties. To elucidate the nature of adhesion, it was necessary to study the nature of the formation of the corresponding structures in the contact zone. The most important characteristic of a monolithic polymer sand coating, which reveals its operational properties, is the value of plastic strength P_T at low loading rates. As expected, as the contact time of the sand with the binder increases, the strength of the coating increases after 16-18 hours according to an exponential law:

$$P_T = A(I/c) \quad (1)$$

- where A is the shear strength of the dried sandy substrate of undisturbed structure; I - time of contact, binder with sand.

Taking the logarithm of expression (1), we obtain the dependence of the increase in P_T on the change in the exponent in the limit of 0-18 hours, which is described by the following expression:

$$18 I - P_T = [(IA + c)$$

Curves of changes in the strength of the coating depending on the hardening temperature (Fig. 1) show that the most acceptable results are achieved at a temperature of 40°C. A further increase in the hardening temperature leads to a strong increase in P , an increase in the brittleness of the material, apparently, this is due to a sharp removal of the dispersed medium, which in turn prevents the processes of structure formation in the contact zone.

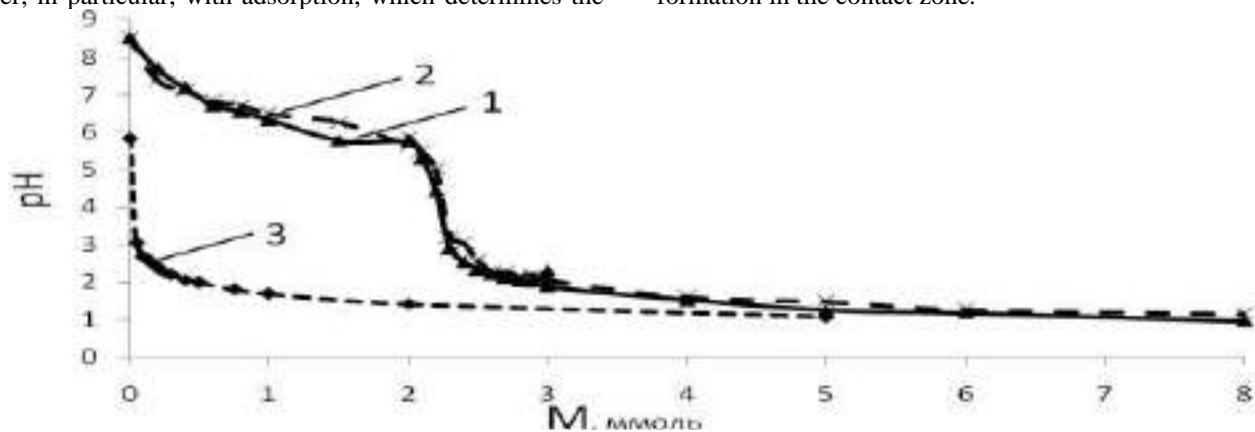


Fig.1. Dependence of the change in the strength of coatings on the temperature of hardening. 1-70°C, 2-40°C, 3-20°C.

The graphic dependence of the change in the strength of the coating on the consumption of the binder of optimal concentration shows that at a flow rate of 1 l/m² to 3 l/m², the value of P_T is practically constant, from 3 to 5 l/m² it increases, and a further increase in the consumption of the binder leads to a noticeable decrease, at the same time, the process of absorption of the binder into the sand worsens, which leads to its spreading on the surface of the sand. At the same time, sand samples from different regions of the Aral Sea region, treated with a binder solution of various concentrations, were tested.

As a result of the research, it was found that the samples treated with a binder containing the preparation "AMU-2" - 12% have the greatest stability of the structural and mechanical properties of the system to the effects of external loads in the temperature range from 20°C to 80°C. In this case, the

maximum values of the true plastic viscosity correspond to the minimum values of the elastic-elastic characteristics. The influence of various factors on the water resistance of the coating has been studied and the values of these factors have been determined. Under the influence of various atmospheric factors and their combination, the structure of the protective coating undergoes profound qualitative changes, which are determined mainly by changes in the properties of the binder.

Change in the plastic strength of the protective coating formed in the sands by impregnation of the AMU-2 preparation of the optimal concentration after testing the samples exposed in the IP-1-ZM and Feitron artificial weather apparatus for 20, 40 and 60 cycles. The cycle consisted of 20 hours of ultraviolet irradiation at 30°C, 5 hours of sprinkling and 3 hours of freezing at -15°C. The strength of the protective coating material by the end of the first 20 exposure cycles reaches



a value of 5.28 MPa, a further increase in the strength of the polymer-sand crust is less intense and reaches a maximum value by 40 test cycles, then a drop in strength is observed. Tests have shown that 20 and 40 exposure cycles, sustained by the samples, correspond to 1-2.5 years of operation of the polymer-sand crust in natural conditions, which is quite consistent with the requirements for it.

После изучения процесса старения под действием комплекса факторов потребовалось установить роль каждого из них. Поэтому изучали изменение пластической прочности от действия тепла, кислорода воздуха и ультрафиолетового излучения. Данные показывают, что для материала защитного покрытия наиболее агрессивным фактором является температура окружающей среды, вызывающая за 300 часов теплового воздействия увеличение прочности почти в 13 раз, тогда как ультрафиолетовое облучение увеличивает R_t , лишь в 7,2 раза, а кислород воздуха - в 12 раз. С увеличением насыщенности потока твердыми частицами увеличивается интенсивность уноса.

CONCLUSIONS

Analysis of the obtained data on the study of the properties of the coating shows that the developed coatings are not inferior in their qualities to the existing coatings. Observations of the samples showed that when blowing with a wind-sand flow, first of all, protrusions and roughness are carried away from the impacts of the solid particles of the flow, and thereby there is a danger of the appearance of erosion centers. In these cases, after a certain blowing time, the samples begin to collapse.

Thus, the analysis of previous studies, as well as experimental work, indicate that the preparation based on lignin "AMU-2" developed by us is a potential organic resource when used as ameliorative materials for optimizing the agrophysical and chemical properties of soils, primarily in the territories adjacent to the Aral Sea and the Aral Sea.

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HALOPHITIZATION OF VEGETATION AND THE DEVELOPMENT OF DESERTIFICATION IN KARAKALPAKSTAN

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ANNOTATION

The article discusses the features of halophytization of vegetation and the development of desertification processes in Karakalpakstan. Great remoteness from the oceans, high temperatures, prolonged droughts and saline lands are the main reasons for the high aridity of the region and intensive halophytization of vegetation.

KEY WORDS: *flora, salinization, drought, process, desertification, halophytization.*

Salinization is a widespread phenomenon. It is known that the predominant number of representatives of the flora of the globe develops in conditions of high salt content, since 25% of the earth's surface is saline to one degree or another, and two-thirds of it is covered by the waters of the World Ocean, where the salt content reaches 3-4%. Thus, a significant part of the world's flora species carry out their development cycle in the presence of a high salt content. As a result, the knowledge of the mechanism of action of salts and the adaptive reactions of plants is not only theoretical, but also of great practical importance.

Every year the problem of development and use of saline lands becomes more and more important. Soil salinization processes are becoming widespread in the countries of Central Asia. About 60 percent of irrigated land in Uzbekistan is saline. All irrigated lands of Karakalpakstan are saline to some extent.

The natural conditions of Karakalpakstan are determined by the geographical position on the modern and ancient deltas of the Amudarya River, in the center of the Eurasian continent, at a distance from the oceans - the main sources of moisture, at the junction of the North Turanian and South Turanian deserts.

The lower reaches and young deltas of the Amu Darya are represented by alluvial plains and lacustrine depressions that have formed in the last 10-15 thousand years. The following geomorphological regions are distinguished here: the modern Amudarya delta; the Akchadarya delta plain of the Amudarya; low mountains Sultanuizdag with adjacent sandy plateau; Assakeaudan - Sarykamysht delta plain, formed after the outburst of Lake Khorezm.

The emergence of a new third desert - Aralkum, in the former water area of the Aral Sea between Kyzylkum and Karakum, whose landscapes and soils are characterized by a high content of water-soluble salts and serve as a source of salts and dust distributed through the atmosphere. A sandy-saline desert formed here.

The Republic of Karakalpakstan is characterized by natural conditions conducive to intensive salt accumulation - a sharply continental climate, intense insolation, increased dryness of the air, and a small amount of precipitation. Great remoteness from the oceans, high temperatures, prolonged droughts and saline lands are the main reasons for the high aridity of the region and intensive halophytization of vegetation.



The modern vegetation cover of Karakalpakstan is largely a reflection of geomorphological conditions.

Psammophilic vegetation is confined to eolian landforms, halophilic vegetation - to various solonchak depressions. The tugai type of vegetation prevails in the floodplain and delta of the Amudarya. Coastal and swamp types of vegetation are confined to lakes.

At present, all irrigated lands located in the delta and lower reaches of the Amudarya are moderately and strongly saline. Almost all meadow and tugai ecosystems are deserted to some extent.

The economic use of the Amudarya delta should be carried out with priority consideration of natural factors that determine the development of degradation processes, such as desertification processes, since the temporal and spatial variability of natural characteristics increases the rate of destruction of natural ecosystems and slows down the rate of restoration of disturbed ecosystems. Fluctuations in the river flow of the Amudarya are also one of the main factors in the development of desertification in the floodplain.

In the arid zone, where saline soils are widespread, plant development often takes place under the influence of mineralized soil solutions. Ecologically different species can take part in the formation of desert communities, which react differently to an excess of salts in soils. The growth and development of weakly salt-tolerant species is inhibited in this case. Species that formed under conditions of increased mineralization of the soil solution quickly adapt to highly saline habitats. Halophytes better endure significant soil salinity with a gradual increase in the mineralization of the soil solution, as they grow and develop, which is observed under natural growth conditions.

Under a certain influence of increased mineralization of the substrate in areas where saline soils are distributed, representatives of different families may find themselves. The ability to accumulate salt is characteristic of halophytes of various forms of growth - trees, shrubs, semi-shrubs, grasses with a pronounced succulent structure. Among them, widespread representatives of the Chenopodiaceae family dominate in Karakalpakstan.

The results of the study showed that during the period of low water in the delta and lower reaches of the Amudarya, the most profound changes occur in natural complexes, which leads to disruption of the natural

course of dynamic transformations in ecosystems in which:

- ubiquitous halophytization of vegetation at various serial stages, which often leads to the disappearance of characteristic floristic differences between different communities and types of vegetation;
- disappearance of typical tugai tree and shrub communities;
- the emergence of various variants of semi-degraded grass communities that were not previously widespread;
- accelerated irreversible transformation of typical tugai and meadow communities into solonchak vegetation;
- significant loss of species diversity in tugai, meadow and desert communities compared to typical ones.

At the same time, the current level of economic management does not allow to completely exclude these territories from economic circulation, therefore it is necessary to conduct systematic and complete studies of successional changes in such ecosystems in order to develop measures for their rational use and timely prediction of the consequences of anthropogenic impacts, which, of course, will contribute to sustainable development in the Amudarya delta.

When carrying out monitoring observations and methodological approaches to organizing scientific research on desertification problems, special attention should be paid to the mechanisms of dynamics and functioning of the biotic components of the landscape (soils, vegetation) that most quickly respond to anthropogenic influence and the development of desertification processes.

As key sites for monitoring observations, it is necessary to select various terrestrial and aquatic ecosystems of the Southern Aral Sea region (meadow, tugai, coastal water, desert and solonchak), which most fully reflect the specifics of the natural conditions of this region, which will allow developing a regional strategy for carrying out the necessary environmental measures, taking into account the specifics various ecosystems, the degree of their disturbance and susceptibility to desertification processes.

Particular attention should be paid to the specifics of desertification of floodplain ecosystems, where many factors are actively superimposed on each other: flow regulation and changes in the water regime of the



Amudarya River, development of irrigated agriculture, degradation of floodplain ecosystems and their succession towards halophytization, and increased soil salinization. In fact, the entire set of negative factors that cause desertification, which are inherent in the entire territory of the South Prearalie, is concentrated in this territory.

Thus, henceforth, when studying the desertification of terrestrial ecosystems of a given territory, it is also very important to develop practical recommendations for their solution. Also, it is necessary to have a comprehensive and accurate predictive assessment of the consequences of the proposed plans for environmental protection measures.

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UDC 58

BIOECOLOGICAL FEATURES OF INTRODUCED PLANTS IN THE CONDITIONS OF THE REPUBLIC OF KARAKALPAKSTAN

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ANNOTATION

The article presents the results of a study of the bioecological features of introduced plants in the conditions of the Republic of Karakalpakstan.

KEY WORDS: *introduction, introducent, bioecological features, flowering, fruiting, seeds, phenology, phenogroup.*

The drying up of the Aral Sea, leading to a global deterioration of environmental conditions within its zone of influence in the territory of Karakalpakstan, makes it necessary to find ways to help mitigate the impact of this environmental catastrophe on the population centers of the republic.

Greening cities and towns is one of the most effective ways to improve the environmental situation. To implement effective landscaping, it is necessary at least to know what plant species can grow in a given region, and as a maximum, to create mother plantations of the most promising tree species and develop methods for their mass reproduction. These problems are solved with the help of plant introduction.

The main objective of the study is to study the seasonal rhythm of growth and development of introducers in new conditions for them; - to identify the adaptive potential of introducers; - conduct an introduction assessment of plants.

The object and subject of the study is the Botanical Garden. A. Temur located in the city of Buston, in the south of the Nizhne - Amudarya dendrological region.

The methods used in the introduction study of woody plants were used in the work (Yurkevich et al. 1980; Shtonda, 1982). Phenological observations were carried out using generally accepted methods and

recommendations (Yurkevich et al. 1980; Schultz, 1981).

Monitoring of introduced plants was carried out by means of visual observations. The influence of low winter and high summer air temperatures, as well as the influence of low air humidity, was noted.

Depending on the general weather conditions, stable confinement of species to a certain phenological group is not observed. This is especially true for the timing of the completion of the growing season, when early autumn frosts contribute to the simultaneous completion of the end of the growing season in plants from different phenological groups according to the degree of completion of the growing season. So, for example, in *Aesculus hippocastanum*, leaf fall ended (the end of the growing season) in 2020 on September 30, in 2021 - October 10. This species belongs to the phenological group of early ending vegetation, while the growing season lasts up to 200 days.

In the phenological group P (early start of the growing season), most plants belong to species that complete the growing season in the second and third ten days of October, i.e., to the phenological group C (average term for the completion of the growing season), and the growing season for these species' ranges from 200 to 215 days (*Forsythia suspensa*, *F. viridissima*, *Cornus sanguinea*, *Chaenomeles japonica*, etc.)

Some species complete the growing season in



early November and their growing season ranges from 220 to 250 days. So, for *Salix babylonica* in 2021, the growing season was 250 days, for *Populus alba* - 238 days, for *Salix caprea* - 235 days.

Plants from phenological group C (average start of vegetation) have a not so long vegetation period - from 173 to 226 days - and almost all fit into the average long-term vegetation period, which is 214 days in the Republic of Karakalpakstan.

The exception was species of the genus *Platanus*, in some years *Quercus castaneifolia*, *Acer campestre*, *Crataegus nitida*, *Euonymus maackii*, *Sambucus canadensis*, *S. nigra*, *Salix matsudana*, and others.

Analyzing the phenological group P (according to the timing of the beginning of the growing season), it should be noted that almost all plants of this group, except for *Sophora japonica*, finish the growing season in the second half of October. from 170 to 205 days.

Many introducents from the phenological group P (according to the timing of the beginning of the growing season) have a longer growing season. However, during the growth period, in most species, the shoots have time to mature, and the vegetation period extended until frost in a number of species does not cause further freezing of the shoots.

The beginning of shoot growth is usually noted 3-5 days after the start of leaf blooming. Under observation were mainly lateral shoots, since most of the plants reached a significant height at the time of the observation (all species with a tree biomorph).

In woody plants of different systematic position and geographical origin, having different ages and growing in different ecological conditions, the rhythm of shoot growth can vary within different limits. In addition, it should be taken into account that the duration of the growth period is significantly affected by the weather conditions of the year of observations. However, we tried to divide the observed plant species into three groups according to the duration of the growth period.

I. A group of plants with a short growth period - from 20 to 60 days. This group included 20 species - *Cercis canadensis*, *C. chinensis*, *Catalpa speciosa*, *C. bignonioides*, *Fraxinus angustifolia*, *Quercus macrocarpa*, *Q. robur*, etc.

II. A group of plants with an average growth period of 61 to 90 days. This group included 44 species,

such as *Acer campestre*, *A. pseudoplatanus*, species of the genera *Euonymus*, *Sambucus*, *Lonicera*, etc.

III. A group of plants with a long growth period - from 91 days or more. This included species of the genera *Salix*, *Morus*, *Platanus*, and others.

Individual species of such genera as *Quercus*, *Platanus*, *Fraxinus*, *Maclura*, etc., under fairly favorable conditions, are characterized by a secondary and even tertiary period of shoot growth. However, the extreme soil and climatic conditions of the Botanical Garden. A. Temur (saline soils, high summer temperatures, and most importantly, the almost annual lack of irrigation water in July-August) did not contribute to the appearance of secondary growth in introduced species during the years of observation.

The flowering of plants almost always indicates that the rhythm of the seasonal development of a particular species has fit into the course of the weather indicators of the point of introduction.

The development of reproductive (functionally generative) buds often begins earlier than the development of vegetative buds, often even at lower air temperatures than are needed for the development of vegetative buds. Even rather short winter thaws contribute to the beginning of flowering in 10 species that bloom before the leaves bloom (*Acer saccharinum*, *Ulmus americana*, *U. scabra*, *Salix caprea*, *Chaenomeles japonica*, *Forsythia ovata*, *F. suspensa*, *F. viridissima*) at a later date, but also before bud break, *Cercis canadensis* and *C. chinensis* bloom.

These species, especially *Acer saccharinum*, are often provoked by short-term warming even in the winter months (February).

In 2020 (the year of the late start of vegetation), *Acer saccharinum* began to bloom in the second decade of March, and in 2021 (the year of the early start of vegetation) - at the end of February. In 2022, flowering in this species began in the first ten days of March. With early flowering, a return of winter cold is always possible, which leads to freezing of the ovaries and subsequently to the absence of fruits. The reason for the absence of fruits for the same reason can also be observed in the species *Ulmus pumila*, *U. americana* and *U. scabra*, in which the earliest flowering was also noted in 2022, and the latest flowering in 2021.

Salix caprea, *Chaenomeles japonica*, *Forsythia*



ovata, *F. suspensa*, and *F. viridissima* also have the latest and earliest flowering periods in 2021 and 2022.

The fruiting of plants is the main factor confirming the success of the introduction of a particular species in new conditions. Before all - in April - the fruits of *Acer saccharinum* ripen. In May-June, the fruits of species of the genera *Populus*, *Salix*, *Morus* ripen; in June-August - in *Broussonetia papyrifera*, *Lonicera tatarica*, a number of species of the genus *Crataegus*, *Chaenomeles japonica*, *Cornus alba*, etc. In September-October-November, fruits ripen in *Crataegus aprica*, *C. oxyacantha*, species of the genera *Diospyros*, *Fraxinus*, *Catalpa*, *Platanus*. In representatives of the last three genera, the process of seed dispersal proceeds until March of the next year. In most species, the fruits and seeds fall off and disperse as they mature.

The high quality of seeds of introduced plants is evidenced by the presence of mass self-seeding in representatives of such genera as *Fraxinus*, *Gleditsia*, *Catalpa*, *Cercis*, *Lonicera*, *Cornus*, *Sambucus*, *Acer negundo*, etc.

Thus, introduced species adapted to the conditions of the Republic of Karakalpakstan are characterized by a shortening of the growth period and high growth rates. Under such conditions, this is explained by the fact that the main limiting factor in the period of plant growth is high temperature and low humidity. And also, on the basis of the foregoing, it should be noted that the ability to bloom and produce seeds and fruits are the main criteria for the success of the introduction of a particular species.

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UDC 574

ENVIRONMENTAL CONDITIONS AS A RISK FACTOR FOR THE SPREAD OF ALLERGIC DISEASES IN KARAKALPAKSTAN

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ANNOTATION

The article presents the results of a study of the prevalence of allergic diseases among the population of the Republic of Karakalpakstan. It is shown that the highest incidence of allergic rhinitis (immediate type allelopathology) is detected among the population of the III ecological group (northern zone) in areas with high aerogenic pollution - Kungrad, Muynak and Takhtakupyr regions.

KEY WORDS: *Karakalpakstan, allergic diseases, environmental factors, prevalence.*

Currently, in the world, along with the development of industry and agriculture, there is an increase in environmental impact and an increase in morbidity due to environmental pollution. Environmental protection in order to reduce the negative effects of environmental factors on public health remains a fundamental task of environmental research. To solve this problem, an analysis between the ecological state of the environment and the level of public health, an integrated ecological approach in assessing information about the state of the environment and the pathological processes occurring in the body is of great scientific and practical importance.

At present, numerous studies are being carried out in scientific research centers around the world to develop a methodology for diagnosing environmentally caused diseases, as well as improving the health of the population and its environment. An increase in allergic diseases was revealed, primarily due to the degree of influence of biotic and abiotic exogenous environmental factors, namely, an increase in the concentration of allergens, pollution of the atmosphere, water, soil,

residential and industrial premises, and exceeding regulatory standards.

The problem of allergies and allergic diseases has occupied one of the key places in medicine in recent decades. Statistics inevitably captures a significant increase in allelopathology, which is, apparently, a logical consequence of a radical change in a person's lifestyle. The avalanche process of urbanization, the rapid development of industry and the associated pollution of the environment led to a massive "chemical aggression" on the human body [78, p.53; 123, p.317-340; 160, p.239-246].

Allergic diseases have become a serious problem for mankind and, according to the WHO forecast, in the 21st century they will come out on top in terms of prevalence in the structure of diseases. Every year, about 35% of the world's population seek medical help with clinical manifestations of allergies [3, 6, 7].

Allergic diseases and especially diseases of the respiratory tract are environmentally dependent diseases, since the phenotypic realization of hereditary



predisposition to them is always carried out under the influence of environmental factors. Epidemiological studies conducted in different countries show that bronchial asthma has now reached 5-9% among the adult population and 8-12% among children; hay fever (P) - about 20% of the population; allergic dermatoses - 10-12%, in children - from 5 to 15% [1, 4, 5, 7].

Tracing the dynamics of the prevalence of allergic diseases in the territory of the Republic of Karakalpakstan, according to official statistics, a certain upward trend in diseases such as allergic rhinitis and emphysema has been revealed.

The analysis made it possible to present the dynamics of the incidence of allergic pathology among the population of Karakalpakstan. Thus, it was found that the maximum incidence of allergic rhinitis among the population was noted in 2008-2009, after which the rate slightly decreased. The minimum level was registered in 2002. From 2002 to 2009, the indicator increased by almost 2.5 times. Apparently, during this period there was a sharp increase in pollution in environmental objects in the surveyed area.

Analysis of the dynamics of the incidence of bronchial asthma (Fig. 8) also shows the periods of increase and decrease in the incidence of bronchial asthma among the population of Karakalpakstan. The maximum level was noted, as well as allergic rhinitis in 2001, 2008. The minimum level was registered in 2002-2003. Further, we revealed a trend towards an increase in the incidence of emphysema among the population of Karakalpakstan during the study period.

Thus, since 2001, there has been an increase in the incidence of emphysema up to 2008-2009. Since 2010, a sharp decrease in the incidence rate has been revealed (to 5.3 per 1000 population), after which there is again a stable increase in this indicator. At the same time, we also considered the dynamics of the incidence of allergic rhinitis among the population of Karakalpakstan, depending on the territorial differentiation for 2010-2017.

The analysis made it possible to reveal that the highest incidence of allergic rhinitis (immediate type allegopathology) is detected among the population of the III ecological group (northern zone) in areas with high aerogenic pollution - Kungrad, Muynak and Takhtakupyr regions. Data exceeding the control at $\alpha=0.05$ on the general incidence of allergic rhinitis are also detected in residents of groups I and II (southern and central zones,

respectively) in conditions of moderate environmental pollution.

It has been established that under the influence of various harmful substances, along with violations of some mechanisms of nonspecific resistance of the organism, the indicators of humoral and cellular immunity change [1]. Various chemical allergens cause the development of bronchial asthma, urticaria, allergic lesions of the upper respiratory tract, allergic dermatitis and some other diseases.

The mechanism of action of allergenic chemical and natural compounds has not been fully elucidated. According to a number of experts, low molecular weight substances combine with tissue proteins, which creates an allergen depot in the body. Further, the allergen is captured by macrophages or other phagocytic cells, which in turn interact with lymphocytes, causing an immune response [3, 4, 6].

Thus, the assessment of the correlation dependences of incidence with various pollutants of the atmospheric air of the Republic of Karakalpakstan made it possible to identify a correlation dependence, in order of significance, with the concentrations of carbon monoxide, nitrogen oxides, and sulfur dioxide. There is also a direct relationship between allergic morbidity and an increase in the number of vehicles in the central regions of the surveyed territory of Karakalpakstan.

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CELL THEORY AT THE PRESENT STAGE

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ANNOTATION

The article deals with the cellular theory at the present stage. The cell is a unit of structure, physiology and biological organization, maintains a dual existence as a separate entity and a building block in the construction of organisms.

KEY WORDS: *structure, organization, cell, theory, crystal, organism, genetic code.*

It is now perhaps generally accepted that cell theory (GT) is one of the fundamental ideas of modern biology. Modern formulations of GT (cell theory) are characterized by a certain liberty, which is largely due to its already historical nature, the loss of relevance to a certain extent, and the metaphysical interpretation of a number of issues.

T. Schwann in 1839 summarized his own and M. Schleiden's observations in three positions of GT:

1. The cell is a unit of structure, physiology and biological organization.

2. The cell maintains a dual existence as a separate entity and a building block in the construction of organisms.

3. Cells are formed by the formation of free cells, similar to the formation of crystals.

Schwann's main mistake was his opinion after Schleiden about the possibility of the emergence of cells from the structural non-cellular substance *de novo*. The value of cell division, mitosis was not yet completely represented. It was firmly established in the 1870s so that the third postulate of the original GT appears to be incorrect.

The first postulate of GT ("The cell is a unit of structure, physiology and biological organization") is usually interpreted as the fact that there is no life outside the cell. But viruses are unconditional biological objects - they are "related" to all cellular objects because they

use the same standard genetic code, they need proteins. Not a cell, but rather a standard genetic code - evidence of the unity of life. This makes it possible to extend the "unity of life" to viruses as well.

It is usually said that viruses are not living organisms, if metabolism (and energy) is taken as a necessary and sufficient property of organisms. But, in truth, they have a metabolism - when they are activated in the cell! Everything is like everyone else. And what we see on supermicrographs or reconstructions is their resting stages. Like plant seeds, worm eggs or ciliate cysts. They also say that viruses are not capable of too much on their own (replication there, metabolism and energy, etc.). But they are obligate primary parasites. They don't have to do anything on their own. All at someone else's expense. Viruses are both the object and the subject of biological evolution. Actually, viruses are the most numerous biological objects on this planet. Probably, we can talk about the "cellular minority". This, by the way, is about you and me. "There is no life outside the cell".

From the first postulate of GT, it is usually concluded that a cell is homologous to a cell. But prokaryotic and eukaryotic cells are structurally different. Eukaryotic cells are relatively prokaryotic in the light of endosymbiotic theory, they are multicellular constructs, and in this sense, they are not completely homologous to prokaryotic cells. Prokaryotic cells



correspond ("homologous") to mitochondria and chloroplasts, and apparently also to a protoeukaryotic cell derived from Asgardarchaeobacteria. The direct phylogenetic connection of eukaryotes with one of the groups of archaeobacteria destroys the concept of three domains of cellular organisms. There are only two domains: archaeobacteria and eubacteria [3].

The second postulate of GT is aptly formulated as all known living beings consist of one or more cells. A simple observation, as we see it now. In addition, it is relevant only to the "multicellular minorities" (to which we ourselves belong), since there are much more unicellular organisms than multicellular ones. Just like there are more viruses than cellular organisms.

The third postulate of GT ("the cell is only from the cell") is due to the genetic continuity of the three main components of the cell - the genetic apparatus, membranes and cytoplasm (cytosol). "Chromosomes only from chromosomes", "membranes only from membranes", "cytoplasm only from cytoplasm".

These components are not formed in the cell *de novo*, by self-assembly. Other components of the cell (cytoskeleton, prokaryotic and eukaryotic flagella, ribosomes, cell walls, etc.) do not have such continuity and continuity in time.

There are 3 main (initial) components of the cell: membranes, cytoplasm and genetic apparatus. The membranes are responsible for the delimitation of the intracellular space, more precisely, the substance (protoplasm) from the extracellular and its derivatives (ER lumen, vacuole cavities, mitochondrial intermembrane space, etc.) of their interaction. The cytoplasm is responsible for metabolism, energy, protein biosynthesis. The genetic apparatus (DNA) is responsible for the information support of life and its evolution.

The continuity of the genetic apparatus is obviously based on the copying of hereditary information - DNA nucleic acid molecules ("each molecule from a molecule"). All elements of the cell's genetic apparatus (chromosomes, nucleoids, viroids, plasmids, etc.) are ultimately apparently homologous, homophyletic, since they originate from the archaic ancient genetic program. The "guarantor" of this

conclusion is the universality of the standard genetic code.

Protoplasm (~hyaloplasm, ~cytosol) is the initial and indispensable component of the cell. Here, protoplasm means "living slurry or glue, gel" minus membranes and the genetic apparatus (DNA). It "opposes" (logically, topographically), delimited from the external environment of the cell and its derivatives - the contents of the endomembrane system. The protoplasm dies with the cell and comes only from the living protoplasm.

The nucleoplasm is a specialized part of the eukaryotic protoplasm. It specializes in replication, transcription, splicing (and mRNA processing in general), and ribosome assembly. It is believed that the spread of splicing in protoeukaryotes required the need to uncouple translation and transcription, and, as a result, the formation of the nuclear envelope [2].

Unlike the cytoplasm, the nucleoplasm, like the protoplasm of prokaryotes, is immobile and lacks actin-myosin mobility. Perhaps, the mobility of the cytoplasm required that DNA strands be protected from it with the help of the nuclear envelope [1].

The cytoplasm of a eukaryotic cell corresponds to the stroma of chloroplasts and the matrix of mitochondria as originating from the cytoplasm of endosymbiont prokaryotes. All protoplasts are homologous to each other, in the sense they have the same origin. Nothing indicates that eukaryotic cytoplasm can fuse with mitochondrial matrix, plastid stroma, or endosymbiont cytoplasm. The periplasm of gram-negative bacteria (the space enclosed between the plasma and outer membranes) is obviously not homologous to their protoplasm, but rather corresponds to the external environment.

With the formation of membranes, it became possible to speak of a primary living cell, the contents of which were separated from the external environment by a fairly reliable barrier. Primary, apparently the plasma membrane. This is probably the first "organ" of the cell, providing its isolation, protection of its protoplasm, its metabolism, its genetic apparatus from dissolution in the environment. Creating "individuality", "corpuscularity" as the conditions for the operation of Darwinian selection. It should be emphasized that membranes are



not flat layers, they are always closed on themselves, forming hollow vacuoles, vesicles, vesicles, etc. Biomembranes always separate protoplasm and the external environment or its derivatives (spaces of the endomembrane system).

The endomembrane system is secondary. The endoplasmic reticulum (ER) is the main and possibly the primary part of the endomembrane system of the eukaryotic cell. But this is not just a membrane system. It makes no sense to consider it in isolation from the actin-myosin and microtubular mobility of the cytoplasm. It is thanks to her that the transport of vesicles exists. And this is the essence of the activity for the most part of the endomembrane system of eukaryotes.

The endomembrane probably formed as an invagination of the plasmalemma. It appears that “the outer membrane of the chloroplast envelope appears to be homologous to the outer membrane of mitochondria and Gram-negative bacteria. It is these membranes that never connect with membranes derived from the ER. The origin of the outer membrane of Gram-negative bacteria is unclear. It is probably not homologous to the cell membrane system.

After the formulation of GT, our knowledge of the cell has dramatically expanded and deepened and requires further understanding. In general, it should be recognized that CT has an outstanding, but for the most part already historical significance.

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UDC37.013

FORMING A RESPONSIBLE ATTITUDE TO NATURAL RESOURCES AND WASTE IN FUTURE BACHELORS BY MEANS OF KARAKALPAK PEDAGOGY

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ANNOTATION

The article is devoted to the formation of a responsible attitude towards natural resources and waste among future bachelors by means of Karakalpak folk pedagogy. The experience of Karakalpak folk pedagogy, used as a means of environmental education of students of higher educational institutions in classroom and extracurricular work, will allow future bachelors to form a responsible attitude to natural resources and waste.

KEY WORDS: *experience, formations, pedagogy, folk, situation, crisis.*

At the present stage of development of Karakalpakstan, environmental education and the spiritual revival of the people are of particular importance. This is a significant role of Karakalpak folk pedagogy - extensive environmental knowledge accumulated by the people in their interaction with nature.

In the Republic of Karakalpakstan, in the context of a growing environmental hazard (environmental crisis, environmental emergency), the "environmental insufficiency" of knowledge among specialists with secondary specialized, higher education, including future bachelors studying in higher educational institutions, is becoming increasingly recognized.

At present, it has become quite clear that the important priorities of human survival in the conditions of the ecological crisis are environmental literacy, responsible attitude to the environment, all-round environmental education of the younger generation and future specialists.

A future specialist cannot be environmentally educated if he does not have knowledge about the laws of nature development, does not see the reasons for its change, and cannot predict the consequences of the impact of external factors on nature. Environmental education and upbringing in universities are designed to systematize and develop natural science knowledge

based on the rich and diverse Karakalpak national environmental experience.

The content of ecology and environmental protection is designed to take into account the socio-ecological experience, including the Karakalpak folk traditions of the rational use of natural resources, riparian, land and water lands, improvement and planting of greenery in settlements, landscape transformation, etc.

Generalized knowledge about nature management is given in a higher educational institution in the classroom of natural sciences and social and humanitarian disciplines.

Environmental education in a higher educational institution is a systematic, systematic impact on the consciousness and behavior of students in order to educate them in an environmental culture, expressed in a responsible attitude to nature, including natural resources and waste as the most important social and moral value in society. An important task of ecological education is to make nature an object of formation of moral, patriotic and aesthetic personality of students.

Ecological culture is an integral element of the spiritual world of a student's personality. It is an environmentally oriented consciousness and behavior based on humanistic value orientations and attitudes towards nature, including natural resources and waste. It is impossible to achieve a high level of human ecological



culture without the formation of an emotional and value attitude to the world.

It is necessary to determine the conditions and ways that contribute to the formation of experience in future bachelors of emotional and value relations that correspond to the goal of environmental education. These tasks can be solved by focusing educational activities on the awareness of socially significant values, which is facilitated by the experience of Karakalpak folk pedagogy. According to I.Ya. Lerner, social experience is the property of previous generations, embodied in consciousness, skills, systemic activities, characterized by specific content and certain methods for achieving them.

The moral and aesthetic aspect of environmental education and upbringing is considered by T.V. Kalugina, G. Komilova, M. Rakhimkulova, L.P. Pechko and others. Questions of ecological education and its connection with local history are studied by V.L. Bogdarenko, S.N. Kravchenko, 3.A. Shakhmardanov, M.M. Eldarov, N.I. Yatsenko and others. There are studies by Karakalpak scientists P. Berdanova, A. Gaipova, G. Saporova and others on the problems of environmental education, upbringing and formation of ecological culture.

Karakalpak folk pedagogy, as part of the general culture of the population, has a strong potential for further development and, despite the rapid growth of knowledge of scientific ecology, will not be assimilated by it.

Karakalpak folk pedagogy constantly faces many everyday environmental problems, related, in particular, to environmental life support, environmental improvement, and maintaining a sustainable ecological balance. In recent years, there has been increased attention to the study of the heritage of the Karakalpak people, the development of its age-old experience and the prevailing universal values in various areas of life. A special place belongs to the Karakalpak folk pedagogy, to the extensive ecological knowledge that society has accumulated in interaction with nature.

Information from the Karakalpak folk pedagogy is a guide to action on the rational use of natural resources and waste, as well as environmental protection. For modern reality, this is a very relevant and vital problem.

Issues of environmental education and upbringing have been studied to a certain extent, the goals, objectives, content, forms and methods of

upbringing have been considered. But at the same time, the problem of environmental education, upbringing and the formation of an environmental culture, in particular, a responsible attitude to natural resources and waste in the process of classroom (subject) and extracurricular work at the university based on the special course "Natural Resources and Domestic Waste" and the experience of Karakalpak folk pedagogy not received sufficient coverage in the scientific literature.

Building a pedagogical system of environmental education and upbringing based on the special course "Natural Resources and Domestic Waste" and the experience of Karakalpak folk pedagogy, used as a means of environmental education of students of higher educational institutions in classroom and extracurricular work, will allow future bachelors to form a responsible attitude to natural resources and waste.

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THE FAUNA OF ORTHOPTEROID INSECTS (INSECTA: ORTHOPTERA) IN FERGANA VALLEY AGROCENOSIS (UZBEKISTAN)

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ANNOTATION

There were identified 45 species of agrocenoses in the Fergana Valley, including 4 species of ferruginous family, 8 species of chirps, 2 species of tripers, and 31 species of locusts. Of the studied agrocenoses, 29 species (65.1 %) were found in gardens, 24 species (55.8 %) in cotton agrobiocenosis, 18 (41.8 %) in wheat agrobiocenosis, 18 (39.5 %) in rice 22 (51.2 %) in maize, 16 (37.2 %) in corn, 14 (32.5 %) in legumes, 21 (48.8 %) in melons, and 12 (27.9 %) in the river, collector and canal. of fauna of the corrected insect species.

KEYWORDS: *Tettigonidae, Grylloidea, Pyrgomorphidae, Acrididae, order, family, species, fauna, ecology, agrocenosis, landscape, imago, larva.*

INTRODUCTION

We can be found insects all over the world except Antarctica. Researchers have been interested orthopteroid insects in a different agrocenosis component every time [8]. Although some data have been collected on various agrocenoses in the Ferghana Valley [1], the data are incomplete, and it is important to study agrocenosis corrections in this region, taking into calculating natural and anthropogenic changes last 20 to 30 years.

Determination of species composition of phytophages in agrocenoses with favorable climatic conditions for the development of pest insects and one of the main objectives making of agricultural security is to conduct research aimed at developing modern countermeasures against them. Locust is a major source of damage to cultural crops and pastures, due to the anthropogenic transformation of the natural environment in Fergana valley in recent years, the increase in numbers of orthopteroid insects require the introduction of drastic measures against pest locust species [3,4,7].

Because the representatives of this category are not only pasture plants but are the main pests of all crops, we aim to study the fauna of orthopteroid insects that is common in the various agrocenoses in Fergana valley.

MATERIALS AND METHODS

Our research was conducted in eight agrozenoses (cotton, wheat, rice, alfalfa, maize, legumes and orchards) in Namangan, Ferghana and Andijan regions of the Fergana Valley in 2017-2019. In order to study the pattern and pattern of distribution of orthopteroids in agro landscape, they were analyzed in eight sections of agrocenosis and on the basis of materials collected from aquatic environments.

The collected samples were studied based on [2,5,6] some books. The following are conditional determinations for species distribution and density, that is, when 1 to 3 insects are collected per hour with entomological material, their number is "very low" (in the case of 4-10 insects per hour), "low species - kt.", "permanent species - ps." 11–20 insects per hour), as well as "numerous but not productive species" (20–100 insects per hour) [8,5].

Laboratory, field and production experiments conducted by B.A Dospekov. Statistical analysis of the results was determined using BioStat 2008 5.0.1 and Microsoft Office Excel 2007.

RESULTS AND DISCUSSION

According to the data, 45 species of seven orthopteroids belong to the agrocenoses of Fergana valley. Of the studied agrotsenoses, 29 species (65.1 %) are common in the Gardens, including *Tettigonia viridissima* L., *Pyrgomorpha bispinosa* dessert B.-Bien., *Calliptamus italicus italicus* (L.),



Calliptamus barbarus cephalotes, *Acrida oxycephala* (Rall). Many species, such as *Duroniella gracilis* Uv., *Aiolopus thalassinus thalassinus* (F.), *Oedaleus decorus* (Germ.); *Tettigonia caudate* Charp., *Platycleis intermedia* Serv., *Grullatalpa unispina* Sauss., *Grullatalpa grullatalpa* L., *Modicogryllus bordigalensis* Latr., *Tetrix tartar subacuta* B.-Bienko., *Tetrix tartartara tartara* Saulcy. permanent species of *oxianus* Uv., *Sphingoderus carinatus* (Sauss.); *Modicogryllus frontalis* (Fieb.), *Eremogryllodes semonovi* Mir, *Anacridium aegyptium* (L.), *Ramburiella foveolata* (Tarb.) Rare and *Ruspolia nitidula* (Scop.), *Heteracris littoralis* Ramb., *Hilethera turanica* Uv., *Chorth.) dichrous*, *Mioscirtus wagneri* are very rare species. *Oecanthus turanicus* Uv., *Melanogryllus*

desertus Rall., *Tartarogryllus tartarus* Sauss., *Tetrix sudulata* Saulcy., *Calliptamus turanicus* Serg. The 14 species, *Dociostaurus maroccanus* (Thnd), *Bruntrydactilus tartarus*, *Xia variegata*, are not widely distributed in this agroecosystem. Other similar agroecosystems studied showed similar species composition to 24 species (55.8 %) in cotton agroecosystem, 18 (41.8 %) in wheat agroecosystem, 18 (39.5 %) in rice and 22 (51.2 %) in alfalfa., 16 (37.2 %) in corn, 14 (32.5 %) in legumes agroecosystem, 21 (48.8 %) in melons, and 12 (27.9 %) in river, collector, canal, *Bruntrydactilus tartarus* , It was found that the *Xia variegates* occur only along the banks of the river (Table 1).

Table 1
Distribution of orthopteroid species in Fergana Valley corrections and agro landscapes

№	Species	Type of Crops								
		1. Cotton	2. Wheat	3. Rice	4. Alpaalpa	5. Corn	6. Legume plants	7. Melon	8. Garden	9. Rivers, collector and canals
1	<i>Platycleis intermedia</i> Serv.	Rs	Rs	Fs	Rs	Rs	Fs	Fs	Rs	Rs
2	<i>Tettigonia viridissima</i> L.	Fs	Rs	-	-	Fs	M	-	M	-
3	<i>Tettigonia caudate</i> Charp.	-	Vfs	-	-	Fs	Rs	Fs	Rs	-
4	<i>Ruspolia nitidula</i> (Scop.)	-	-	-	-	-	-	-	Vfs	-
5	<i>Oecanthus turanicus</i> Uv.	Rs	-	Vfs	Rs	Rs	-	Fs	Fs	Rs
6	<i>Modicogryllus bordigalensis</i> Latr.	Vfs	-	Vfs	-	Fs	-	Fs	Rs	Rs
7	<i>Modicogryllus frontalis</i> (Fieb.)	-	-	-	-	-	-	Vfs	-	-
8	<i>Melanogryllus desertus</i> Pall.	Rs	Rs	-	Rs	Fs	Fs	Fs	-	Rs
9	<i>Eremogryllodes semenovi</i> (Mir.)	-	-	-	Vfs	-	-	-	-	-
10	<i>Tartarogryllus tartarus</i> Sauss.	-	-	Fs	-	M	-	Rs	Vfs.	-
11	<i>Grullatalpa unispina</i> Sauss.	Fs	Rs	Rs	Rs	-	-	Rs	Rs	Rs
12	<i>Grullatalpa grullatalpa</i> L	-	Rs	Rs	-	Fs	-	Rs	Rs	-



13	<i>Tetrix sudulata</i> Saulcy.	-	M	-	-	-	-	-	-	Rs
14	<i>Tetrix tartara subacuta</i> B.-Bienko.	-	-	M	-	-	Rs	-	Rs	Rs
15	<i>Tetrix tartartara tartara</i> Saulcy.	Rs	Rs	M	-	-	-	-	Rs	-
16	<i>Pyrgomorpha bispinosa deserti</i> B.-Bien.	Rs	Rs	M	Rs	M	M	Rs	M	Rs
17	<i>Anacridium aegyptium</i> (L.)	-	-	-	-	-	-	-	Rs	-
18	<i>Tropidopola turanica turanica</i> Uv.	-	-	-	-	Rs	-	-	-	-
19	<i>Calliptamus italicus italicus</i> (L.)	M	M	-	-	-	M	M	M	-
20	<i>Calliptamus turanicus</i> Serg.Tarb.	-	Fs	-	Rs	-	M	M	-	-
21	<i>Calliptamus barbarus cephalotes</i>	M	Rs	M	Rs	M	Rs	M	M	Rs
22	<i>Heteracris littoralis</i> Ramb.	Rs	-	Rs	-	-	-	-	Vfs	-
23	<i>Heteracris adspersa</i> (Redt.)	Rs	-	M	-	-	-	Rs	-	-
24	<i>Heteracris pterosticha</i> (F.d.W.)	-	Fs	-	Rs	-	-	-	Rs	-
25	<i>Eyprepocnemis unicolor</i> Serg. Tarb.	Rs	-	-	-	-	-	-	-	-
26	<i>Acrida oxycephala</i> (Pall.)	Fs	-	Rs	Rs	M	Rs	Fs	M	-
27	<i>Truxalis eximia</i> Eichw	Rs	-	-	Rs	-	Rs	-	-	-
28	<i>Duroniella gracilis</i> Uv.	M	M	Rs	Fs	Fs	-	Fs	M	-
29	<i>Duroniella kalmyka</i> (Ad.)	Rs	Rs	-	Rs	-	-	-	-	-
30	<i>Aiolopus thalassinus thalassinus</i> (F.).	M	Rs	Rs	Rs	M	M	Rs	M	M
31	<i>Aiolopus oxianus</i> Uv.	Rs	-	-	Rs	M	-	Rs	Rs	-
32	<i>Hilethera turanica</i> Uv.	Vfs	-	-	-	-	-	-	-	-
33	<i>Locusta migratoria</i> L.	Rs	-	-	Rs	-	Rs	Rs	-	-
34	<i>Oedaleus decorus</i> (Germ.)	-	-	-	-	-	-	-	Rs	-
35	<i>Acrotylus insubricus</i> (Scop.)	Fs	-	M	Rs	M	-	Rs	Rs	-
36	<i>Sphingoderus carinatus</i> (Sauss.)	Rs	-	-	Rs	-	-	-	Rs	-
37	<i>Ramburiella foveolata</i> (Tarb.)	Vfs	-	-	Fs	-	-	-	Fs	-
38	<i>Dociostaurus tartarus</i> Uv .	-	Vfs	-	Fs	-	-	-	-	-
39	<i>Dociostaurus</i>	-	Rs	-	Fs	-	Rs	-	-	-



	<i>maroccanus</i> (Thnd)									
40	<i>Chorthippus</i> (s. str.) <i>karelini</i>	-	-	Fs	Fs	-	-	-	Rs	-
41	<i>Chorthippus</i> (s. str.) <i>dichrous</i> (Eversmann)	-	-	-	-	-	-	-	Rs	-
42	<i>Mioscirtus wagneri</i> (Kitt.)	-	-	-	-	-	-	-	Vfs	-
43	<i>Oxya fuscovittata</i> (Marsch.)	-	-	M	-	-	-	Fs	Rs	-
44	<i>Bruntrydactilus tartarus</i> (Sauss.)	-	-	-	-	-	-	-	-	Vfs
45	<i>Xya variegata</i> Latr.	-	-	-	-	-	-	-	-	Rs
Total:		24	18	18	22	16	14	21	29	12

Note: - not found; Vfs - very few species; Fs - few species; Rs - regular species; M- more; Ms -migratory species.

The main reasons for the most common species of plant and cotton in agrobiocenosis we have learned are that these crops, along with the longer vegetation period, also provide more diversity in the habitat for various wild plants around these fields. On the contrary, legumes have a short vegetation period and the relatively high use of chemicals in melon fields has the effect of reducing this type of insect.

The results of the analyzes show that orthopteroid species, the species most closely involved in agrocenosis are *Calliptamus italicus*, *Calliptamus barbarous*, *Calliptamus turanicus*, *Acrotylus insubricus insubricus*, *Pyrgomorpha bispinosa deserti*, *Acrida oxycephala*, *Locusta migratoria migratoria*, *Duroniella gracilis*, *Aiolopus thalassinus thalassinus*; *C. Gryllidae* - *Melanogryllus desertus* of the family, *Gryllotalpa unispina*; *Tettigonioidae* - family of *Platycleis intermedia intermedia*, *Tettigonia caudate*, *Tettigonia viridissima* are more common and have been found to be dominant over other species. There are also very few species in the same crop species, such as *Ruspolia nitidula*, ***Eremogrylodes semenovi***, *Modicogryllus frontalis*, *Hilethera turanica*, *Mioscirtus wagneri*, *Bruntrydactilus tartarus* are common in all cultivated species studied (Table 1). *Anacridium aegyptium*, *Tropidopola turanica*, ***Eyprepocnemis unicolor***, *Oedaleus decorus*, *Bruntrydactilus tartarus*, *Xya variegata* are medium spread in the biocenosis. If the species did not occur in the common garden agrotsenosis, such species as *Platycleis intermedia*, *Pyrgomorpha bispinosa deserti*, *Calliptamus barbarus cephalotes* were found only in this crop. By examining the regularities of seasonal development of

insect species, it allows for environmental prediction of timely adaptation of insects to the nutrient environment and timely control of harmful species. Fergana Valley agrocenoses are four groups of phenological inversions that are imago and larvae wintering, ephemeroïd and early spring, spring-summer and summer-autumn groups.

Adult and larvae of orthopteroids' species winter diapause in the winter, there are *Melanogryllus desertus*, *Modicogryllus bordigalensis*, *Modicogryllus frontalis*, *Tartarogryllus tartarus*, *Grullatalpa unispina*, *Grullatalpa grullatalpa*, *Tetrix sudulata*, *Tetrix tartara tartara*, *Tetrix tartara subacuta*, *Pyrgomorpha bispinosa deserti*, *Anacridium aegyptium*, *Truxalis eximia*, *Duroniella gracilis*, *Duroniella kalmyka*, *Hilethera turanica*, *Acrotylus insubricus*; in the Spring *Tettigonia viridissima*, *Tettigonia caudate*, *Ramburiella foveolata*, *Dociostaurus maroccanus*, *Dociostaurus tartarus*; spring-summer *Ruspolia nitidula*, *Oecanthus turanicus*, *Calliptamus italicus italicus*, *Calliptamus turanicus*, *Calliptamus barbarus cephalotes*, *Locusta migratoria*, *Aiolopus oxianus*, *Oedaleus decorus*, *Sphingoderus carinatus*, *Chorthippus* (s. str.) *karelini* *Chorthippus* (s. str.) *karelini*, *Chorthippus* (s. str.) *dichrous*, *Mioscirtus wagneri*, *Bruntrydactilus tartarus*, *Xya variegata*; and summer diapause also *Heteracris adspersa*, *Heteracris littoralis*, *Acrida oxycephala*, *Heteracris pterosticha*, *Aiolopus thalassinus thalassinus* are take diapause unusually then other species.

According to 2018 observations, larvae accounted for 69% of the corrected insects in the third decade of April in the grain field in Khojabad district in Andijan region (Table 2).



Table 2
Some orthopteroid insects were found in grain field (Andijan Region, Khojabad District, 19.04.2018)
Coordination is N 40°34'43.21, E 72°35'17.83

№	species	Adult		Larvae.	Total	%
		Female	Male			
1	<i>Tettigonia caudate</i> Charp.	-	-	12	12	12.8
2	<i>Grullatalpa unispina</i> Sauss.	5	-	3	8	8.5
3	<i>Acrotylus insubricus</i> (Scop.)	4	3	12	19	20.2
4	<i>Pyrgomorpha bispinosa deserti</i> B.-Bienko.	6	2	14	22	23.4
5	<i>Calliptamus turanicus</i> Serg.Tarb	-	-	16	16	17
6	<i>Tetrix sudulata</i> Saulcy.	2	3	7	12	12.8
7	<i>Tetrix tartara tartara</i> Saulcy.	3	1	1	5	5.3
Total:		20	9	65	94	100

There are 5 species of these species: the tailed *Tettigonia caudate* (A larva), *Acrotylus insubricus* (Scop.), Turon locust *Calliptamus turanicus* (larva), *Tetrix sudulata* larva, adult) and *Pyrgomorpha bispinosa*. can be regarded as In the first decade of May, there was a slight increase in the number of insects (124 ex. Per hour), but the dominant species retained their status, as follows: *Pyrgomorpha bispinosa*, *Acrotylus insubricus* sudulata 11 ex / hr, *Tettigonia caudate* 3 ex. The proportion of larvae decreased significantly - 14%. In the garden, there is a wide variety of species of insects, which is common in 29 fields. Kuva district, Fergana region. One can see that the number of insects collected in the garden for an

hour is 534, suggesting that spring species also came from eggs. In this period the share of the imagination of the righteous is 70%. There are also imago and larvae wintering species such as *Anacridium aegyptium*, *Truxalis eximia*, *Pyrgomorpha bispinosa*, *Duroniella gracilis*, *Modicogryllus frontalis*, *Grullatalpa grullatalpa* in the park, suggesting that the fauna in the park is formed. It has been reported that these species are not considered to be a serious threat to insects by the reduction or alteration of the continuous feed plant. Very few species, such as *Ruspolia nitidula*, *Modicogryllus frontalis*, were also recorded in the garden at this time (Table 3).

Table 3
Orthopteroid insects were found from apple garden in Kuva district, Fergana region in 23.06.2017, Coordination is N 40°43'39.18, E 71°88'03.71

№	Species	Ecology				
		Adult		Larvae	Total	%
		Female	Male			
1	<i>Tettigonia caudate</i> Charp.	9	3	-	12	2.2
2	<i>Ruspolia nitidula</i> (Scop.)	3	-	-	3	0.5
3	<i>Tettigonia viridissima</i> L.	18	15	-	33	6.2
4	<i>Modicogryllus frontalis</i> (Fieb.)	6	-	-	6	1.1
5	<i>Grullatalpa grullatalpa</i> L.	12	6	-	18	3.4
6	<i>Calliptamus italicus italicus</i> (L.)	36	30	24	90	17
7	<i>Calliptamus barbarus cephalotes</i> (Costa.)	48	27	12	87	16.3
8	<i>Calliptamus coelesyriensis carbonarius</i> (Uv.)	-	6	21	27	5
9	<i>Anacridium aegyptium</i> (L.)	-	-	36	36	6.7
10	<i>Acrida oxycephala</i> (Pall.)	-	-	51	51	9.5
11	<i>Truxalis eximia</i> Eichw	-	-	18	18	3.4
12	<i>Pyrgomorpha bispinosa deserti</i> B.-Bienko.	15	9	-	24	4.5
13	<i>Duroniella gracilis</i> Uv.	18	9	-	27	5
14	<i>Oedaleus decorus</i> (Germ.)	18	24	-	42	8
15	<i>Ramburiella foveolata</i> (Tarb.)	6	-	-	6	1.1



16	<i>Chorthippus (s. str.) karelini</i>	9	6	-	15	2.8
17	<i>Aiolopus oxianus</i> Uv.	24	15	-	39	7.3
Total:		222	150	162	534	100

In the cotton field orthoptera fauna comprised 16 species. 199% of the 17 species collected from cotton fields in Turum saroy village, Pop district, Namangan region, accounted for 40% of *Calliptamus species*. In the first decade of June, the larvae and adult locus of *Sphingoderus carinatus*,

Pyrgomorpha bispinosa, *Duroniella kalmyka*, *Calliptamus italicus italicus*, *Calliptamus barbarus cephalotes*. It should be remembered that Asian and valley locusts have a large reproduction pattern and are considered to be pests of agricultural crops (Table 4).

Table 4

Orthopteroid insects were found from cotton field, Turum saroy village, Pop district, Namangan region in 07.07.2018). Coordination is N 40°52'17.85, E 71°0'15.67

№	Species	Ecology				
		Adult		Larvae	Total	%
		Female	Male			
1	<i>Tettigonia viridissima</i> L.	3	-	-	3	1,5
2	<i>Platycleis intermedia</i> Serv.	9	3	-	12	6
3	<i>Melanogryllus desertus</i> Pall.	6	6	-	12	6
4	<i>Modicogryllus bordigalensis</i> Latr.	3	-	-	3	1,5
5	<i>Grullatalpa unispina</i> Sauss.	-	3	6	9	4,5
6	<i>Eremogryllodes semonovi</i> Mir	3	-	-	3	1,5
7	<i>Sphingoderus carinatus</i> (Sauss.)	6	9	-	15	7,6
8	<i>Ramburiella foveolata</i> (Tarb.)	1	1	-	2	1
9	<i>Acrotylus insubricus</i> (Scop.)	6	-	-	6	3
10	<i>Pyrgomorpha bispinosa deserti</i> B.-Bienko.	12	6	-	18	9,1
11	<i>Acrida oxycephala</i> (Pall.)	-	-	9	9	4,5
12	<i>Locusta migratoria migatoria</i> L.	3	6	-	9	4,5
13	<i>Duroniella kalmyka</i> (Ad.)	9	6	-	15	7,6
14	<i>Calliptamus italicus italicus</i> (L.)	17	14	3	34	17,1
15	<i>Calliptamus turanicus</i> Serg.Tarb.	6	5	-	11	5,5
16	<i>Calliptamus barbarus cephalotes</i> (Costa.)	19	17	2	38	19,1
Total:		103	76	20	199	100

In the first decade of August, a significant increase in the number of orthopteroid insects in cotton fields led to an increase in species composition (Table 5).

Table 5

Orthopteroid insects were found from cotton field, Turum saroy village, Pop district, Namangan region in 08.08.2018). Coordination is N 40°52'17.85, E 71°0'15.67

№	Species	Ecology				
		Adult		Larvae	Total	%
		Female	Male			
1	<i>Platycleis intermedia</i> Serv.	9	6	-	15	4
2	<i>Tettigonia viridissima</i> L.	3	1	-	4	1,1
3	<i>Oecanthus turanicus</i> Uv.	15	11	-	26	7
4	<i>Melanogryllus desertus</i> Pall.	14	8	4	26	7
5	<i>Modicogryllus bordigalensis</i> Latr.	7	5	7	19	5,1
6	<i>Grullatalpa unispina</i> Sauss.	2	-	-	2	0,5



7	<i>Tetrix tartartara tartara</i> Saulcy.	5	2	-	7	2
8	<i>Acrida oxycephala</i> (Pall.)	6	3	8	17	4,6
9	<i>Truxalis eximia</i> Eichw.	3	-	12	15	4
10	<i>Aiolopus thalassinus thalassinus</i> F.	4	2	28	34	9,1
11	<i>Duroniella kalmyka</i> (Ad.)	4	3	16	23	6,2
12	<i>Duroniella gracilis</i> Uv.	7	1	13	21	5,6
13	<i>Pyrgomorpha bispinosa deserti</i> B.-Bienko.	3	3	4	10	2,7
14	<i>Locusta migratoria</i> L.	3	-	-	3	0,8
15	<i>Spingoderus cariantus</i> (Sauss.)	13	9	-	22	6
16	<i>Calliptamus italicus italicus</i> (L.)	19	14	-	33	8,9
17	<i>Calliptamus barbarus cephalotes</i> (Costa.)	24	15	-	39	10,4
18	<i>Heteracris adspersa</i> (Redt.)	14	12	-	26	7
19	<i>Eyprepocnemis unicolor</i> Serg. Tarb.	5	4	-	9	2,4
20	<i>Tropidopola turanica turanica</i> Uv.	-	-	21	21	5,6
Total:		160	99	113	372	100

During this time, the larvae of the species *Tropidopola turanica*, *Aiolopus thalassinus thalassinus*, *Duroniella gracilis*, *Duroniella Kalmykka*, *Oecanthus turanicus*, *Melanogryllus desertus*, *Sparioderus cariantus*, *Calliptamus italicus* species. The presence of larvae of these species in the fields in late summer and early autumn suggests that they are spring species and the emergence of new wintering larvae. Later, when they enter the preimaginal phase, they go to winter. It was also observed that locusts are now common in the fields.

Six species of Grasshopper (*Calliptamus italicus*, *Calliptamus turanicus*, *Calliptamus barbarus*, *Melanogryllus desertus*, *Modicogryllus (E.) bordigalensis*, *Gryllus bimaculatus*) are among the closely related species of cotton

agroecosystem. Consequently, the cotton planted in the area in previous years may have been the most important and important nutrient link in their ecosystem. Studies have shown that shortening or alteration of permanent nutrient plants does not pose a serious threat to these insects. It is noted that species of *Calliptamus* also occur in agroecosystems, and they are important in the feed chain due to their high density. In addition to agroecosystems, materials were collected from the Andijan region and near Koradarya river, canal, ditch and collective landscapes. The fauna of the rectified area was much poorer (Table 6).

Table 6

Orthopteroid insects were found from near river, Koradayo river, Andijan region in 07.07.2018. Coordination is N 40°55'5.93, E 71°49'52.43

№	Species	Ecology				
		Larvae		Adult	Total	%
		Female	Male			
1	<i>Modicogryllus bordigalensis</i> Latr.	3	1	-	4	7.8
2	<i>Grullatalpa unispina</i> Sauss.	2	-	-	2	4
3	<i>Xya variegata</i> Latr.	16	-	-	16	31.3
4	<i>Tetrix sudulata</i> Saulcy.	7	6	-	13	25.5
5	<i>Tetrix tartara tartara</i> Saulcy.	-	3	-	3	5.9
6	<i>Acrotylus insubricus</i> (Scop.)	7	4	2	13	25.5
Total		35	14	2	51	100



According to it, there were collected 51 insects of 6 species per hour. These species are considered to be hydrophilic species and have been studied by a number of scientists on the fact that the *Xia variegata* species live near typical rivers and feed on small invertebrates along the water [9].

However, there is not enough data on biology and ecology. This species of trippers contains 20, 10, nesting clumps, 7 species in each of these nests, and only 3 in each of the three species of insect species. It was determined that this would continue.

CONCLUSION

According to our research, there were identified 45 species of orthopteroids in agrocenoses, Fergana Valley, including 4 species of *Tettigoniodea*, 8 species of *Gryllidae*, 2 species of *Tridactylidae*, and 31 species of *Acridoidea*.

Species composition and maximum density of fields were observed from the third decade of June to the second decade of August. Their density decreases from the edge of the field to the center

Of the studied agrocenoses, 29 species (65.1%) were found in gardens, 24 species (55.8%) in cotton agrobiocenosis, 18 (41.8%) in wheat agrobiocenosis, 18 (39.5%) in rice, and 22 in alfalfa. 14 (32.5%) in legumes, 21 (48.8%) in maize, 12 (27.9%) in the river, collector, arable water, formed a fauna of orthopteroid species. The occurrence of swarms of grasshopper in agrocenosis requires timely monitoring to prevent the risk of this pest.

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AGROTECHNOLOGY OF GROWING MALVA (*MALVA L.*) IN THE FIELD

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АННОТАЦИЯ

The article is devoted to the agricultural technology of growing mallow (*Malva l.*) in the field. Growing mallow is a simple process. Regular moderate watering, loosening the soil and weeding, timely removal of wilted flowers are mandatory requirements in caring for mallow.

KEY WORDS: roots, buds, leaves, sprouts, seedlings, pests, fertilizers, leaves.

INTRODUCTION

Medicinal plants are widely used in the treatment of various human diseases, both in scientific medicine and in folk medicine. Medicinal raw materials are various parts of the plant - buds, leaves, flowers and inflorescences, fruits and seeds, roots, rhizomes and bulbs, bark containing medicinal substances.

The therapeutic effect of many types of medicinal plants currently used in scientific and folk medicine is associated with the presence of various biologically active substances in them, which, when they enter the body of animals and humans, exhibit physiologically active properties and have a healing effect. They are called active substances, have a diverse composition and belong to different classes of chemical compounds. Despite the rapid development of synthetic chemistry and the fact that many drugs are obtained chemically, currently up to 40% of medicinal preparations are obtained from herbs.

The wealth of inexhaustible and diverse plants of the Republic of Uzbekistan is a great resource for obtaining medicines.

In this regard, in order to create a unified base for scientific research on the cultivation and processing of medicinal plants conducted in the regions of the republic, the Decree of the President of the Republic of Uzbekistan was adopted, dated November 26, 2020 No. PP-4901 "On

measures to expand the headquarters of scientific research on the cultivation and processing of medicinal plants, the development of their seed production.

METHODS AND MATERIALS

Research on the development of agricultural technology of mallow (*Malva l.*) was carried out in the field on the territory of the experimental site of the Faculty of Biology of Karakalpak State University. General botanical methods are used. The purpose of the study was to develop an agrotechnology for growing mallow seeds in the field.

RESEARCH RESULTS

Research on the development of agricultural technology of mallow (*Malva l.*) was carried out in the field conditions of the experimental site of the Faculty of Biology, which is located on the territory of the Khojeli district of the Republic of Karakalpakstan. For the successful cultivation of medicinal plants, appropriate zoning was observed, areas with appropriate weather and soil conditions were selected, where there are optimal opportunities to meet the requirements of the respective plant species for climatic factors and soil.

Growing mallow (*Malva l.*) is a simple process, since mallow is a non-capricious plant. Regular moderate watering, especially in dry summers, loosening the soil



and weeding, timely removal of wilted flowers are mandatory requirements for caring for mallow.

Mallow seeds (*Malva l.*) were planted without prior soil preparation in May. The mallow seeds were embedded in the treated softened soil to a depth of 2 cm. A distance of 5–10 cm was maintained between the bushes. Seeds were watered 2 times a week. A day later, young

sprouts began to appear. Seedlings appeared 12-14 days after planting.

The optimum temperature for seeds was +8+10°C and for sprouts +18+20°C. Mallow is a short-day plant. The first 40-60 days after planting developed very slowly. Then growth accelerated. Mass flowering was observed after 65-70 days. The duration of the growing season was 110-140 days. (Fig. 1).



Fig. 1. Young sprout of mallow (*Malva l.*)

During the period of plant growth, the size of the button leaves was measured and its growth was observed up to 10 cm in width (Fig. 2).



Fig.2 Leaves of young mallow (*Malva l.*)

It was established that mallow flowers were located one flower at a time in leaf axils or in a panicle at the tips of branches and 20-25 flowers opened. Flowering

lasts almost all summer. Pruning of withered flowers was carried out in a timely and regular manner (Fig. 3).



Fig. 3. Blooming mallow (*Malva l.*)

Mallow does not require mandatory feeding, but responded well to all types of fertilizers. A little compost or a weak dosage of nitrogen fertilizers were applied to the beds at intervals of several weeks. Powdery mildew is the main pest.

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CONCLUSION

The results thus obtained show that mallow seeds germinate well without prior preparation. Seedlings appear 12-14 days after planting. The optimum temperature is +8+10°C for seeds and +18+20°C for sprouts. Short day plant. The first 40-60 days after planting develops very slowly. Then growth picks up. Mass flowering is observed after 65-70 days. The duration of the growing season is 110-140 days. When planting in humus and sand in greenhouse conditions, a germination rate of 35% was determined.

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STUDENTS' PERSPECTIVES ON E-LEARNING FOR COURSEWORK COMPLETION AMIDST COVID-19 AT MUFULIRA COLLEGE OF EDUCATION, ZAMBIA

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ABSTRACT

This study aimed to explore students' viewpoints on using E-learning for coursework completion amidst covid 19 at Mufulira College of Education, Zambia. Data were obtained using a qualitative approach from a total sample of 24 participants and analysed using thematic analysis. The study discovered that students' use of E-learning to complete their coursework during the pandemic was challenging. Precisely, students were concerned about how the digital divide manifested itself in their lack of online technology awareness, connectivity challenges, a lack of collaboration, and ill emotions, circumstances perceived to have significantly impeded the progression of course content completion. Thus, the quality and quantity of coursework provided to students seem to have been jeopardized. Recommendations for addressing the issues have been made.

KEYWORDS: *Coursework completion, Covid-19, Perception, E-Learning, Digital divide.*

BACKGROUND

Learning institutions worldwide provide learners with integrated formal and informal learning programs. These programs prioritize providing social, emotional, psychological, and physical health and well-being as learners strive to pursue academic accomplishments. However, when unexpected long-standing crises strike, such as droughts, pandemics, or wars, it becomes a nightmare to implement any high-quality educational programs. Consequently, students, especially the underprivileged, lose a critical place that gives them stability and have their minds overwhelmed with additional unpredictable circumstances.

Of late, the education system has been rocked by an extraordinary health crisis (Covid-19 epidemic), which has shaken its foundation and revolutionised how the educational system operates. Inevitably, the Covid-19 crisis brought education systems worldwide to a halt. This catastrophic situation has impacted educational settings, posing numerous unforeseen obstacles for teachers and students worldwide (Famularsih, 2020; Zalat et al., 2021). Before March 2020, more than 300 million fatal Covid-19 cases were verified globally (WHO, 2022), and these cases were highly contagious (Igai et al., 2022). Several countries worldwide confirmed an increase in cases and deaths as the months passed, which devastated the entire education system. Perhaps it is undeniable that there has not been such a potentially disruptive crisis since

the introduction of modern education systems on a global scale (UNESCO, 2021).

As one of several measures taken to prevent the spread of the virus, many governments, including Zambia, had to shut down learning institutions for several weeks or months (Li et al., 2021). College students across Zambia and beyond had to abruptly pack up their possessions with the view to finishing their coursework off campus in the middle of the first academic term of 2020. Although the cost of closing schools outweighs the risks of keeping them open, teachers and students face significant uncertainty (Mukuka et al., 2021).

Decades of research show that abrupt school closures are associated with learning loss, with more pronounced effects among underprivileged families (Grogger, 1997; Gilbert et al., 2009; Sunderman & Payne, 2009; Brummet, 2014; Mukuka et al., 2021; UNESCO, 2021). Even brief interruptions in a learner's academic progression have a substantial detrimental impact on their learning and can have long-term consequences (UNESCO, 2021). Thus, it is undoubtedly that the detrimental effects of school closures during Covid-19 have had disastrous consequences on students' learning in Zambia and elsewhere, circumstances that necessitated alternative modes of educational provision.

The critical situation forced institutions to rethink and re-evaluate a better means of prioritizing education provision for their students to sustain the educational sector as a public



good for everyone and avoid a generational catastrophe. This is because the effects of the 2020 academic calendar disruption on today's students appear long-term (UNESCO, 2021). Thus, learning institutions globally were forced to adopt significant adjustments designed to mobilize and maintain learning continuity to counteract the anticipated effects. This was due to the certainty that educational institutions would not complete the entire curriculum in their customary manner amid the pandemic.

In this unexpected time, institutions including Mufulira College of Education were obliged to transition from conventional methods of teaching and learning, in which students were required to interact physically with lecturers, to a complete online learning environment (Hazaymeh, 2021). There is no denying that using E-learning for coursework completion is an effective strategy for students; however, when E-learning systems are not planned adequately and supported, students' learning becomes terrifying (Kibuku et al., 2020; Li et al., 2021).

Prior to the pandemic, E-learning was widespread in developed nations. However, the Covid-19 epidemic forced educators in less developed countries like Zambia to embrace E-learning technologies to maintain their students' academic progression (Famularsih, 2020). Unfortunately, these technologies have not been spread equitably worldwide (Mukuka et al., 2021). Advanced mobile phones, computers, and high-speed internet broadband are concentrated mainly in high-income countries. The circumstances may entail that the capacities of colleges to respond to the crisis by delivering learning and support to learners through E-learning have been diverse yet uneven (Zalat et al., 2021). This scenario could be more complex for specific colleges than for others. Similarly, some students could face a more challenging time adjusting to the new normal than others (Mphahlele et al., 2021; Mukuka et al., 2021). This is because each student is unique in handling technology, as it is based on age, cognitive capacity, and interest in technology usage (Silomba & Kasonde, 2021).

Subsequently, knowledge of employing E-learning technology to promote students' academic growth has been a struggle for some lecturers in most developing countries, like Zambia. Academics have found that while most lecturers and students habitually use virtual technology in their personal and professional lives, there is a gap between personal use and online learning (Kibuku et al., 2020; Li et al., 2021; Silomba et al., 2021). This disparity supports the notion that a lack of ability, teaching beliefs, and learning prohibits lecturers and students from regularly employing technology in their educational interactions (Almanthari et al., 2020; Mukuka et al., 2021) as each party appears to lack the required expertise in using E-learning. This situation seems to create a crisis within a crisis among students, worth exploring.

PROBLEM AND RESEARCH QUESTIONS

Although Zambia has historically experienced many natural calamities, none have necessitated a widespread transition to a complete E-learning mode in the educational system, nor has

the technology infrastructure previously been ready to fulfill this mandate. The global pandemic and college closures mandated in 2020 also have no precedent. As such, the crisis exposed many deficiencies and inequalities in our education systems that are worth exploring (Mukuka et al., 2021). Recent evidence indicates that E-learning during the Covid-19 pandemic had significant adverse effects on student learning (Aboagye et al., 2020; Famularsih, 2020; Halemam & Yamat, 2021; Hazaymeh, 2021; Ibrahim et al., 2021; Purwadi et al., 2021; Igai & Yunus, 2022). However, many of these studies have been undertaken in high-income countries, with much less attention paid to academic institutions in low and middle-income nations. Consequently, there is a dearth of studies on this topic, which is urgently needed, in Zambian academic institutions, particularly in Copperbelt colleges of education. Gaining insight into how students used E-learning amid Covid-19 could help educationists develop effective E-learning strategies and better prepare for future emergencies. Therefore, two questions were raised to understand this pressing matter.

1. How has the shift to E-learning by students affected coursework completion amidst covid 19 upsurge?
2. What expectations do students have for future E-learning practices in coursework completion amidst similar catastrophes?

SIGNIFICANT OF THE STUDY

It is envisaged that this research will add to the current body of knowledge about students' perceptions of E-learning for coursework completion amidst Covid-19. The findings may also raise awareness of students' challenges when using E-learning. It is also vital because it is the first of its kind at Mufulira College of Education. As such, it may benefit academic staff by enabling them to plan for future catastrophic incidents to avoid academic disruption. Finally, it is hoped that this study will inspire additional research on institutions' and students' capacity for disaster preparedness and coursework completion.

RESEARCH METHODOLOGY

In the quest for answers to the research question, this study sought to understand the lived experiences of regular students pursuing undergraduate and diploma programs at Mufulira College Education on the Copperbelt of Zambia. Relying on the social constructivist paradigm, this study deployed an exploratory qualitative approach in investigating the students' perspective on using E-learning as the method of coursework completion amid Covid 19. The choice of the exploratory case study is vested on "investigating a contemporary phenomenon within its real-life context" (Yin, 2003, p. 13) and allowed for a relativist viewpoint, mainly because the boundaries between study phenomenon and context are not evident in colleges of education on the Copperbelt of Zambia (Mukuka et al., 2021). Thus, this study aimed to cast more light on E-learning phenomena rather than quantify it. The sample consisted of 24 college students chosen randomly from 6 distinct cohorts, as presented in the figure below.



Gender and Composition of College Participants Sampled

Type of Program	Cohorts	F	M	Total number
Diploma Students (Year 1 to 3)	Year 1	2	2	4
	Year 2	3	1	4
	Year 3	2	2	4
Degree Students (Year 2 to 4)	Year 2	3	2	5
	Year 3	2	2	4
	Year 4	1	2	3
Total		13	11	24

In order to ensure confidentiality, participants pursuing diploma programs have been identified as DS1, DS2, DS3, DS4, DS5, DS6, DS7, DS8, DS9, DS10, DS11, and DS12, respectively. Those pursuing degree programs, on the other hand, have been assigned initials such as BES1, BES2, BES3, BES4, BES5, BES6, BES7, BES8, BES9, BES10, BES11, and BES12. This format of identifying participants has been used to ensure confidentiality and anonymity among participants. Semi-structured interviews and Focus Group Discussions (FDG) were used to gather data, and analysed thematically. Ethics were taken into account; for example, participation in the study was voluntary, anonymous, and unpaid.

RESULTS AND DISCUSSIONS

Thematic analysis revealed rich findings regarding students' experiences with E-learning for coursework completion amidst the Covid-19 pandemic. Despite students' waiting for less than a month to commence online classes, they expressed satisfaction with the college's effort to engage them in another learning mode. The participants unanimously applauded the college management for incorporating the students on Moodle and other platforms. In this regard, one of the interviewees narrated, "I applaud my college's administration for their prompt and kind response; they gave us the opportunity to attend lectures online while remaining at home" (BES5, 2022).

Equally, students, as a whole, perceive the E-learning platform as an excellent tool for online learning during the Covid-19 lockdown. Data revealed commonalities among the participants' responses, which linked to a positive effect on using E-learning. A considerable number of participants believed that E-learning was a valuable tool to enhance students' learning and examination preparation. They cited some positives, such as facilitating learning continuity and interacting with lecturers in the comfort of their homes. However, they accused lecturers of introducing the program abruptly. On this issue, one discussant narrated, "despite the college's rolling out the program in a hurry, students were able to keep up with the lecturers, assured to complete the course materials, and feel more at ease for the November exams" (DS1, 2022). Thus, it is without a doubt that the transition from traditional teaching methods to online learning has dramatically impacted learners' hopes at the initial stage. In this regard, it could be argued that E-learning is necessary for educational material covering among learners amidst the pandemic (Igai & Yunus, 2022). All that is required is the need

to embrace it if coursework completion could succeed in both critical and routine situations.

Lack of Online Technological Awareness

Regardless of the positive comments, it was noticed that the unplanned and quick switch to online learning without proper technological awareness and with little preparation had illuminated inertia in adopting the program among students. Most participants were trying to learn how to utilize the E-learning platforms and simultaneously learn course contents. Equally, there was agreement that technical difficulties plagued their online interactions. At the same time, others had fears that the observed challenges had the potential to compromise adequate coursework completion and examination preparation. Supporting these viewpoints, the participants echoed their frustrations;

"it was not a big deal for me to adopt E-learning; although it is a good thing, I did not like the system in the first place; the institutions hurriedly introduced it, and students were learning two hard things at the same time -Content and Moodle- it was hard, this will affect the examination results" (DS7, 2022).

"We were utilizing Google Meet for discussion, but every time everyone turned on the mike, disturbing noise used to take up center stage, and cleaning up the mess used to prove tricky; it used to take a lot of hours to learn a few concepts, clearing course this year will be by God's grace" (DS7, 2022).

"When assigned an assignment on Moodle, I don't remember answering and submitting any task without challenges. The worst part is that I could respond satisfactorily but neglect to hit the submit button, an effort that used to be worthless; I fear what will happen in the exams" (BES3, 2022).

Subsequently, others narrated that they struggled to find the posted coursework and instruction on how to go about various course tasks. The struggle can be seen in the following discussions;

"does it mean I do not have internet bundles because aim failing to open the page; it kept on giving me an invalid password" (BES3, 2022).



"I have tried to contact my course lecturers for guidance, but to no avail; the phone just rings and rings for past two week" (DS7, 2022).

"this is the third time I am submitting the activity; this lecturer always calls to say she has not received it; it is tedious; could it be that I am on the wrong side?" (BES3, 2022).

"did any lecturer attend to you this week? I cannot find anything posted. I do not know what I will write in the exams" (DS7, 2022).

"I always miss online discussion forums as well as quizzes because the phone keeps on failing me" (BES3, 2022).

However, what remains a mystery was participants' suspicions that even some lecturers had trouble transitioning to online mode. Most participants highlighted significant lapses in lecturers' usage of Zoom, Moodle, and Google Link, which they perceived as additional obstacles in covering coursework. Regarding this issue, a discussant voiced out; *not all the lecturers were familiar with these E-learning tools; lecturers and students became learners of the platforms, creating a crisis within a crisis*" (BES9, 2022). Also, an interviewee expressed disappointment; *"Online materials such as lecturer notes could not be found on some course platforms because some lecturers did know how to post them"* (DS6, 2022). Subsequently, an extract from an interviewee regarding this matter;

"I used to have trouble opening the coursework that my lecturers would send each time I logged into Moodle. Even though I spent nearly two months learning how to use the platform, I don't even recall ever succeeding and profiting from E-learning classes. It would be far better if we were first introduced to the platforms face-to-face before covid 19. But everything was done in a flash by lecturers who were also learning online platforms. Eeesh, it was an extremely trying time for me, and it kept draining my brain power" (BES3, 2022).

Therefore, students were initially hesitant to participate in online lectures as they were unfamiliar with the E-learning mode and had unconfirmed doubts about their lecturers. The author, a lecturer, also observed that students expressed their worries on their friends' media platforms, such as Facebook, with some reporting directly on the college's official web pages.

In this regard, the participants thought that college institutions should not underestimate the observed negative impact of E-learning as any near future devastating event could prove more disastrous when covering coursework. More significantly, many participants narrated that E-learning courses should be mandatory for all students, particularly in the first year of study. They further indicated that teaching using online should be done side by side traditional one to make students accustomed to the new learning method and also if the

disaster strikes transitioning to a complete E-learning mode will not be difficult as echoed by a discussant, *"it is a must that colleges should resort to offering online learning alongside traditional learning to alleviate undue stress on students in the event of another pandemic"* (BES8, 2022). In the same vein another interviewee narrated; *Online learning is here to stay; the easiest way is to include it as a mandatory task in all year-one students; this will relieve students of undue stress in the long run"* (DS7, 2022). Another discussant said, *"there is a proverb which says 'practice makes a man perfect; ideally, students at the college have never really practiced E-learning. Most of them are complacent and are stuck with face-to-face modes of learning"* (DS12, 2022).

As a result of the preceding observations, it is undoubtedly that the pandemic presented educational institutions with several lessons. One of the lessons is centered on the student's lack of technological awareness, a crucial aspect of the E-learning progression. As current and prior results hold, a lack of awareness of E-learning technologies among students disrupts the learning process and merely leaves learners frustrated (Mphahlele et al., 2021; Mukuka et al., 2021). More importantly, students' time spent learning various platforms could have been spent learning additional course content; nevertheless, it is better late than never. The observed gloomy situations could be countered by providing awareness and training students on digital literacy to bridge the gap between those with knowledge and those without if coursework completion is to take an effective root at Mfulira college of education and beyond. These observations are also echoed in the findings of other academics (Famularsih, 2020; Haldeman & Yamat, 2021; Mukuka et al., 2021; Zalat et al., 2021). Thus, to guarantee that technology is used effectively, institutions must guide students on accessing and using various E-learning tools. This will contribute to reducing the prevalence of digital illiteracy, improving the rate at which coursework is done, and reducing the stress associated with upcoming assessments.

LACK OF INTERNET CONNECTION AND POWER OUTAGES

Overweeningly, participants raised a concern of poor or lack of internet connections as a considerable challenge that affected the implementation of coursework. A significant thing that seemed to disturb participants the most was the poor quality of the internet services provided by MTN and Zamtel, even in urban cities such as Lusaka and Ndola. Besides, most participants attested that they could not afford the exorbitant prices and fast finishing data provided by Airtel mobile services, which they believed had a little bit better service in terms of speed. In this regard, one discussant echoed, *"It was a nightmare following the timetable that the college set because of intermittent data services; the internet kept appearing and disappearing"* (BES7; 2022). Similarly, interviewees from the urban attested:

"The Internet exists; however, it is not widely dispersed throughout, including here in Ndola. The internet is quite worrying. I feel sorry for my friends who live in



remote places with scarce internet connections” (DS11, 2022).

“The network used to disturb me a lot during the presentation; it used to disrupt the class; by the time I got back online after several trials of re-joining, critical topics explained by my lecturer had gone. The network used to be so terrible that it made me miss entire lessons” (BES4; 2022).

The respondents also unanimously agreed that constant power outages also hampered course completion. As such, participants cited electricity as one of the main obstacles the students faced during the implementation of the online learning process. One of them said: *“Electricity was one of the most significant barriers to coursework progression and completion amidst the pandemic; imagine, at times, we used to experience a power outage for 13 hours” (BES1, 2022).* Conversely, one interviewee also stated, *“most online lecturers used to come around 19 to 20, and my area was scheduled for power cuts at that particular time; things were horrible, I never learnt much, and this worries me when I think of examinations” (BES7, 2022).*

The current findings are similar to many recent pieces of research conducted in Zambia and elsewhere (Famularsih, 2020; Kibuku, 2020; Purwadi et al., 2021; Mphahlele et al., 2021; Mukuka et al., 2021). Researchers in these investigations discovered connectivity as the subjects’ main issue in implementing E-learning tasks. Given that the E-learning environment is driven by internet access and availability of power services (Igai & Yunus, 2022; Mukuka et al., 2021), it could be anticipated that coursework completion was hampered in the current study. Students were failing to attend online classes due to internet challenges across regions, the high cost of internet bundles and power outages. These circumstances pose substantial obstacles in fulfilling college-planned academic work (Gin et al., 2021).

In this regard, participants unanimously agreed that Zambia Information and Communications Technology Authority (ZICTA) needs to be on top of everything. More importantly, it was resolved that ZICTA should compel all mobile service providers to work diligently and roll out better services across the country. Data quality, notably for MTN and Zamtel, which most participants felt had poor bandwidth in some places, should be enhanced. Supporting the statement, a participant from FGD narrated; *Zambia needs to invest more in mobile service and adopt developed-country methods of providing high-speed internet access to customers” (DS3, 2022).* Most participants also expected telecommunication companies to consider upgrading data services and lowering the high-priced data bundle in the near future, as these negatively affect the E-learning process. Following this, one of the participants during the FGD said, *“if the mobile providers, particularly Airtel, continue with higher data service charges, then it will be a nightmare for E-learning should a similar scenario arise” (BES7, 2022).*

In practice, when the E-learning environment is appropriately supported by various infrastructures, such as ensuring that most parts of the country regions are connected to high-speed internet. Also, by working on minimizing power outages, online student-centered learning techniques may operate effectively (Gin et al., 2021; Igai & Yunus, 2022). Subsequently, students may adequately prepare for future academic tasks such as examinations.

Thus, any departure from prioritising provisions of E-learning necessities may be regarded as exclusion rather than inclusion as the college strives to achieve planned coursework coverage among students.

Lack of appropriate E-learning tools

It is recognized that to access E-learning learning systems, one needs to have a communication device such as a smartphone, computer, or tablet that can connect to the internet (Igai & Yunus, 2022). Unfortunately, in the current study, a few participants stated that they had no appropriate gadgets for online lessons. The unexpected shutdown of institutions and mobility restrictions had impacted their families' income, particularly those who relied on hand-to-mouth businesses. They further said, they had less support in E-learning tools, such as smartphones, from those who used to sponsor their education. As such, the sponsors chose to acquire necessities for survival rather than support them with online courses, as evidenced by the below conversation;

“I failed to buy a smartphone for online lessons because of financial challenges; our family's small business was shuttered, and all that was left was for survival; I had no option apart from relying on calls for online coursework updates; it was horrible” (BES 8, 2022).

“Even though he knew I couldn't afford it, my father told me to buy a smartphone and hunt for the bundles on my own because of his priority for home demand, so I never learned during the shutdown” (DS8, 2022).

Based on the after mentioned, the lack of interactive gadgets created severe challenges for the students. The unpleasant observation agrees with other scholars who observed that a lack of technological devices hinders the implementation of online learning (Aboagye et al., 2020; Haleman & Yamat, 2021; Bird et al., 2022) and also negatively affects the academic performance of students (Bird et al., 2022). Based on the current and prior studies, it can be argued that the student's inability to acquire an ideal phone played a significant role in incapacitating students' E-learning activities, thereby derailing the coursework completion process. As such, college authorities should strive to bridge the gap between the digital "haves" and the "have-nots" so that all students can have equal access and equal privilege to access E-learning academic activities.

Lack of collaboration and ill emotions

Another barrier to coursework completion that emerged strongly among participants is evident in collaborative learning through group tasks, group presentations, and group



assessments. Regarding this issue, participants reported higher levels of understanding while using collaborative work in the Face-to-Face approach. However, when it came to E-learning, they disagreed, relying on the collaborative method to cover coursework effectively. Most submitted that the diverse unfavourable perceptions about pandemic threats and E-learning mode challenges made it difficult for them to work together online during the lockdown. As a result, they had difficulty navigating the system on their own, as testified by one of the discussants; *“it is difficult to learn when you are alone; academic work in tertiary institutions is done well through partnership learning”* (BES2, 2022). Equally, an interviewee also said, *“forming or joining group discussion was not a priority for me, because my thought was focused on Covid fears other than education”* (DS8, 2022).

As research holds, tertiary education is driven appropriately when learned materials are discussed using a collaborative method that involves social settings such as groups, even if it is done virtually (Darko & Wang, 2021). Practically, using E-learning tools amidst abrupt school closures, like in the case of Covid, is crucial in promoting peer interaction and encouraging student-to-student exchange of ideas and information. Without that, it could further alienate isolated students, leading to their disengagement, withdrawal, or eventual exclusion from participating in completing the course materials in a high-spirited manner. Thus, the collaborative technique promotes more favourable attitudes toward learning than competitive or individualistic ones, ideas that needs to be embraced (Darko & Wang, 2021).

Subsequently, it was also interesting getting from participants that some lecturers never cared about any impending challenges that students used to pass through. Others expressed a lack of interest in attending some lectures, and they further mentioned that the closure became a primary advantage to shunning their services. Below are the complaints submitted by the discussants;

“each time I contacted my course lecturer, the answer I used to get was horrible; I recall one telling me not to bother him for failing to open the sent material; without doubt, negative responses have had a huge impact on coursework completion” (BES8, 2021).

“I never used to get along with some lecturers; whenever I asked a question on technical issues through a phone call, only sarcastic language was heard; I do not know, perhaps, we were all learners of the platforms” (BES9, 2022).

Even though lectures were not included in the study, the findings provide enough evidence to suggest that further research is necessary to understand the interactions between some lecturers and their students. Precisely, intimidation and lack of courtesy from lecturers may leave learners in an isolated situation where they may also have various levels of inabilities and inexperience when it comes to using E-learning mode and, therefore, somewhat hampering the completion of the coursework (Famularsih, 2020). As a result, the data shed light on the unconfirmed behaviour of particular lecturers' lack of

dedication, an important topic that necessitates future research to establish the facts.

Furthermore, the Covid-19 pandemic resulted in numerous ill emotions that impacted most students' family structures and way of life. Stressful emotions at home included losing familiar individuals due to the epidemic, getting sick, losing employment, and lockdowns. These circumstances appear to have significantly impacted the students' social, psychological, and cognitive functioning as they harm learning ability. In one of the FGDs, one of the discussants said;

“I was not mentally prepared to study; I had no idea where to begin because everything I had heard from colleagues concerning how deadly the pandemic was, made my mind ill; worse, I could not control my emotions; whenever I turned on the TV to get the Covid updates, my mind assumed I would be the next victim. My thoughts were consumed by illness and death, not academic issues” (DS7, 2022).

When asked what they expected regarding ill emotional disturbances, participants unanimously reported that they expected the college administrators to use online psychosocial counseling to boost self-situational acceptance and self-esteem. This strategy was also believed to positively deal with technology acceptance, and positively deal with negative perception. Regarding this issue, one interviewee reckoned that *“to increase confidence and good decision-making skills, the college needed to allocate one counseling hotline mobile number to enable students to access counseling services on their perceived ill emotions and E-learning challenges”* (BES1, 2022).

Subsequently, most participants reported that seeking clarifications and explanations from some lecturers on specific course content perpetuated ill emotions when using unfamiliar E-learning tools. They further indicated that it was challenging to seek clarifications, a situation that made them to loss interest and think that E-learning was less effective than the traditional learning method. This circumstance is backed by one of the discussants and an interviewee who echoed the following words;

“Online learning was challenging; learning two things simultaneously became complicated. Lecturers would have devoted time to training students on using the E-learning platforms before embarking on teaching content because it was hard to get proper explanations and clarifications from some lecturers on specific issues using the unaccustomed, less effective method” (DS6, 2022).

“It was rough for me to understand the course content fully because clarifications never used to come forth from the lecturer” (BES7, 2022).

“Learning online was not interesting; it was inconvenient and ineffective for me; no wonder I used to lose interest most of the time” (DS6, 2022).



The observations mentioned above allow the author to argue that students developed a negative attitude toward online learning due to some lecturers' inability to explain students' concerns and students' lack of interest in the unfamiliar learning method. The results may be explained by the supporting evidence from previous studies (Almahasees et al., 2021; Daniel Teodorescu, 2021). The two separate studies observed that college students are more likely to engage in online academic activities if they are given ample explanation on specific online learning issues. Also, if the online tools are of interest to them and if they are motivated to do so. Thus, the unavailability of appropriate clarifications and a lack of interest and motivation as students use E-learning technology can be challenging because many students miss out on learning activities (Gin et al., 2021). Nevertheless, it must be stated that online course content and E-learning tools foster learning environments if students assume greater responsibility for their interest and motivation in learning (Younas et al., 2022). This concept of self-direction or self-regulation learning embodies a student's ability to work autonomously. By implication, more effort is required to educate students on the E-learning mode believed to hamper coursework progression and completion.

CONCLUSION AND RECOMMENDATIONS

Despite several beneficial impacts that E-learning use entails, its use among students to complete their coursework during the epidemic was problematic. Participants' perceptions were dominated by frustration, which stemmed from digital gaps. In particular, lack of online technology awareness, connectivity issues, a lack of collaboration, and ill emotions were all seen as major impediments to participants' ability to make progress in learning the course material. Thus, the standards and rate of coursework learning were put in jeopardy, circumstances that may ultimately lead to students' low academic performance in due course. Therefore, students' experiences and expectations could translate into opportunities or obstacles. It is dependent on how the college responds to the predicaments. Thus, to adequately prepare students with E-learning abilities and increase accessibility, it is recommended that the teaching of effective use of E-learning should become mandatory for all students, particularly those in the first year of academic study. Lastly, for totality comprehension of the phenomena, further research on lecturer's viewpoints regarding E-learning among students amidst Covid-19 should be undertaken.

Conflicts of Interest

The author declare that he has no conflicts of interest

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ACCLIMATIZATION OF CHERRY ROOTSTOCK KRYMSK-5 (VSL-2)

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ABSTRACT

This article presents new aspects regarding the influence of nutrient media on acclimatization of cherry rootstock Krymsk-5 (VSL-2). Experiments are carried out for estimating the effect of nutrient media: MS, mMS DKW, WPM on acclimatization of cherry plantlets. The shoot length and width are measured periodically. The highest mean shoot length of Krymsk-5 in acclimatization were observed in DKW media: $4,55 \pm 0,22$ cm after 30 days, and followed by $118,87 \pm 2,56$ cm growth after 160 days in transferring to the field. The DKW nutrient media is found the most suitable among four nutrient media for acclimatization development of Krymsk[®]5 explants.

1. INTRODUCTION

The effective application of techniques of micropropagation of fruit plants are common in today's world horticulture. These techniques are most efficient for rootstock propagation [1,2]. There is not unique nutrient media for micropropagation of all plants; they differ in inorganic salt and organic molecules composition [3]. Acclimatization is defined as the climatic or environmental adaptation of an organism, especially a plant, to a new environment. Substantial numbers of in vitro cultured plants do not survive transfer from in vitro conditions to the greenhouse or field environments. Plantlets or shoots that have been grown in vitro have been continuously exposed to a unique microenvironment that has been selected to provide minimal stress and nearly optimal conditions for plant multiplication. Plantlets are often developed within the culture vessel under low light intensity, aseptic conditions, and on a medium containing ample sugar and nutrients to allow for heterotrophic growth and in an atmosphere with high levels of humidity. These conditions result in the formation of plantlets of abnormal morphology, anatomy and physiology.

2. MATERIALS AND METHODS

Before acclimatization process, all *in vitro* rooted plantlets were gently washed in distilled water to eliminate any nutrient media remnants. Consequently, explants were planted to plastic containers with peat filled cell trays, after which all containers were covered by plastic glasses and then, were maintained in acclimatization room with 25°C temperature. The containers kept closed for 4 days in order to provide high humidity. The containers are ventilated with air by opening the containers. The containers are opened frequently for a short time in the beginning of acclimatization, after they are opened for longer period. The peat and seedlings are watered frequently in the beginning of acclimatization, after they watered rarely. High humidity provides fungal contamination; the seedlings must be treated with Topas® and Khom® fungicide solutions to prevent the contamination. The high light intensity are provided for autotrophic growth of seedlings, these are cultured in mixotrophic mode during in vitro propagation. The seedlings were incubated in the growth rooms at 23 ± 1 °C, 6500-lux light intensity and 16 hours daylight / 8 hours darkness photoperiod.



3. RESULTS AND DISCUSSION

Growth dynamics on acclimatization period of Krymsk 5 plantlets were studied which were micropropagated in different nutrient media. The highest shoot growth length (4.55 ± 0.22 cm) was established in DKW media propagated plantlets while the lowest

shooting length (3.95 ± 0.14 cm) was established plantlets which was propagated in standard MS (MS(st)). Krymsk-5 explants which planted in modified MS (MSm) and WPM showed shooting length of 4.05 ± 0.18 cm and 4.21 ± 0.15 cm respectively (Table 1).

Table 1

Growth dynamics of Krymsk-5 plantlets in acclimatization room (cm).

N _o	Nutrient media	day1	day5	day10	day15	day20	day25	day30
1	MS(st)	$3,08 \pm 0,13$	$3,31 \pm 0,13$	$3,56 \pm 0,14$	$3,74 \pm 0,14$	$3,78 \pm 0,14$	$3,92 \pm 0,14$	$3,95 \pm 0,14$
2	DKW	$2,96 \pm 0,14$	$3,19 \pm 0,14$	$3,48 \pm 0,15$	$3,65 \pm 0,15$	$4,10 \pm 0,20$	$4,46 \pm 0,22$	$4,55 \pm 0,22$
3	MSm	$3,03 \pm 0,15$	$3,15 \pm 0,13$	$3,53 \pm 0,15$	$3,62 \pm 0,18$	$3,81 \pm 0,14$	$3,98 \pm 0,19$	$4,05 \pm 0,18$
4	WPM	$2,98 \pm 0,13$	$3,10 \pm 0,18$	$3,38 \pm 0,18$	$3,61 \pm 0,17$	$4,05 \pm 0,21$	$4,13 \pm 0,21$	$4,21 \pm 0,15$

Field (*in vivo*) growth dynamics of different media micropropagated plantlets were studied according to two aspects: shoot growth and shoot width.

The Shoot height. According to the results, the highest rates were demonstrated by plantlets, which were

developed in DKW media ($118,87 \pm 2,56$ cm), while the lowest rates were mentioned at standard MS ($92,87 \pm 3,59$ cm). Modified MS and WPM were demonstrated an average results: $108,82 \pm 2,62$ cm and $112,75 \pm 3,23$ cm respectively (Table 2).

Table-2

In vivo conditions shoot height results indicators of in vitro micropropagated Krymsk 5 plantlets (cm)

N _o	Nutrient media	Day 1	Day 20	Day 40	Day 60	Day 80	Day 100	Day 120	Day 140	Day 160
1	MS(st)	$21,52 \pm 0,49$	$25,52 \pm 0,69$	$32,67 \pm 1,20$	$40,62 \pm 1,75$	$59,10 \pm 2,47$	$67,60 \pm 3,14$	$80,50 \pm 3,80$	$87,47 \pm 3,52$	$92,87 \pm 3,59$
2	DKW	$32,37 \pm 1,36$	$36,45 \pm 1,23$	$44,27 \pm 1,26$	$52,42 \pm 1,48$	$71,30 \pm 2,48$	$78,75 \pm 3,48$	$99,23 \pm 2,52$	$116,14 \pm 2,76$	$118,87 \pm 2,56$
3	MSm	$39,30 \pm 1,14$	$41,73 \pm 1,01$	$46,70 \pm 1,04$	$51,73 \pm 1,27$	$68,55 \pm 1,91$	$79,40 \pm 1,99$	$98,80 \pm 2,63$	$104,00 \pm 2,48$	$108,82 \pm 2,62$
4	WPM	$35,45 \pm 1,30$	$38,57 \pm 1,18$	$44,32 \pm 1,17$	$49,47 \pm 1,37$	$68,07 \pm 2,22$	$84,62 \pm 2,76$	$103,72 \pm 2,91$	$112,03 \pm 3,13$	$112,75 \pm 3,23$

The shoot width. The highest mean value of shoot width was observed in DKW media, $10,68 \pm 0,21$ mm. The shoots cultured in WPM and mMS followed after, the mean shoot widths were

$9,36 \pm 0,28$ mm and $8,55 \pm 0,25$ mm, respectively. The lowest mean value of shoot width was observed MS media, $7,66 \pm 0,23$ mm (Table 3).

Table 3

In vivo conditions shoot width results indicators of in vitro micropropagated Krymsk-5 plantlets (mm)

N _o	Nutrient media	Day 1	Day 20	Day 40	Day 60	Day 80	Day 100	Day 120	Day 140	Day 160
1	MS(st)	$2,09 \pm 0,05$	$2,39 \pm 0,06$	$2,88 \pm 0,08$	$3,46 \pm 0,11$	$4,81 \pm 0,13$	$5,05 \pm 0,15$	$5,57 \pm 0,14$	$6,75 \pm 0,22$	$7,66 \pm 0,23$
2	DKW	$2,43 \pm 0,10$	$2,88 \pm 0,10$	$3,84 \pm 0,11$	$4,75 \pm 0,13$	$5,83 \pm 0,17$	$6,44 \pm 0,19$	$7,10 \pm 0,15$	$8,46 \pm 0,21$	$10,68 \pm 0,21$
3	MSm	$2,43 \pm 0,10$	$2,94 \pm 0,10$	$3,92 \pm 0,09$	$5,24 \pm 0,13$	$5,60 \pm 0,14$	$6,13 \pm 0,14$	$6,79 \pm 0,16$	$7,81 \pm 0,21$	$8,55 \pm 0,25$
4	WPM	$2,53 \pm 0,15$	$3,07 \pm 0,14$	$4,00 \pm 0,12$	$4,85 \pm 0,14$	$5,90 \pm 0,15$	$6,36 \pm 0,15$	$6,76 \pm 0,17$	$7,81 \pm 0,19$	$9,36 \pm 0,28$



4. CONCLUSION

According to research results, it is established in vitro micropropagation of Krymsk 5 the most effective nutrient media was DKW. DKW was followed by WPM and the lower results were obtained in standart MS nutrient media in vitro micropropagation of Krymsk 5. Well-developed root system plays a vital role in acclimatization process, which provide good basis for adaptation to new conditions. Due to careful treatment in acclimatization period, persistence of plants was 90%. Based on results of the survey the media protocol to micropropagate of Krymsk 5 can be established in industrial production scale.

Abbreviations

MS (st)–standard Murasige and Skoog Media (Murasige and Skoog, 1962)

MSm - modified Murasige and Skoog

DKW– Driver and Kuniyuki Walnut (Driver and Kuniyuki 1984)

WPM - Woody Plant Media

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FAUNA OF STINK BUGS (PENTOTOMIDAE: PENTOTOMINAE) DISTRIBUTED IN THE NORTH-WEST OF KARAKALPAKISTAN

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ABSTRACT

The Ustyurt Plateau in north western Uzbekistan fauna of the family Pentotomidae is summarized in this paper. In total, 11 genus and subgenus, and 18 species are listed from Uzbekistan (Karakalpakistan).

KEY WORDS: *Fauna, Heteroptera, True bugs, Cimicomorpha, Pentotomidae, new species, new records, Uzbekistan, Karakalpakistan, Palearctic Region.*

INTRODUCTION

With more than 40,000 described species, Heteroptera or true bugs, are part of the most successful radiation of nonholometabolous insects (Weirauch & Schuh 2011). Heteroptera include 9365 species belonging to 1632 genera in the Palaearctic Region (Aukema et al. 2013). Species are usually trophically specialized, phytophagous, zoophagous, or mycophagous (Schuh & Slater 1995). As a consequence of their often specialised feeding habits, many species are economically important as crop pests, biological control agents of phytophagous insect pests (Schaefer & Panizzi 2000), or vectors of diseases (Schofield & Dolling 1993; Schaefer 2000; Garcia et al. 2000). Some bugs constitute an important protein source in human diet (Fritsche & Gitsaga 2000).

The Pentatomomorpha comprise more than 14,000 species in 5 or 6 superfamilies (the Aradoidea, Coreoidea, Idiostoloidea, Lygaeoidea, Pentatomoidea, and Pyrrhocoroidea) and 40 families (Schuh & Slater 1995; Grazia et al. 2008; Weirauch & Schuh 2011). The Pentatomoidea is one of the most species-rich groups of terrestrial Heteroptera with 15 families, nearly 1250 genera and approximately 7200 species (Henry 2009) worldwide. The size varies from 2 mm to more than 30 mm. The ground color is very variable ranging from unicolorous

(brown to green) in species living on the ground or vegetation, respectively to bright colored (and often aposematic) species living on vegetation. Often the integument is matte (not shiny) but it also can be metallic shining (Scutelleridae) in some species. The pilosity varies according the group. The head is directed forwards, rarely somewhat downwards (Cydnidae and

some species in the other families). Antennae are usually 5-segmented (hence, the 'penta' in the name of the superfamily) but it may only be 4-segmented in some Dinidoridae and a few Pentatomidae, and in some exotic Pentatomidae and Scutelleridae it may even be 3-segmented. The rostrum is 4-segmented and slender in plant feeding groups but in Asopinae (predators) the rostrum, especially the first segment, is remarkably stout. The pronotum is usually trapezoid with the lateral margins variously formed (dentate, blade shape, reflexed or bent). Always visible, the scutellum is usually triangular but sometimes it is enlarged and covers a great part (Thyreocoridae, Pentatomidae: Podopinae) or entirely (Plataspididae, Scutelleridae, and the neotropical families Canopidae and Megarididae) the hemelytra. The ostioles (i.e. external openings) of the metathoracic scent glands are situated more or less laterally arising between the middle and hind legs; they are usually accompanied by a peritreme of variable (often useful at tribal or generic state) shape, and the evaporatorium is usually large, covering large portions of meta- and mesopleuron, in Plataspididae also on propleuron (Kment & Vilímová 2010 a.).

The Ustyurt Plateau is an elevated area in the central part of the Turan Lowland. It is bordered by cliffs on almost all sides. The cliff from the east is formed by the former western shore of the Aral Sea. The plateau falls to the Kunya Dar'insk ancient alluvial plain and the Uzboi River Valley in the south, to the Karynyaryk Depression and the Northern Caspian Karakumy Sands in the west, and to the Caspian Sea Lowland in the North. According to the geographical zoning of Kazakhstan and Middle Asia (in the desert region), the Ustyurt Plateau was assigned to the western– northern Turan



subprovince of the northern Turan province by E.I. Rachkovskaya (2003) and others. The total solar radiation in the northern Turan desert is 130–140 kcal/cm² per year, and the radiation balance is 45–50 kcal/cm² per year. The total of temperatures above 100°C is 3600°C. The mean temperature is 10°C for January and 26–29°C for July. The growing period lasts 200–210 days (240–270 days in the southern Turan desert). The precipitation regime is similar to the Mediterranean type. The total precipitation is 100–150 mm per year. The snow cover in the northern part of the plateau is more stable (Rachkovskaya, 2003). The water and temperature regimes are characterized by the dryness index (2.5–6.0).

MATERIAL AND METHODS

Studies on the fauna of true bugs have been carried out in AskhaMazar, Sarykamysh, Asakeaudan, Karabaur, Kartbaikum, Lysaya, Zharynkuduk, Churuk, Beleuli, Baiterek, Almambet, Aktumsuk, Kasarma, and Kyrkkyz natural areas of Ustyurt plateau (Fig. 1). Samplings were done by using a 45-cm diameter sweep-net, taking 25 (back-forth) sweep samples per site, in 2019–2020 years. Most of the material was collected using light traps. Sampling took place between 10 AM to 4 PM to allow warming so that insects may move onto the surface of plants. All samples were done by the same person, usually a straight line transect across the sample site. Samples were immediately placed into (0.5 L) plastic cups containing 96% ethyl alcohol and returned to the lab for evaluation. Adults and nymphs of Heteroptera species were sorted out from plants materials.

The collected materials were also processed in the Institute of Zoology of the Academy of Sciences of the Republic of Uzbekistan and compared with the existing collection of bugs in the institute.

RESULTS

A total of 18 species of Heteroptera classified in 11 genus are known from Uzbekistan. The list of species with distribution and host data are given below.

Family Pentatomidae Leach, 1815

Subfamily Pentatominae Leach, 1815

Tribe Aelini Douglas & Scott, 1865

Genus *Aelia* Fabricius, 1803

Aelia acuminata Linnaeus, 1758

Material – Sarykamysh, 2♂, 42°14'58.65" N, 57°03'11.30" E.

Distribution in Uzbekistan. Kyzylkum desert (Davletshina, 1960), Western Tien-Shan (Papov, 1957),

Kharezm region (Ganjaeva, 2020.), Karakalpakstan (Kulumbetova, 1999).

General distribution and hosts. Euro-Siberian. On barley (Farahbakhsh 1961; Modarres Awal 1997b), wild Poaceae (Farahbakhsh 1961; Modarres Awal 1996a, 1997b; Linnavuori 2008; Mehneh et al. 2010; Nateq Golestan et al. 2011), *Triticum* sp. (Poaceae) (Farahbakhsh 1961; Modarres Awal 1996a, 1997b; Khanjani 2006), *Medicago sativa* (Fabaceae) (Khalilzadeh et al. 2007).

Aelia furcula Fieber, 1868

Material – Kasarma, 2♀, 1♂, 44°35'48.66" N, 58°02'33.62".

Distribution in Uzbekistan. Kyzylkum desert (Davletshina, 1960), Western Tien-Shan (Papov, 1957), Kharezm region (Khamraev, 2003, Ganjaeva, 2020.).

General distribution and hosts. Ponto-Mediterranean and Central Asia: Greece, Turkey, European Russia, Ukraine, Afghanistan, Armenia, Azerbaijan, Tadjikistan, Turkmenistan, Uzbekistan (Derjanschi & Péricart 2005); *Cyprus* (P. Moulet, unpublished data). *Hordeum spontaneum* (all Poaceae), *Helichrysum oligocephalum* (Asteraceae) (Modarres Awal 1997b).

Aelia melanota Fieber, 1868

Material – Kasarma, 2♀, 3♂, 44°35'48.66" N.

General distribution and hosts. Afghanistan (Hoberlandt 1984), and Caucasian Region and Central Asia including, Armenia, Azerbaijan, Georgia, Iran, Kazakhstan, Kirgizia, Tadjikistan, Uzbekistan. On *Triticum* sp. (Poaceae) (Modarres Awal 1996a, 1997a, b; Khanjani 2006).

Tribe Nezarini Atkinson, 1888

Genus *Brachynema* Mulsant & Rey, 1852

Brachynema germari Kalenati, 1846

Material – Kyrkkyz, 1♀, 43°28'21.86" N, 58°08'07.02".

Distribution in Uzbekistan. Kyzylkum desert (Davletshina, 1960), Western Tien-Shan (Papov, 1957), Kharezm region (Ganjaeva, 2020.).

General distribution and hosts. Western Mediterranean Europe, North Africa (Canary Archipelago), Near East, Central Asia extending to Mongolia, China, Pakistan. On wild Poaceae (Modarres Awal 1996a).

Tribe Carpocorini Mulsant & Rey, 1858

Genus *Carpocoris* Kolenati, 1846

Carpocoris (Carpocoris) fuscispinus Boheman, 1849

Material – Askha - Mazar, 2♂, 42°43'21.16" N, 57°54'18.11" E.

Distribution in Uzbekistan. Kyzylkum desert (Davletshina, 1960), Western Tien-Shan (Papov, 1957).



General distribution and hosts. Afghanistan (Hoberlandt 1984), and Caucasian Region and Central Asia including, Armenia, Azerbaijan, Georgia, Iran, Kazakhstan, Kirgizia, Tadjikistan, Uzbekistan. Asteraceae, Apiaceae (Linnavuori 2008), dill and licorice (Khaghaninia et al. 2010b), *Cirsium sp.*, *Triticum aestivum* (Poaceae) (Nateq Golestan et al. 2011), in alfalfa field (Farshbaf Pour-Abad 2000; Khalilzadeh 2008)

***Carpocoris (Carpocoris) pudicus* Poda, 1761**

Material – Sarykamysh, 2♂, 42°14'58.65" N, 57°03'11.30" E.

Distribution in Uzbekistan. Kyzylkum desert (Davletshina, 1960), Western Tien-Shan (Papov, 1957).

General distribution and hosts. Afghanistan (Hoberlandt 1984), and Caucasian Region and Central Asia. On *Triticum sp.* (Modarres Awal 1996a, 1997b).

Genus *Codophila* Mulsant & Rey, 1866

***Codophila varia* Fabricius, 1787**

Material –Lysaya, 1♂, 44°21'29.69" N, 56°26'39.20" E.

Distribution in Uzbekistan. Kyzylkum desert (Davletshina, 1960), Western Tien-Shan (Papov, 1957), Kharezmi region (Ganjaeva, 2020).

General distribution and hosts. Europe (except Great Britain, Scandinavia), North Africa, Near East, Central Asia. On lucerne, sesame, other legumes and Elaeagnaceae family plants (Farahbakhsh 1961; Modarres Awal 1997b).

Genus *Dolycoris* Mulsant & Rey, 1866

***Dolycoris baccarum* (Linnaeus, 1758)**

Material – Kasarma, 1♀, 3♂, 45°24'15.87" N, 58°24'16.62" E.

Distribution in Uzbekistan. Kyzylkum desert (Davletshina, 1960), Western Tien-Shan (Papov, 1957).

General distribution and hosts. Central Asia, Afghanistan, China (occidental regions), Iran, Kazakhstan (Asian part), Kirgizia, Tadjikistan, Turkmenistan. Poaceae, *Trifolium sp.* (Fabaceae), *Pistacia sp.* (Anacardiaceae), *Triticum sp.* (Poaceae), *Rumex sp.* (Polygonaceae) (Modarres Awal 1996a), barley, clover, broad bean, *Cirsium sp.* (Asteraceae), poplar (Modarres Awal 1997b).

***Dolycoris penicillatus* Horvath, 1904**

Material – Kasarma, 2♀, 3♂, 44°35'48.66" N, 58°02'33.62" E, 45°24'15.87" N, 58°24'16.62" E, Askha - Mazar, 2♂, 42°43'21.16" N, 57°54'18.11" E

Distribution in Uzbekistan. Kyzylkum desert (Davletshina, 1960), Western Tien-Shan (Papov, 1957), Kharezmi region (Khamraev, 2003, Ganjaeva, 2020.).

General distribution and hosts. Central Asia, Afghanistan, China (occidental regions), Iran, Kazakhstan

(Asian part), Kirgizia, Tadjikistan, Turkmenistan. On Poaceae (Safavi 1959), barley, lucerne, lupine, tomato, sunflower, wheat (Farahbakhsh 1961; Modarres Awal 1997b), *Triticum sp.* (Poaceae) (Modarres Awal 1996b; Mehneh et al. 2010), wild Poaceae (Modarres Awal 1996a, 1997a)

Genus *Desertomenida* Kiritschenko, 1914

***Desertomenida albula* Kiritschenko, 1914**

Material –Askha - Mazar, 2♂, 42°43'21.16" N, 57°54'18.11" E

Distribution in Uzbekistan. Kyzylkum desert (Davletshina, 1960), Western Tien-Shan (Papov, 1957), Kharezmi region (Khamraev, 2003, Ganjaeva, 2020.).

General distribution and hosts. Central Asia: Kazakhstan (Asian part), China (northwestern), Iran, Kirgizia, Tadjikistan, Turkmenistan, Uzbekistan. In saline steppes with *Atriplex halimus*, *Suaeda sp.* (both Amaranthaceae), *Cynodon dactylon* (Poaceae), *Tamarix sp.* (Tamaricaceae) (Linnavuori 2008).

Tribe Halyini Amyot & Serville, 1843

Genus *Apodiphus* Spinola, 1837

***Apodiphus integriceps* Horváth, 1888**

Material – Kasarma, 2♀, 3♂, 44°35'48.66" N, 58°02'33.62" E.

Distribution in Uzbekistan. Kyzylkum desert (Davletshina, 1960), Western Tien-Shan (Papov, 1957), Kharezmi region (Khamraev, 2003, Ganjaeva, 2020.), Karakalpakistan (Rulumbetova, 1999).

General distribution and hosts. Central Asia (Kazakhstan (Asian part), Iran, Kirgizia, Tadjikistan, Turkmenistan, Uzbekistan), Indian Peninsula (India, Pakistan), mentioned in Yemen not in Saudi Arabia. On *Rubus fruticosus* (Rosaceae), *Olea europea* (Oleaceae) (Farahbakhsh 1961; Modarres Awal 1997b).

Tribe Nezarini Atkinson, 1888

Genus *Brachynema* Mulsant & Rey, 1852

***Brachynema germarii* Kolenati, 1846**

Material – Sarykamysh, 2♂, 42°14'58.65" N, 57°03'11.30" E 45°24'15.87" N, 58°24'16.62" E, Lysaya, 1♂, 44°21'29.69" N, 56°26'39.20" E.

Distribution in Uzbekistan. Kyzylkum desert (Davletshina, 1960), Western Tien-Shan (Papov, 1957), Karakalpakistan (Rulumbetova, 1999), Kharezmi region (Ganjaeva, 2020).

General distribution and hosts. Western Mediterranean Europe, North Africa (Canary Archipelago), Near East, Central Asia extending to Mongolia, China, Pakistan. On wild Poaceae (Modarres Awal 1996a), wheat



(Modarres Awal 1996a, 1997b), bean caper, harmel, seidlitzia, saltwort, sugar-beet (Modarres Awal 1997b), *Ephedra major* (Ephedraceae), *Artemisia sp.* (Asteraceae), *Kochia sp.* (Chenopodiaceae).

Genus *Nezara* Amyot & Serville, 1843

***Nezara viridula* Linnaeus, 1758**

Material - Baiterek; 1♂, 45°16'15.87" N, 57°42'05.11" E.

E.

Distribution in Uzbekistan. Kyzylkum desert (Davletshina, 1960), Western Tien-Shan (Papov, 1957), Kharezsm region (Khamraev, 2003).

General distribution and hosts. Mediterranean basin, Near East, Central and Far Eastern Asia (Japan), tropical and subtropical Africa and Asia, (Ferrari et al. 2010), it is also known from Argentina to the southern half of United States. *Salix sp.* (Salicaceae) near rice field (Miyamoto 1963).

Tribe Pentatomini Leach, 1815

Genus *Menaccarus* Amyot & Serville, 1843

Subgenus *Orocephalus* Mulsant & Rey, 1866

***Menaccarus (Orocephalus) deserticola* Jakovlev, 1900**

Material - Material – Kasarma, 2♀, 3♂, 44°35'48.66" N, 58°02'33.62" E, 45°24'15.87" N.

Distribution in Uzbekistan. Kyzylkum desert (Davletshina, 1960), Western Tien-Shan (Papov, 1957), Kharezsm region (Khamraev, 2003).

General distribution and hosts. European Russia, Iran, Kazakhstan, Tadjikistan, Turkmenistan, Uzbekistan; mentioned doubtfully from Algeria by Derjanschi & Péricart (2005). Poaceae (*Festuca sp.*, *Elymus sp.*, *Calamagrostis sp.*, *Corynephorus sp.*) but also on *Artemisia sp.* (Asteraceae), *Thymus sp.* (Lamiaceae) or *Astragalus sp.* (Fabaceae) (Derjanschi & Péricart 2005).

Genus *Eurydema* Laporte, 1833

Subgenus *Eurydema* Laporte, 1833

***Eurydema (Eurydema) oleracea* Linnaeus, 1758**

Material - Karabaur; 2♀, 1♂, 42°54'59.81" N, 56°27'14.39" E, Kasarma, 1♂, 44°35'48.66" N, 58°02'33.62" E.

Distribution in Uzbekistan. Kyzylkum desert (Давлетшина, 1960), Kharezsm region (Khamraev, 2003).

General distribution and hosts. European Russia, Iran, Kazakhstan, Tadjikistan, Turkmenistan, Uzbekistan; mentioned doubtfully from Algeria by Derjanschi & Péricart (2005). On *Sinapis sp.* (Nateq Golestan et al. 2010a).

***Eurydema (Eurydema) ornata* Linnaeus, 1758**

Material –Baiterek; 1♂, 45°16'15.87" N, 57°42'05.11" E, 45°13'33.30" N, 57°50'04.65" E.

Distribution in Uzbekistan. Kyzylkum desert (Davletshina, 1960), Western Tien-Shan (Papov, 1957), Kharezsm region (Khamraev, 2003, Ganjaeva, 2020.).

General distribution and hosts. Palearctic though not in Scandinavia, Korea, or Japan. On cabbage (Farahbakhsh 1961; Modarres Awal 1997b; Askari et al. 2009; Hassanzadeh et al. 2009a).

Subgenus *Rubro dorsali um* Stichel, 1944

***Eurydem (Rubrodorsali um) maracandica* Oshanin, 1871**

Material – Kyrkkyz, 2♀, 3♂, 43°28'21.86" N, 58°08'07.02" E.

Distribution in Uzbekistan. Kyzylkum desert (Davletshina, 1960), Western Tien-Shan (Papov, 1957), Kharezsm region (Khamraev, 2003, Ganjaeva, 2020.).

General distribution. Widely distributed in Asia: Azerbaijan, Asian Kazakhstan, Iran, Turkmenistan, Tadjikistan, Mongolia, China.

***Eurydema (Rubrodorsali um) ventralis* Kolenati, 1846**

Material – Kasarma, 2♀, 3♂, 44°35'48.66" N, 58°02'33.62" E, 45°24'15.87" N, 58°24'16.62" E, Askha - Mazar, 2♂, 42°43'21.16" N, 57°54'18.11" E.

Distribution in Uzbekistan. Kyzylkum desert (Davletshina, 1960), Western Tien-Shan (Papov, 1957), Kharezsm region (Khamraev, 2003, Ganjaeva, 2020.).

General distribution and hosts. Euro-Siberian but not in Great Britain, Scandinavia and North Africa. On colza, mustard, raddish, turnip (Modarres Awal 1997b), *lucerne* (Modarres Awal 1997b; Modarres Awal 2008), cabbage (Modarres Awal 1997b; Hassanzadeh et al. 2009a).

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KIENBÖCK'S DISEASE, AVASCULAR NECROSIS OF THE LUNATE

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SUMMARY

Introduction: Avascular necrosis of the lunate bone was described in 1910 by the Austrian radiologist Robert Kienböck, which is named after him. A mixture of different factors such as mechanical, vascular and genetic predisposition may be related to the pathogenesis of this disease. As for the natural evolution of the disease, failure in early diagnosis and early treatment may lead to a gradual evolution from stage I to stage IV, causing discomfort to the patient.

Objective: to detail the current information related to avascular necrosis of the lunate, description, etiology, classification, imaging presentation and management of Kienböck's disease.

Methodology: a total of 32 articles were analyzed in this review, including review and original articles, as well as clinical cases, 20 bibliographies were used because the other articles were not relevant for this study. The sources of information were PubMed, Google Scholar and Cochrane; the terms used to search for information in Spanish, Portuguese and English were: Kienböck, avascular necrosis of the lunate and lunatomalacia.

Results: it is the second most frequent cause of avascular necrosis of the carpal bones and generally affects males between 20 and 40 years of age. Nuclear magnetic resonance has a greater contribution due to greater sensitivity and detection of radiographically occult cases, computed tomography also has a good specificity at the time of diagnosis. Radiography at the beginning of the disease does not present evident changes and nuclear scintigraphy presents non-specific findings. In the first stage, the treatment is based on immobilization with a plaster cast or splints. When incomplete necrosis is evidenced in the second stage, conservative treatment can be performed, however with complete necrosis or in the third and fourth stage, it requires "joint leveling" surgery and probably vascular bone grafting or transfer of branches of adjacent arteries. Stage IIIA usually merits lunate restoration, in stage IIIB and Lichtman IV wrist arthrodesis can be used.

Conclusions: Kienböck's disease presents with unilateral pain over the dorsal aspect of the wrist, weakness and limited wrist motion, in addition to functional impotence, decreased grip strength, wrist edema, sensory disturbances in the median nerve territory and synovitis, depending on the stage. It is related to the following variables such as ulnar minus or ulnar negative variation, vascular contribution of the lunate bone, morphology of the lunate, radial inclination angle. The diagnosis is clinical and imaging where Lichtman's classification is useful. Treatment will depend on the cause and also on the stage of the disease.

KEY WORDS: Kienböck, avascular necrosis, lunatomalacia, lunate.



INTRODUCTION

The lunate bone is the central bone in the proximal row of the carpus, it articulates with the scaphoid, large bone, pyramidal and occasionally the hooked bone. It is involved in much of the motion of the wrist and is one of the bones that constitute the radiocarpal joint, as well as articulating with the ulna by means of the triangular fibrocartilage complex(1).

Avascular necrosis of the lunate bone, also known as lunatomalacia, was first described in 1910 by the Austrian radiologist Robert Kienböck, which is why it is also known as Kienböck's disease(1-3). A mixture of different factors such as mechanical, vascular and genetic predisposition may be related to the pathogenesis of this disease. As for the natural evolution of the disease, failure in early diagnosis and early treatment may lead to a gradual evolution from stage I to stage IV(4).

METHODOLOGY

A total of 32 articles were analyzed in this review, including review and original articles, as well as cases and clinical trials, 20 bibliographies were used because the information collected was not important enough to be included in this study. The sources of information were Cochrane, PubMed and Google Scholar; the terms used to search for information in Spanish,

Portuguese and English were: Kienböck, avascular necrosis of the lunate, lunatomalacia and lunatomalacia.

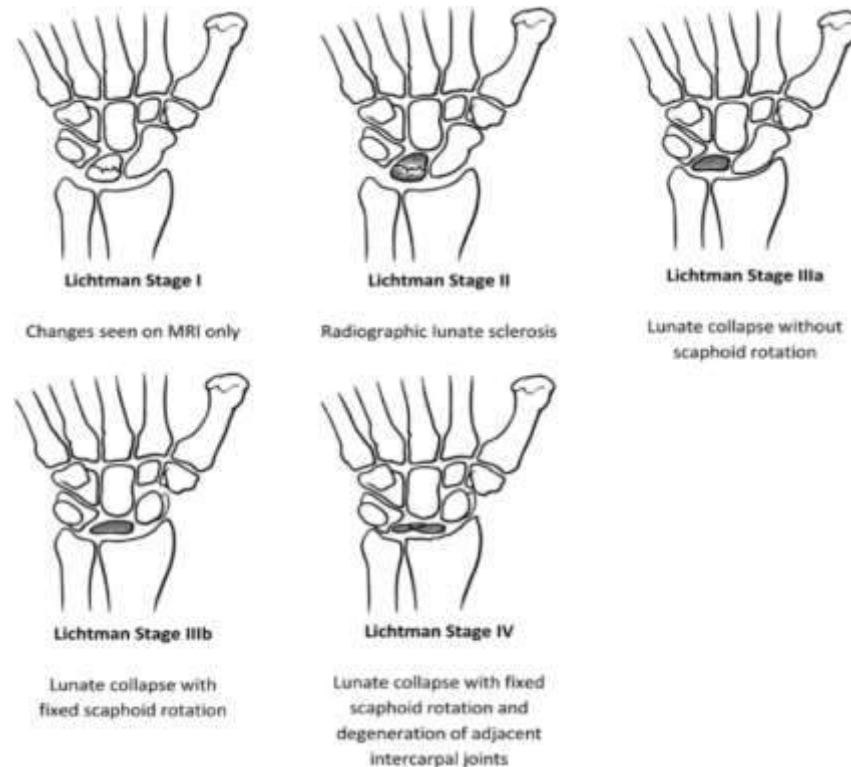
The choice of the bibliography exposes elements related to avascular necrosis of the lunate; in addition to this factor, etiology, presentation, evaluation of Kienböck's disease are presented, as well as the diagnosis and management of the disease.

DEVELOPMENT

Kienböck's disease or lunatomalacia is the second most frequent cause of avascular necrosis of the carpal bones, only after scaphoid avascular necrosis. It generally affects males between 20 and 40 years of age and the condition rarely presents bilaterally or with the presence of trauma. Among the most frequent signs and symptoms we can find unilateral pain on the dorsal side of the wrist, weakness and limited movement of the wrist, functional impotence and decreased grip strength, as well as wrist edema, sensory disturbances in the territory of the median nerve and synovitis. In the final stages, pain becomes more moderate and stiffness and loss of strength predominate. Axial loading and wrist extension usually worsen the pain(1,5,6).

Avascular necrosis of the lunate has a common prevalence of 0.5% and increases to 1.1%-2% in groups exposed to vibration such as those working with jackhammers(3).

Figure 1. Lichtman classification



Source: Caso Radiol Rep. 2022 jun; 17(6): 2115–2119(3)

**Table 1. Lichtman classification for Kienböck disease.**

Lichtman Classification	
STAGE I	- Normal radiograph - Linear fracture lines - Decreased uniform signal on T1 MRI images - Bone scans are positive but nonspecific
STAGE II	-Single radiographs show sclerosis of the lunate - Fracture lines - No evidence of lunate collapse.
STAGE IIIA	- Semilunar collapse, maintaining alignment and height of the carpus.
STAGE IIIB	- Semilunar collapse plus one of the following: <ul style="list-style-type: none"> ● Loss of carpal height ● Proximal migration of the large bone ● Scaphoid rotated and flexed
STAGE IV	- Stage IIIB + radiocarpal degenerative changes

Source: The Authors.

Patients with stage I disease frequently present with intermittent, non-specific wrist pain accompanied by synovitis that may resemble a wrist sprain. Plain radiographs may appear normal or small linear compression fractures through the lunate may be seen. There is no evidence of collapse, sclerosis or increased radiodensity of the lunate. On MRI there is evidence of uniform signal decrease on T1 and T2 images indicating osteonecrosis of the lunate. If revascularization is performed, after a surgical intervention, an increase of the signal in T2 can be observed(7,8).

Stage II is clinically characterized by increased edema, progressive pain and variation on stiffness. Radiographs show sclerosis of the lunate with or without the presence of linear compression fractures. The lunate is more radiodense, however, there is no collapse and the height is maintained. The rest of the carpal structures remain without degenerative changes(7,8).

Stage III presents continuous sclerosis and collapse of the lunate. It is subdivided into two stages depending on its alignment and relationship to the carpus. Attention should be paid to the scapholunate angle and height of the carpus. A decrease in height may be represented as a collapse or osteoarthritic changes within the carpus. Carpal height is the measurement between the distal articular surface of the large bone to the lunate fossa of the distal radius. The degree of carpal collapse is the height of the carpus

divided by the length of the third metacarpal which is approximately 0.53(7).

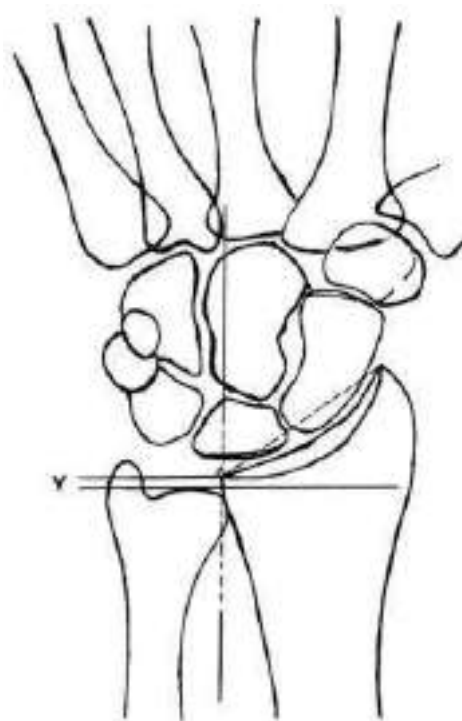
Stage IIIA is characterized by collapse of the lunate with preservation of carpal height and intercarpal alignment. Stage IIIB is characterized by collapse of the lunate and characteristic changes of the large bone and scaphoid. The large bone migrates proximally and there is a decrease in carpal height. Symptomatology progresses from vague pain and synovitis to symptoms of instability, radial and ulnar deviation, progressive pain and decreased grip strength(7).

Stage IV is characterized by progressive carpal collapse, leading to radiocarpal degenerative changes. Radiographs show decreased joint space, subchondral sclerosis, degenerative cysts and osteophyte formation. Symptoms progress to stiffness, constant pain and edema(7).

Regarding the main causative factor of Kienböck's disease, there is no clear consensus. However, it is related to the following variables:

Ulnar minus or ulnar negative variation: this is when the ulna is excessively shortened in relation to the radius which can cause increased mechanical stress. In addition the comparatively longer radius can cause repetitive microtrauma on the lunate. It can be found in 78% of Kienböck's cases(1).

Figure 2. Measurement of ulnar variance with technique described by Quenzer et al.



Source: Rev Esp Cir Ortopédica Traumatol. 2005;49(2):106-11(9).

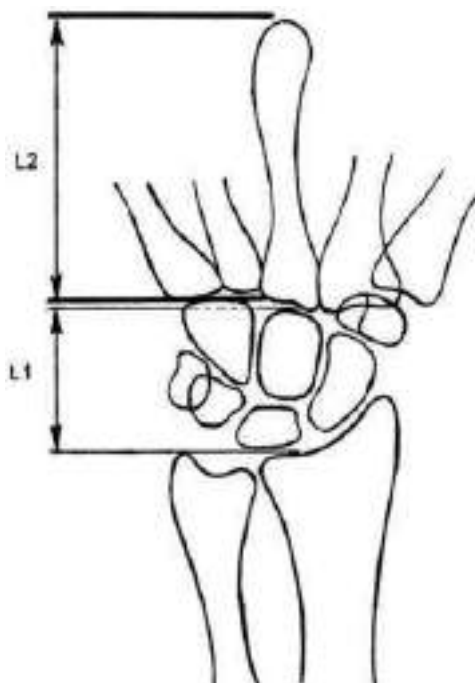
Vascular supply of the lunate bone: the lunate bone accepts blood supply through the palmar and dorsal penetrating arteries, which are branches of the dorsal and palmar radiocarpal and intercarpal arches. They have almost no intraosseous collaterals. There are clinical studies that show that approximately 20% of the lunate crescents present only one vascular blood tributary. The lower the number of penetrating arteries, the higher the probability of developing Kienböck's disease(1,10).

Morphology of the lunate: the smaller the size of the lunate bone, the greater the risk of Kienböck's disease, because it bears

more axial load. The shape of the lunate is varied, it can be triangular due to the lack of the medial articular facet (type I), square (type II) or rectangular (type III). The triangular shape presents a less strong trabecular pattern and is therefore a risk factor for the progression and development of the condition(1).

Radial tilt angle: The smaller the radial tilt angle, the higher the risk of Kienböck's disease. This angle can be found between the horizontal and a line drawn from the ulnar tip of the radial articular surface to the tip of the radial styloid(1).

Figure 3. Degree of carpal collapse by Salmon et al. through the ratio of carpal height (L1) and third metacarpal length (L2).



Source: Rev Esp Cir Ortopédica Traumatol. 2005;49(2):106-11(9).

Avascular necrosis of the lunate most of the times leads to the destruction of the joint in 3 to 5 years if it is not treated in time and it is a characteristically progressive disease(3,5,6). This disease alters the biomechanics of the wrist resulting in early arthritis and degenerative changes(11).

A clinical study evaluating 27 patients over 50 years of age diagnosed with Kienböck's disease suggests that the option of surgery should be thoroughly evaluated in this age group, as the disease may have a naturally benign radiographic and clinical course(12).

The diagnosis of Kienböck's disease is clinical and by imaging. Nuclear magnetic resonance has a greater contribution

due to greater sensitivity and detection of radiographically occult cases, computed tomography also has a good specificity at the time of diagnosis(1).

The following is a brief description of the different imaging tests used in Kienböck's disease:

MRI: In addition to assessing the integrity of the articular cartilage, MRI shows a decreased signal from the crescentic bone marrow on T1-weighted images which is characteristic of the disease. Both T2 and short TI inversion recovery images change with the progression and extent of osteonecrosis(1).



Figure 4. a. MRI of left hand coronal DP Fat Sat sequence: collapsed lunate with heterogeneous signal. b. MRI of left hand coronal T1-weighted sequence: collapsed lunate in hypointense in T1. c. MRI of left hand sagittal DP Fat Sat sequence: collapsed lunate with heterogeneous signal. d. MRI of left hand sagittal Fat Sat sequence: collapsed lunate with heterogeneous signal. MRI of the left hand T1-weighted coronal sequence with fat suppression and gadolinium injection: collapsed lunate without significant enhancement.



Source: Caso Radiol Rep. 2022 jun; 17(6): 2115–2119(3)

Radiography: at the beginning of the disease, no evident changes are observed, so they usually appear normal, according to the progression of the disease it may present: cystic changes, diffuse semilunar sclerosis, collapse of the articular surface and of the

carpus, secondary arthrosis of the middle carpus and/or radiocarpal. Coronal fractures may occur in type I lunate fractures (6,13).



Figure 5. Plain radiographs of Kienböck's disease and its evolution.

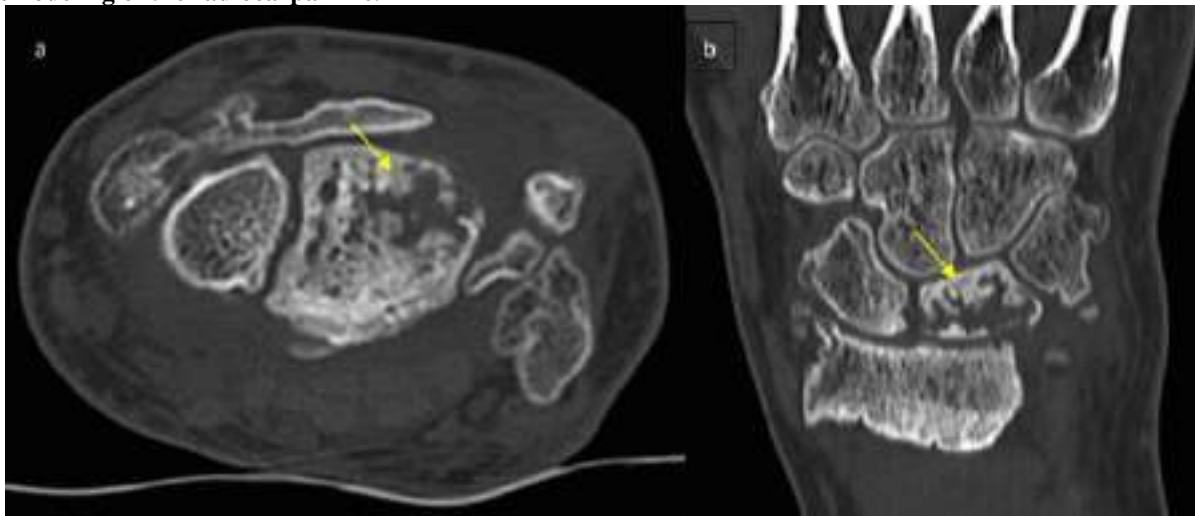


Source: Clin Orthop Surg. 2022 Sep; 14(3): 450–457(12).

Computed tomography: it is more sensitive than radiographs to find mild subchondral fractures, fragmentation, carpal instability,

fractures of the lunate in the coronal section and the degree of trabecular rupture. It is frequently used for surgical planning (1).

Figure 6. Axial and coronal CT of the left wrist with fragmented and agglomerated semilunate aspect of the lunate with arthritic remodeling of the radiocarpal line.



Source: Caso Radiol Rep. 2022 jun; 17(6): 2115–2119(3)



Nuclear scintigraphy: it presents non-specific findings, previously it was used as a complementary diagnosis(1).

The differential diagnosis of the disease can be made with: arthritis, ulnar impaction syndrome, osteoid osteoma, semilunar intraosseous ganglion, bone contusion, enostosis/bone island(1,13).

Pain relief is the main goal of treatment in Kienböck's disease, in addition to preserving motion and grip strength. Treatment will depend on the cause and also on the stage of the disease(1).

In the first stage, treatment is usually based on immobilization with plaster or splints, conservative treatment is recommended; in the second stage it is also possible to treat conservatively when there is incomplete necrosis, however with complete necrosis, or in the third and fourth stage it will require "joint leveling" surgery and probably vascular bone grafting or transfer of branches of adjacent arteries. The main objective in the treatment of stage II is revascularization, unloading and decompression of the lunate(1,14).

Subsequent stages presenting with lunate collapse and secondary degenerative arthrosis of the wrist may require proximal row carpectomy or intercarpal arthrodesis. To unload the lunate in cases with coexisting ulnar negative variance, radial shortening osteotomy is most often used (1).

In stage IIIA it usually requires restoration of the lunate, in stage IIIB it is customary to perform a partial arthrodesis of the wrist. As for rescue procedures, such as wrist arthrodesis, they are mainly limited to Lichtman IV(14).

Partial shortening of the large bone is a decompression technique for the treatment of lunatomalacia with positive or neutral ulnar variance. The large bone shortening technique done by means of a smaller cut takes less time compared to radial shortening and leads to an advantage in stage II(15,16).

It is possible to compare the results between the combined technique of large bone/hook osteotomy with the isolated large bone shortening osteotomy, however, both present good postoperative results(15).

In a clinical study it was possible to confirm that the height and dimensions of the lunate can be restored when performing the shortening of the large bone combined with neutral ulnar variation in stage IIIA, improving the final results and thus evidencing a low failure rate. In stage II patients, there was no evidence of superiority of large bone shortening combined with large bone shortening alone. An important prognostic factor in treatment results is the lunate height index(17).

In a systematic review by Wang et al. a significant decrease in joint functionality, specifically in the flexion-extension arc of motion, could be found when comparing conservative management with 89°, non-rescue treatment such as lunate reconstruction and radial osteotomies with 95°; and rescue procedures such as intercarpal and radiocarpal arthrodesis, proximal row carpectomy, total wrist arthroplasty with 73° (p = 0.0001). Meanwhile, all treatments brought improvements such as pain relief, ability to return to their activities and grip strength.

However, there was no significant difference in grip strength (p = 0.28)(18).

The scapho-semilunar fusion technique shows promising results in the management of advanced Kienböck's disease without the need for excision of the lunate lunate(19,20).

CONCLUSIONS

Kienböck disease is the second most frequent cause of avascular necrosis of the carpal bones, generally affecting males between 20 and 40 years of age, presenting unilateral pain on the dorsal aspect of the wrist, weakness and limited movement of the wrist, as well as functional impotence, decreased grip strength, wrist edema, sensory alterations in the territory of the median nerve and synovitis, depending on the stage.

It is related to the following variables such as ulnar minus or ulnar negative variation, vascular contribution of the lunate bone, morphology of the lunate, radial inclination angle.

In stage I they frequently present intermittent and non-specific wrist pain. Plain radiographs may be normal or small linear compression fractures through the lunate may be seen. There is no evidence of collapse or sclerosis. Stage II is characterized clinically by increased edema, progressive pain and variation in stiffness. Radiographs show sclerosis of the lunate with or without the presence of linear compression fractures. Stage III presents continuous sclerosis and collapse of the lunate. It is subdivided into two stages depending on its alignment and relationship to the carpus. Stage IIIA is characterized by collapse of the lunate with preservation of carpal height and intercarpal alignment. Stage IIIB is characterized by collapse of the lunate and characteristic changes of the large bone and scaphoid, in addition there is a decrease in the height of the carpus. Stage IV is characterized by progressive collapse of the carpus, leading to radiocarpal degenerative changes.

The diagnosis of Kienböck's disease is clinical and imaging. Magnetic resonance imaging has a greater contribution due to greater sensitivity and detection of radiographically occult cases, computed tomography also has a good specificity at the time of diagnosis. Radiography at the beginning of the disease does not present evident changes and nuclear scintigraphy presents non-specific findings.

Treatment will depend on the cause and also on the stage of the disease. In the first stage, treatment is based on immobilization with plaster cast or splints. When incomplete necrosis is evidenced in the second stage, conservative treatment can be performed, however with complete necrosis or in the third and fourth stage, it requires "joint leveling" surgery and probably vascular bone grafting or transfer of branches of adjacent arteries. In stage IIIA it usually requires restoration of the lunate, in stage IIIB it is customary to perform a partial arthrodesis of the wrist. As for salvage procedures, such as wrist arthrodesis, they are mainly limited to Lichtman IV.



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ACTIVE LEARNING STRATEGIES ADMINISTRATION IN ENGLISH LANGUAGE E-LEARNING ENVIRONMENTS IN SAUDI UNIVERSITIES

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ABSTRACT

The present study focuses on implementing active learning strategies in EFL online classes at in Saudi universities. It investigates EFL instructor's main role in language class, their attitudes towards virtual classes, and the online active teaching / learning activities. To meet the goals of the study, an online questionnaire was randomly sent to faculty members of the EFL in all Saudi universities. The results of this study reveal that instructors realize the importance of involving students in the course, allow students to engage in the learning material. The findings also revealed instructors' positive attitudes towards learner-centered strategies as an important method to achieve sustainable and fruitful teaching and learning outcomes. Although results revealed that some instructors believe that conventional classes are more suitable for their EFL classes, but generally the results agree with those obtained in previous studies, which assure that active learning strategies require a participant instructor not a knowledge transmitter. Because active learning strategies often require more effort and time, further studies and surveys are essential to measure how far those strategies are applied in EFL classes.

KEYWORD: active learning, learning strategies, EFL, learning techniques, virtual classes, learner-centered

INTRODUCTION

Effective language learning requires real interaction between the instructor and the learner; and interaction amongst the learners. The absence of direct face-to-face interactions in the physical lecture rooms, due to covid-19 pandemic curfew, had urged Saudi universities to switch to e-learning or virtual classrooms. This change has prevented instructors to realize active learning strategies. Though live interaction is restricted, to some extent, in virtual classes (Gagne & Shepherd, 2001), some recent researchers claimed that effective virtual classes platforms could help to exchange views, share teaching materials and interact with the instructors, which result in more engagement and effective learning (Sarker et al., 2019).

Implementing active learning strategies in EFL virtual classes promote learning outcome by comprising active learning activities with interactive multimedia components. Researchers argue that in virtual classes less emphasis is placed on transmitting information and more on developing students' linguistic skills, which is the ultimate goal of language teaching-learning process. For instance, Meyers and Jones (1993, p. 13) state that Multimedia applications provide learners with meaningful opportunities to talk, listen, write, read, reflect on the course content, give ideas, and discuss issues and concerns of an academic subject. Interactive

multimedia applications encourage learners to engage directly with learning activities and will give outstanding learning outcomes particularly with language skills. So, utilizing e-learning devices to virtual EFL classes allow learners to involve in language learning process and shift teaching-learning from passive to active learning.

STATEMENT OF THE PROBLEM

Language teaching-learning practices, as other university courses, has been greatly affected by the absence of face-to-face meetings with the students in physical lecture room setting due to covid-19 curfew. The unexpected shift to online instruction forced instructors to adopt new learning techniques that costume with e-learning environment and maximizes opportunities for students to learn. Still active learning strategies remain the top priority in EFL classes to fulfill the learning goals.

RESEARCH QUESTIONS

From the background mentioned above, the following research questions arise:

1. What is the instructor's main role in the language class?



2. What are instructor's attitudes towards virtual classes concerning active teaching/learning activities?

THE OBJECTIVES OF THE STUDY

The general aim of this study was to investigate the implementation of active learning approaches in online EFL classes in Saudi universities. The objectives of the study are:

1. To identify Instructors main role in language class.
2. To find out instructors' attitudes towards virtual classes and online active teaching/learning activities.

SIGNIFICANCE OF THE STUDY

The importance of this study emerges from its contribution to the process of teaching and learning EFL in Saudi Arabian universities. It will provide both educators and stakeholders with a clear portrait of the process of implementing active learning in English virtual classes. In this way the affected parties will have a better idea of what to expect in terms of instruction and assessment during this process, allowing them to identify the major challenges that may affect teaching and learning practices. This will pave the way for them to make more informed decisions to change and strengthen EFL teaching and learning practices. Such improvements are patently of great practical significance.

LIMITATION OF THE STUDY

This study is limited to instructors of English at Saudi universities. It is confined to instructors who taught English in Saudi universities during the first and second terms of the 2020-2021 academic years.

LITERATURE REVIEW

Theoretical Background

Active learning is based on the sociocultural theory of learning - that means students learn in a social context (learn from each other). It is "a student interaction with content, with materials and with peers in a multi-disciplinary, multi-sensory and multi-graded approach" (Meyers & Jones, 1993, p. 93). Prince (2004) maintained that active learning can be accomplished by any method or teaching technique that actively involves learners in the process of authentic learning. Within this context, cooperative learning, collaborative learning, student-centered learning, engaged learning, and participatory learning methods all fit within the notion of active learning. All these methods fit the use of partnerships and aim to trigger students to work in groups or pairs to complete learning tasks cooperatively to achieve certain academic goals (Beichner et al., 2007; Millis, 2002; Morrone et al., 2014). The results produce positive outcomes for students in increased academic success, development of learners' critical thinking skills, and greater social and psychological benefits.

Doyle (2012) asserted that "Neuroscience, biology, and cognitive science research have made it clear that the one who does the work does the learning" (p. 1). For EFL educators, it is vital to engage students more actively in their learning by providing learning activities that lead to optimal learning outcomes. Felder and Brent (1996) stated that "Student-

centered instruction is a broad teaching approach that includes substituting active learning for lectures, holding students responsible for their learning, and using self-paced and/or cooperative (team-based) learning" (p. 43). Learner-centered instructions activities help students understand the course content better because they are more actively engaged with the course content. Active learning techniques leads to deeper learning and increased critical thinking (Millis, 2002).

Defining Active Learning Strategies (ALS)

Active learning, in simple terms, according to Bonwell and Eison (1991) was the involvement of students in doing things and thinking about the things they are doing. More precisely, Prince (2004) noted that "the core elements of active learning are student activity and engagement in the learning process". The learner in an active learning setting is supposed not to be a passive recipient of information and assistance from the instructor, but to be a central participant in the course material. Active learning in this context is the learning activity that is often distinguished from the traditional lecture where students passively receive information from the instructor by placing them at the center of the teaching-learning process.

Active learning method alludes to the fact that the learner is the center of instruction. The learner's role in an active class entails active involvement and responsibility for the learning process. Komarraju and Karau (2008) claimed that active instructional techniques should be used to more effectively "to encourage students to reflect on their learning, provide them with feedback, give them a chance to review material, and encourage them to take responsibility for their learning"(p. 73).

Benefits of Active Learning Strategies

Researchers who studied active learning confirm that active engagement significantly impacts student learning, understanding, and critical thinking and it is much more effective in developing learners' cognitive abilities than passively listening to lectures. Thompson (2009) initiated her article "*40 Active Learning Strategies for Active Students*" by saying that "one of the most obvious ways to increase your classroom charisma is to increase the amount of active learning in your class". (Pundak et al., 2010) noted improvement in students' conceptual understanding, test achievements, reduced dropout rates, student satisfaction, teamwork, and problem-solving when they applied active learning techniques in their classes. Moreover, Dori and Belcher (2005) argued that active learning strategies (ALS) assist students to attain higher conceptual understanding compared to other learners who study the same courses through traditional learning approaches. (Kuh et al., 2011) affirmed that student involvement in learning is vital to academic success. They argued that students learn more when they are deeply engaged in the learning process and allowed to think about and apply what they are learning.

In addition, active instructors' who have experienced group work realized the importance of involving students in the course and enabling them to achieve its objectives (Pundak et



al., 2009). Yazedjian and Kolkhorst (2007) admitted that active-learning activities positively develop learners' retention and retrieval of knowledge. They added that small-group activities, "can be an effective strategy for promoting classroom engagement in that they compel students to take on a more active role in the learning process" (p. 169). To this list of benefits of active learning, Cavanagh (2011) added that students who experienced active learning usually have more motivation, better attitudes, improved critical thinking skills, and more self-directed learning.

a. Active Learning Strategies and Language Teaching

Active learning is the eminent method that enthusiastically engages students in higher-order thinking tasks such as analysis, synthesis, and evaluation instead of letting students sit passively in classrooms. Prince (2004 as cited in (Alves, 2015)) noted that group work, pair work, peer review, and in-class reading/writing activities are some examples of Active Learning Strategies (ALS) which are extremely effective in language classes. It is important to move students' roles beyond notes-taking and passive listeners to total involvement in the learning role. Lecturing does not keep students' minds engaged and awake all through the lecture because many students will be mentally check out after only a few minutes. Students should be involved in learning through activities that make them actively interact with the learning content such as reading, writing, discussion, and problem-solving activities.

Creating learner-centered environments in EFL settings is an extremely recommended technique a faculty can follow to enhance students learning (Doyle, 2008). Active Learning Strategies (ALS) make language learning more dynamic because they connect teaching, learning, and language to real-life situations. In this way, EFL language learners will find language learning more meaningful because they do not merely rely on textbooks and worksheets (Woldemeskel, 2019). According to Ellis (1993), interaction inside the classroom conveys several benefits for EFL learners such as comprehension checks, language practice, and so on. Long and Porter (1985) maintained that when FL learners work in groups, they will be active, inspired, and motivated. EFL learners in active learning situations will be more creative, initiative and have less anxiety regarding their learning classes.

The basic idea is that by immediately applying what students have been exposed to, deeper learning occurs. Not only due to the practice itself, but also to other factors connected with it, such as the desire to show competence in front of peers (healthy competition). Active learning increasingly makes students accountable for their learning, as they should be; and with the right techniques, students can deepen their learning and learn a variety of other language skills for academic and professional environments, something that listening to lectures alone cannot accomplish.

b. Previous Studies

Many studies have shown that some instructors have positive attitudes towards e-learning classes. They admitted that

e-learning has shifted teaching practice from an instructor-centered approach to a learner-centered approach. Walabe (2020), for instance, argued that e-learning platforms provide an interactive interface that enhances communication and discussion between students and instructors and among students themselves. He added, "virtual classes build strong relationships between the instructors and the students". Mutambik (2018), who investigated students' and instructors' perceptions of using e-learning for EFL learning in Saudi schools, mentioned many benefits of e-learning such as independent learning, flexible learning, and interactive learning. Instructors have benefited from the interactive interface of the e-learning platform to engage students in social learning where they support each other and promote collaboration among themselves (Almahasees et al., 2021; Layali & Al-Shlowiy, 2020). Abdelrahman and Irby (2016) stated that faculty confirmed that they support e-learning because it is suitable for higher education, but they believe the physical class learning attain more quality of education.

From the learner's perspective, Al-Mubireek (2019); Vipin (2019); Madini & de Nooy (2014); Long & Porter (1985); reported that students have positive attitudes toward e-learning platforms as flexible means of developing their language skills. In addition, online instruction decreases students' writing anxiety (Bailey & Cassidy, 2019) and makes them feel like decision-makers (Al-Shehri, 2010). Online instruction has positive effects on students' performance in speaking skills (AbouRezk, 2015). Alghamdi and Deraney (2018) found that students who were taught via active learning instruction demonstrated improvement in grammar, sentence structure, and overall writing skills. Online students can easily access information on their own and find enough time and flexibility to cooperate and interact with each other and with the instructor. Layali & Al-Shlowiy (2020) found out that students who studied online "became more flexible in their thinking, more aware of the diverse nature of people within their society, less inhibited about the opposite gender, and more self-confident".

METHODOLOGY

a. Participants:

The target population of the study was EFL instructors in Saudi universities. The selection of the participants was based on their availability and their willingness to participate. An online questionnaire was randomly sent to the faculty members of the EFL in all Saudi universities. 68 responses were received; 46 respondents were male instructors of which 20 were lecturers and 26 assistant professors. Of the 22 female respondents, 6 respondents were lecturers and 16 assistant professors. The experience of the respondents varies from less than 5 years to more than 15 years. Tables (1) show the number of participants, their gender, academic degree, and years of experience.



Table 1: Number of participants, their gender, academic degree, and years of experience

Gender		Years of experience					Total
		- 5 years	5-9 years	5-9 years	10-15 years	+15 years	
Male	1. Academic lecturer	2	8	0	1	9	20
	Degree assistant prof	1	4	1	6	14	26
	Total	3	12	1	7	23	46
Female	1. Academic lecturer	0	3	0	2	1	6
	Degree assistant prof	2	2		6	6	16
	Total	2	5	0	8	7	22
Total	1. Academic lecturer	2	11	0	3	10	26
	Degree assistant prof	3	6	1	12	20	42
	Total	5	17	1	15	30	68

b. Instrument and Data Collection

An online questionnaire was used to collect the primary data of the study. The development of the questionnaire items was constructed after reviewing and examining ample literature in active learning and was validated through semi-structured interviews with faculty members and teaching professionals. The questionnaire comprised three sections. The first section contains personal and professional information. The second, is to collect data about instructors' role in the language classroom. The questionnaires items in this section were designed according to the constructivist seven instructor's roles model: motivator, authority, controller, trainer, moderator, facilitator, and leader, which aims to achieve mastery of the teaching material at each cognitive level (Bloom's Taxonomy); and the 5 E Instructional Learning Objectives Model: engage, explore, explain, elaborate, and evaluate). The third section was about instructor attitudes toward using active learning activities in virtual classes.

A five-point Likert-type scale ranging from "strongly disagree" to "strongly agree" was used measure instructors' main roles in EFL classroom and their attitudes towards adopting active learning strategies. The questionnaire was pilot-tested with twelve targeted participants. Some minor amendments were made to the order of the question and the personal information.

c. Research reliability and validity

The questionnaire has been subjected to a reliability and stability test. Cronbach's alpha coefficient was calculated to assess the internal consistency of the scale, thus the reliability of the Likert scale. The value of Cronbach's alpha was .91 which suggested very good internal consistency and reliability according to (Devellis, 2003; Field, 2013, p. 675) who stated that the alpha of a questionnaire should be more than 0.7, to be reliable. To ensure face and content validity the questionnaire was scrutinized by experienced academic researchers. Construct validity was achieved through developing the questionnaire based on theoretical study and reviewing the ample research literature on the subject matter.

RESULTS AND DISCUSSION

Due to the two-pronged nature of the hypothesis, the results of the survey are analyzed and discussed in two categories. The first part deals with the instructor's main role in the language class, which gives a clear idea of the instructor's basic beliefs about language teaching and learning. The second part highlights instructors' views on virtual classes and the activities that take place in teaching and learning practice.

In the analysis of the survey, the five-point Likert scale is considered an interval scale where the mean is highly significant. Therefore, the interval from 1 to 1.8 means: strongly disagree; from 1.81 to 2.60: disagree; from 2.61 to 3.40: neutral; from 3.41 to 4.20: agree; from 4.21 to 5: agree completely.

1. Instructors' main role in language class

Table (2) shows the descriptive statistics for the instructor's role in the EFL class. The results reveal that the greatest awareness was awarded to the items 2, 4, and 3 with means of 4.38, 4.25, 4.16, and standard deviations of 0.98, 1.10, and 1.06 respectively. These results mean that EFL instructors strongly agree with the role of facilitating, moderating and training strategies in their classes and that they make every effort to identify and address students' learning difficulties.

These results show clearly that EFL instructor were not centering the learning activities, but they give some freedom to the learners and free the rein to their students to be creative and innovative. Instructors play the role of a facilitator in the classroom to help learners achieve their learning goals without having to intervene themselves. As a facilitator, the instructor gives the learners the opportunity to actively participate in discussions and group work so that the learning process becomes comprehensive (Gholami et al., 2014). The instructor, then, makes every effort to make his lessons lively, so learners can gain new knowledge at the end of each lesson. As a facilitator, an EFL instructor corrects misinformation and gives helpful hints that clarify some vague facts in the learning task by letting learners try to correct their own mistakes rather than handing them the corrections.

E-learning settings facilitate students' and instructors' active engagement in English learning and teaching through numerous forms of interaction, including online collaboration



and the delivery of instant feedback (Mutambik, 2018). A successful facilitator creates constructive lessons in which both the instructor and the learners respond positively and actively in the classroom (Kudryashova et al., 2016). The role of the EFL as a facilitator is to simulate professional situations, solve problems, and encourages students to develop alternative solutions. Here, students create new personal knowledge from the elements they have learned in the previous stage. Besides, the instructor helps students evaluate their own progress, make judgments based on certain criteria, and give reasoned explanations for phenomena. The facilitator's role is to observe students' behaviour and skills and encourage them to evaluate their own learning.

As a moderator the instructor moderates the learners' activities by creating the necessary conditions for learners to analyse, reflect and reconstruct current knowledge in a cooperative way. The moderator organizes and observes learners' interaction in groups where they carry out joint activities, make predictions, form hypotheses or collect evidence to support generalizations, share ideas and suspend judgment, record observations, and discuss tentative alternatives (Lim & Lee, 2007). In online teaching, the role of the instructor shifted from lecturer to moderator who leads an online electronic session or conference (Webster, 2012). In principle, the e-moderator is expected to fulfil the dual functions of maintaining community and ensuring that language learning takes place.

In e-learning situations, EFL instructors should support students learning by relating new knowledge to the knowledge and concepts they have already known. Learners need to be trained to divide knowledge into similar, retrievable categories, to develop larger conceptual ideas, and to link ideas together. The EFL instructor has to clear learners' misconceptions and faulty ways of thinking that limit and

weaken the connection to new knowledge with the previously learned knowledge. In addition, an active e-learning instructor presents the knowledge to students, and perform other tasks to identify students' learning difficulties, controls and guides students in various activities, directs the work of groups, and encouraging students to participate in learning activities (Pundak et al., 2009). E-learning technologies and the use of multimedia technologies enables students to acquire knowledge by engaging in learning activities and being active, creative, positive thinkers and problem solvers.

Results presented in Table 2 also show Items 1 and 5 got a mean of 3.93 and 3.66 and standard deviation of 1.26 and 1.11 respectively which mean that the participant agree with leading and controlling role of EFL instructor. This indicates that instructors want to have a high degree of control over classroom activities. They also need to have some influence over their classes that helps them manage the classroom carefully through effective leadership.

Successful online EFL classes require great leadership to achieve great results. A great EFL instructor can utilize the wide set of E-learning applications and processes such as web-based learning, computer-based learning, virtual classrooms and digital

collaboration. E-learning applications provide interactive teaching management tools to help EFL instructors to lead learning activities and students actively. An EFL instructor can fully benefit from E-learning applications to set his plans carefully and purposefully to ensure that he achieves his teaching goals. Effective EFL leadership involves the right mix of good judgement and good decision-making together with successful dialogue that enable the instructor to engage, motivate, encourage and build strong relationships between instructors and students (Walabe, 2020).

Table 2: Instructor's main role in language class

Questions		S. Disagree	Disagree	Neutral	Agree	S. agree	Mean	St. Deviation	Rank
1. My role in class is to promote learning by helping learners stimulate their interest in learning English.	N	6	4	8	21	29	3.93	1.26	4
	%	8.8	5.9	11.8	30.9	42.6			
2. My role in class is to assist learners use the previously learned knowledge and skills in new situations	N	3	1	3	21	40	4.38	0.98	1
	%	4.4	1.5	4.4	30.9	58.8			
3. I organize and observe students' interaction in groups where they conduct joint activities	N	4	0	9	23	32	4.16	1.06	3
	%	5.9	0	13.2	33.8	47.1			
4. I give my students tasks and assignments where they can apply previously learned concepts to new situations.	N	3	3	7	16	39	4.25	1.10	2
	%	4.4	4.4	10.3	23.5	57.4			
5. I encourages students to give clarifications and explanations in their own words and participate in discussions.	N	3	8	15	25	17	3.66	1.11	5
	%	4.4	11.8	22.1	36.8	25.0			
6. In online classes, I allow my students to learn on their own and take responsibility for their learning	N	3	11	20	26	8	3.66	1.04	6
	%	4.4	16.2	29.4	38.2	11.8			
7. I encourage cooperation between students rather than competition	N	4	11	21	21	11	3.35	1.15	7
	%	5.9	16.2	30.9	30.9	16.2			
Weighted mean							3.74		
St. deviation							0.55		



As a controller, An EFL instructor presents his linguistic utterances as the central means of promoting student understanding. The teacher talking time TTT is crucial factor in language classes but teacher has to be careful not to do too much talking. Students also need to have their own free time to learn the content covered, which means that control sometimes needs to be reduced. Otherwise, there is a risk of hindering the students' learning progress. Therefore, it is not advisable to talk too much, as the students will then not have the opportunity to communicate independently.

The results of items 6 and 7 were unexpected. The statistics show clearly that respondents had neither positive nor negative teaching role as authorities and motivators. The scoring weights reveal that items 6 received the mean of 3.37 and the standard deviation of 1.04, and item 7 received the mean 3.35 and the standard deviation of 1.15 (see Table.2). This means that instructors are doubt about whether they could allow students to learn on their own and take responsibility for their learning, and about whether they could encourage cooperation between students instead of competing between them.

The instructor's authority and influence on students' autonomy of the students are necessary in EFL classroom to achieve learning goals in relation to their responsibility and that of the lecturer in the learning process. The lecturer initiates and explores new material through the students, demonstrates new concepts, gives instructions and ready-made answers through listening, watching videos and reading texts. Instructor authority plays an important role in classroom interaction as it facilitates students' understanding of the subject matter and encourages them to actively participate in the learning process.

The role of the EFL instructor as a motivator is to arouse and encourage student's interest, motivation, desire and attention which are associated with strong feelings to learn the target language. A motivator Increases learner's satisfaction and promote positive self-evaluation. Motivational strategies aimed at increasing learner satisfaction usually focus on giving learners the opportunity to showcase their work and encouraging them to take pride in their learning.

Based on the assumption that Learning a foreign language in a country where language is not spoken requires many sustainable motivational strategies, whether intrinsic, instrumental, integrative or extrinsic. Motivation, thus, plays a crucial role in learning the target language, because it takes a lot of effort and a long time to master the basics. For a foreign language learner to sustain intrinsic motivation, he or she needs to create opportunities to practice the target language in different contexts.

The results generally agree with those obtained in previous studies which assure that active learning strategies require the instructor to engage in learning activities not as a mere transmitter of knowledge, but as a participant. An

instructor must be close to his students and become familiar with the students' learning difficulties. Involving learners in learning activities makes them participants and they enjoy learning because they have the lecturer in their midst. In addition, the instructor's responses to the students' difficulties provide him with the necessary feedback, correction, and motivate his students (Bonwell & Eison, 1991). The lecturer should be helpful and available to answer some of the students' questions and support them by involving them in the learning process (Pundak et al., 2009). It is important for EFL instructor to strengthen learners' self-confidence as a key part of successful language teaching and learning.

2. Instructors' attitudes towards online teaching and learning activities

Results presented in Table 3 show instructors' responses about their attitude towards online teaching and online learning activities. The results reveal that instructors' attitudes towards item 9: "E-learning technologies help me to assign more learning activities to my students" got the highest score with a mean and standard deviation followed by item 11: "online classes are a good platform for providing students with knowledge and skills for the course" with a mean (3.750) and standard deviation (0.983066).

These results mean that the EFL instructors' positive attitudes towards those items. Instructors often face the challenge of limited resources when trying to adapt lessons to the individual abilities and learning styles of their students. This is where online learning has a great advantage and can support instructors. E-learning offer several resources to engage learners actively in learning process such as: media delivering texts, audios, images, animations and streaming videos, and includes technological applications and processes such as audio or video tapes (Almahasees et al., 2021). A good e-learning platform adapts to students' personal progress, strengths and weaknesses, are available anytime, anywhere and can be self-directed, which is highly motivating and engaging for students. It allows students to practice real-life scenarios in a safe environment, which boosts learners' confidence.

A well use of technological communication and interaction tools, an online teaching provides the features similar to face-to-face communication in traditional learning. A learner can interact with the teacher and peers or ask them for assistance, guidance and receive directions. All this and more can be done with the help of teaching and learning communication and interaction tools. E-learning provides a suitable learning environment that helps students to participate in the learning process and increase their efficiency and performance in educational courses through the elements it can provide in electronic assessment and feedback.

**Table 3: Instructor's attitude toward online teaching/learning activities**

Items		S. Disagree	Disagree	Neutral	Agree	S. agree	Mean	St. Deviation	Rank
8. Online teaching met my expectation with active learning strategies	N	5	10	17	21	15	3.46	1.2	4
	%	7.4	14.7	25.0	30.9	22.1			
9. E-learning technologies help me to assign more learning activities to my students.	N	2	8	11	24	23	3.86	1.11	1
	%	2.9	11.8	16.2	35.3	33.8			
10. My online students do not respond to active learning activities	N	5	16	21	13	13	3.19	1.21	5
	%	7.4	33.5	30.9	19.1	19.1			
11. online classes are good platforms for providing student with knowledge and skills of the course	N	1	8	13	31	15	3.75	0.98	2
	%	1.5	11.8	19.1	45.6	22.1			
12. I believe that learning English in a conventional classroom is more effective than in online classes	N	6	7	12	21	22	3.68	1.27	3
	%	8.9	10.3	17.6	30.9	32.8			
13. Students can be evaluated in basic courses only by means of a final exam	N	13	17	12	18	8	2.87	1.33	6
	%	19.1	25.0	17.6	26.5	11.8			
Weighted mean						3.47			
St. deviation						0.64			

No doubt that online learning technology offers language instructors new ways to explain the subject matter. It can provide students with a better opportunity to engage with authentic material, which in turn helps them gain fluency. Active learning allows students to learn in the classroom with the help of the teacher and other students, rather than being left to their own devices. Compared to traditional classes, online students learn more in active classes, can retain information longer and enjoy the lessons more (Gholami et al., 2014). A great advantage of traditional classroom teaching is that the lecturer can intervene quickly if the students are not catching on. A lecturer can change the direction of the lesson or use a different technique to keep the students interested. The immediate feedback that is possible in the traditional classroom cannot be replicated as in an online environment. In classrooms, teachers can pull students to engage in collaborative learning activities.

Unexpectedly Item 12: "I believe that learning English in a conventional classroom is more effective than online classes" got the mean (3.72) and standard deviation of (1.24), and a moderate average was awarded to item 11: "My online students do not respond to active learning activities" with a mean (3.196) and Std. Deviation (1.21). These results show that respondents prefer direct contact with their students to online classes for the belief that conventional classes are more suitable for their EFL classes.

It is worth noting that to EFL instructors, conventional face-to-face teaching could be effective particularly for those who newly joined language classes because regular attendance to classes enforces peer interaction and students will be

disciplined and mentally alert. In a traditional classroom, students share their ideas, views and queries with the instructor, and get immediate feedback accordingly. Regular attendance to conventional classroom helps students and teachers know each other better due to a continuous interaction between them. Face to face class interaction enables instructor to evaluate students' strengths and weaknesses better, and guide students in better learning possibilities.

Beside all the advantages of conventional classes, EFL instructors should not ignore the fact that in online classes students can have access to rich and appropriate material that helps them to be more confident while working in class (Bailey & Cassidy, 2019). In addition to, shy students can find in online classes the opportunity to express their ideas and thoughts in class. Indeed, shy students, or those who do not find an opportunity in traditional face-to-face classes to participate language, can post questions, observations, or answers to questions either before or after class on the online discussion boards. Discussion boards are good places where students can meet and collaboratively develop and discuss their learning issues; and share learning materials. They can exchange written work, videos, presentations, or other assignments for peer feedback.

Crucially, however, EFL instructors believe that online learning activities can be challenging because some students do not have the basic digital skills, while others hide behind their screens or engage in other activities instead of learning. Beside spending many hours in front of a screen may students to flee from attending the class since there is no direct follow up. lack of appropriate devices. Hiding behind a screen



is easy because everyone has their mobile phone with them all the time.

CONCLUSION

The present study aimed at investigating the role of EFL instructor in administering active learning class; and explores their attitudes towards applying active learning strategies in online EFL classes. The first important finding was that the main role of EFL instructors is to act as guide and a facilitator in the language classroom by motivating and supporting students to approach their learning or being aware of relevant learning strategies and styles. The results also show that instructors beheld that they should make every effort to identify and address students' learning difficulties.

This multi-roles of EFL instructors give the learner various opportunities to engage in the learning process and receives immediate feedback. Such engagement contributes to learners' academic success by helping them to identify their learning styles, participate in planning how they will learn and how they will demonstrate their learning success. Purposeful and active engagement increases learners' motivation as well. Also, through engagement instructors can have the opportunity to discuss learning difficulties with their students; identify learners' unique experiences and what difficulties that affect their learning needs to be addressed.

The findings also revealed instructors' positive attitudes towards guiding students in the learning process and assisting them with learning difficulties, suggesting that learner-centered strategies are important to achieve learning outcomes. Moreover, the results also show that EFL instructors use various active learning techniques to promote teaching and learning process. This is due to factors that instructors take students' learning problems into account by listening to suggestions, asking for ideas; giving learners enough time to share their ideas and take an active role in their own learning experiences. Helping learners to understand the main concept of the learning material is essential for learners as it increases learner understanding and enables better use of the learning material.

In conclusion, it is important to evoke that active learning, opposed to passive teaching, often requires more effort and time and sacrifice of course content covered in class. It is a departure from passive learning for it requires students to think critically and actively engage in the learning process. Implementing an active-learning techniques is not easy task and may involve overcoming many obstacles since the way a class is conducted depends on the character of the instructor. Some instructors are very open-minded and do not hesitate to put themselves at the centre of the lesson, while others prefer to give their students the opportunity to interact. Instructors have to be flexible to enable students to learn. It is also necessary for EFL instructors to adopt many different techniques and play different roles in the classroom to achieve the best learning outcomes.

As stated earlier, this study contributes to the process of teaching and learning beneficial for educators and stakeholders. Further researches may carry out comprehensive

studies on using surveys and class observation tools to investigate learning activities and both students and instructors' roles in EFL classes. Case studies can also be conducted to determine individual's teaching / learning activities and interest.

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ONLINE QUR'ANIC AND ISLAMIC RESEARCH: A STRATEGY BASED ON A COMPENDIUM OF METHODS

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ABSTRACT

This paper intends to comprehend and describe online search tactics for Qur'anic and Islamic material. This is a topic that has gotten little attention in prior studies; thus, this study tries to fill that gap. The collection of data has been approached using a methodology that is a compendium of methods, making use of both quantitative and qualitative approaches. During the course of the study activities, query logs from the Microsoft Live search engine were collected and examined for phrases associated with Islam. The collected data allowed for the derivation of a number of characteristics, including query frequency, word frequency, query length, and session length. Interview data was acquired from twenty-five users who had prior experience surfing the internet for Qur'anic and Islamic resources. This data was gathered to supplement the quantitative data that was collected. The interviews provided a more in-depth understanding of various aspects of information searching, such as search techniques, problems, and perspectives regarding the process of accessing Qur'anic and Islamic information online.

KEYWORDS: *Qur'anic and Islamic information, interactive IR, information seeking, query log analysis.*

1. INTRODUCTION

The use of the internet is growing in popularity because more and more people are turning to it as a platform to disseminate content of a religious nature. Højsgaard and Warburg (2005) It was estimated that there were approximately 51 million religious websites on the internet by the year 2016, all of which were engaging with their respective followers and spreading information to their respective communities. More research has been done to find out all the different ways that religious groups use the Internet to spread their ideas. (Helland, 2000; Dawson & Cowan, 2004; Karaflogka, 2006) Members of religious communities utilize the Internet for a variety of purposes, including networking, seeking guidance, listening to sermons, and even shopping for goods related to their faith. (Helland, 2002; Foltz & Foltz, 2003; Campbell, 2005a; Cheong et al., 2009). The investigation of the connection between religious practice and online activity is a subfield within the discipline of information retrieval that is garnering an increasing amount of attention. (Campbell, 2005b; Krueger, 2005). According to the findings of several studies, one significant aspect of religious activities that take place online is the pursuit of religious information. (Casey, 2001; Larsen & Rainie, 2001; Ho et al., 2008).

According to the findings of a survey conducted by the Pew Internet & American Life Project in 2002, 25 percent of Americans utilized search engines to look up information related to religious topics (Fox, 2002). In a more recent study, Hoover et al. (2004) discovered that 64 percent of the 128 million American online users had used the Internet for spiritual and religious purposes. Specifically, 28 percent of the online users had searched for their own religion, and 26 percent had searched for the religion of others.

According to Dawson (2000), investigating people's search objectives and methods, in addition to the content of religious websites on the internet, is an essential area of investigation. This is corroborated by Jansen et al. (2009), who state that few studies have explored how people search, especially for material linked to religion. This finding lends credence to their claim. It is essential to have an understanding of the individuals who use search engines in order to build systems that will assist people from a variety of linguistic and cultural backgrounds in their search for information that is relevant to religion and culture (Neelameghan & Raghavan, 2005). Nevertheless, the searching procedures and challenges that are especially related to searching for religious material are not the primary focus of the studies that were stated above.

Because of this, and in light of the fact that there haven't been very many user-oriented studies conducted in the field of religious searching up until this point, the purpose of the research presented in this article was to add to the existing body of knowledge on religious searching by investigating search purposes and processes specifically relating to Qur'anic and Islamic information, and also to gain a better understanding of the nature of religious queries that are conducted on the internet.

Both a quantitative approach based on real user-system interactions from a large web search engine and a qualitative method based on interviews with a random sample of users chosen to show the variety of people looking for information on Islam and the Qur'an on the web were used to collect data and inform the findings. (1) a quantitative approach based on real user-system interactions from a large web search engine; and (2) a method based on real user-system interactions from a large web search engine. The findings paint a picture of what people



are genuinely looking for on the internet and of their experiences with web searching at the present time.

The following outline constitutes the paper's structure: In Section 2, we will describe past research that has been done on evaluating patterns of web searching, and in Section 3, we will provide the approach that was utilized to collect data. Section 3 has the datasets and interview data used in the log analysis study. Section 4 looks at the results, and Section 5 gives a summary of the work and ideas for more research in this field.

2. RELATION TO OTHER STUDIES

2.1 Web-searching patterns

Studies of user searching habits have a lengthy history that dates back to the late 1970s, when Bates was one of the first researchers to explore how people search. Bates (1979) was one of the first researchers to look into how people search. Her research investigated how people conduct searches, and she presented a number of different approaches to characterize the search process as a whole. After the availability of web search engines and the rise in popularity of these tools, a great deal of research was carried out to investigate how individuals conduct searches on the internet. Studies such as these were conducted by researchers such as Jansen et al. (1998), Silverstein et al. (1999), Spink et al. (2001), and Baeza-Yates et al. (2005). These researchers investigated how internet users carry out their searches and proposed a variety of search behavior models.

2.2 Islam and the Internet

Research on Islam and the pursuit of knowledge has been the subject of a number of past studies. For instance, Bunt (2003) and Lawless (2004) discovered that the internet contains a wide variety of information pertaining to Islam, such as translations of the Qur'an, recitations of the Qur'an, viewpoints, sermons, fatwas, and conversations. These are geared toward two distinct groups of readers, namely Muslims and those who are not Muslims. Studies have also been conducted to investigate the existence of Muslim and Islamic documents on the internet, as well as the activities that Muslims engage in on the internet in general. (Bunt, 2003, 2004; Adamu, 2002; Brouwer, 2004).

It has been demonstrated that the number of Islamic and Qur'anic websites that may be found on the internet is continually growing (Bunt, 2003). Nevertheless, as Shoaib et al. (2009) point out in their article on our research, when it comes to using keywords to search for verses in the Qur'an, there are three fundamental issues to consider: (1) In the majority of instances, not all of the pertinent verses are recovered; (2) the order in which the retrieved verses are presented does not hold the reader's interest; and (3) some

verses that are not important are also retrieved. According to the researchers Baqai et al. (2009)

"It remains a challenge to reach out to the Qur'anic learner and research community using emerging technologies in order to assist in the creation of better, user-centric means to facilitate the learning of the Qur'an, exploration of the Qur'an, management of the Qur'anic knowledge resources, and retrieval of those resources."

There have been very few studies conducted from the point of view of end users about the actual experiences they have had collecting material linked to Islam and the Qur'an. In general, this is the case. The current research hopes to shed light on this gap in knowledge.

3. METHODOLOGY

A mixed-methods approach was used in order to collect data for the purpose of studying patterns of web searching activity on the internet for information linked to Islam and materials related to the Qur'an (Tashakkori & Teddlie, 2010). This necessitates the utilization of quantitative and qualitative approaches in tandem with one another. In the quantitative study, which can be found in Section 3.1, queries from a significant web search engine were used to investigate various search phrases. The qualitative analysis (Section 3.2) was conducted on the basis of interviews with individuals who frequently search for Islamic and Qur'anic information online. The purpose of these interviews was to learn about the individuals' preferences and levels of success when searching for information online.

3.1 Search Logs

We made use of the Live Search query log that was made public by Microsoft in 2006. This log contains 12,251,068 inquiries that were entered by users based in the United States. The query string itself, a timestamp, the URLs of clicked results, and the click position of items selected by the user are all included in the logs together with a unique identity for each inquiry. From Every inquiry was taken, but the only ones that were extracted were the ones that included Islamic-related phrases in the query string. We used a list of phrases that was created from directories in the Islamic areas of Google, Yahoo!, and DMOZ. These directories were combined with the top 10 religious (Islamic-related) queries that were suggested by Jansen et al. (2009). We collected queries that contained any one of the terms specified in Table 1 or a combination of them. This also contained inquiries with a variety of potential spelling variants.


Table 1. In the query logs, Islamic-related phrases are utilized to categorize requests.

Arabic phrase	Transliteration	Meaning
الله	Allah	the one and only God in Islam. Etymologically, the name Allah is probably a contraction of the Arabic al-Ilah, "the God." The name's origin can be traced to the earliest Semitic writings, in which the word for god was il, el, or eloah, the latter two used in the Hebrew Bible (Old Testament).
فقه	Fiqh	The word fiqh is an Arabic term meaning "deep understanding" or "full comprehension." Technically, it refers to the body of Islamic law extracted from detailed Islamic sources (which are studied in the principles of Islamic jurisprudence) and the process of gaining knowledge of Islam through jurisprudence.
حرام	Haram	In Islamic law, haram refers to any act that God forbids and is one of the five Islamic commandments (Arabic: al-Ahkam al-Khamsa) that define the morality of human action.
مدينة	Madinah	Arabic Al-Madinah, formally Al-Madinah al-Munawwarah ("The Luminous City") or Madinat Rasul Allah ("City of the Messenger of God [i.e., Muhammad]"), is an ancient Yathrib, city located in the Hejaz region of western Saudi Arabia, about 100 miles (160 km) inland from the Red Sea and 275 miles from Mecca by road.
مسلم	Muslim	In Arabic, the word "Muslim" means "one who submits," from the root word aslama, "he resigned." Definitions of Muslim a believer in or follower of Islam.
دين	Religion	The word "Islam" means "submission to the will of God." Followers of Islam are called Muslims. Muslims are monotheistic and worship one all-knowing God, who in Arabic is known as Allah. Followers of Islam aim to live a life of complete submission to Allah.
سوفي	Sufi	A Sufi is someone who believes in the kind of Islam known as Sufism. The spiritual goal of a Sufi is to have a direct, personal experience of God.
عقص	Aqsa	Aqsa is a Muslim girl's name. The name Aqsa means "name of the Jerusalem mosque." It has multiple Islamic meanings. The name is Arabic.
رب	God	Rabb means "Lord of the worlds," which is itself an appositive following the noun Allah. A simple translation of the full sentence is "Praise belongs to Allah, the Lord of the worlds."
كريم	Holy	In Arabic, holy is defined as muqadas: sacred, sacramental, heavenly, sanctifying, hallowing; adjective; taqi: pious, religious, godly, devout, mystic; adjective;
مكة	Makkah	Mecca, Arabic Makkah, also known as ancient Bakkah, is a city in western Saudi Arabia, located inland from the Red Sea coast in the irt Mountains. It is the holiest of Muslim cities. Muhammad, the founder of Islam, was born in Mecca, and it is toward this religious center that Muslims turn five times daily in prayer (see qiblah).
دعاء	Prayer	The most well-known and obligatory act in Islam is the performance of the five daily prayers, which are known in Arabic as salah (often written salat). In the Qur'an, the Arabic word salah means to demonstrate servitude to God by means of certain actions.
الصلاة	Salat	the daily prayer that all Muslims must do because it is one of the five pillars of Islam.
سنة	Sunni	"Sunna" is the Arabic term for the prophet Muhammad's way of life and legal precedent.
وعز	Daawah	is an Arabic word that has the literal meaning of "issuing a summons" or "making an invitation."
الحديث	Hadith	Hadith, Arabic adith ("News" or "Story"), the corpus of the Prophet Muhammad's sayings or traditions, revered by Muslims as a major source of religious law and moral guidance.



الإسلام	Islam	"Islam" means "submission to the will of God." Followers of Islam are called Muslims.
مسجد	Masjid	"Mosque" denotes a Muslim house of worship. The word evolved from the Arabic term "masjid," which means "place of prostration." During prayer, Muslims briefly kneel and touch their foreheads to the ground as a sign of submission (literally, Islam) to the will of God.
نبي	Prophet	A prophet is someone who is thought to have been chosen by God to say the things that God wants people to hear....the sacred name of Islam's Holy Prophet.
مدرسة	School	Madrassa is the Arabic word for any type of educational institution, secular or religious (of any religion), whether for elementary instruction or higher.
تفسير	Tafsir	Tafsir, which means "explanation" or "exegesis" in Arabic, is the study of how to explain the Qur'an, the holy book of Islam, or how to comment on it.
عيد	Eid	Eid al-Adha, or the Feast of Sacrifice, is celebrated by Muslims all over the world as a major holiday for a period of three to four days. The majority of Muslims will attend the special prayers held at different major mosques and Islamic centers in the United States and all over the world.
حج	Hajj	Hajj, also spelled Hadjdj or Hadj, is, in Islam, the pilgrimage to the holy city of Mecca in Saudi Arabia, which every adult Muslim must make at least once in his or her lifetime. The hajj is the fifth of the fundamental Muslim practices and institutions known as the Five Pillars of Islam.
جهاد	Jihad	The importance of jihad is rooted in the Quran's command to "struggle or exert" (the literal meaning of the word jihad) oneself in the path of God. The Quranic teachings have been of essential significance to Muslim self-understanding, piety, mobilization, expansion, and defense.
مسجد	Mosque	"Mosque" denotes a Muslim house of worship. The word evolved from the Arabic term "masjid," which means "place of prostration." During prayer, Muslims briefly kneel and touch their foreheads to the ground as a sign of submission (literally, Islam) to the will of God.
قرآن	Qur'an	literally meaning "the recitation," which is the central religious text of Islam, which Muslims believe to be a revelation from God (Allah). It is the sacred writings of Islam, revealed by God to the Prophet Muhammad during his life at Mecca and Medina.
شريعة	Shari'ah	Sharia acts as a code for living that all Muslims should adhere to, including prayers, fasting, and donations to the poor. It aims to help Muslims understand how they should lead every aspect of their lives according to God's wishes.
أمره	Umrah	"to visit a populated place" is an Islamic pilgrimage to Mecca (the holiest city for Muslims, located in the Hejazi region of Saudi Arabia).
فتاوى	Fatwa	A fatwa is a legal ruling on a point of Islamic law (sharia) given by a qualified faqih (Islamic jurist) in response to a question posed by a private individual.
حلال	Halal	Halal is Arabic for permissible. Halal food is that which adheres to Islamic law, as defined in the Koran.
كعب	Ka'aba	a small stone building in the court of the Great Mosque at Mecca that contains a sacred black stone and is the goal of Islamic pilgrimage and the point toward which Muslims turn when praying.
نبي	Muhammad	also spelled Muhammed or Muhamad or Mohammad or Mohammed or Mohamed or in a variety of other ways, is an Arabic given male name literally meaning "praiseworthy."
رمضان	Ramadan	Common greetings during Ramadan include Ramadan mubarak and Ramadan kareem, which mean "blessed Ramadan" and "generous Ramadan," respectively.
شعه	Shiite	A Shiite is a Muslim who follows specific religious traditions. Shiites are the second-largest branch of Islam, after Sunnis. A Shiite believes that Mohammed's son-in-law, Ali, was his legitimate successor as political and religious leader.
زكاة	Zakat	As one of the Five Pillars of Islam, zakat is a religious duty for all Muslims who meet the necessary criteria of wealth to help the needy.



At least one of the terms discovered in Table 1 was present in at least 2089 of the queries that were examined. The session, the query, and the term are the three levels at which query logs can be evaluated, as proposed by Jansen and Pooch (2001). At the session level, we derived statistics on the number of distinct sessions as well as the average session length, which was calculated based on the number of queries performed during each session. At the level of the inquiry, we determined the number of requests that were made, including any combination of the terms presented in Table 1 earlier (query frequency). At the level of the terms, we determined the total number of terms, the number of unique terms, and the average number of terms returned by each query (query length).

3.2 Interviews

We conducted in-depth, face-to-face interviews with 25 users who were eager to share their experiences searching for Qur'anic literature on the internet. These interviews were recorded and analyzed. Purposive sampling was employed because it was deemed to be the most appropriate method for conducting qualitative research in accordance with the guidelines given by Silverman (2009). Invitations in the form of emails were issued to various organizations, such as Islamic student groups, new Muslim societies (composed of individuals who had converted from other religions), and cultural societies from all across the UK. Invitations were also distributed to parallel organizations and societies through the use of the social networking website Facebook. Several individuals were selected for the interview by making use of a technique that is referred to as "purposive sampling" (Mason, 2002). reflect the wide variety of people who look for knowledge about the Qur'an on the internet.

We asked open-ended questions in order to highlight concerns relating to the search methods and aims of online users, as well as their perceived challenges, degrees of relevance, levels of satisfaction, and areas for desired development. The interviews' transcriptions were dissected for further investigation inductively, with the goal of discovering recurring themes (Boyatzis, 1998).

4. RESULTS

4.1 Examination of Search Inquiry Records

2089 (0.02%) out of a total of 12.2 million inquiries made using Microsoft Live Search included at least one of the phrases linked to Islam found in Table 1. The total number of sessions was 1,220. We then looked at how many queries were submitted by users during a single session (session length) and found that over 65% of users searching for Islamic-related phrases only submitted a single query. Jansen et al. (2009) found that between 61 and 76% of religious and religiously-related searches involve between one and two queries per session, thus their results are consistent with that range. The most questions asked during one session were 12. While the Jansen et al. (2000) study on web search as a whole found an average of 2.84 inquiries per session, our data shows that our average is significantly lower, at 1.72.

We then looked at how many words were used in each query (query length) and found that the most common query length was two terms. There might only be up to 17 terms in your query. In general, 3.14 terms were used in each query on average. Compared to the average web user, who uses 2.16 terms per query (Spink et al., 2001), this is significantly greater.

Table 2: Recent developments in Islamic-related search trends

Queries	Frequency
All queries	12,251,068 (100%)
Queries with Islamic terms (query frequency)	2,089 (0.02%)
Unique sessions	1,220
Terms (total)	5,398 (100%)
Unique Terms	942 (17.5%)
Number of queries per session (session length)	
1 query	795 (65.2%)
2 queries	211 (17.3%)
3 queries	111 (9.1%)
4+ queries	103 (8.4%)
mean (average)	1.72
median	1.00
mode	1.00
Number of terms per query (query length)	
1 term	357 (17.1%)
2 terms	553 (26.5%)
3 terms	454 (21.7%)
4+ terms	725 (34.7%)
mean (average)	3.14
median	3.00
mode	2.00

**Table 3: Top 10 Most Frequent Queries**

Query	Frequency	%
Islam	71	3.40
Koran	36	1.72
Muslim Names	27	1.29
Quran	20	0.96
99 Names of Allah	18	0.86
Islamic Prayers for Repentance	16	0.77
Islamic Calligraphy	16	0.77
Nation of Islam	14	0.67
Qur'an	13	0.62
Islamic Art	13	0.62

We studied the queries that users submitted, and the findings are presented in Table 3, which lists the top ten queries that were submitted the most frequently. The word "Qur'an" can be spelled in three different ways: Koran, Quran, and Qur'an. All three of these forms are included in the top ten most popular search terms that people enter. When added together, these three

questions account for 3.3% of the total number of Islamic-related questions asked online.

In addition, the query phrases were evaluated to determine which terms were used the most frequently throughout all of the searches. Table 4 presents the top 10 terms that are seen most frequently in the text.

Table 4: The 10 terms that occur most frequently in the table (across all queries)

Term	Frequency	%
Islam	608	11.26
Islamic	380	7.04
Muslim	351	6.50
Mosque	93	1.72
Muslims	82	1.52
Koran	75	1.39
Quran	72	1.33
Allah	71	1.32
Names	67	1.24
Halal	54	1.00

From the list of terms in Table 4, the terms "muslim" or "muslims" (8%) and "muslim" are the most often used terms. This was determined by grouping phrases with similar meanings or different spellings of the same word (Muslims), and Koran/Quran (2.7%). This comes in second place, after Islam or Islamic (18.3%), which is the most frequent search term. In general, the distribution of search words follows a Zipfian curve, which can be described as follows: a relatively small set of terms is used rather frequently, while a big collection of terms is quite rarely used (Jansen et al., 2000). It was discovered that the 100 terms that were utilized the most

frequently accounted for 61.8% of the total number of terms, which is a substantially greater percentage compared to the 18–22% that was observed for general web search in the study by Jansen et al. (2000).

4.2 Analysis of data gathered from interviews

The characteristics of the 25 people who participated in the interview are summarized in Table 5. These variables include age, gender, occupation, country of origin, ethnicity, and religion.



Table 5: Characteristics of the representative interview sample

Age range:	21-61 years
Gender:	13 males, 12 females
Occupation:	Student (undergraduates and postgraduates) (11), researcher (5), university Professors/lecturers (2), university faith advisors (2), computer-related Executives (2), Housewives (3)
Country of origin:	Algeria (1), France (1), Germany (1), Indonesia (1), Jordan (1), Kashmir (1), Kuwait (1), Malaysia (3), Morocco (1), the Netherlands (1), Pakistan (3), Philippines (1), Saudi Arabia (1), Sudan (1), Syria (1), and the United Kingdom (6).
Ethnicity:	Caucasian (7), Asian (11), Arab (5), and African (2);
Religion:	Islam [born (18), convert (3)], Christianity (1), Atheism (1), Other (2)

One of the people who was questioned used the French version of Google to look up information about Islam and/or the Qur'an, while the vast majority of those who were interviewed used the English version of Google to look up information about Islam and/or the Qur'an. There were a few people who searched in Arabic using Arabic characters, and the majority of searches were done with English keywords. However, there were a few people who searched in Arabic, using Roman alphabets to spell Arabic keywords. People who were interviewed stated that conducting a search in other languages, such as French, Malay, German, Urdu, or Persian, would provide fewer results in comparison to searching in English or Arabic. More than half of the people who took part in the survey thought that there were insufficient trustworthy websites available in the language of their choosing and that this was an issue that needed to be addressed. Many people are under the impression that the majority of quality links and material can be found in Arabic. Because of this, inquiries conducted in languages other than Arabic would be unable to retrieve the results unless they had been translated into another language. Some of the participants were of the opinion that because certain nations impose restrictions on search engines, many good connections coming from Arabic and Muslim countries are being blocked from Arabic and Muslim countries are being blocked. As a result, "innocent" good links are being hidden.

Although Qur'anic verses, translations, explanations, and recitations were the most searched for items, almost all of the Muslim participants reported that in addition to searching

for Qur'anic information, they would also search for Hadith (sayings and teachings by the Prophet Muhammad), because the Qur'an and Hadith are very closely related to one another. Hadith is the source of the majority of the interpretations for the verses in the Qur'an. The Hadith, on the other hand, are constructed in a manner that is distinct from the Qur'an. The Hadith is a collection of sayings and teachings of the Prophet Muhammad that have been compiled by a number of different people, in contrast to the Qur'an, which only exists in one version and follows a predetermined framework (i.e., chapters and verses). Compilers have different approaches to the structure, hence it varies. Therefore, looking for hadith is more challenging than searching for information in the Qur'an, particularly for individuals who have a limited understanding of hadith. The process of looking for hadith in a language other than Arabic is significantly more difficult. Also, this was recognized as one of the most significant components of searching the Qur'an that has to be improved.

One of the Muslims there put it this way. *"Since many of the verses in the Qur'an contain Hadith that explain their meaning, a person's understanding of the Qur'an would be incomplete without also understanding the Hadith that explain their meaning." The appropriate hadith should be retrieved as a result. as well as the Asbab (revelational events in the Qur'an)."*

Table 6 is a listing of the various other topics that are being looked for.

Table 6: The following is a list of the topics that participants searched for the most.

Term	Meaning
Qur'an	Translation, Tafsir (explanation), Ruqyah (verses to cure illness), motivational verses, miracles of the Qur'an, Asbab-ul-Qur'an (occasions and circumstances of the Qur'an revelation), history, learning the Qur'an, tajwid/tarteel (proper pronunciation when reciting the Qur'an), and how to read the Qur'an are some of the topics that are covered.
Hadith	Hadith and Sunnah (the ways in which the Prophet Muhammad lived his life), translation, sanad (the chain of narration), matn (the wording of the Hadith), and explanation
Islam	Fatwas are religious opinions that are issued by scholars regarding Islamic law. Rulings on current issues, prophets, seerah (historical biographies of prophets), sahabah fiqh (jurisprudence, an expansion under Sharia law), talks, Islamic finance, digitized Islamic books, masa'el (issues and problems), Islam, women and feminism in Islam, Sharia law, and naat are also discussed. Naat are religious songs (poetry that praises the Prophet Muhammad).



In particular for newly educated Muslims and those that already have a large collection of physical copies of the books, the participants cited the following as reasons why they used the internet to search for the topics listed in Table 6: speed and ease of access to many versions of the Tafsirs and Hadiths; access to more collections; and the ability to retrieve more and deeper explanations for Qur'anic verses. They also use the material that they have collected to prepare for their studies, assignments, examinations, or papers. teaching, talks, and sermons; to get the opinions of scholars as possible solutions to problems; for work; out of self-interest or curiosity to learn more or to find the truth about teaching, talks, and sermons; to get the opinions of scholars as possible solutions to problems; for work; for the purpose of improving one's ability to recite or memorize lyrics by listening to them online; To replicate the sounds of the recitation so that non-native speakers of Arabic can hear where they are going wrong There is information about Islam that can be found on the internet. This information can be used to correct any false information, get the full picture of something that may only be remembered in part, talk about or debate issues, and copy verses into their own writings. easily be call isra'iliyyat.

However, the most important concern for individuals who identified as Muslims, as well as for a few people who did not identify as Muslims, was the dependability and integrity of Islamic and Qur'anic websites. This had an effect on When they looked at the search results, the brief descriptions that came along with each result (these descriptions are termed "snippets") did not assist them in determining whether or not the link should be trusted. The only way to determine whether or not a website claimed to be Islamic or Qur'anic was to click on each result and then navigate through the pages of the websites. This required going through a lengthy process, which

was oftentimes very frustrating. Some people would only look at websites that were suggested to them by their academic advisors or their close friends. University links, links from established institutions or organizations, and URLs that end in ".org" are generally seen as reputable by the general public. This is especially true of links that are associated with the names of renowned academics working in the relevant field. The vast majority of Muslims were of the opinion that information that they were already familiar with and that corroborated their prior knowledge was more likely to be judged significant and accurate. However, in some instances, it was realized that in order to establish credibility, one would need to read a number of different parts of a website or visit a website frequently in order to be able to assess the balance and reliability of the website. This was the case because it was recognized that in order to establish credibility, one would need to establish credibility.

When it comes to establishing the veracity of the information, the majority of Muslim participants will compare any Qur'anic verses or Hadith that they have collected with any printed sources that they have on hand. collections, or verify them with a skilled acquaintance, an accessible scholar, or other reliable websites specializing in the Qur'an or Hadith collections. However, there were several non-Muslims who admitted that they would not be able to tell the difference between legitimate Islamic or Qur'anic websites and websites that are not authentic. One of them even believed that there would be no fictitious material about the Qur'an on the internet because it would be a waste of time for anyone to put it there. There were a few Muslims who commented that they would approach the material with caution omitting the verses that are in Arabic Table 7 contains a list of the additional issues and difficulties that the participants raised.

Table 7: Detailed analysis of the interviewees' top concerns and difficulties

Information overload -	Unavailable information
Misleading information -	Incorrect information
Disorganized information -	Too much sectarian information
Low volume of information -	Dissatisfaction with retrieved information

The participants had a variety of opinions on Islamic discussion boards, which were listed and discussed among other sorts of websites. More than half of the participants believed that the information from forums is not reliable because they tend to be more opinion-based; however, a few Muslim participants believed that forums actually give better information because answers in forums tend to be supported with Qur'anic or Hadith references and sometimes by recommended links to further information. Forums may be a one-stop-shop for getting information and assistance on a wide range of topics, including solutions to specific difficulties and suggestions for additional reading on the subject topics.

The majority of respondents identified prior knowledge (of Islam or other topics) as a distinguishing factor between this type of searching and general searching or searching for other topics. and the capacity to precisely specify keywords (whether in the Qur'an or Hadiths) as factors that contribute to the

retrieval of more relevant results. While Google may offer query suggestions when you're constructing your search, you shouldn't assume that these will lead to better or more relevant results. Almost all of the Muslims who took part in the study were concerned that, due to a lack of training or awareness, they were retrieving fake websites without realizing it and having no way to verify their accuracy. As one Muslim participant said,

"In addition, one should come equipped with some past knowledge." People who have limited understanding should inquire with others about which websites are considered to be of high quality, because they would not be able to tell legitimate from fake websites on their own.

The participants offered a variety of recommendations for how to enhance the experience. These include the requirement that we find ways that online users can collectively rate or recommend links that are believed to be authentic with



reliable content or that we figure out how to move good links higher up in search result lists. In addition, there is the requirement that we find ways to move good links higher up in search result lists. Another idea was to establish a governing body that would be responsible for determining whether or not the connections between the Qur'an and Islam are genuine. This section comes to a close with a comment from one of the participants that, in our opinion, does an excellent job of summing up the most important conclusion of this study.

"The challenge here is figuring out how to evaluate your outcomes." How do you determine which of them may be relied upon? "Everyone who is not of the Islamic faith faces the challenge of trying to find something that they can put their faith in." "I don't know who or what I can put my faith in."

5. CONCLUSION

In order to understand how individuals look for Islamic and Qur'anic knowledge on the internet, this study is the first to combine analysis of search engine query records with user interviews. The research found that 12.2 million people used a large general web search engine, and among those searches, there were a significant number of people looking for information related to Islam and the Qur'an. Additionally, the study was able to identify the queries that were used the most, as well as the terms that were used the most frequently in relation to these queries, as well as the different spellings of the Qur'an that were used in the research. The qualitative information that was acquired through interviews was included in this study as a supplement to the quantitative data in order to shed light on the reasons and thoughts that people have for searching the internet for material that is relevant to Islam and the Qur'an.

From a wide-ranging purposive sample, it became clear that a number of important issues were top of mind for the consumers. These included the information's relevancy and reliability, the retrieval of Hadith in reference to the Qur'an, and the language of search queries in relation to the language of the website's content itself. It was also discovered during the interviews that all of the Muslim participants only use the phrases "qur'an" or "quran" in their requests for information pertaining to the Qur'an, but the other participants would also use the terms "koran," "kuran," and coran. Cross-checks between items obtained from the web and printed sources (the Qur'an, Hadith, Tafsir, etc.) or with knowledgeable people are almost always required to avoid retrieving inaccurate information for Muslim participants. Nevertheless, the non-Muslim participants put a greater amount of faith in the outcomes of web searches, and as a result, they did not frequently engage in cross-checking the results.

In the not too distant future, one of our goals will be to do research on specific subsets of internet users who conduct searches for material relevant to Islam and the Quran, as well as users from different regions of the world. world in order to determine whether or not there are differences in searching based on factors such as age, culture, or any other factors, as well as whether or not there are any other distinctions in the

searching behavior and activities among the groups. In addition, additional research is required to determine whether or if searching of this type for religious content differs considerably in any manner from searching of a more broad nature. These kinds of results might be able to inform both the people who develop search engines and the people who produce religious content on the internet.

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AN OVERVIEW OF EPILEPSY DISEASES & PRESENT CONDITION OF EPILEPSY IN BANGLADESH

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ABSTRACT

Even though epilepsy is one of the most prevalent and debilitating neurological disorders, our knowledge of its precise pathogenesis and therapeutic rationale is limited. Sixty-five million individuals throughout the globe are living with epilepsy, which imposes a substantial burden in terms of disability, mortality, comorbidities, stigma, and expenses due to seizures. Significant progress has been made in the last decade toward a better understanding of the pathophysiological underpinnings of the illness and the variables that influence its prognosis. These developments have resulted in updated criteria and terminology for the diagnosis and categorization of epilepsy and new conceptual and operational definitions. However, while there has been a significant rise in antiepileptic medications in the last 20 years, around a third of patients still refuse to respond to conventional therapy and take non-conventional treatment. Furthermore, only a tiny percentage of drug-resistant patients get epilepsy surgery, despite the fact that more than half of those who undergo surgery experience permanent independence from seizures. This article aims to introduce readers to the clinical aspects of epilepsy by covering topics including diagnostic methods, risk factors, and treatment strategies, as well as the current scenario of epilepsy in Bangladesh.

KEYWORDS: Epilepsy, Prevalence, Causes, Diagnosis, Management.

1. INTRODUCTION

Epilepsy is an ailment. When some individuals were ambushed by epilepsy, they trusted they had epilepsy. Transient paroxysms of unnecessary or uncontrolled releases of neurons might be caused by various distinctive etiologies called epileptic seizures [1]. Seizures are reactions of cerebral varieties from the standard. It is a direct result of the abnormal electrical development of the cerebrum.

Furthermore, epilepsy is a blood-borne sickness that is portrayed by effective direction. Term epilepsy is gotten from the Greek word "Epilamvanein or Epilepsia," which signifies "to be seized," "to be grabbed hold of," or "to be assaulted. Around 65 million people on the planet have epilepsy [2]. As of late, there has been an expanding acknowledgment that epilepsy isn't just about repetitive seizures; however, as reflected in the most recent accord definition, it additionally concerns the neurobiology, intellectual, mental, and social outcomes of the condition [3]. The Prevalence of brain

disorders is higher in developing countries than in developed countries [4]. So the incidence frequency is additionally higher in males than females. Epilepsy has an increased risk of premature birth death with mortality risk from 1.2-9.3 of all causes of death and 24% Longevity [5]. Remarkably, the frequency rate can reach 6– 9 for every 10³ men per year in a contender for epilepsy surgery [6]. WHO assesses that eight individuals for each 1000 worldwide have this disorder [7]. Rates of occurrence are rising steadily over the globe. That's why it's crucial to understand the condition of epilepsy. It's also essential to realize that a proper diagnosis of drug-safe epilepsy in a male patient is necessary. Here, we report on predominance, occurrence, statistical information, and sorts of epilepsy, etiology, treatment, and forecast to give a complete perspective of epilepsy.



2. METHODOLOGY

We searched the subsequent tabulated databanks, journals, and sites by using the titles of 'prevalence & incidence of epilepsy,' 'cause of epilepsy,' 'pathophysiology,' 'classification,' 'sign & symptoms,' 'risk factors,' & 'management of epilepsy' shown in **Fig 1(See Appendix)** In addition, we used to identify our search by writing 'title & author' in Google and Google Scholar.

3. PREVALENCE AND INCIDENCE

Prevalence is stated per 1000 people in the population, and Incidence is expressed as new cases per 100,000 persons per year. The overall predominance of epilepsy is conflicting and expanded among nations simultaneously. It is assessed that the general pervasiveness is 10/1,000 individuals [8]. The prevalence rate of epilepsy in a different region is summarized in **Fig 2 (See Appendix)** The more significant part of concentrates on epilepsy is directed in Asia, a huge medical issue. The age-balanced predominance of epilepsy is 10.2 for each 1000 in Asia, which is higher than in Europe [9]. Despite the scarcity of data on the Prevalence of epilepsy, a few studies have shown that the median incidence rates in developing and industrialized nations, respectively, are 68.7 and 43.4 per 100,000 people [10].

4. CLASSIFICATION AND SIGNS OF SEIZURES

Classification plays a central role in clinical brain disease and brain disease analysis. The initial international types of brain disease goals are improving communication, providing some organization to the data regarding brain disease at that time, and facilitating research [11]. Classification of epilepsy is moreover frequently used to allude to the rundown of the distinctive types of epilepsy sorted out inside the characterization framework and to an individual analysis itself. Seizures are classified into three categories according to the ILEA classification of epilepsy [12] (**Fig 3(See Appendix)**) A partial seizure influences just a single piece of the cerebrum [13]. Manifestations rely upon which part is influenced. For example, one player in the body, or different body parts restricted to the other side of the body, may begin to jerk wildly [14].

On the other hand, generalized seizures influence both cerebral halves of the sphere (sides of the cerebrum) from the earliest starting point of the episode [15]. They deliver a loss of awareness, either quickly or for a more extended time. However, unclassified seizures have no inadequate data & cause neonatal seizures, e.g., chewing and rhythmic eye movements.

5. CAUSES OF EPILEPSY

There are so many factors that are responsible for epilepsy. Therefore, the epilepsy condition might be followed

by different components, including Birth injuries, birth asphyxia, head damage, cerebrum contaminations, hereditary qualities, a few sicknesses, and so on.

5.1 Inherited genetics

A few kinds of epilepsy are ordered by various sorts of seizures originating from the family history. There is likely a hereditary impact. Pathogenic changes or transformation in qualities and basic variations from the norm in chromosomes (cancellations, inclusions) is in charge of an assortment of epilepsies [10].

5.2 Head injury

Head trauma or damage because of an accident or another traumatic injury can cause epilepsy. Car crashes related to the poor direction of engine vehicle travel, and the absence of safety belts and caps for engine cycle riders may come about head damage [7].

5.3 Brain infections

A portion of the mind contamination that harms the cerebrum, for example, cerebrum tumor or stroke, can cause epilepsy. Stroke is the primary driver of epilepsy in grown-ups more established than age 35 [16]. Neurocysticercosis is most likely an imperative reason for seizures and epilepsy in areas with a high commonness of *Taeniasolium* contamination in people [17].

5.4 Birth trauma

Before birth, babies are susceptible to cerebrum harm that could be happened by different components, for instance, a disease in the mother, poor sustenance, and oxygen lack [18]. In this case, epilepsy may happen.

5.5 Diseases

Some irresistible disorders, for example, meningitis, AIDS, autism, neurofibromatosis, and viral encephalitis, may cause epilepsy [19].

5.6 Drugs

Epilepsy is also connected to withdrawal drugs [20] such as Barbiturates and so forth. Besides, some medicines also induce seizures, for example, Antidepressant: TCA-(Amitriptyline, Imipramine, and Clomipramine), Antipsychotics: Chlorpromazine, Mood Stabilizer: Lithium, Psychostimulant: Amphetamine, etc.

6. RISK FACTORS

A hazard factor makes a man more prone to developing a specific sickness or condition. For example, some particular aspects that may expand the danger of epilepsy are illustrated in **fig 4. (See Appendix)**



7. PATHOPHYSIOLOGY OF EPILEPSY

Epilepsy is related to surrendering an overabundance of mind nerves in the cerebrum that makes the body move [21]. Epileptogenesis is the process through which healthy brain tissue develops epilepsy [22]. The brain neural network develops a greater propensity for seizures [23] which results due to an imbalance between excitatory and inhibitor activity within a neuronal network [24], leading to excessive, aberrant synchronous neuronal firing in a region of the brain or throughout the brain [25] and thereby disrupting standard neuronal processing and is capable of disrupting other neuronal networks [24]. Another possible cause behind this hypersynchronous firing may be the critical construction of the network or any other structural or metabolic issues [25].

As the pathophysiology is unclear, several mechanisms have been proposed to understand the same. It has been suggested that abnormal neural pattern due to chromosomal abnormalities, malformation of cortical development, inflammation and irritation of neural tissue, infiltration of mass, grey matter irritation, enzyme deficiencies, and neurodegeneration contributes the damage to the brain and thereby alters the neuronal circuitry which leads to disturbance of neurotransmitter balance, increased inflammatory cytokines [26], altered neurogenesis and gliosis [26], and abnormal functioning of ion-channel and receptor causing an imbalance of the ion-channel charges. These changes cause the neurons to fire in burst activity mostly hypersynchronously, which further causes abnormal neural movements that form self-reinforcing circuits, ultimately leading to recurrent seizures.

Any procedure that demolishes the mind's cerebrum may bring about the initiation or deactivation of nerves. The primary neural transmission unit is a neurotransmitter, and the particulate channel is the natural part of the neural connection. Hereditary irregularities cause around 33% of epilepsy, for example, an expansion in extracellular k^+ and a decline in cell sugar fixation [27]. Notwithstanding these activity factors, this can make the seizure more compelling. E.g., Ach, aspartate, glutamate, and the inhibitory neurotransmitter GABA are additionally associated with the advancement of episodes. Moreover, when the change happened in GABA, NMDA receptor epilepsy happened. Different pathways to developing epilepsy are schematically represented in **Figures 5 and 6**. (See Appendix)

8. DIAGNOSIS OF EPILEPSY

Different types of diagnosis are available worldwide. However, the diagnosis depends on the patient's conditions, including seizures and epileptic syndrome. Several tests to diagnose epilepsy are:

8.1 Through history taking

The foremost vital things to diagnose epilepsy are to know reliable, valid family history information from patients and from an observer who observed the seizures [28].

8.2 Physical test

The physical test may incorporate neurological examination and blood test. In the neurological exam, the specialist may test the mental capacities, mental brokenness, and different zones to analyze the condition and decide the kind of epilepsy [29]. Again in a blood test, the specialist checks the indication of disease, hereditary conditions, and different variables related to epilepsy [30].

8.3 Laboratory test

Some of the lab tests are performed to analyze epilepsy. These are: S. Electrolytes, S. Prolactin, Blood sugar, CBC, TFT, LFT, RFT, and CSF [31, 32].

8.4 Imaging

Specialists may also suggest some tests to diagnose epilepsy, such as EEG, Video EEG telemetry, CT scan of the brain, MRI of the brain, MRS, PET, and SPECT [33-35].

8.5 Polysomnography

Polysomnography is a non-invasive strategy for break analysis. It records the brain's oxygen levels in the heart, heart breathing, and foot movements [36, 37].

8.6 Electroencephalogram (EEG)

Electroencephalogram (EEG) is the most widely recognized test to utilize as a part of diagnosing epilepsy [38]. Initially, glue is used to attach terminals to your scalp. Taking the test is simple and painless. You could be given a role in which you're expected to complete a specific task. The exam is done amid repose. The terminals will capture the electrical activity of your cerebrum. Whether you're experiencing a seizure or variations in familiar cerebrum wave shapes are normal in epilepsy [38].

9. MANAGEMENT OF EPILEPSY

Patients with epilepsy are managed with an emphasis on three primary goals: seizure control, side effect avoidance, and maintaining or regaining patient satisfaction. The Treatment plan depends on the accurate diagnosis of the seizure types. Epilepsy can be dealt with through numerous techniques, as shown in (Fig 7)(See Appendix) Normally pharmaceutical is expected to control seizures and treat epilepsy; these usually recommended drugs are called anticonvulsants [39]. However, medications alone can't generally stop or diminish attacks [40]. A gadget called a vagus nerve stimulator might help treat epilepsy if you don't get alleviation from the solution [41].



9.1 Conventional treatment

9.1.1 Drug treatment

Epilepsy is a heterogeneous and genuine mind issue. It contains numerous seizure composites and epilepsy disorders. It is traditional to talk about somebody having epilepsy, be that as it may, it may be better, especially in connection to advancing better medical treatment, if we somehow happened to think as far as one of the epilepsies [42]. About 70-80% of grown-ups with new beginning epilepsy will move toward becoming seizure free with current antiepileptic sedation. On the other hand, 20-30% keep on having drug-safe epilepsy with episodes. Different antiepileptic drugs are Diazepam, Carbamazepine, Clonazepam, Clobazam, Vigabatrin, Topiramate, Phenobarbital, etc.

9.1.2 Surgery treatment

When medicines fail to give satisfactory control over seizures, surgery might be an alternative way. With epilepsy surgery, a specialist expels the territory of your mind that is causing seizures [43]. In addition, surgery is needed to remove epileptic focus (e.g., mesial temporal sclerosis), Anterior Temporal Lobectomy, Corpus colostomy, and Subpial transaction [44].

9.1.3 Brain imaging

Cerebrum imaging is a modern innovation for subjective neuroscience, expanding on many years of intellectual brain research, behavioral molding, psychophysics, and mind science [45]. The accessibility of attractive reverberation imaging permits a more continuous etiological finding, diminishing the number of idiopathic cases.

9.1.4 Dietary manipulation

It additionally treats epileptic seizures. A portion of the dietary supplements is - Ketogenic, eating fewer carbs and establishing a ketogenic diet [46]. MCT eats fewer carbs, Atkins consumes fewer calories, and Oligoantigenic abstains from food.

9.1.5 Others

Illustrations incorporate statins, thalidomide, progesterone subordinators, montelukast, Brain cooling, antioxidant and free radical scavengers, immunosuppressive treatment [47], suppression of respiratory alkalosis, etc., are available.

9.2 Alternative therapy for epilepsy

Some elective treatments are likewise used to treat epilepsy. For example, Homeopathic, Yoga, Ayurveda, Herbal Medicine, and so on [48]. 13% of guardians utilized elective prescriptions for epilepsy treatment of their youngsters. Elective treatments, including pressure decrease procedures, can push a few people to control their seizures better.

9.2.1 Homeopathic treatment

Epilepsy can be treated with the homeopathic method of treatment. Regular homeopathic therapy for epilepsy is precious for treating intense fits and additionally in taking out the inclination to have seizures [49]. The consequences of the homeopathic treatment differ for each situation, depending on the length and sort of attack [50]. Some natural homeopathic cures include color, Cicuta [50], Artemisia, Stramonium, Cupremet, Bufo Rana, and so on [51]. These are the best solution for Epilepsy, where the assaults of shaking are set apart by a rough, contorted body shape. Homeopathic prescription Nux Vomica is of tremendous help when outrageous coldness is available with seizures.

9.2.2 Yoga for epilepsy

Epilepsy is a turmoil in which strange electrical releases in the cerebrum cause intermittent seizures. Most seizures can be controlled by antiepileptic drugs (AEDs), yet sometimes attacks create imperviousness to those medications. Individuals may likewise wish to attempt non-tranquilize medicines, for example, yoga [52]. For individuals who have epilepsy and related issues, it is critical to create, assess, and actualize a correlative treatment shown in the standard treatment of epilepsy. The antiquated Indian practice and reasoning of yoga are progressively becoming a point of convergence of therapy and research in epilepsy. Yoga encourages you to pick up control over your body, empowering you to deal with a seizure better without giving it a chance to get excessively extraordinary [43]. Yoga asanas enable you to extend your nerves and oxygenate your cerebrum [53]. They quiet your mind cells and keep them from getting energized. Yoga trains you to make an inward adjustment that backs off excitation [54]. It gives you profound rest, enabling the body to mend and repair itself. There are different sorts of yoga, including postural activities, breath control (pranayama), Uttanasana (Standing Forward Bend), Salamba Sirsasana (Head Stand), and reflection. In an investigation, the act of Sahaja yoga, a basic type of reflection, decreased seizures and EEG changes in individuals with epilepsy.

9.2.3 Ayurvedic treatment

Epilepsy influences more than 1.5-2% of all-inclusive communities worldwide, with higher commonness in creating locales [55]. Antiepileptic drugs, however powerful in symptomatically controlling seizures, do not counteract or reverse the obsessive procedure that underlies epilepsy. Even though antiepileptic drugs are mostly very much endured, there still is a need to look for new medications with fewer reactions and better viability. The ayurvedic solution looks to treat epilepsy by unblocking the heart and mind channels that the abundance of doshas or humor might obstruct. This opening of the tracks is worked on utilizing different inventions and laxatives. Oral hygiene is produced by oil and gaseous (pure oil), and external oil and rain are part of the treatment. The herbs examined for antiepileptic action in human examinations



were distinguished. It was intriguing to note that nearly 60 unique herbs said in Ayurveda writing have been contemplated for antiepileptic action (**Fig 8**) (**See Appendix**). Some of the Herbal formulation used is *Aswagandharishtam*, *Saraswatarishtam*, *Saraswati churna*, *Tiktaka ghruta*, *Apsmarari Rasayana*, *Smritisagara rasa*, *Chaturbuja rasa*, *Yogendra rasa*, *Albizia lebbeck* [52,53], *Aloe vera* [54], *Emblica Officinalis*, etc. The accessible writing focuses on the beneficial impact of herbs utilized as a part of Ayurveda therapeutics for epilepsy.

10. RECENT RESEARCH AND ACHIEVEMENT

Some current advances and accomplishments for epilepsy treatment for most, if not all, conventional AEDs act by decreasing over-the-top cortical sensitivity through the instrument of epileptogenesis [56]. In the previous ten years, there has been a surge in epilepsy sedate improvement, with no less than ten new antiepileptic drugs (AED) presented, such as felbamate, carbamazepine, lamotrigine, topiramate, and vigabatrin [57], etc. Nevertheless, numerous patients encounter symptoms or try not to have finished seizure control [58]. Some new bearings for treatment incorporate novel pharmacotherapies, biosensor-coupled transportation frameworks, quality and cell treatment & surgical approaches.

10.1 In drug treatment

Sodium valproate or lamotrigine is picked to start with first-line medications for absence seizures and incomplete episodes (54), and Valproate is essentially superior to Topiramate and Lamotrigine in the treatment of idiopathic generalized seizures [59].

10.2 Surgery

In creating nations, patients with Mesial TLE are attainable by a proficient group comprising epileptologist, neurosurgeon, and experts utilizing MRI and EEG [60].

10.3 Seizure after stroke

The general rate of seizures within 24 hrs when the stroke was 3.1%. A higher rate was seen in bleeding (8.4%). Seizures when stroke had higher mortality at 30 days when stroke [61].

10.4 Antiepileptic drug & pregnancy

As of late, proof regarding major congenital malformation (MCM) rates has been related to epilepsy and pregnancy registries. The latest information from the UK epilepsy and pregnancy enlist demonstrates a reasonable dosage-related impact with valproate chance 5% with 600 mg every day expanding to 11% at more than 1000 mg [62].

11. THE PERSPECTIVE OF EPILEPSY IN BANGLADESH

Bangladesh is a hugely populated nation. There is a considerable measure of issues; for example, irresistible

ailments, unhealthiness, and neurological confusion are most common in this nation. However, it is estimated that at least 1.5–2.0 million people in Bangladesh are living with epilepsy, despite the fact that there are no official measures available concerning the Prevalence of epilepsy [63]. According to reports, the incidence rate is about 5 per 1,000 people in affluent countries; however, it is more significant in poorer nations. Men are far more impacted than women, and rural residents are more afflicted than city dwellers [64]. As demonstrated by the normality of 10 out of 1,000 people, the amount of patients with epilepsy in Bangladesh is around 1.3 million. About 10-12 per 1000 people in Bangladesh are affected by epilepsy, and the most common ages are mostly 16 to 31 for epileptic patients [65]. According to the reports of Bangabandhu Sheikh Mujib Medical University, the prevalence rate of epilepsy from January 2008 to June 2010 is shown in **Fig. 9** [66] (**See Appendix**). The causes of epilepsy vary with age. In Bangladesh, the dominant part of individuals have superstitious beliefs, and thus, it functions as a solid hindrance for add up to the care of patients with epilepsy. A misjudging and negative state of mind of the guardians, relatives, and society towards epilepsy is common. In this manner, numerous patients with epilepsy are yet disregarded in analysis, treatment, training, restoration, and other social needs. Besides, childhood epilepsies are likewise not known in Bangladesh [67].

Epilepsy patients are frequently hesitant to seek doctors' counsel [68], or maybe they trust epilepsy has no cure and seek guidance from indigenous prescription professional 'Kabiraj,' wind charmer 'Ojha' and profound healers [69]. However, antiepileptic drugs [70] & some physiotherapy [71] are available in this country to treat epilepsy. Besides, epileptical surgery is finally given to the patient according to their need [72].

12. CONCLUSION

There have been noteworthy advances in comprehending the study of disease transmission of epilepsy in recent years [73]. The middle lifetime commonness rate is evaluated as six for every 1000 individuals, which is lower than in other creating areas. Nevertheless, today, the etiology of seizures often stays idiopathic [74]. As a rule, seizures can be controlled with medicines with minor symptoms. The correct finding in managing treatment is fundamental. Because of the expanding number of epileptic seizures worldwide, researchers are looking for a superior method to fix illnesses with fewer symptoms. As of late, researchers have imagined that it would be imperative to test if embryonic stem cell transplant may be compelling to repair harms caused by epilepsy. Furthermore, governments should identify centers equipped with physical offices like video-electroencephalography and MRI and prioritize the development of an epileptic medical process for the treatment of medication-safe epilepsy.



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APPENDIX

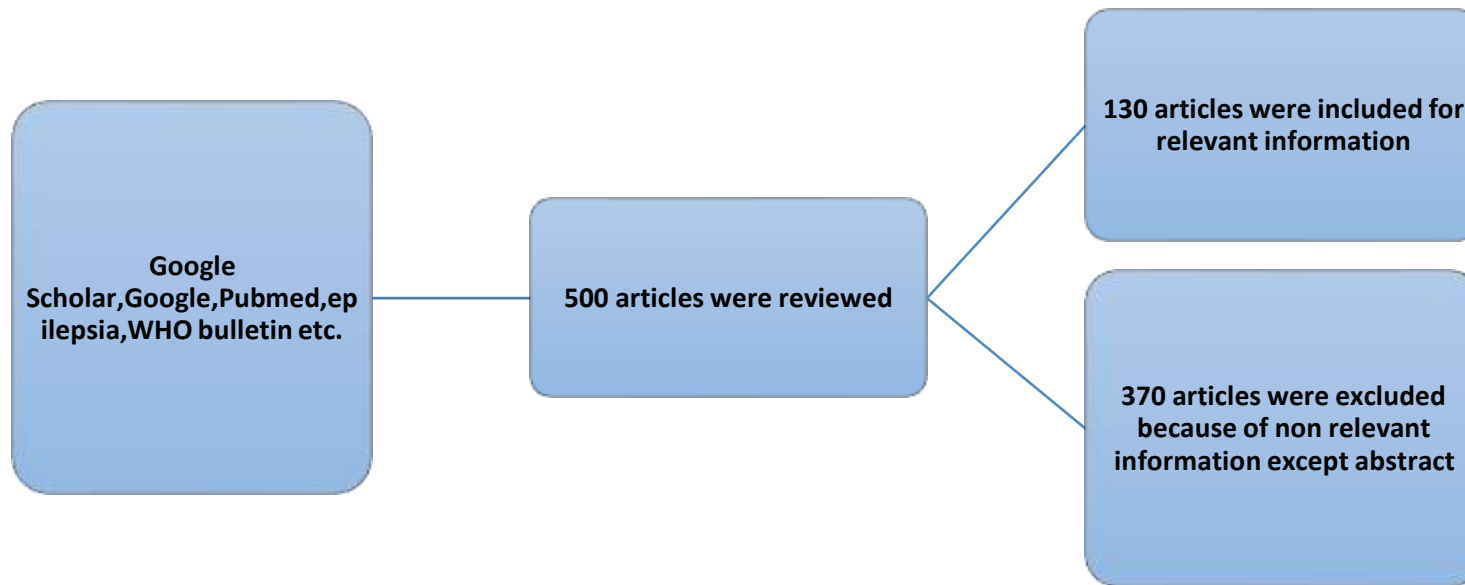


Fig 1. Article search protocol

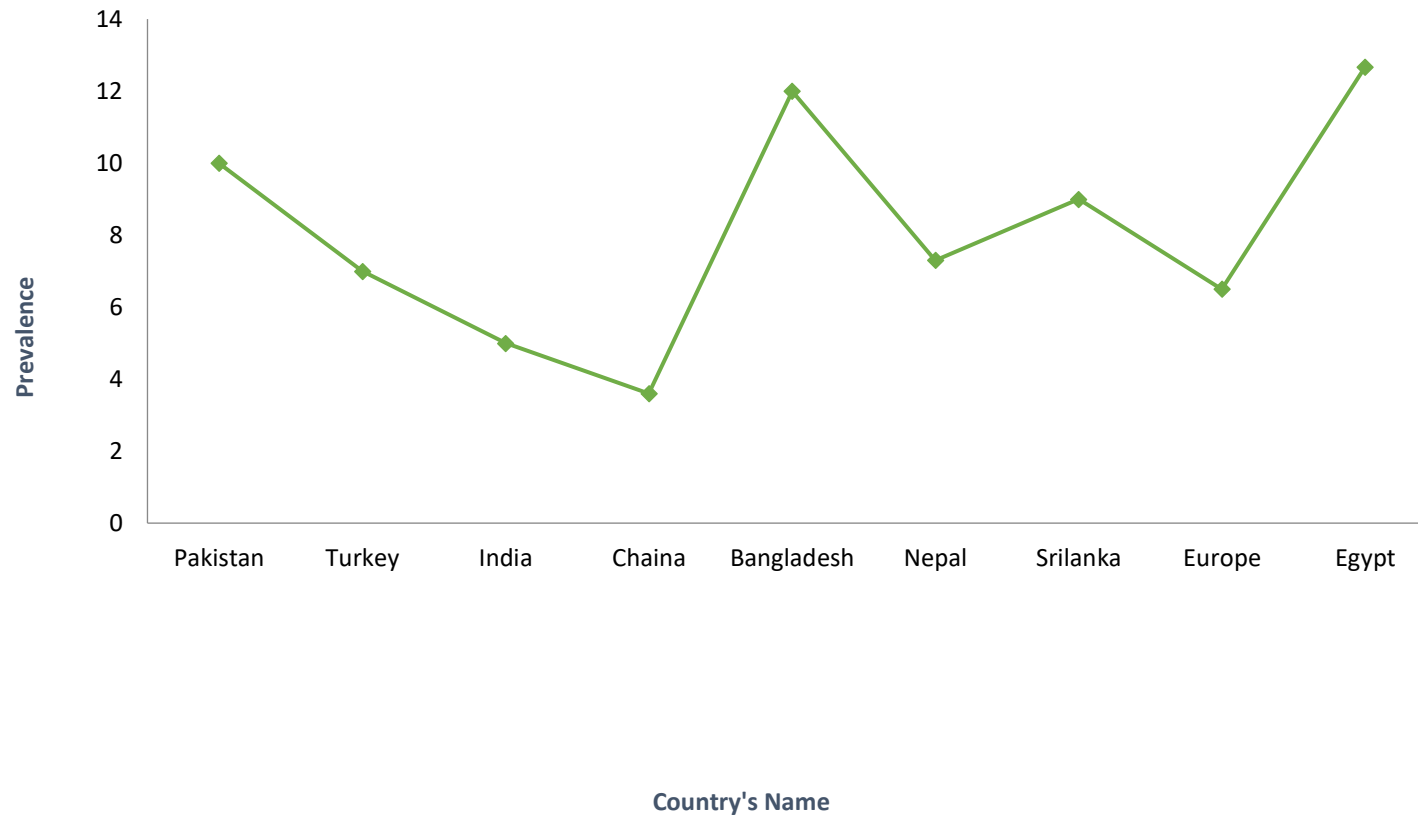


Fig 2. Prevalence of epilepsy in a different region

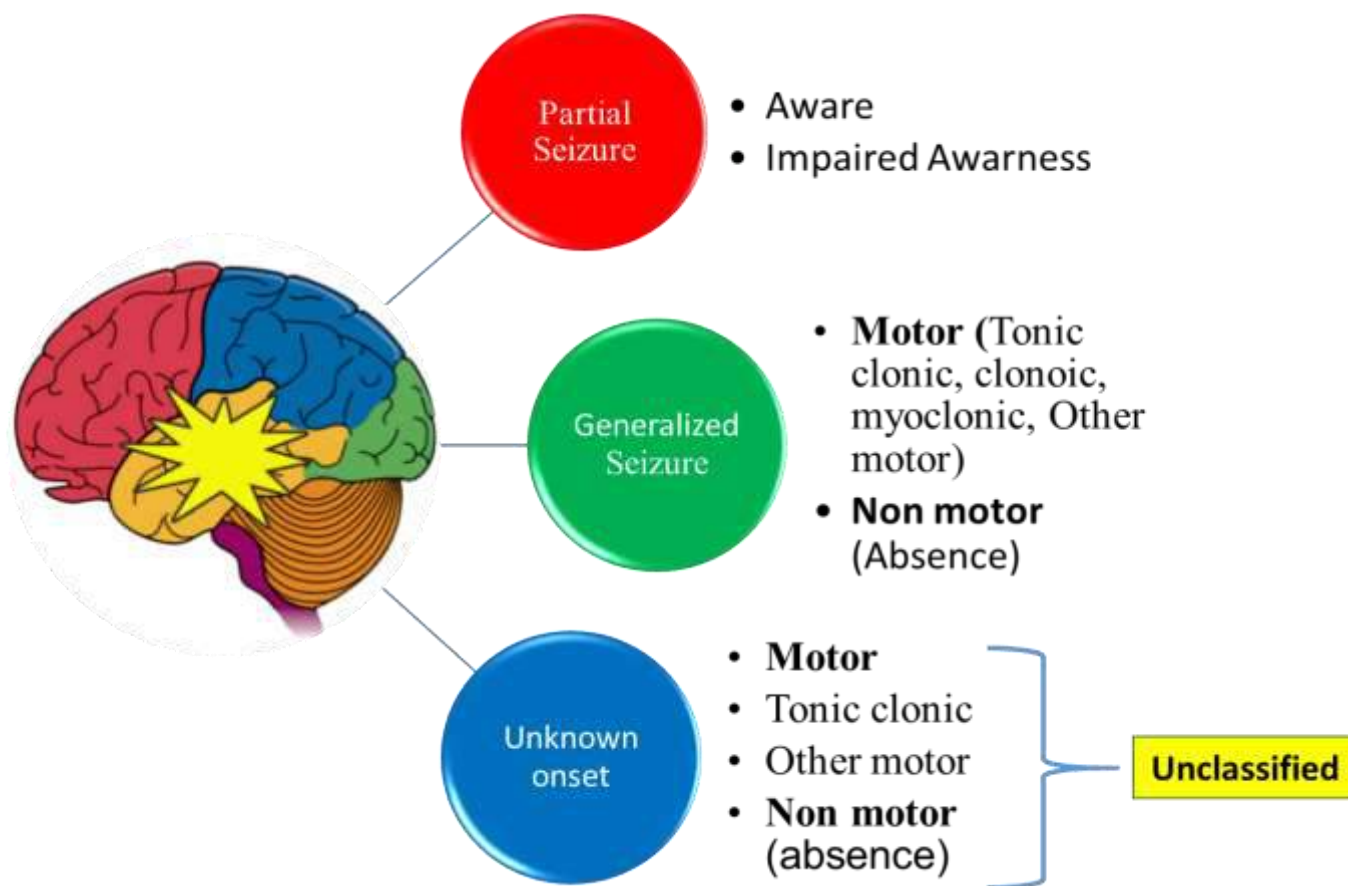


Fig 3. ILEA Classification of Epilepsy

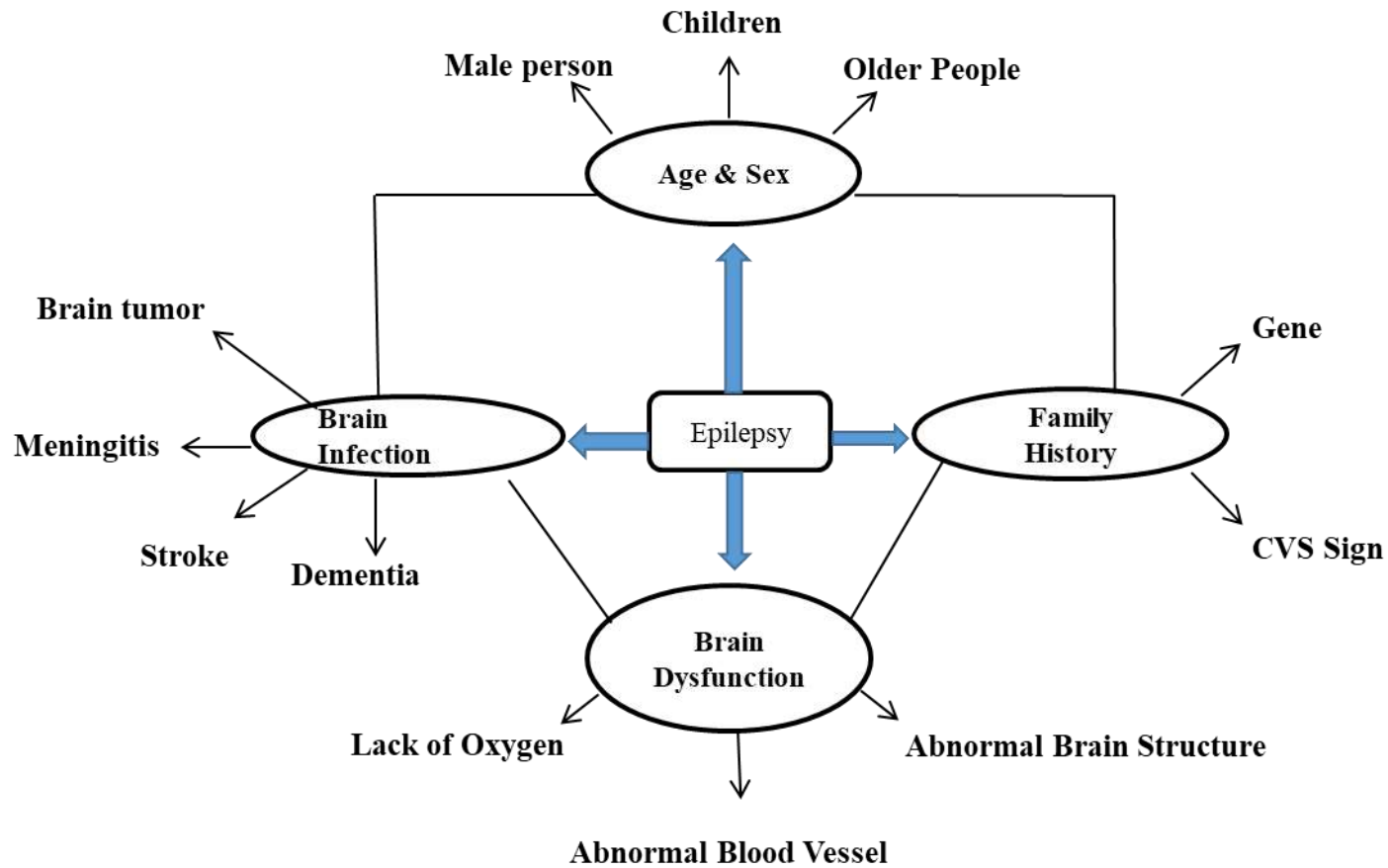


Fig 4. Schematic diagram of certain risk factors which influence epilepsy

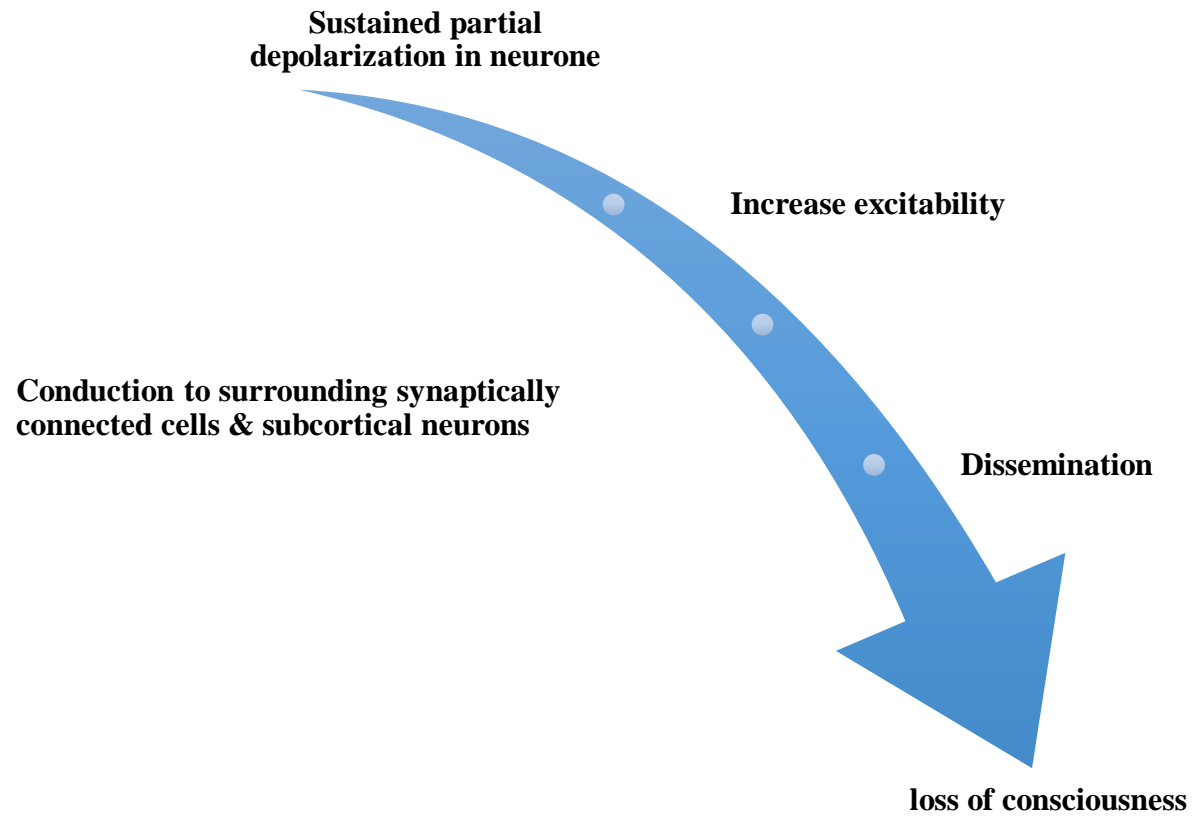


Fig 5. Pathogenesis of Epilepsy

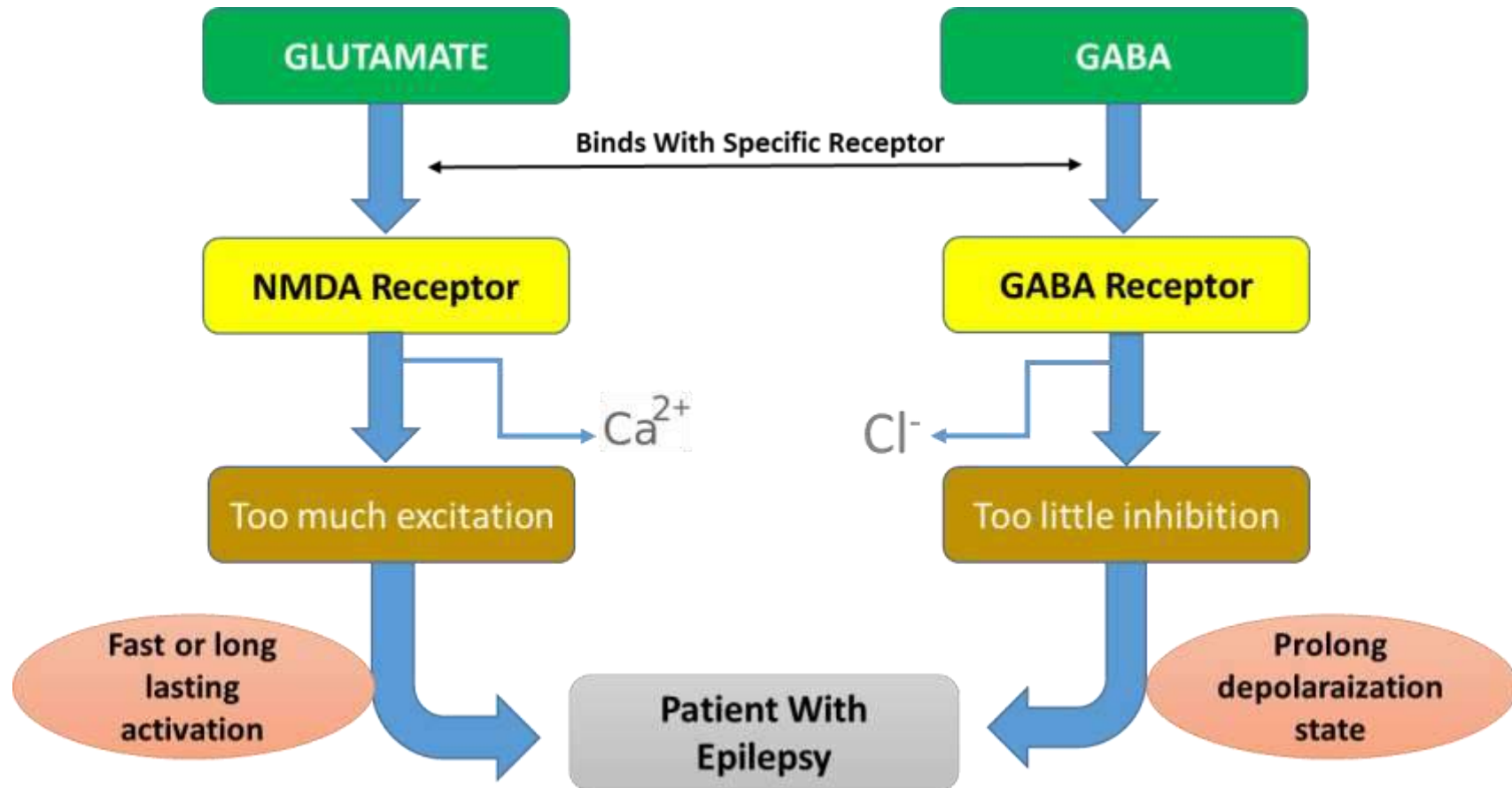


Fig 6. Role of glutamate & GABA to influence epilepsy

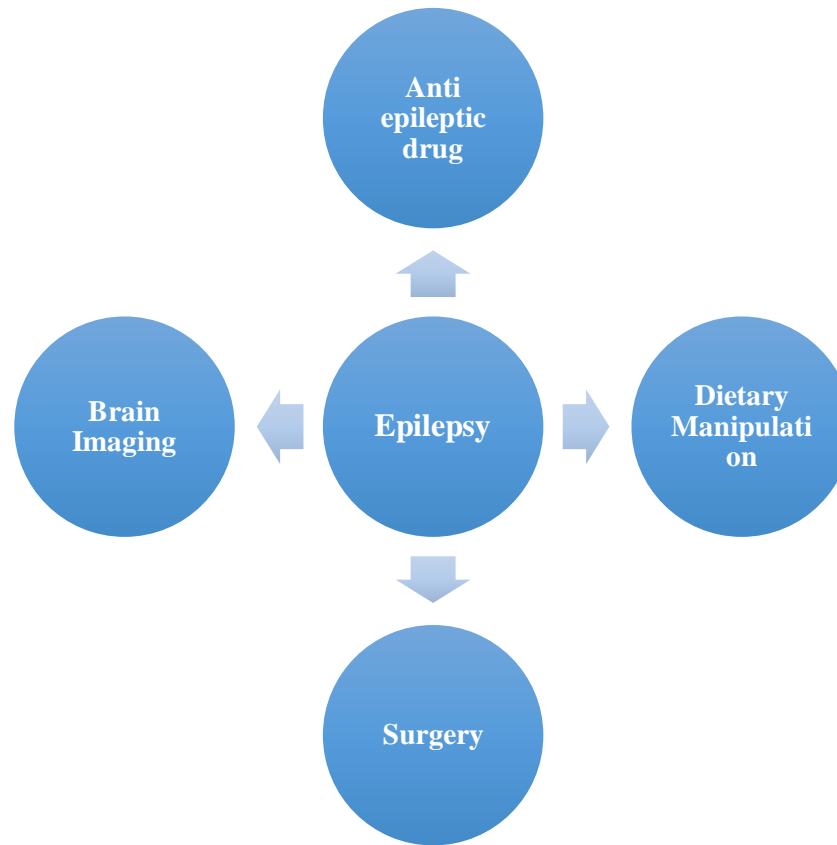


Fig 7. Treatment option for epilepsy

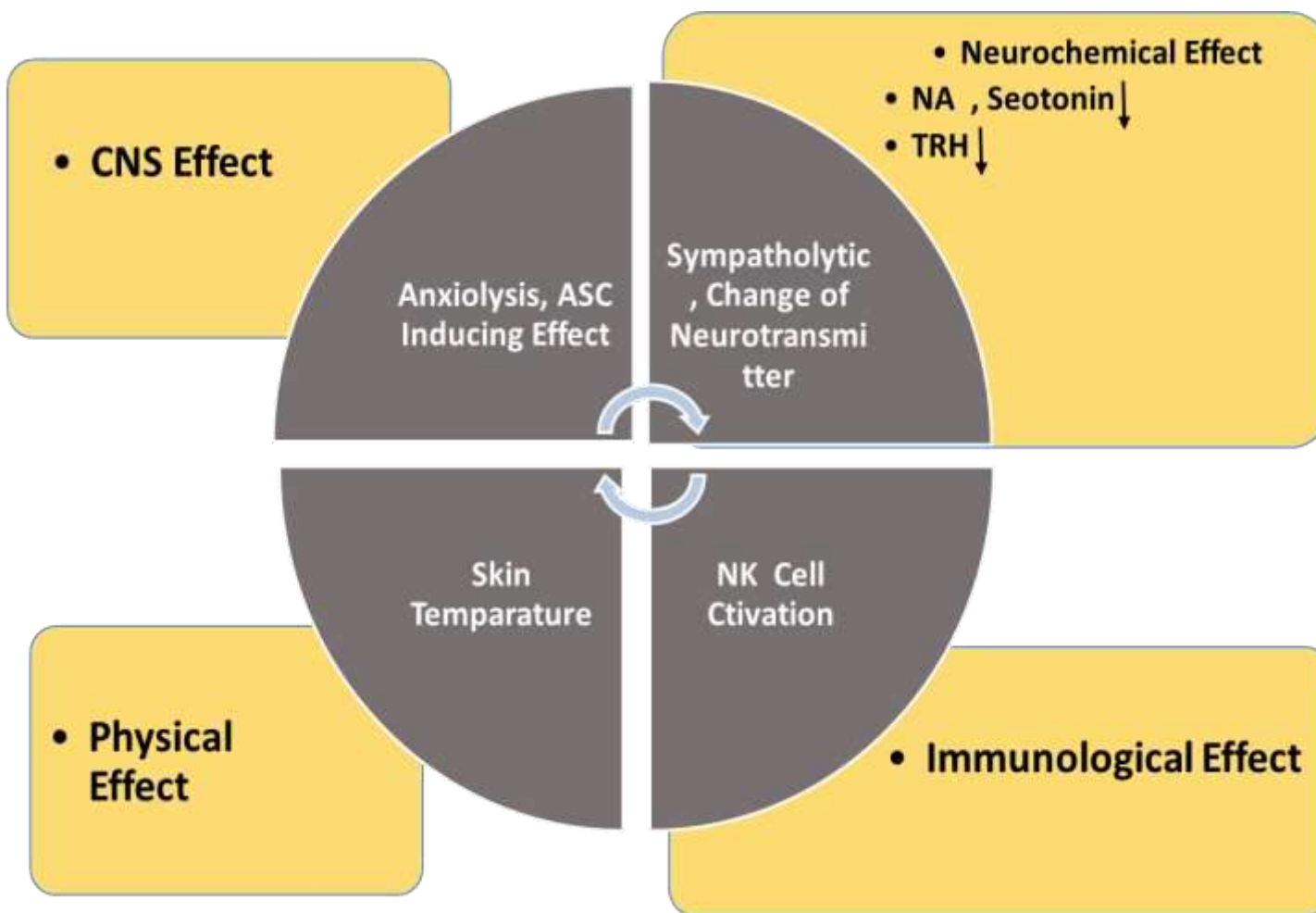


Fig 8. Shirodhara induced CNS effects, immunological & physical Change

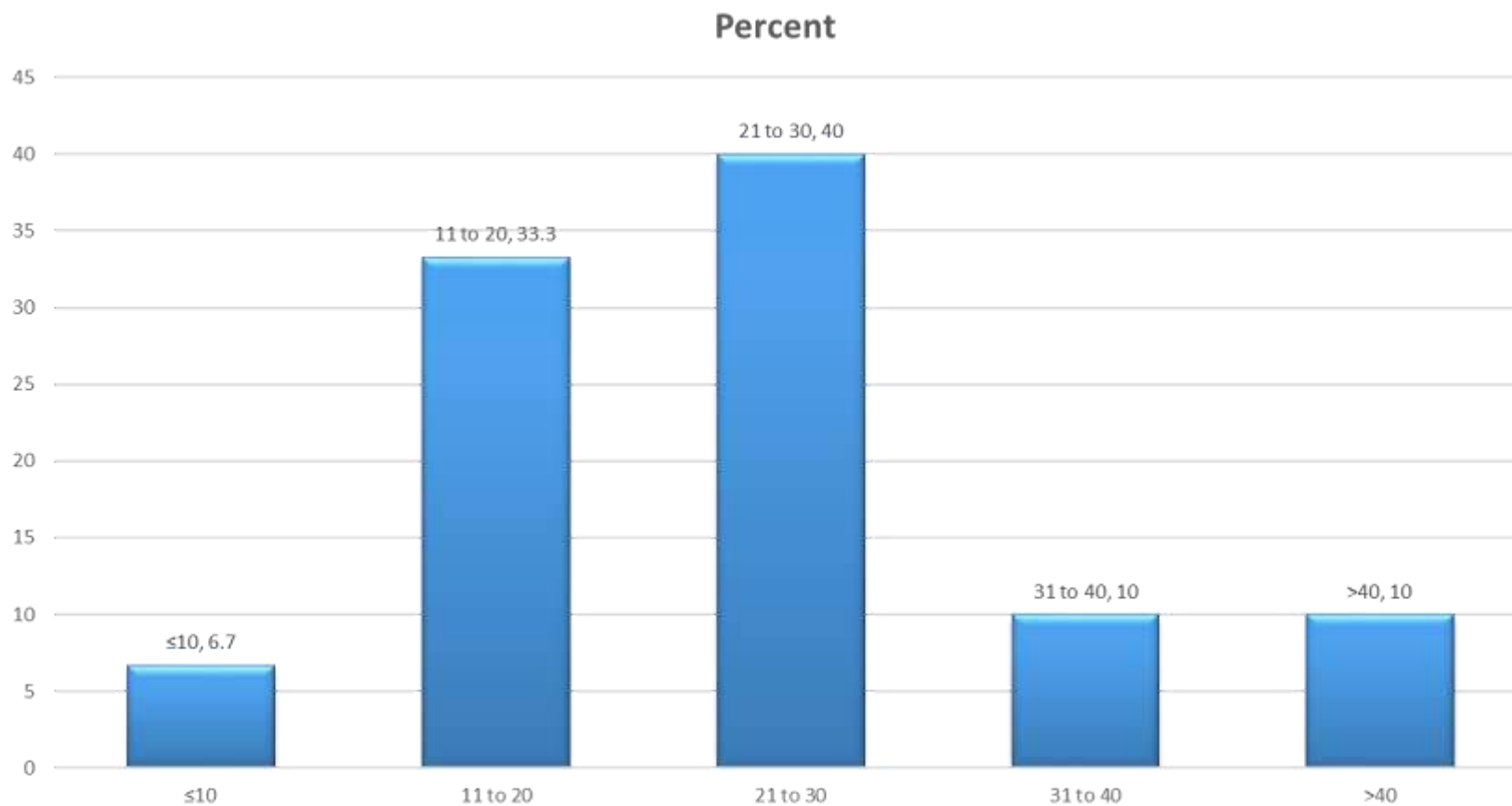


Fig 9. The age-specific prevalence rate of epilepsy in Bangladesh



AN ANALYSIS OF FINANCIAL PERFORMANCE OF SELECT INDIAN INDUSTRY SECTORS BEFORE AND AFTER COVID 19

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ABSTRACT

Covid-19 impacted the Indian industries as there were lock down restrictions, supply chain disruptions and other issues. The stock market which is an indicator of industry's performance crashed when lockdown was announced. Financial performance of the companies got impacted and many of them are the process of recovery. A study was conducted to find the impact of Covid on the financial performance of three key industry sectors in India, namely, Healthcare, Automotive and Information Technology. The above analysis shows that 4 out of 5 Top companies in the Healthcare, Automotive and Information Technology sectors have recovered after Covid and have done well in their growth and profits. The IT industry stocks compared to other industries under study, have performed well post pandemic. The Automotive industry has also recovered but is not growing as compared to pre Covid era, the shortage of silicon chip can be a reason behind its slow growth. The healthcare industry improved drastically due to the need of medical attention needed in the country. The analysis shows that 4 out of 5 Top companies in the Healthcare, Automotive and Information Technology sectors have recovered after Covid and have done well in their growth and profits.

KEY WORDS: Covid-19, Healthcare, Automotive, Information Technology, Profitability and growth.

INTRODUCTION

Industries all across the world were functioning under the threat of global financial markets during Covid. As a result of the lockdown, unemployment rose, interest rates fell, and the stock market became very volatile. The pandemic's results were devastating, with millions of people sliding into poverty, businesses facing extinction, the workforce enduring job losses, and society undergoing a paradigm change. The impact of Covid-19 was very bad on the NIFTY 50 and Sensex because at the initial stage of Covid NIFTY lost about 4470 points or about nearly 37 per cent and Sensex lost 3934 points in March 2020. With an increase in the number of coronavirus cases in India, the Sensex and NIFTY registered their worst losses ever. The stock market reflects the crisis and its consequences. Therefore, the COVID-19 outbreak is crucial for analysing stock price volatility. Stock prices are also an important indicator of a company's success and value to its shareholders. The COVID-19 pandemic is influencing several businesses and has destroyed some of them throughout the world. The majority are withering as a result of the crisis. Simultaneously, the scenario has created opportunities for numerous businesses to thrive, including manufacturing and logistics. In this study we have analysed the influence of the COVID-19 pandemic on stock prices in Indian businesses such as Automotive, IT and Healthcare.

While the stock market reacted positively to the announcement of the lockdown, once the lockdown restrictions were relaxed. In this study, we have analysed the financial performance of the

Healthcare, Automotive and Information Technology sectors before and after COVID.

LITERATURE REVIEW

This part of the research focuses on the relevant past empirical studies done on pandemics and their effect on the stock market.

Avijit Sikdar (2021), In this study he discovered that the average daily share price, average daily return, daily number of transactions, and volatility varied considerably between the before and after COVID periods for most industries. However, he did not see a substantial variation in the delivery percentage of traded shares in these industries between the two research periods.

Byomakesh Debata, Pooja Patnaik, Abhisek Mishra (2020), This study talks about the corona virus epidemic has had a severe negative economic impact in India. The question of how the Indian economy will recover has been raised by the brief stop in economic activity that saw India's exports plummet by 34.6% and imports decrease by 28.7% as nations closed their borders, the sharp collapse in equities markets, and the minimal activity in the service sectors.

Pravakar Sahoo and Ashwani (2020), In the best-case scenario, India's GDP could only increase by 0.5%, while in the worst-case scenario, it might contract by 3–7%. The effects on the manufacturing, MSME, and trade sectors are significant.



Basistha.D and Bora.D (2020), both studied the volatility of stocks of the BSE Sensex and NSE NIFTY index using a model called the GARCH model. The research found that Indian stock market experienced very high adverse volatility during the Covid-19 period. When results of pre and during periods were compared it was found that the return on indices was higher in the pre-pandemic period.

Our research covers financial performance before and after the Covid-19 period. For this purpose, the financial year 2019-20 is taken as the pre-Covid period and the financial year 2021-22 as the post-Covid period. We chose three industries for this experimental study: Healthcare, Automotive and Information Technology.

THE OBJECTIVE OF THIS STUDY

1. To study the stock market trend of Healthcare, Automotive and Information Technology industries before and after Covid 19.

2. To analyse the financial performance of Healthcare, Automotive and Information Technology industry pre and post-pandemic.
3. To analyse the growth of Healthcare, Automotive and Information Technology Industry.

RESEARCH METHODOLOGY

The research has been done using secondary data for before and after the pandemic era. The BSE Index has been used as the secondary data of daily stock trends. For overall financial performance of the industries data has been gathered from the BSE website, ACMA Report, Statista and Pharmabiz.com. Using this data we have analysed the growth, and profitability of the Top 5 companies from the industries under observation.

ANALYSIS AND INFERENCES

The stock market trends for the three industry sectors were analysed. Chart 1 – 3 show the trend by sector.

Chart 1: Stock Market Trend - Healthcare

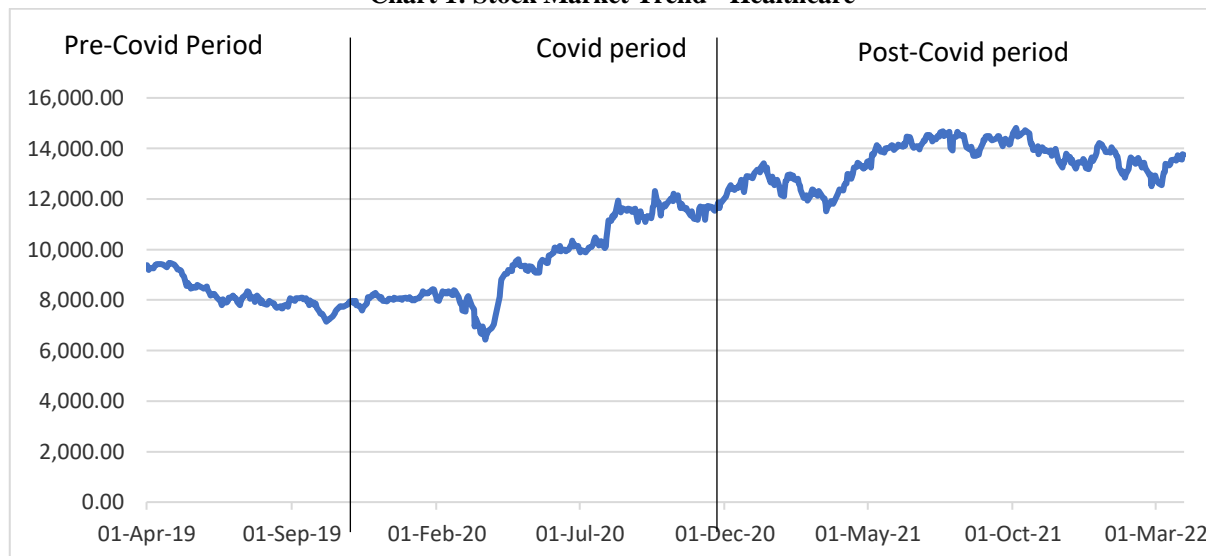
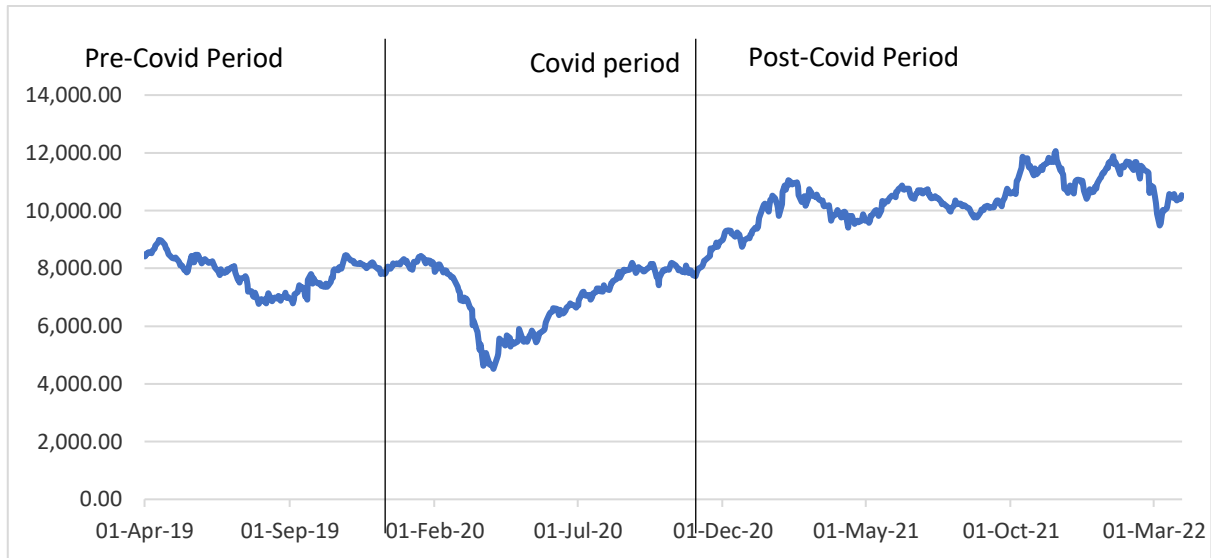


Chart 1 shows the overall stock price change in the Healthcare industry from the start of the financial year 2019-20 to FY 2021-22. Ever since Covid hit India the healthcare industry of India has increased rapidly. Before Covid, the highest stock price of this industry was 8378.65 as the lockdown was

imposed in India on March 24th 2020 the lowest it hit was 6432.30, but soon after exponential growth in this industry took place.

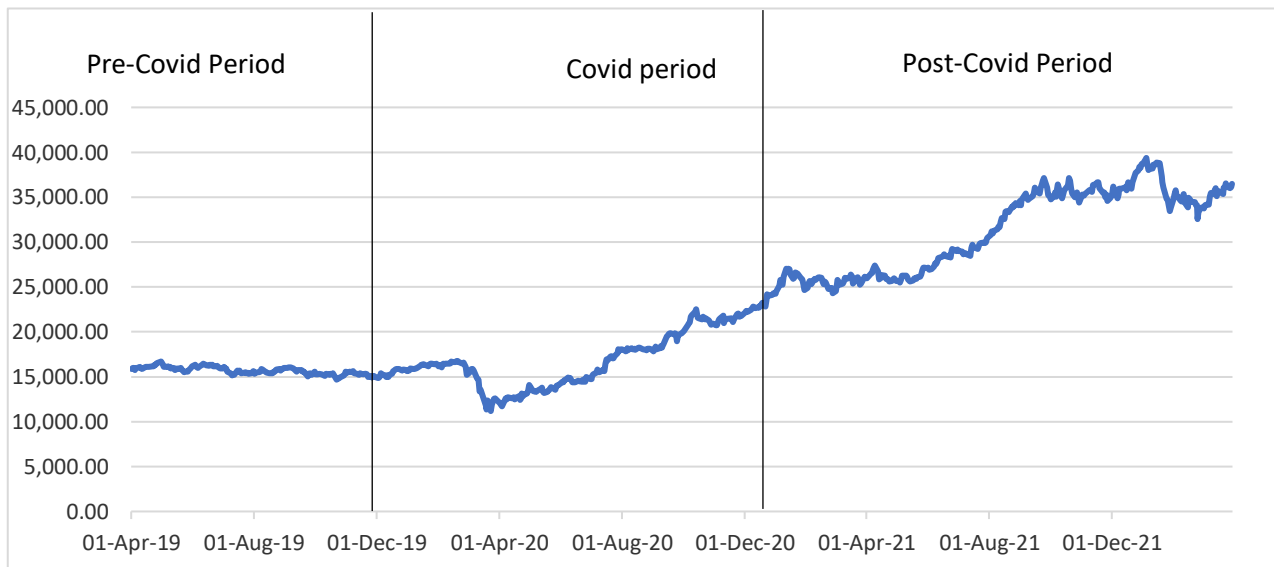
Chart 2: Stock Market Trend - Automotive



The stock trend of the Automotive industry looks positive in chart 2 but it did not grow at a very fast pace. Supply Chain bottlenecks like chip shortages around the world have affected this whole industry very badly. The chart above shows the growing trend of the Automotive industry before March 2020

but it reached its lowest from 8,395.90 to 4,517.75 due to the lockdown. The Automotive industry took time to recover after 1st wave but due to chip shortage, the growth was not exponential.

Chart 3: Stock Market Trend – Information Technology



The stock market trend in the IT industry did fairly well pre Covid as shown in chart 3. In this case, initially the stock trend in the IT industry in the financial year 2019-20 increased but towards the end of the financial year the stock market dipped down due to a peak in Covid. However, the IT industry was able to bounce back strong in the financial year 2021 and it is growing continuously since. Right before Covid, we can see in the graph that the IT industry had stable growth, the highest was 16,748.75 before Covid but at the peak of Covid the prices fell to 12,099.25, indeed a bad phase for IT. But we can see, this

industry got adapted to the new normal and their growth went exceptionally well reaching the highest level of 39,370.70 points which no other industry could achieve in our research.

ANALYSIS OF GROWTH & PROFITABILITY OF TOP COMPANIES

We have analysed the growth and profitability of the top 5 companies in each of the three sectors. Table 1 relates to Health Care Industry.



Table 1A: Revenue and Profit - Healthcare

Companies	Revenue(Rs.) 19-20	Revenue(Rs.) 21-22	Growth	Net Profit (19-20)	Net Profit (21-22)	Increase/Decrease in Net Profit
Sun Pharma	140.4B	165.4B	17.81%	22.87%	-0.60%	Decrease
Cipla ltd.	135.5B	137.6B	1.52%	17.11%	21.50%	Increase
Divi's Lab	55.B	89.9B	63.46%	24.96%	32.79%	Increase
Dr. Reddy Lab	118.5B	144.5B	21.94%	24.79%	11.23%	Increase
Apollo Hospitals	98.1B	61.5B	-37.33%	6.96%	13.87%	Increase

In Table 1A, the growth of these companies has been positive except for Apollo Hospitals. The growth of Apollo Hospitals is negative compared to the revenue of FY 2019-20 in FY 2021-22. But if we look at the profitability, it has increased for all companies except Sun pharma.

The Current Ratio indicates the solvency of the company. The Current Ratio is arrived at by dividing current assets by current liabilities. The Current ratio of these companies was also analysed to find the impact post-Covid period. Table 1B shows the analysis of the Current Ratio.

Table 1B: Current Ratio - Healthcare

Companies	Current ratio			
	2019-20	2021-22	Change	Favourable/Adverse
Sun Pharma	2.00	2.00	0.00	Favourable
Cipla ltd.	3.44	4.22	0.23	Favourable
Divi's Lab	5.16	7.10	0.38	Favourable
Dr. Reddy Lab	1.80	1.90	0.06	Favourable
Apollo Hospitals	1.19	2.91	1.45	Favourable

In the Table 1B Current ratio of these companies has been favourable.

Table 2A: Revenue and Profit – Automotive

Companies	Revenue(Rs.) 19-20	Revenue(Rs.) 21-22	Growth	Net Profit (19-20)	Net Profit (21-22)	Increase/Decrease in Net Profit
Maruti Suzuki	790.3B	900.9B	13.99%	8.94%	5.09%	Increase
Tata Motors	453.1B	479.2B	5.77%	-15.73%	-3.42%	Decrease
Mahindra & Mahindra	471.6B	595.2B	26.22%	6.61%	10.48%	Increase
Bajaj Auto	316.5B	343.5B	8.54%	16.11%	14.61%	Increase
Honda MotoCorp	296.1B	298.B	0.63%	12.27%	8.30%	Increase

Table 2A above shows the growth and profitability of these companies. If we have a look at the growth, Tata Motors did

not do well compared to others and their profitability has also decreased which is a negative sign for this company.

Table 2B: Current Ratio – Automotive

Companies	Current ratio			
	2019-20	2021-22	Change	Favourable/Adverse
Maruti Suzuki	0.70	1.00	0.30	Favourable
Tata Motors	0.53	0.58	0.05	Favourable
Mahindra & Mahindra	1.19	1.40	0.21	Favourable
Bajaj Auto	1.55	2.13	0.58	Favourable
Honda MotoCorp	1.53	1.21	-0.32	Adverse

The Table 2B shows the current ratio of these companies are all favourable but for Hero MotoCorp it has gone adverse.

Table 3A: Revenue and Profit – Information Technology

Companies	Revenue(Rs.) 19-20	Revenue(Rs.) 21-22	Growth	Net Profit (19-20)	Net Profit (21-22)	Increase/Decrease in Net Profit
TCS	1313.1B	1603.4B	22.11%	25.33%	23.82%	Increase
Infosys	817.5B	1071.6B	31.09%	19.01%	19.82%	Increase
HCL Technologies	331.9B	415.2B	25.08%	27.02%	26.19%	Increase
Wipro	528.8B	642.8B	21.55%	16.41%	18.88%	Increase
Tech Mahindra	315.9B	362.5B	14.74%	14.35%	13.55%	Increase

As visible in the table 3A the top 5 companies did exceptionally well during these 2 financial years as growth and profitability of these companies are positive.

Now lets have a look at the current ratios:

Table 3B : Current Ratio – Information Technology

Companies	Current ratio			
	2019-20	2021-22	Change	Favourable/Adverse
TCS	3.30	2.6	-0.70	adverse
Infosys	2.80	2.1	-0.70	adverse
HCL Technologies	1.60	2.6	1.00	Favourable
Wipro	2.40	2.0	-0.40	adverse
Tech Mahindra	3.20	2.6	-0.64	adverse

Table 3B shows the current ratio situation for almost all of them are adverse except for HCL Technologies. HCL has been doing good in the terms of maintaining their current asset.

The overall performance of the three sectors is given in the Table 4 below:

Table 4 : Revenue and Profit - Overall

Industries	Revenue(Rs.) 19-20	Revenue(Rs.) 21-22	Growth	Net Profit (19-20)	Net Profit (21-22)	Increase/Decrease in Net Profit
Automotive	3496.4B	4200.0B	20.12%	29.17%	-22.90%	Decrease
Healthcare	2310.5B	2753.7B	19.18%	11.41%	11.57%	Increase
Information Technology	13151.1B	14414.2B	9.60%	0.86%	25.32%	Increase

Source: ACMA, Pharmabiz, Statista

The above analysis shows the growth and profitability of the mentioned industries overall. It shows there is decrease in automotive sector mainly due to shortage of silicon chips and other two are in growing stage.

CONCLUSION

The above analysis shows that 4 out of 5 Top companies in the Healthcare, Automotive and Information Technology sectors have recovered after Covid and have done well in their growth and profits. From the analysis we can observe that:

1. The IT industry stocks compared to other industries under study, have performed well post-pandemic.
2. The Automotive industry has also recovered but is not growing as compared to pre- Covid era, the shortage of silicon chips can be a reason behind its slow growth.
3. The pharma industry improved drastically due to the need for medical attention needed in the country.

The profits of the top companies in these three sectors have shown positive growth. So, we can conclude from the analysis that the financial performance of the industries in scope has shown positive growth and profitability compared to the pre-pandemic era and has recovered. The study covers only three industries and the Top 5 companies in these three industries in particular. Hence the findings may be not the same for the other industries.

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A CONTEMPORARY STUDY OF ENVIRONMENTAL CHALLENGES IN SUNDARBAN TIGER RESERVE: A UNESCO WORLD HERITAGE SITE

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ABSTRACT

The geographical location of the Sundarban Tiger Reserve lies between 88° 10' E to 89° 51' E and 21° 31' N to 22° 30' N, covering the major portions of the North and South 24 Parganas district of the state West Bengal. The Sundarbans is the largest mangrove ecosystem in the world and a UNESCO world heritage site known for its pristine natural forest and the associated cultural heritage. The reserve is a home to numerous flora and fauna including the apex species Royal Bengal Tiger and three other lesser cats. Moreover, it acts as the natural barrier to the various cyclones and storm surges that arise due to various weather phenomena in the Bay of Bengal. As a result of Global Warming and the resultant Climate change the frequency of such events are increasing more than any other part in the world. In recent times ground truthing of GIS data indicated that some of the areas are getting submerged into the tidal water courses due to sea level rise. Moreover increasing frequency and the impact of cyclones, rill and gully erosion, and severe landslides which are the integral parts of an active delta formation have accelerated the dynamism. It is important to note that, new land formation and frequent landslides in the riparian area may compensate for each other on a larger scale but it is difficult to modulate the impacts on the overall wildlife and the ecosystem in a specific area. To understand the past dynamics of the ecosystem and ascertaining the future of the landscape under the ensuing climatic scenario and the interventions required in the wildlife management of the reserve is discussed in the paper.

KEYWORDS: Sundarban Tiger Reserve, UNESCO, global warming, sea level rise, erosion, wildlife, elevation.

1. INTRODUCTION

The Sundarbans is the largest mangrove delta in the world and it is a designated UNESCO World Heritage site administered under Man And Biosphere (MAB) program. The vast area of about 10,000 sq Km is divided between two countries, i.e. India and Bangladesh [1]. The biotic and abiotic components of the unique natural habitat make the delta a unique landscape. Diurnal Tidal Influx, Constant accretion and erosion, Submergence of the island during high tide and the adaptation of the Mangroves and other species to such demanding abiotic conditions thereof are the defining features of the Ecosystem. The oxygen deficient soil, often called physiologically dry soil, acts as an abiotic stratum which supports about 69 true mangroves and mangrove associated floral species and has a huge carbon sequestration potential. The fifth estimate of the Intergovernmental Panel on Climate Change (IPCC) suggests that the mean summer temperature will rise by 1.5– 2.0 degree C and mean winter temperature will rise by 2.5– 3.0 degree C by the 2050s which would result in sea level rise of up to 37 cm in the Bay of Bengal [2]. The surface water temperature in the Sundarbans has been rising at

a rate of 0.5 degree C per decade over the last three decades [3]. It is anticipated that a sea level rise of 10 cm, 25 cm, 45 cm, and 60 cm will engulf 15%, 40%, 75% of the forest area respectively. The World Bank report conjectured that a rise by 1.0 m sea level will submerge the whole of Sundarbans [4]. Owing to anthropogenic emissions and the ensuing global warming, the sea level is rising on an average of 3–4 mm every year and the rate of increase is accelerating. In line with scientists like Cazenave *et al.* the heat absorbed by ocean water results in thermal expansion which has also contributed to the rise in sea level apart from the influx of freshwater trapped in glaciers throughout the world [5,6]. Increased ocean temperature is accelerating the Antarctic glacier outlets, which might possibly result in rapid sea level rise [7]. Akhil *et al.* avowed that the northern Bay of Bengal receives a great amount of freshwater directly from monsoonal rains over the ocean, and obliquely through river runoffs [8]. Thus, the resulting salinity stratification hinders vertical mixing of heat and contributes to maintaining warm sea surface temperature and high climatological rainfall over the bay. Islam and Gnauck suggested that the salinity around the Sundarban region has



been increasing due to remarkably lower discharge from the Ganges River after the construction of Farakka Barrage in West Bengal [9].

It is noteworthy that a huge population of people are dependent on the natural resources of the reserve. The agrarian society, especially the fishing and crab-hunting community earn their livelihood directly from the resources of the reserve. These people are directly affected by the natural calamities that occur due to Climate Change on a frequent basis. Mangroves are the natural barriers and act as a shield against the effects of the frequent cyclones, increasing tide levels and storm surges. Due to frequent landslides (locally known as 'bhangon') some land areas are lost to erosion. Thus the impacts of Climate Change will have a disproportionate effect on Sundarbans due to its vulnerabilities and will result in the submergence of the forested islands which will ultimately result in the habitat loss for numerous flora and fauna, biodiversity, coastal shield against cyclonic impacts and other valuable ecosystem services. In this paper, we discuss in lengths the past, present and the possible future in the short to medium term in terms of the change in the landscape due to the active accretion and erosion and the increasing tide levels.

OBJECTIVES

This article is focused on the changing Landscape and the change in real time elevation profile of the Sundarban Tiger Reserve (STR) due to sea level rise. To understand and establish the impacts of future climatic scenario and the resultant sea level rise on the landscape which will help in mending the management strategies to better protect the forest cover, wildlife and the landmass sustainably from damage and destruction. Discussions on the Climate change related topics and the impetus that is required in the Policy level for the necessary course correction required in the management of the landscape will be the main objective of the paper. By observing the projected GIS maps, policy makers will have a clearer idea of which are the strategically important locations which will require management interventions with a more comprehensive wildlife management strategy plan. The present study will help in the policy making in Sundarban context in the near and mid future.

2. METHODOLOGY

Data Source-

A total of 4126 locations (GPS coordinates) with their real time elevation data (August 2022) were taken all over the TR area associated with the Bangladesh border to create an intensive DEM (digital elevation model) through World Geodetic System (WGS84 coordinate system) through Landsat8 satellite. The entire geo-database is verified with the ESRI (Environmental System Research Institute) free software system. After that, the DEM was imported to QGIS 3.24.2 Tisler for better understanding.

Altitude data were fixed as the 'attribute' dataset in this study. The authors had used the heat map operation for better thematic output. High heat zones are mostly coloured with yellow to greenish which means the comparatively high elevated zones. Note that, the pale blue colour indicates medium elevation and the deep blue dots to denote the lower elevation profiles. Three coordinates are fixed with latitude, longitude and altitude (elevation) data with X, Y and Z axis respectively. Hence the elevation profile map was prepared for clarification. Google Earth Pro software was also used for ground truthing. Highest elevation point was around 15 meters and the lowest elevation point was around -2.0 meters recorded in the study period.

Study area-

The STR is considered as the study site. In the digital survey work, the authors are majorly focusing on the areas of STR which comprises the area of 2584.89 sq KM along with adjacent areas of Bangladesh Sundarban for better understanding of the elevation profile.

3. RESULT & DISCUSSION

By analyzing the Quantum GIS it was observed that the National Park West (NP WEST) range has the highest possible chances of submergence as the Matla- Bidyadhari river system continuously widens (Fig 1). The distance between the northernmost tip of the Haliday island Wildlife Sanctuary to the nearest tip of Dalhousie Island (a.k.a. Mayadweep under NP West of STR) was 5.1 KM in 2004; but in 2021, the distance became 6.76 KM. The shrinkage of the area of Haliday Island Wildlife Sanctuary is noteworthy due to continuous erosion, landslides and severe cyclonic storms raised in the Bay of Bengal, the distance and the area coverage had changed within a decade (Fig 1).

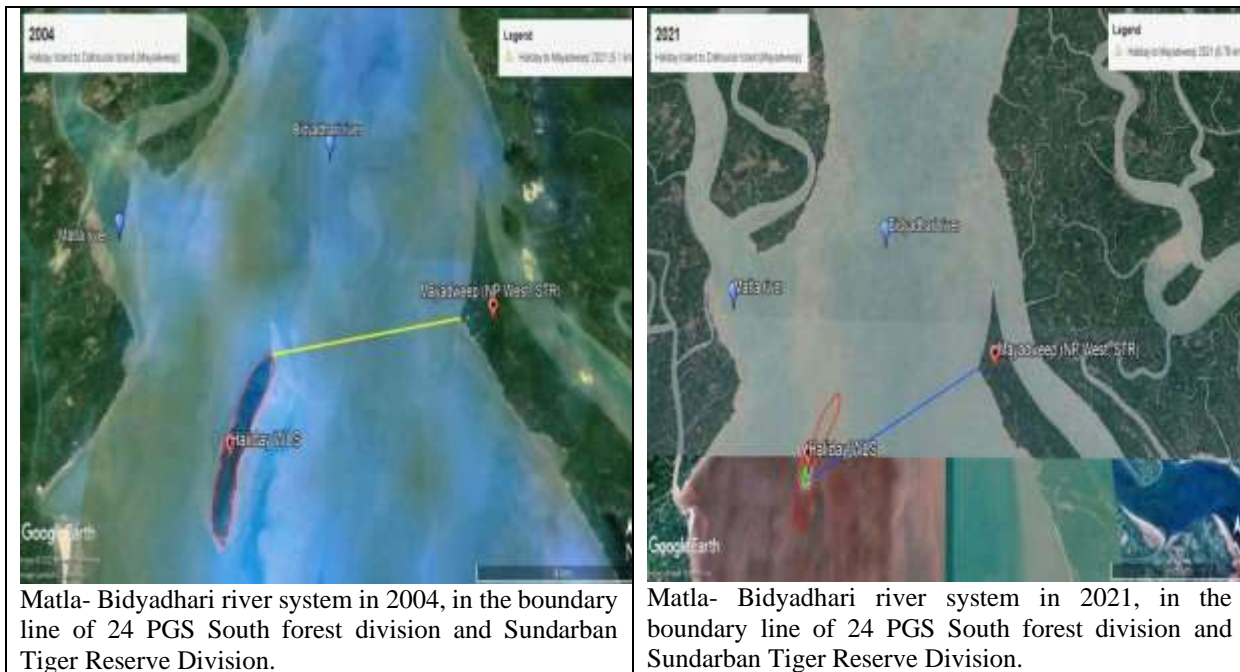


Fig 1: Matla- Bidyadhari river system.

The reducing elevation profile (from 1991 to 2021) of the islands resulting in damage and reduction of area of the islands has impacted the ecosystems directly, influenced by the change in river course and global sea level rise. The timeline of the past thirty years (1991-2021) showed the ups-and- downs of the landscape. Note that, when an area is sinking under the tidal influence (due to events viz. landslide) other new places (a.k.a. Char land) are rising. After that, ecological succession starts with the natural germination of Dhani grass (*Porteresia coarctata*) followed by *Avicennia* sp., *Sonneratia* sp. etc.

Landforms in a coastal region generally alter as a result of erosion, accretion, and inundation which are influenced by wave, wind, daily tide and cyclonic actions etc [1]. Reduction in the area of the Kendo Island (locally called as Bhangaduni Island) is the result of such natural climatic factors aggravated by Climate Change.. The area of Kendo Island was 37.8 sq Km in 1991, but presently it is 22.7 sq KM. The northern portion of the island is still elevated and the southern portion has been eroded since the 1990s (Fig 2).



Fig 2: Habitat loss at Kendo Island, a core area under National Park West range of STR.

Another instance of wave action and river course change is observed in the area under Haldibari beat (under National Park West Range, STR), it is situated in a core area. Note that, in 1990s it was an elongated horn-like structure, but in later 20s a new landform rises on Haldi river and the river flows in a bifurcated way (Fig 3). Moreover, river course widening is also observed in case of Dutta river in Sajnekhali Wildlife Sanctuary

range. The Dutta river flows between two populated areas, namely Pakhiralay and Dayapur; note that these areas are under Joint Forest Management Committees of STR. In 2003 the smallest distance between two islands was 969 meters (Fig 4); but now in 2022 it becomes 1149 meters (Fig 5). All the rivers and the creeks (a.k.a Khal) are connected with the Bay of Bengal, and daily tidal influx enhances the chance of landslides.

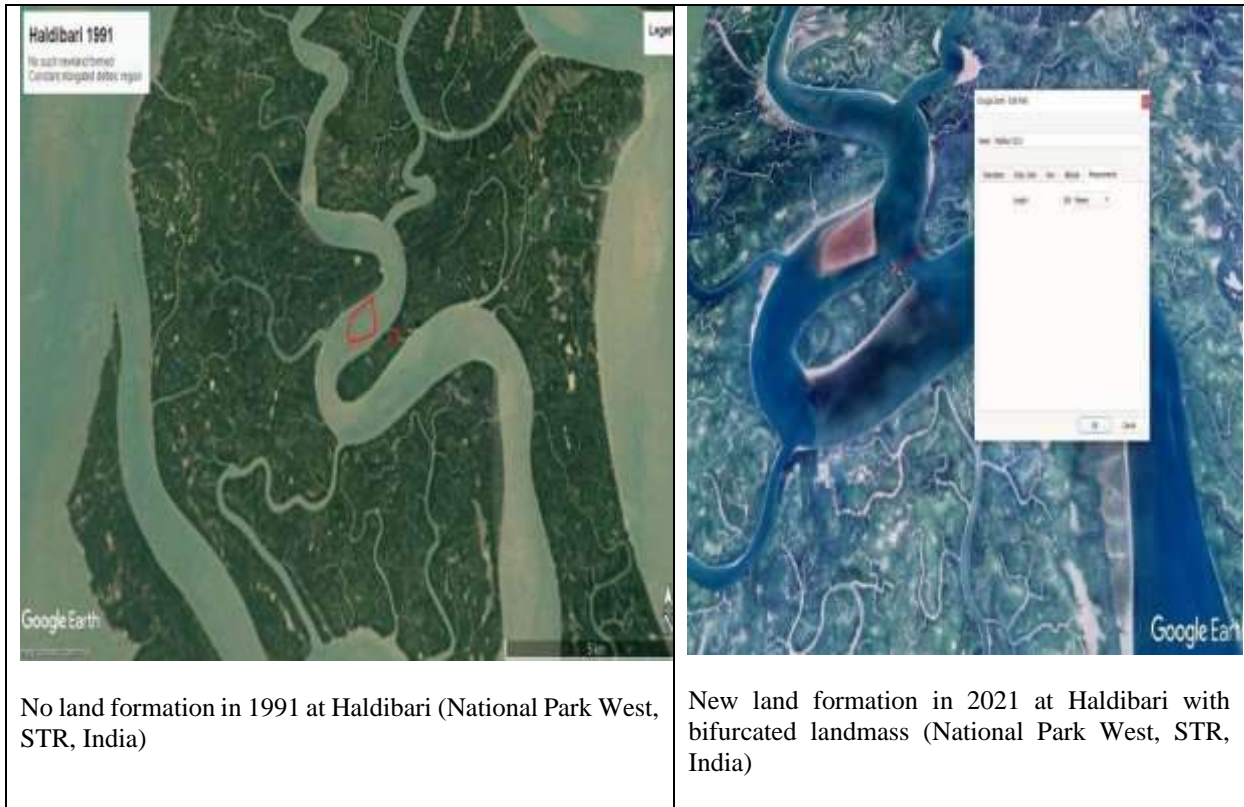


Fig 3: Silt deposition and land (a.k.a. char) formation near Haldibari beat from 1991 to 2021 and bifurcated Haldi river course.

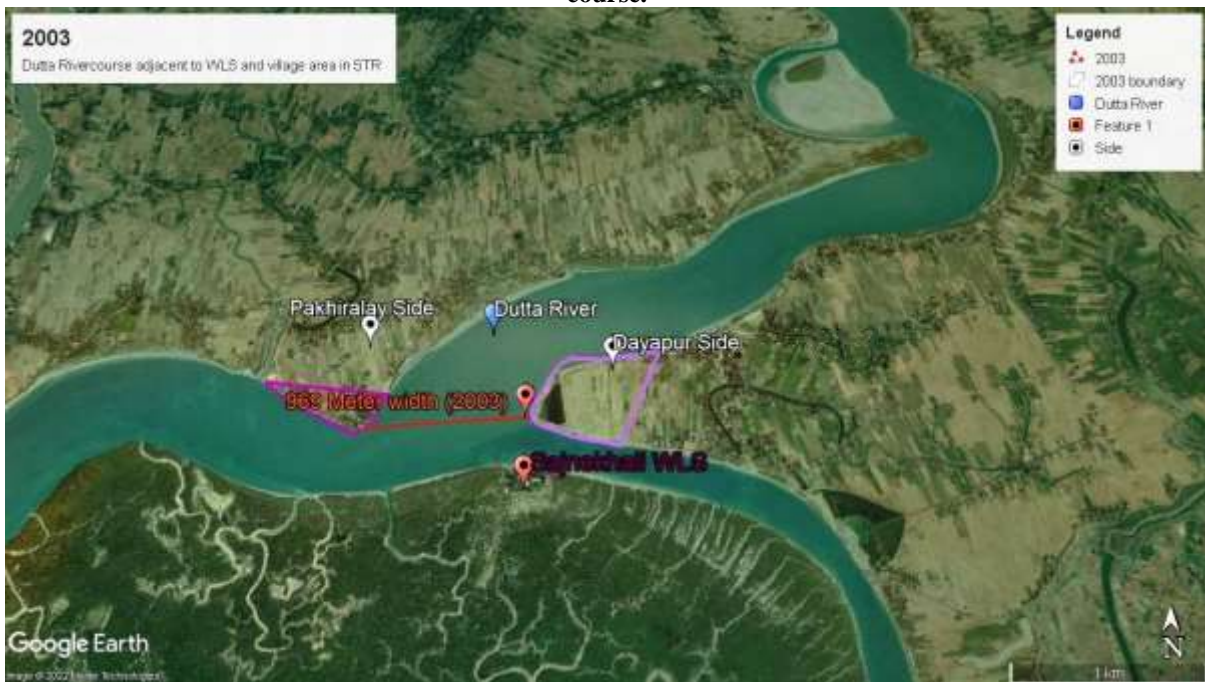


Fig 4: Dutta River course between Pakhiralay and Dayapur in 2003 (969 m).



Fig 5: Widening of Dutta River course between Pakhiralay and Dayapur under Sajnekhali WLS in 2022 (1149 m).

A submergence of the Dobanki Island and associated char (accretion platform) areas under Sajnekhali Wildlife Sanctuary (SWLS) is also observed. Besides this, the eastern and north-eastern part of the TR i.e. the Basirhat range (BHT,

distributed in both North and South 24 Parganas administrative districts) along with the Bangladesh Sundarban portion is comparatively elevated in comparison with the National Park West and Sajnekhali Region region (Fig 6).

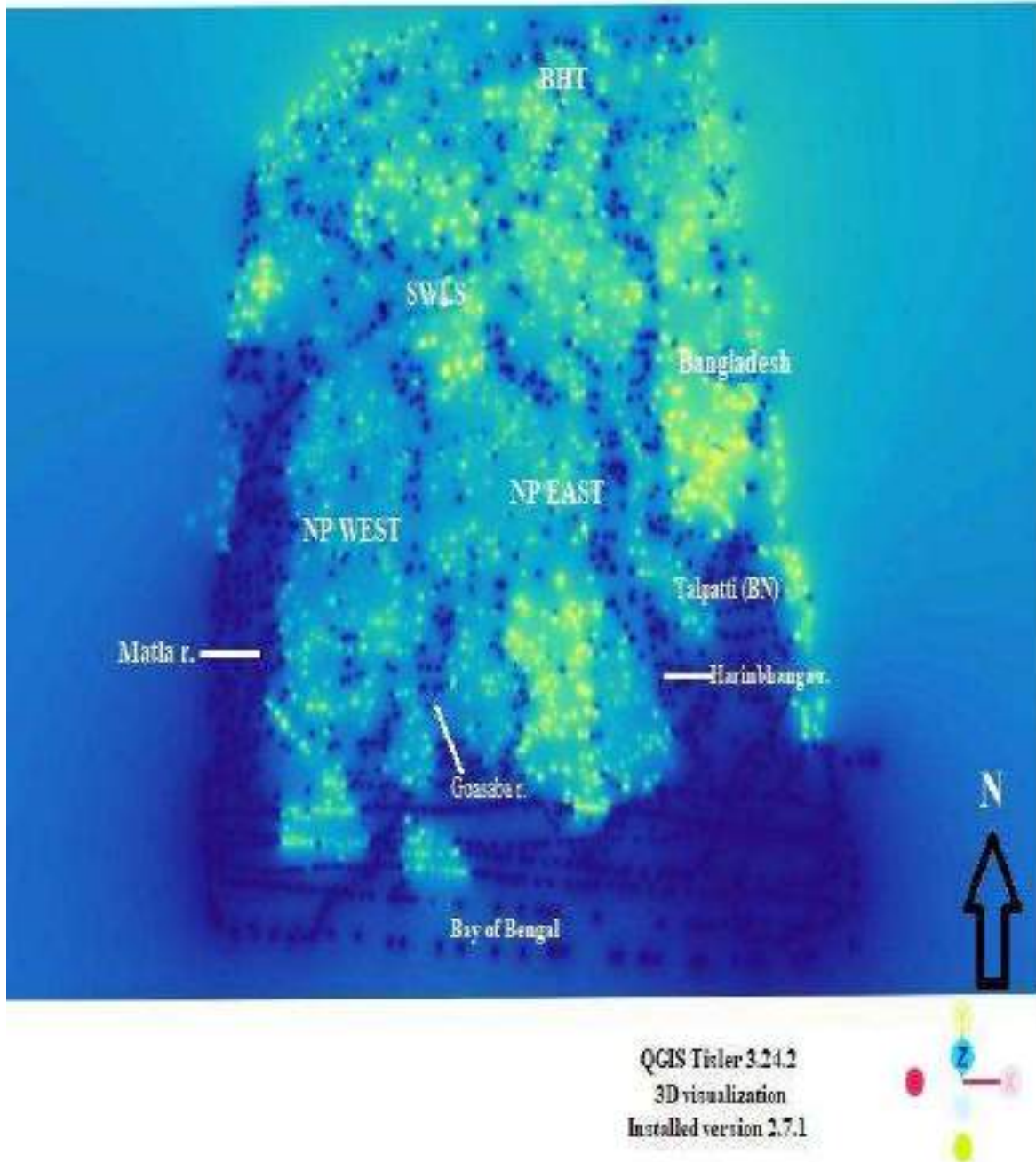


Fig 6: GIS map of Sundarban Tiger Reserve adjoining Bangladesh based on elevation profile. Scale Dark Blue (waters) to light Green (elevated land) - indicating lower elevation profile to Higher elevation profile.

4. CONCLUSION

As established in the above analysis the landscape has been subjected to regular accretion and erosion cycles in the past more in the western portion of the reserve and the rising sea levels and resultant increase in tide levels have accelerated the rate of such changes. The erosion system is predominant in

the Southern and western Part of the reserve resulting in loss of landmass and the Northern part is predominated by Accretion system resulting in the formation of New islands. In this regard, the National Park West and East Ranges are increasingly losing landmass but the same is not deposited in the Northern portion of the reserve but even beyond along the human habited islands.



This might in the future result in the net loss of land and habitat for the animals in the reserve in the longer run.

The DEM model shows that the islands in the western portion of the reserve are under greater risk of submergence as the elevation profiles of these islands are much lower in comparison to the islands in the east. This also raises the question of why there is a difference in elevation profile from the west to east. This might be due to the Freshwater inflow which is still intact in the eastern side in comparison to the western side and the resultant higher rate of deposition. This needs further study and analysis.

The Matla River is getting widened and the resultant land loss directly implies the habitat loss and habitat destruction to the wild animals as well as human beings in the western part of the river. New char land formation in the middle of the rivers in the northern extents of Sundarbans is also a threat, because it can block the water outlets to the adjacent villages and make it impossible for the movement of vessels and boats in these channels due to unavailability of required draft. Taking into account the above analysis there is a need for further research in various interdependent fields and a need for devising management strategies in the future mitigating the impacts of such changes that are unavoidable so as to ensure the protection and conservation of the wildlife and the rich biodiversity of the region.

Population pressure related challenges should be reduced by rehabilitation programmes along with sustainable livelihood for the fringe villagers. Reduction in Forest-dependency of the villagers needs more focus and measures should be taken to strengthen alternative livelihoods. Though the economy is based on agriculture, more salt-tolerant GMO crops can be introduced.

In this era of Climate Change, Sundarbans is the region with one of the highest vulnerability and also one of the regions which has least contributed to Global Warming. It is also true that the Sundarban mangroves have soaked in 4 Cr tonnes of carbon dioxide, and it acts as a major source of carbon sequestration owing to the huge biomass of Mangroves. Introduction of renewable energy dependent watercrafts in the Sundarban Tiger Reserve can reduce the carbon impact due to ecotourism and reduce pollution to a great extent. The role of mangroves lies not only as the natural barriers to cyclones, but also in nutrient recycling in the brackish ecosystem, as the nursery for the shellfish and fin fishes and a habitat for a wide variety of flora and fauna.

5. ACKNOWLEDGMENTS

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A STUDY ON EFFECT OF SOCIAL LOAFING IN PRODUCTIVITY

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ABSTRACT

Every business organization is trying to survive in the competitive corporate world, In order to gain competitive advantage and market positioning. The labor intensive economies and firms within that economy will always try to keep their position stable and stronger by giving due significance to their Human Resource. Human resource is the most valuable assets of all the organization. It is believed that, a single machine can simple to cover the work done by more than 10 or 50 labours, but, it can't replace the power and skills of an extra ordinary man . And that's why the organizations is treating their workforce as estimable one. The skills and talent of employees is the main thing which assist the business in boosting their growth, increasing the turnover and attaining the overall objectives.

This paper attempts to know how social loafing of an employee is going to affect the individual productivity , total productivity of firm and industry thereafter .

KEYWORDS : *Diffusion of responsibility , Free rider effect , Productivity , Team building, social loafing ,sucker effect*

INTRODUCTION

Business is defined as , an organization which is engaged in the commercial and industrial activities , maybe profitable or for not . It doesn't matters ,whether a business is Profit making organization or Not for profit making , the backbone of that venture is always Human resource . They have an equal importance in the organization as what the Finance resources and others possess. Organization's performance is purely depended on the skills and talents of employees within the firm. By that way , we can said that the business's most valuable resources is always Human Resource . The prime motive of every business is to make the customer's feel delighted and to have profit .Only a firm having better Productivity can gain competitive positioning also. So, the organization always need to ensure that the employees are having good productivity.

This article attempts to identify how the social loafing process affects , both organizational and individual productivity .

DISCUSSION

As we mentioned earlier , it is assumed that the prime motive of every business is to gain the goal and makes good profit . For the same , management will try to force the workers . They surely ensure that the employees are contributing their maximum to increase and improve the productivity .Here , comes the need of checking the affect of social loafing in productivity .Management may implement several strategies in order to reduce the cost and at the same time improving the performance . One of the important strategy out of them is **Team and Team building** .

Team is a group of individuals working together for attaining a common goal. Every team have a goal to attain and the members will focused towards the same. The main aim of business, behind creating a team is for having a synergy. ie, applying the strategy of Synergy ; $1+1=3$. The result , when we works together is always high while comparing to working alone. But, according to human psychology it is assumed that people will be lazy when they are working as a part of group . Team Building is a collective term for various types of activities for improving social relations .It will help the group to evolve into a cohesive unit .Working together as a team will helps to increase the overall productivity and collaboration between the management levels. Also it will create innovative ideas and creativity .Likewise, it will make the employees encouraged in their work. A study found that the team collectively can better perform to accomplish the task because everyone is participating and work is divided as to their ability to perform (Jackson and Williams, 1985).

But, working together as a team may create Social loafing in Business's internal environment .Social loafing is a psychological concept that refers to the inclination for people to exert less of an effort when working in a group, than when working individually (**Karau & Williams, 1993**). When the total work load is splitted for different groups , it'll make them more easier to accomplish within the given time limit and with lower workload to individuals . But, in some cases it is noted that the employees become lazy and decreasing their productivity as they are working part of a group. The diagram below shows that how much each of the individuals will contribute to a activity while they are working single , and as being part of a group .



100% EFFORT



93% EFFORT EACH



85% EFFORT EACH

(Lawrence, 2022)

It is clear from several studies that Social loafing generally occurs when individuals exert less effort in a group than they would by themselves. Scientific inquiry into this phenomenon has found that the mere presence of other people is enough to hinder efforts in tasks of great mental difficulty. Since many work goals require group effort, social loafing should be a concern for organisation.

It is noted that social loafing is because of mainly 3 reasons, like Lack of motivation, lack of commitment and lack of clearly defined goals. Employee performance indicates financial and non-financial outcomes of employees. It is directly linked to the performance of the organization and also to the success of the organization. Past studies show the important ways to enhance the performance of employees and the employee engagement (Fleming and Asplund, 2007; Christian et al., 2011; Rich et. 2010; Richman 2006; Macey and Schneider, 2008; Leiter and Bakker, 2010; Holbeche and Springett, 2003).

There are 3 important terms related to social loafing, such as,

DIFFUSION OF RESPONSIBILITY: This is the phenomenon happens when the employee, as working part of a group feels that he/she is able to share their responsibility and by that way they can reduce their effort.

This is somewhat related to Delegation of authority. Manager can delegate their work to subordinates, but, the responsibility lies to manager itself. However, as there showing an option for diffusing their duties and activities they'll tempt to transfer those duties and try to reduce their workload.

SUCKER EFFECT: The individual perceives that the colleagues is not contributing best and as because he/she too reducing their effort.

This effect is actually reducing and badly affecting the morality of hard working employees.

FREE-RIDER EFFECT: While working as a part of group, employees will start to reduce their effort when they noticed the result won't change, even though they are participated in the work or not.

Out of these 3 concepts itself, we can definitely interpret that social loafing have a negative impact on productivity of individual.

At the same time it won't affect the overall productivity of firm, because, as employees are working together as a group for accomplishing the group goal, it will never negatively affect the overall result. It will help in achieving the objectives at a short span of time with reduced cost. As the overall performance of firm is not affected, the industrial performance also remains same. It will not diminish.

We can conclude the result of study as, Social loafing has a negative impact on the productivity of employees, as working a part of group will create a tendency to reduce their. Employees will start less contributing to the group. But we can say that when, one of the group member started reducing their effort, that reduction will come as burden for another employee in the same group. The relationships between co-workers could affect productivity. Specifically, becoming part of a team, gaining the support of teammates, and feeling a sense of responsibility to colleagues motivated positive changes in employee performance. (<https://teambuilding.com/blog/team-building-history>).

For preventing social loafing organisations can take several measures such as, They can establish individual responsibility and accountability to each members in a group, and make them mandatory to contribute for group and work together. It is also important to highlight individual achievements and group outcomes. In some cases, loafing is happening because wrong positioning of candidates. Organisation should choose the right members for the right job. Likewise, a huge membered group will also affect the proper working. When the number of employees are more, then chance of sucker effect and free-rider effect is more as well as diffusion of responsibility is relatively high.

CONCLUSION

This study attempts to identify how social loafing of an employee is going to affect the individual productivity, total productivity of firm and industry thereafter. Out of the analysis and interpretations hereby concluding that, social loafing has a negative impact on individual productivity. But, the chance of



getting affected to overall productivity of Business and industry thereafter is very low. This is because ,as they are working together as a group for accomplishing the group goals and objectives .The members will always strive to attain all the overall objective of the firm. Even though the contribution by an employee to a group is low , it won't affect the result .Because the other co-members can balance and manage it effectively. The study indicate that social loafing of was significantly related to employee performance .

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WHATSAPP AS A SOCIAL TOOL FOR THE MUSLIM WORLD

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ABSTRACT

An American professor by the name of Leonard Kleinrock was responsible for the development of the internet in the 1960s. This was a pivotal moment in the history of the information and communication industries. Because of this, written correspondence as well as digital apps such as text messaging that can be transmitted from mobile phones came into existence. Apps for communication that use this technology are only available in the form of short messages (SMS). However, you may find data-based apps, such as BlackBerry Messenger Whatsapp, for a wide variety of social media messengers, including Facebook, Twitter, Mighty Text, Telegrams, and Instagram. This investigation seeks to answer the question, "What sorts of uses does technology have for the Muslim society in terms of spreading media coverage and agendas?" by making use of qualitative methodologies that are based on phenomenology. You may be able to create a highly successful app for communicating Muslims' performance at muslimpro.com by making use of the app's capability to convey not only information but also photographs, video content for media content, daily ibadat, synchronized five articles of faith, and halal and haram denial. You can find more information about this app's capabilities here. The app's event editor also uses WhatsApp to send out the schedule for the day's media coverage and set up daily meetings between editors and the Muslim Society, which eliminates the need for phonograms. In addition, WhatsApp is used to set up daily meetings between editors and the Muslim Society. Because of advances in technology, individuals from different parts of the world are now better able than ever to connect with one another in an instant and to gain access to a wide variety of materials on the internet. There is a significant need for Islamic software, which is to be expected in a nation that has a population of more than 1.8 billion people. These apps contain everything from virtual tours of well-known mosques to online bazaars that offer only merchandise that is compliant with Islamic law.

KEYWORD: WhatsApp, Muslim, media, society, technology.

1. INTRODUCTION

Our lives have become more interconnected as a result of technological advancements; information and knowledge are now more readily available to us. It should come as no surprise that there is a massive Islamic app market with a range of accessible apps, ranging from augmented reality experiences of prominent mosques to halal fashion shops. The population of the Islamic world is approximately 1.8 billion.(shahid,2021)

Not only are Islamic apps gaining more and more fans, but they are also becoming an increasingly important part of daily life. It is crucial for Muslims to have access to apps that might help them stay on the straight and narrow in a society where Islamic principles are continuously under attack. In this world, Muslims need all the aid they can get. There are several Islamic apps available, and each one has its own set of special features and advantages over the others. The following are the top five Islamic mobile applications that every Muslim should download right away:

The advancement of technology has an effect on many different aspects of life, including the realms of communication and information. The Internet, which was initially developed in the 1960s by an American professor named Leonard Kleinrock, is currently having a significant effect on people all over the world. The invention had a significant impact because it prompted the development of additional communication

applications. These applications could take the form of written correspondence or digital applications in the form of text messages sent from mobile phones. Both types of applications have had a significant impact. Communication applications on this technology were initially only available in the form of short messages (SMS), but in the end, it also found data-based applications, specifically in the form of BlackBerry Messenger, WhatsApp, and various types of messengers on other social media, such as Facebook and Twitter. Initially, SMS was the only type of communication application available with this technology.

The handheld mobile phone, often known as a cellphone or hanphone, is a personal communication tool that, in conjunction with the rapid development of telecommunications equipment and internet networks in different regions of the world, appears to be a fundamental human necessity. A phenomenon that has just recently started to be fascinating in regard to the use of cellphones is the innovation of several significant corporations to manufacture a smart cellphone. This is a phenomenon that has been occurring. Smartphones that are sensitive to the requirements of humans.(Thota, 2015)

The BlackBerry smartphone, which competes with Android as well as Apple's iPhone and iPad for consumers of mobile devices, is one of the technologies that continues to excite users in the present day. The public, including the mass media, is interested in using the mobile phone because it



possesses a number of interesting features, as well as the convenience with which it can obtain quick information and specific functions that are exclusive to the mobile phone. Because of the availability of such superb software and a smartphone, we were able to manage the disaster and preserve the patient's life. We would like to make it clear that despite the fact that telemedicine and electronic intensive care units are offered at facilities all over the world, this kind of technology is not available in settings where the patient is being moved to a more advanced facility. Assuming there is an operational network offered by the mobile service provider, the presence of an application that enables the transfer of photographs and videos while patients are being transported plays a significant part in reducing the likelihood that an accident will occur. (Thota, 2015)

Other than being able to be used for telephones and sending short messages, as well as regular telephones, the features on the Blackberry application are intriguing because the use of Blackberry Messenger (BBM) is an advantage that Blackberry has over other cellphones. In addition, the Blackberry application can be used on regular telephones. Blackberries are necessary for the operation of this facility, which is one of the reasons why they have such high appeal. BBM is equipped with chat facilities, or short conversation facilities, that are provided by BlackBerry. (Wajekar, 2017) With the help of these facilities, users are able to send brief messages, send pictures, send data to group conversations or conferences, send voice messages, and send locations where the user is currently located. We have established a PAC group on WhatsApp, and all members of the organization, including the department head, senior consultants, and registrars, are members of the group. When a patient is given the all-clear by an anesthesiologist following PAC, a photograph of the event is taken and uploaded to the PAC group. Everyone then has a record of all patients who are certified fit for anesthesia under the appropriate ASA grade and is aware of the comorbidities of the patients as well as any other areas of difficulty (need for invasive lines, difficult airway or spine, poor venous access) that are highlighted in the PAC form. In this way, anesthesia can be safely administered to all patients who meet the requirements. (Wajekar, 2017)

Entertainment features such as music and video playback, cameras, and data storage capabilities that are almost identical to those found on computers are also included in this application. Other features of this application include push e-mail, which is the sending of electronic messages via internet networks; browsing, which is the browsing of the internet via internet networks; push browsing; and browsing. This smartphone user can also explore cyberspace by activating BIS (Blackberry Internet Service), which is available through operators such as MTN, Airtel, etc. The expenses associated with activating BIS are determined independently by each operator, resulting in a wide range of pricing and quota levels. For instance, 9ja charges one million naira per month for wireless local area networks, while MTN charges two million naira per month, and Pospet charges five million naira per month for wireless local area networks (Wi-Fi). (Basir, 2018)

This BlackBerry "colonizes" all areas of life in some parts of the world, including Muslim countries like Saudi Arabia and Indonesia, due to the ease of communication that it provides for its users. As a result, this smartphone is the best-selling one currently available on the market. Smartphones equipped with this application are helpful for work routines that involve a wide range of different activities. Within the realm of Muslim society, there is not a single exception. Even a statewide online media network, such as Muslimpro.com, Qur'an hero.com, Athan App, Pillas App, UshubApp, Collabdeen.com Islamic GPRS, Scan Halal Food, needs an application in order to use blackberries as the primary method of contact between Muslims and ulama editors over the distribution of prayer times, also known as qibla, and fatwas from the applications. Additionally, BlackBerry's share of the smartphone industry saw significant growth. Based on statistics obtained through collaboration with six different cellular operators, including Etisalat, Vodafone, Smart Telecom, Hutchison CP Telecom, and Natrindo Telepon Seluler, it is predicted that the number of Blackberry users in Muslim nations reached three million consumers in 2011. (Thota, 2015)

The number of people using BlackBerry Messenger (BBM) is increasing at a rapid rate day by day, and the feature of instant messaging services that is exclusively available on BlackBerry handsets made by Research in Motion (RIM) is estimated to have been utilized by 35 million people all over the world, including in nations that practice Islam. This smartphone company saw a growth in fuel consumption of 500 percent in 2010, and in 2011, BBM users increased by 1.5 million every month, with approximately 2000 people becoming new users of the BBM instant messaging feature each month. In 2010, this smartphone company also recorded a 500 percent growth in fuel usage. The only problem is that BBM's reputation won't last forever. Overcapacity users seek out other types of applications for their smartphones, which they then try to switch to, causing the network to be regularly disrupted. One such application is called WhatsApp, and it aims to provide users with communication functions that are analogous to those offered by BBM while also adding more advanced options. If the user of BBM must know the PIN of the friend who wants to be a friend in order to communicate via message, and if the PIN is attached to the user's mobile, but the messenger application on WhatsApp uses the phone number that is used on the smartphone, then the user of BBM must know the PIN of the friend who wants to be a friend in order to communicate via message. (Basir, 2018) Because Messenger WhatsApp is easier to use and lighter, more smartphone users are using it than BBM.

WhatsApp Messenger is a cross-platform messaging application that allows users to exchange messages without incurring SMS costs. This is made possible by the fact that this type of application utilizes the same internet data package that is used for email, web browsing, and other applications. WhatsApp is a messaging application for smartphones with basic features that are comparable to those of BlackBerry Messenger. This Whatsapp messenger program makes use of a 3G, 4G, or WiFi internet connection for data communication, allowing users to engage in online conversation, share files and



photographs, and do a variety of other tasks. WhatsApp was initially only available for iPhone users, but as time passed, it was ported to other mobile platforms, including Blackberry, Android, iPhones, OS, and Symbian. (Thota, 2015)

WhatsApp was ranked as the third-best-selling app downloaded through the Nokia Ovi Store in November 2010. This was compared to BlackBerry Messenger, which did not reach the milestone of 100 million users downloading from the Google Play Store until April 2018. This number is even lower than the number of people who have downloaded the application Line, which has been downloaded by more than 500 million people, and it is even lower than the number of people who have downloaded the application WhatsApp, which has been downloaded by more than 1 billion users. (Lee,2028)

This kind of messenger communication application is required by the communication user community, particularly among media professionals, as a result of the creation of innovative applications such as WhatsApp Business, which serves as a form of development to satisfy the needs of users. In addition, the capabilities that are provided do not differ greatly from those that were offered by BBM, which had previously dominated the market for messaging users on mobile devices. To interact with its ummah, which is dispersed across four continents (Africa, the Arab world, Asia, and Europe), MuslimPro.com, one of the top five online Muslim media apps in the world, employs the WhatsApp Messenger app. MuslimPro.com is one of the top five online Muslim media apps in the world. USHUB is a streaming movie and television service that caters specifically to Muslims. USHUB provides Muslims with the ability to quickly stream movies, series, and documentaries that correctly portray the Muslim community. These media are selected by a staff of highly qualified Muslim film enthusiasts. One of the most ingenious and feature-packed apps is called Collabordeen. It offers practical applications for the average Muslim, such as an augmented reality qibla and a radio that plays the Qur'an, in addition to providing communities with simple fundraising solutions, integrated support for Apple Pay and Google Pay, and RSVP forms for community events. (shahid,2021) This app offers the finest possible community experience for users who are interested in going digital from any location, thanks to the participation of 462 centers that have already joined Collabordeen. The first augmented reality (AR) program designed for the Islamic faith is called Islamic GPS, and it gives users the ability to explore well-known Islamic heritage sites like the holy Ka'ba and Masjid al-Aqsa as if they were there in person with a tour guide. The app will also guide you to the closest mosques that are within 20 kilometers of your current location. Have you considered having some halal? Will Travel provides Muslim tourists with halal itineraries and travel advice to make their experiences abroad more enjoyable. Halal travel has never been simpler than it is now, thanks to countries and regions such as Australia, Japan, South Korea, Vietnam, Greece, the Netherlands, the United Kingdom, and the United States. (shahid,2021)

2. RESEARCH METHODS

The purpose of this research is to determine whether or not using the WhatsApp program can benefit muslimpro.com in any way. utilizing qualitative research methodologies with an emphasis on Islamic studies, communicating regarding current events and the media, and taking a phenomenological approach to agenda setting In this particular investigation, the methods for collecting data included conducting direct interviews with perpetrators, users of muslimpro.com, and society leaders working for online media firms. Other approaches included direct observation of WhatsApp use behaviors and the delivery of services. after being sent from the program to the user but before being broadcast on WhatsApp groups. The purpose of this study is to investigate, among other things, the following questions: 1) What is the pattern of usage and utilization, as well as the efficiency, of the WhatsApp applications among members of Muslim societies? Which instant messaging program does the Muslim supporter like to use in order to share information with others? and coverage activities in comparison to those of other sorts of programs such as Facebook Messenger and BBM? 3). How does the use of WhatsApp within these online media enterprises contribute to the overall success of their businesses? Which type of communication is best for asking questions, getting answers, and getting information across?

3. RESULT AND DISCUSSION

3.1. Removal of media and information technology

The advancement of technology has had an effect on many different aspects of human life in a variety of different ways, including the spheres of communication and information as well as the mass media. After the development of these systems, the supply of rapid information systems is the aspect in the field of communications technology that is regarded as having the most influence. In many locations across the globe, the Internet has grown to be increasingly popular. Whereas in the realm of mass media, information is promptly delivered through many forms of media that are accessible over the internet, sometimes known as "online media." The photograph is then saved in the gallery of the smartphone, making it simple for the anesthesiologist to retrieve it whenever he or she needs information about the patient or any underlying conditions that are pertinent to the administration of anesthesia. (Basir, 2018)

The proliferation of internet use has led to the growth of online media, and the beginning of the development of online media in Muslim nations can be traced back to the reform that took place in 1998. According to the data collected by the Press Council, during the 32 years that comprised the New Order Era, there were a total of only 740 radio stations, six television stations, and 289 print media outlets. One year after the implementation of the reform, the number of print publications skyrocketed to 1,687, representing a sixfold increase. This indicates that 1,389 new print media were born one year after the reformation, which is equivalent to 140 new print media being born each month or approximately five new print media being born each day. However, as a result of the following events, the quantity of print media has fallen, specifically to a total of only 830, along with 60 televisions, 2,000 licensed



radios, and 10,000 unlicensed or illicit radios. (Indo,2016)The subsequent advancement was online media, which was registered at 43,300. However, there were only 211 online media among those who entered as professional media and met the data collection requirements. While television recorded 523 different pieces of material, radio recorded 1,166 different pieces of media.

The proliferation of online media is a result of the evolution of the internet and the effects of technological and informational progress. (Kadir,2018) With the proliferation of new forms of online media, the rapid expansion of mass media has also contributed. The internet has this effect because it represents the convergence of numerous significant technologies. These technologies include computers, televisions, radios, and telephones. (Hamuddin,2018)

Cybercommunication (cybercommunity) is a social order that has emerged in the field of communication as a result of technological and informational advancements.

In cyberspace, students are categorized according to their internet habits. Improved means of communication are another target of this industry's pursuit of progress. such as telegrams, Instagram, BlackBerry Messenger, Line, Facebook Messenger, and other short communication applications for mobile phones. consequences of each phase of a project's life cycle Contextual usability approaches are defined, and their characteristics and examples are given, along with an explanation of how these methods are chosen. Instead of seeing usability testing as a final product, it should be treated as an ongoing procedure. As a result, it might be used in conjunction with the current system during a system prototype, which would be beneficial for system enhancement. (Lee,2028)

In the Muslim world, WhatsApp is the most popular messaging program for both desktop and mobile users. online education and training with respect to Group as a replacement for BlackBerry Messenger (BBM). Because the only required PIN for Whatsapp is a mobile phone number, adding new friends is a breeze. This app will only search for it and display it to friends who use the same app directly if you manually enter their phone numbers into the app's phonebook. Whatsapp syncs immediately with the server after retrieving contact information from the phonebook. (Wajekar, 2017) In Muslim communities, nearly all smartphone owners rely on this software for their personal, social, and professional messaging needs. In addition, WhatsApp has just released its WhatsApp business application, which targets businesspeople, micro- and small- and medium-sized enterprises (UMKM), and students at Islamic universities, as well as members of the media and those studying in Islamic countries. One of the digital media sites even necessitates WhatsApp, which is widely used for communication among Muslims.

3.2 WhatsApp as a communication tool between lecturers and students in Islamic education

Education and communication are two domains that, according to Djatmiko (2019), cannot be separated from the context of family and Muslim society. Education is the key for a nation to be able to prepare for the future, improve and develop human resources, and have the function and capability

to make preparations for changes in society according to the demands of the times. Education is essential for a country to be able to plan for the future. It is backed by the perspective of Tambak (2013: 5), which argues that education stresses the importance of efforts to sustain, maintain, and develop the existence of the community. This opinion lends credence to the idea that education is important. Therefore, it is clear that education and other forms of communication cannot exist in isolation from one another.

This is in line with the plan to utilize social media platforms such as Facebook, WhatsApp, Instagram, and other similar platforms, among others. These numerous platforms of social media offer an efficient replacement for traditional methods of connecting people in the hope of fostering connections that are amicable and mutually beneficial to both parties (Syaifullah, 2019).

WhatsApp users will experience the influence of the communication process since interpersonal communication makes communication easier and closer. The WhatsApp app can make engaging and communicating easier because users can easily add new friends and get to know each other. WhatsApp is used to develop social ties among connected users.

As a result, students rely on WhatsApp as a social media platform for communication. Students are required to pay close attention in class and finish their homework while using the WhatsApp app. According to Suryani (2017: 15), utilization is an activity in which procedures and resources are used for learning; therefore, it stands to reason that the WhatsApp app will be able to exert some measure of control over students' academic pursuits. The utilization function is crucial as it addresses the interaction between students and the instructional environment.

Students within and outside of the classroom are obligated to utilize social media (WhatsApp Group, or WAG) to further their education. In this age of globalization, using the WhatsApp app is therefore essential. Because, at its heart, the WhatsApp app is made to aid or facilitate academic endeavors. This means that WhatsApp is a great tool for facilitating two-way communication between professors and their students. Means by which media are utilized

Students may approach lecturers with questions regarding course materials, and professors may share information about course requirements with students. There are a lot of extras you may use with the WhatsApp app. According to Brata (2010), WhatsApp offers its users the following functions:

- a. Signs that the message was successfully sent, received, and read
- b. Can send documents in the form of photos, videos, audio, locations, and contacts
- c. View Contact: Users can see if other users have a WhatsApp account by viewing the contact on their smartphone.
- d. Avatar: An avatar is a WhatsApp user profile photo.
- e. Add a conversation shortcut; multiple chats can be added as a home page shortcut.screen.
- f. Email Conversation: You can send all chats via email.



- g. "Forward," a feature to forward or resend messages that have been received;
- h. Smile Icon, a large selection of emoticons such as human expressions, buildings, weather, animals, musical instruments, cars, and others.
- i. Call, to make voice calls with other users.
- j. Video Call: In addition to voice calls, users can also make video calls.
- k. block, to block someone else's number.
- l. Status, which tells other contacts whether or not the user is willing to have a chat. So, it can be seen that the WhatsApp application has many features to make it easier to communicate and support learning activities.

WhatsApp's utility as a means of communication stems from basic human tendencies to maintain and expand social networks. With the rise of modern means of communication, meetings no longer need to take place in person. Technology has allowed individuals and groups to communicate with one another in real-time without physically meeting. WhatsApp is used by many kids to stay in touch with friends, family, and teachers. WhatsApp has a positive effect as a facilitator of students' educational pursuits.

Raihan (2019) found that WhatsApp is an appropriate medium for transmitting da'wah, especially in family groups. The WhatsApp app allows the group leader to monitor messages and ensures that all members see them. The head of the household who functions as the leader of the group may also guarantee that each member of the group answers to the contents of the da'wah to ensure that the group's members are not dishonest. The goal of this study is to find out how lecturers and students use WhatsApp to talk about learning activities and help each other.

4. CONCLUSION

According to this survey, the WhatsApp app is highly helpful and has become a requirement for employees to join the Muslim community since it makes it simpler to connect with employees, teachers, and students in the field. So distance and location are not relevant to research duties, including service delivery. The Muslim app uses WhatsApp to simplify gender identification. Text, image, and video sending is fast using a personal phone number PIN, unlike the easy-to-use BBM software if it delivers huge amounts of data, let alone video. The psychological status of the individual they're conversing with is unknown because they can't confront each other directly. Communication Media can help overcome distance, location, and time. Face-to-face communication is more effective since both parties are aware of the other's psychological state. Students use WhatsApp to communicate and learn with lecturers; WhatsApp makes it easier for lecturers to communicate with students and support learning activities; WhatsApp makes it easier for students to communicate and support learning activities than other online media; and students use WhatsApp to send materials and assignments to lecturers. WhatsApp's ease of use helps students, who like this crucial communication tool. Several challenges to students talking with academics via WhatsApp were related to civility; therefore, some students had trouble drafting excellent,

appropriate sentences for the lecturers. Students prefer direct communication using WhatsApp. This research also found that few students use WhatsApp for status updates because its major purpose is to enhance communication between people, both individuals and groups.

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A STUDY ON PERCEIVED BARRIERS TOWARDS ENTREPRENEURSHIP IN AGRICULTURE

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ABSTRACT

Agriculture is backbone of Indian economy. The Agriculture sector faces various challenges from production to marketing, internal to external. Along with the challenges there are various opportunities lies in the agriculture and allied activities. There is huge scope for entrepreneurship in Agriculture which is eventually known as Agriprenurship. The present study aims to investigate the barriers for Agriprenurship. Descriptive research design was employed and cross sectional data was collected to achieve the aim of the study. The data were collected form 150 respondents by applying snowball sampling method. The exploratory factor analysis was performed on primary data and factor analysis yielded four major barriers Infrastructure Accessibility, Perceived Risk perspective, Weather Concern and Knowledge Perspective.

KEYWORDS: *Agriprenurship, Agribusiness, Entrepreneurship*

INTRODUCTION

Entrepreneurship is one of the driving forces for the achievement of economic development and job creation (Sandhu, 2010 ; Gorman, 1997). Entrepreneurial development and operations have been identified across the globe as viable mechanism and means of efficient economic progression (Adewale, 2015). Entrepreneurship is considered as innovation and competition (Gorji & Rahimian, 2011). According to UNFPA report 2014, world's largest youth population is in india (356 million – 10 to 24 years) the unemployment is one of the concerning issue for the country. Entrepreneurship is the key for the unemployment of country which is the one of the burning issue for the country.

Agriculture is backbone of Indian economy. The significant population of country depends on Agriculture and allied activities. It is the primary source of livelihood for 58 percent population in India (IBEF, 2020). Entrepreneurship in agriculture can also be referred as Agriprenurship. Opportunities for entrepreneurship in agriculture lies at various stages of production and marketing of agricultural produce such as farming stage, value addition, supply chain, marketing, agricultural inputs and related services. Addition to this, the agriculture faces challenges of climate change, information system, post harvest losses, changing weather pattern, changing consumer habits, reduction in land, excessive use of chemical etc. the opportunities of agriprenurship also lies there. The agricultural students are those who studied the agriculture and its aspects in detail. The present study focuses on whether these agricultural students willing to adopt agriprenurship, and

further which are the barriers that plays pivotal role for agriprenurship.

REVIEW OF LITERATURE

So far as individual barriers are concerned lack of familiarity in establishing the working relationship and weakness in decision making are two important factors. In case of organizational barrier the several trustees in entrepreneurship and condition and complexity of the rules are two important factors. In case of social and cultural barriers two important barriers were competitive nature and rule of brokerage and intermediation. In case of economic barrier the lack of financial support from bank and interest on load were two major barriers. (Kashani et.al , 2015)

Aversion to risk, Aversion to stress and hard work (stress), fear of failure, lack of social networking and lack of resources are major barriers to entrepreneurship. Further, the marital status and gender were found to be more important factors influencing entrepreneurial inclination. The male students, married students are more inclined towards entrepreneurial activities. The post graduate students were more inclined towards entrepreneurship. (Sandhu et.al , 2010)

Lack of capital, lack of skill, lack of support, lack of market opportunities and risk are the main obstacles to entrepreneurial intention. In case of employment the lack of experience, corruption, nepotism, lack of training and lack of relevant skill are the major challenges. (Boateng et.al, 2014)

Entrepreneurship among students positively correlated with entrepreneurship support, lack of saving, lack of



information, fear of starting business, fear of failure, lack of exposure and course content. (Adjei et.al, 2014)

Entrepreneurial Intention, Motivation, Knowledge & Skill constraints, Market constraints, and funding constraints are major factors affecting entrepreneurship and out of that other than entrepreneurial intention and motivation are barriers which affect the entrepreneurship. Further the correlation analysis found entrepreneurship has negative correlation with market constrains and funding constraints. (Loannis & Fotis, 2016)

RESEARCH METHODOLOGY

The present study aims to investigate the perception towards barriers of entrepreneurship in Agriculture (Agripreneurship) among agricultural background students. To achieve the objectives descriptive research design was applied in present study. The cross sectional data were collected using questionnaire. The structured questionnaire was designed with questions related to demographic profile and related to barriers to agripreneurship. In the questionnaire multiple choice close ended questions were designed and for barrier to agripreneurship data were collected on five point rating scale where (VI- Very important, I-Important, N-neutral, NI-Not Important, NIA- Not Important at all). The questionnaire was

transferred to online data collection platform and it was disseminate to the students of agriculture. The snowball sampling method was applied for the present research. The sample size was kept 150. The collected data were coded and analyzed with the help of computer software. The data were analyzed with descriptive statistics and multivariate technique.

DATA ANALYSIS

Demographic Profile of Respondents

For the present study 150 respondents were surveyed and the demographic profile of the respondents were also studied and it was found that out of 150 respondents 70.7 percent respondents were male and 29.3 percent were female. In case of education the 58.7 percent respondents were educated up to post graduate level followed by 39.3 percent at graduate level. Out of total respondents 54.7 percent respondents were from rural background followed by 30.7 percent from urban background and 14.7 percent from semi-urban background. Out of total respondents 90.7 percent respondents wants to become agripreneur where as 9.3 percent respondents were not interested in agripreneurship. The average age of respondents were found 22.14 years.

Table-1 Barriers to Agripreneurship

Parameters	N	VI	I	N	I	NIA	Mean	Std. Deviation	Rank
Availability of Land	150	84	46	13	5	2	4.37	.878	IV
Availability of Labour	150	67	63	15	5	0	4.28	.778	VII
Availability of Capital	150	82	51	14	3	0	4.41	.744	III
Proper Agriculture Knowledge	150	97	38	12	2	1	4.52	.757	I
Govt Policies	150	50	69	27	4	0	4.10	.784	VIII
Climate Change	150	71	62	13	4	0	4.33	.748	V
Marketing Support	150	74	66	9	1	0	4.42	.637	II
Seasonality	150	66	64	19	1	0	4.30	.712	VI
Fear of Failure	150	35	65	35	11	4	3.77	.977	X
Not Considered as Good Profession	150	17	43	46	18	26	3.05	1.250	XI
Perishable Produce	150	49	71	24	3	3	4.07	.864	IX

The respondents were asked to rate 12 parameter based on the importance which can be act as barrier to agripreneurship on five point rating scale where (VI- Very important, I-

Important, N-neutral, NI-Not Important, NIA- Not Important at all). Out of 12 parameters 11 were considered for the analysis and based on the responses the mean for each parameter was



calculated and accordingly ranks were also given which is presented in table-1.

As the table depicts the important barrier was proper agricultural knowledge (mean= 4.52 : s.d= 0.757) followed by marketing support (mean= 4.42, s.d= 0.637), Availability of capital (mean= 4.41 , s.d=0.778), Availability of Land (mean= 4.37, s.d= 0.878), climate change (mean= 4.33 , s.d= 0.748), seasonality (mean= 4.30, s.d= 0.712) whereas least important factors were fear of failure (mean= 3.77, s.d= 0.977) and not considered as good profession (mean= 3.05 , s.d= 0.977). The reliability of the 11 parameters was checked by calculating cornbach’s Alpha. The cornbach’s Alpha value above 0.6 is appropriate. For the present study it was found 0.712.

Factor Analysis

Factor analysis is multivariate data analysis technique which is used for the data reduction, it identify the small number

of factors that explain most of the variance observed in a much larger number of manifest variable. To check the appropriate data for factor analysis two tests have been conducted. i. Bartlett’s test of sphericity and ii. Kaiser- Meyer- Olkin (KMO) measures of sampling adequacy. The result presented in table-2. The approximate chi-square value was found 362.540 at 55 degree of freedom for Bartlett’s test of Sphericity which is significant at the 0.05 level (value= 0.00). So, it can be inferred that the variables in population are correlated. Generally, the value of KMO measures of sampling adequacy, falls between 0.5 to 1.0, which indicates factor analysis is appropriate and value below 0.5 indicates inappropriateness of the analysis. For the present study the Kaiser- Meyer- Olkin measures of Sampling Adequacy value obtained is 0.724, so, it can be inferred that data are appropriate for factor analysis.

Table-2 KMO and Bartlett's Test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.724
Bartlett's Test of Sphericity	Approx. Chi-Square	362.540
	Df	55
	Sig.	.000

To do the factor analysis the “principal component method” is selected and eigenvalue greater than 1 is considered. Further, the Varimax with Kaiser Normalization rotation method was employed. The rotated component matrix

was presented sorted by size and the coefficients were suppressed having value below 0.4. The factor analysis yielded 4 factors which explain 64.314 percent of total variance which is shown in table 3.

Table- 3 Total Variance Explained

Component	Total Variance Explained								
	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.190	29.000	29.000	3.190	29.000	29.000	2.530	23.000	23.000
2	1.706	15.513	44.513	1.706	15.513	44.513	1.609	14.630	37.630
3	1.165	10.593	55.106	1.165	10.593	55.106	1.486	13.510	51.140
4	1.013	9.208	64.314	1.013	9.208	64.314	1.449	13.175	64.314
5	.799	7.266	71.580						
6	.765	6.958	78.538						
7	.599	5.444	83.982						
8	.553	5.026	89.008						
9	.477	4.338	93.347						
10	.420	3.816	97.162						
11	.312	2.838	100.000						

Extraction Method: Principal Component Analysis.



Table- 4 Rotated Component Matrix

Rotated Component Matrix ^a				Component
	1	2	3	4
Availability of Labour	.806			
Availability of Land	.784			
Availability of Capital	.763			
Marketing Support	.581			
Agriculture is not Considered as Good Profession		.815		
Perishable Produce		.727		
Fear of Failure		.554		
Climate Change			.818	
Seasonality	.429		.678	
Govt Policies				.854
Proper Agriculture Knowledge				.640
Extraction Method: Principal Component Analysis.				
Rotation Method: Varimax with Kaiser Normalization.				
a. Rotation converged in 8 iterations.				

The factor analysis yielded with four factors namely Infrastructure Accessibility, Perceived Risk perspective, Weather Concern and Knowledge Perspective which are presented in table 4 and summarized in table -5. The first factor termed as “Infrastructure Accessibility” due to high loading to factors like availability of labour (0.806), availability of land (0.784), availability of capital (0.763) and marketing support (0.581) which explain 23 percent of total variance. The second factor termed as “Perceived Risk perspective” due to high loading to factors such as not considered as good profession (0.815), perishable produce (0.727) and fear of failure (0.554) which explain 14.630 percent of total variance. The third factor

termed as “Weather Concern” due to high loading to the factors like climate change (0.818) and seasonality (0.678) which explain 13.510 percent of total variance. The fourth factor termed as “Knowledge Perspective” due to high loading to the factors like Government policy (0.854) and proper agricultural knowledge (0.640) which explain 13.175 percent of total variance. The present study will be helpful to policy makers in crafting the strategies to make entrepreneurship in agriculture attractive. Further it will also be helpful in identifying the concerning area such as availability of resources and strategies to overcome so youth can be benefited.

Table- 5 Summary of Factors

Factors	Variables	Factors Name
Factor – I	<ul style="list-style-type: none"> • Availability of Labour • Availability of Land • Availability of Capital • Marketing Support 	Infrastructure Accessibility
Factor – II	<ul style="list-style-type: none"> • Agriculture is not Considered as Good Profession • Perishable Produce • Fear of Failure 	Perceived Risk perspective
Factor – III	<ul style="list-style-type: none"> • Climate Change • Seasonality 	Weather Concern
Factor - IV	<ul style="list-style-type: none"> • Government Policies • Proper Agriculture Knowledge 	Knowledge Perspective



CONCLUSION

The present study aims to understand the perceived barriers of agripreneurship (entrepreneurship in agriculture) and the cross-sectional data were collected from 150 respondents. The study found that the barriers to aripreneurship are proper agricultural knowledge followed by marketing support, Availability of capital, Availability of Land, climate change, seasonality whereas least important factors were fear of failure and agriculture not considered as good profession. The factor analysis yielded four major four major barriers namely resources for agriculture, Social status and fear, Uncertainty and government policy & knowledge influence agripreneurship. The study outcome will be helpful to the policy makers in designing appropriate strategies to promote entrepreneurship in agriculture. So broadly it has been found that possibility and feasibility of agripreneurship depends on Infrastructure Accessibility, Perceived Risk Perspective, and Weather condition and knowledge perspective among the potential entrepreneur. So if government consider this four dimension which hampered the growth of agripreneurship and accordingly do some intervention programmes in terms of educating and coaching potential entrepreneur in agriculture area then definitely more entrepreneurial activities flourish.

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EVALUATION OF THE TEACHING OF STRATEGY IN BUSINESS EDUCATION IN THE DEVELOPMENT OF ENTREPRENEURSHIP SKILLS IN KOGI STATE POLYTECHNIC

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ABSTRACT

The transformation of entrepreneurship skills and drive among students has been one of the major government concerns globally in recent time including Nigeria. The strategies to effectively implement this has been via deliberate effective teaching through direct teaching strategies, interactive teaching strategies and practical operational teaching strategies in most of the tertiary institutions including Kogi State Polytechnic Lokoja. Thus, in order to evaluate whether or not these strategies have been helpful in providing the needed result, the study merely used the instrument of a structured questionnaire in eliciting responses from a purposeful sample population of 200 hundred students of the HND/ND of the Business Administration department of Kogi State Polytechnic. Data gathered are subjected to a Likert scale measurement and analyzed using the Spearman correlation analysis. Result showed that all three variables are statistically significant in explaining entrepreneurship skill transformation but with a weak rho. It was concluded that there are other possible concerns other than the one used in this study responsible for the weak coefficient among the variables. As such, a stronger but deliberate tripartite –lecturer-student-government arrangement for optimal result is recommended.

KEYWORDS: Entrepreneurship, Education, Teaching Strategy, Transformation

INTRODUCTION

Recently, the acquisition of entrepreneurship skills/knowledge/education, especially among the tertiary students, has received massive attention in the global space. This is specifically so among the developing and emerging economies of the world, where the agent of economic advancement such as in technology-driven and aided learning is low (Kim-Soon, Al-Rawi, Mostafa, Ling, Al-Dayyeni, Ali, Mahmoud & Al-Rawi, 2022; Fidel-Imoisili & Ogunleye 2021; Sutapa, Zeplin, Tarigan, Djundjung & Rahardjo, 2018).

In this context, entrepreneurial learning/education has been seen as tool of catalyst in this regard. According to Mahieu (2006), entrepreneurial education is viewed widely from diverse perspective. For instance, in the United Kingdom, the concept is often referred to as enterprise education. With this, its focus broadly on personal development, mindset, skills and personal abilities. In the United States of America, the concept is widely called entrepreneurship education (Erkkilä, 2000). In other words, the term entrepreneurship education has been described as focusing on specific context of setting up a venture and becoming self-employed through innate drive or acquired learning/strategies (Mahieu, 2006). Some other concepts often used are: enterprise and entrepreneurship education, or entrepreneurial education.

More importantly, the efficacy of entrepreneurial education has been seen as a vital tool to contributing to economic growth in the areas of youth employment, reduction of vices, insecurity, economic productivity, innovation, technological advancement, new business creation, fostering creativity, to say the least; through appropriately designing of taught educational curriculum (Kim-Soon, et al, 2022; Fidel-Imoisili & Ogunleye 2021; Sutapa, et al, 2018; Lackeus, 2015; Wilfred-Bonse, Sam-Ngwu, 2014; Cooney, 2012).

On record, in Nigeria, approximately 600,000 thousand graduates are turned-out yearly from all the tertiary institutions (Ukazu 2021). However, out of this population, 13.69 percent remained unemployed in 2016. This figure rose to 15.3 percent in 2019 and, now 33.3 percent in 2021 (National Bureau of Statistics - NBS). Out of this, 22.8 percent are under-employed, 42.5 percent are youth employment (graduates), while 21.0 percent are youth under unemployment. This record collaborates that of the International Labour Organisation (ILO) report of 2020, where it affirmed that unemployment in Nigeria has been linked to increased number of graduates with no matching job opportunities. That there is also the presence of a moratorium on employment in many public and private sectors, plus continued job losses in the manufacturing and oil services owing to economic crisis endangered largely by economic fluctuations,



mismangement and the ongoing pandemic (Okunlola, Babajide & Isibor, 2020).

In this wise, Nigeria government, through its Ministry of Education, has devoted efforts in creating entrepreneurial curriculum and policies aimed at equipping students of higher learning especially at the Polytechnics and Universities to be self-reliant. The aim is to gain adequate skills through strategically taught classes using varying but effective learning strategies (Shamatov, Merrill & Cohen Miller, 2017).

To gain entrepreneurship skill, the learning atmosphere must be right. The styles, the teachers, the teaching, and the environment must be effective. In the words of Shamatov, et al (2017), effective teaching means that learning is taking place. The purpose of education in the institution of higher learning (i.e. Polytechnics and Universities) is to produce learning, and its measures of success is whether or not students achieve the learning outcomes (Esmi, Marzoughi & Torkzadeh, 2015; Dragovich & Halaseh, 2015).

In Nigeria, there are thirty-seven (37) Federal Polytechnics, fifty-one (51) State Polytechnics and sixty-four (64) Private Polytechnics in Nigeria. Out of this, Kogi State Polytechnic is centrally located at the North Central. The Polytechnic was established by Kogi State government in the year 1992 through an amended Edict No 6 of 1994, is mainly to provide man power for the State in particular and has produced graduates numbering several of thousands since inception. Like most other higher learning in the country, Kogi State Polytechnic pride itself in the establishment of Centrally Learned Entrepreneurial Centre, where students (National Diploma - ND and Higher National Diploma - HND) are taught the rudiment of entrepreneurial education in order to transform them to worthy job creators after their graduation. Like most other schools, writers, researchers, policy makers and pundits, the Polytechnic, had in the past, and on-going, adopt series of teaching strategies that range from the common classroom teaching model - direct learning - mentoring, training through curriculum, special lessons/assignment, tutoring and inviting guest entrepreneurs; interactive teaching strategy - process learning, learning from mistakes, group discussion, networking, problem solving, active learning; practical operational strategy - role-playing, training workshop, class practice, research projects, internship, practical experiences, etc. Whether or not this is effective in driving the need to which the Centre is created leaves much questions in the mind of the researcher. Thus, an evaluation is imperative. The essence, therefore, for this study, is to evaluate the general effectiveness of the teaching strategies deployed in the school, and its overall impact on transforming the entrepreneurial skills needed by the students'.

OBJECTIVE OF THE STUDY

For a robust study, the objectives are subdivided into the main objective and other specific objectives. The main objective of the study is to evaluate the teaching of strategy in business education in the development of entrepreneurship skills in Kogi State Polytechnic. Other objectives are:

1. Identifying whether or not direct teaching transforms needed entrepreneurial skills among Kogi State Polytechnic students.
2. Assess the impact of interactive teaching strategy in the transformation of entrepreneurship skill of the Kogi State Polytechnic students
3. Ascertain the effectiveness of practical-operational teaching on the transformation of entrepreneurial skill of the student of Kogi State Polytechnic.

RESEARCH QUESTION

Based on the specific objective of the study, the following research questions were raised:

1. Does direct teaching strategy have any significant influence in transforming entrepreneurial skill among Kogi State Polytechnic students?
2. To what extent do we agree that interactive teaching strategy help in transforming entrepreneurial skills among Kogi State Polytechnic student?
3. What is the effectiveness of practical-operational teaching in transforming entrepreneurial skill among Kogi State Polytechnic students?

HYPOTHESES

H₀₁: Direct teaching strategy does not significantly transform entrepreneurial skills among Kogi State Polytechnic students

H₀₂: Interactive teaching is not a strategy that significantly transforms entrepreneurial skills among Kogi State Polytechnic students.

H₀₃: Practical operational teaching strategy is not significant in transforming entrepreneurial skills among Kogi State Polytechnic students.

LITERATURE REVIEW

Conceptualizing Entrepreneurial Education

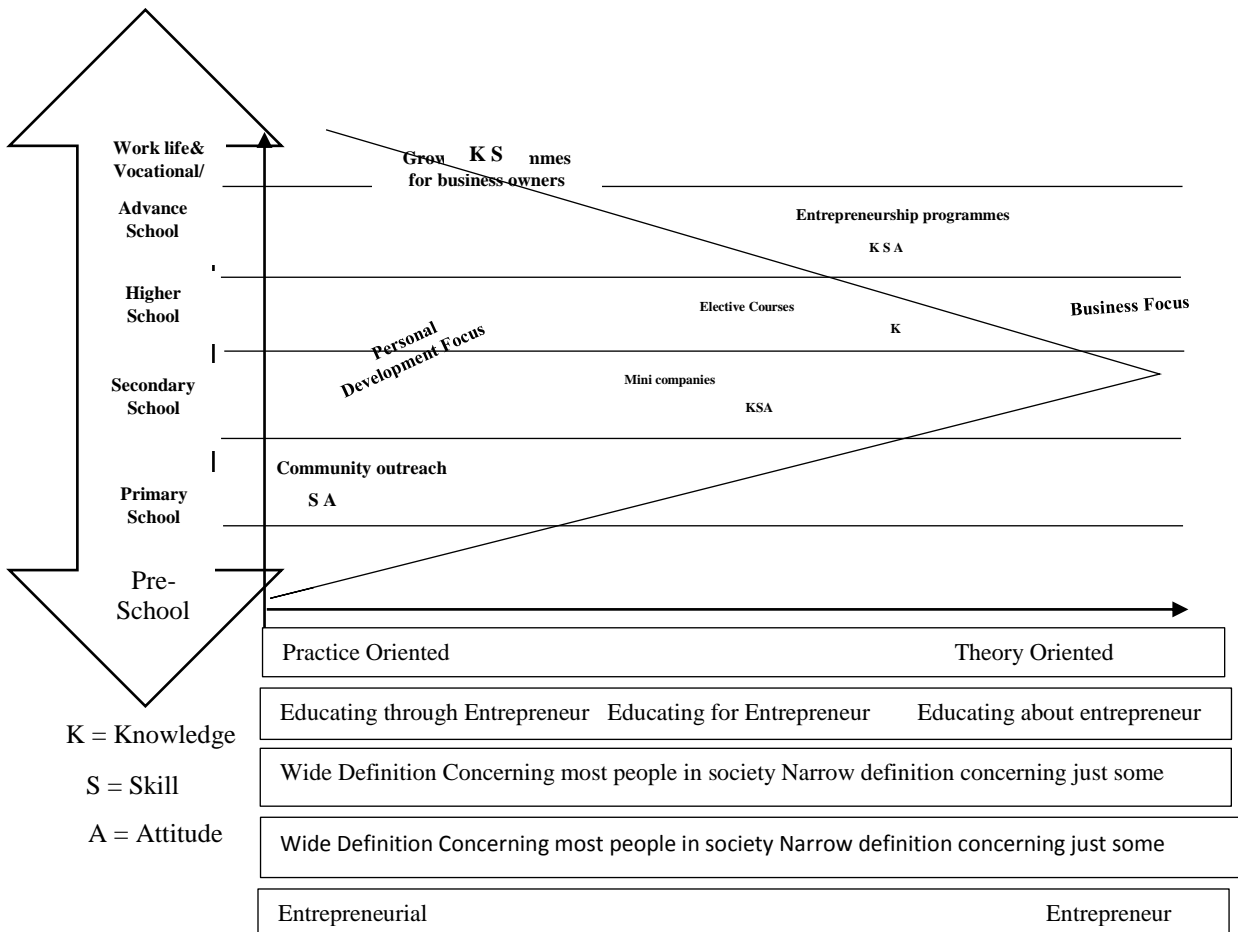
Understanding the concept of enterprise/entrepreneurship/entrepreneurial/education is germane to this study. This is so as to avoid common misconception, especially as it relates to education. Though, most often than not, authors have ascribed same or similar meaning to the concept inasmuch as it sounds like the concept. This is not to say also that there is consensus as to its native meaning (Fidel-Imoisili & Ogunleye 2021; Lackeus 2015; Mahieu, 2006).

For clarity, in a European Union Commission (EUC) study of the Organization for Economic Cooperation and Development (OECD) by Lackeus (2015), Hytti (2005), and Mahieu (2006), Erkkila (2000) study, the term is described as enterprise education in the United Kingdom. This differs to that of Mahieu that says it is entrepreneurship education. For Lackeus, enterprise education is defined broadly as mainly focusing on personal development, mindset, skills and abilities of an entrepreneur, whereas entrepreneurship education is simply focusing on the building-business concepts where, the entrepreneur sets-up a venture or he/she becomes self-employed. On the other hand, entrepreneurial education term is



synonymous to the United States. Here, there is the unifying understanding that the concept encompasses both enterprise and entrepreneurship education, thus leveraging us of most common misconceptions (Fidel-Imoisili &

Ogunleye 2021; Lackeus 2015; Sarasvathy & Venkataraman, 2011; Mahieu, 2006). This description is also the summation of most recent authors such as Erkkila (2000) in their narrow and broad definition of the concept.



The figure depicts the time line for the meaning of the concept of entrepreneurial education as describe through the narrow and the broad way. Specifically, narrow definition of entrepreneurship is concerned about opportunity identification, business development, self-employment, venture creation and growth. It is about becoming an entrepreneur (Fayolle & Gailly, 2008). On the other hand, broad definition of the concept describes it as concerning personal development, creativity, self-reliance, initiative taking, action oriented, thus, becoming entrepreneurial. In the word of Mwasalwiba, (2010), whatever definition is used, has, to a great extent, huge impact on educational objectives, target audiences, course content design, teaching methods and student assessment procedures.

Teaching Strategy

Again, teaching strategies relate to methods which are used in the general teaching professions. Specifically, each profession has its unique characteristics in teaching its students in how, while, when, where and why such study should be

taught. In order words, a profession may use a particular strategy or group of strategies, to pass on training to its students. This is not quite different in the manner and means through which entrepreneurial education is been passed on to the students. However, unlike already existing skills being taught to specified students/apprentice, entrepreneurial education differ slightly. While, it is the goal of entrepreneurial education to equip the students with the necessary skills to be self-reliant, the students are also expected to possess some innate qualities in addition to the entrepreneurial skill-sets as pointed out in Kim-Soon (2022), Lackeus (2015), Cooney (2012). In the words of Akani (2011), Mohammed and Futua (2009) there are varying strategies that can be employed in teaching and transforming entrepreneurial education among students. These are:

- i. Organizing internship for students/ activity-based method
- ii. Establishing seminars/workshop/child centered method for students



- iii. Organizing Practical/ problem solving/demonstration method.
 - iv. Reward based system
 - v. Learning through science-technological method.
- These strategies are not exhaustive

List of Some Teaching-Strategies Use in Entrepreneurial Education

Teaching Strategies	Elements
Direct Teaching-learning Strategies	Invitation of guest entrepreneurs, mentoring, organizing seminars, video aid, extracurricular functions, specialized lessons, and tutoring
Interactive teaching strategies	Process-learning, identifying errors/mistakes, organizing interview session, group discussion, bilateral learning, problem solving, networking, discussion, active learning
Practical teaching strategies	Workshops, class practice, research/project writing, visitation, internship, studying, actual starting a business, investing in individual/group projects, practical experience.

Source: Esmi, et al (2015).

Entrepreneurial Educational Link Programme Development in Nigeria

Like most parts of the globe, where there are deliberate links between education and the industry, same is said of the entrepreneurial education. Most often, the intention between developing a link between entrepreneur education and the industry is to broaden the needed zeal and enthusiasm of students across tertiary institutions.

For instance, Wilfred-Bonse and Sam-Ngwu (2014) observed that Africa and indeed Nigeria has, in the time past developed a synergy between the industry and the educational sector. The obvious reasons are spelt also in Wilfred-Bonse and Sam-Ngwu (2014) argument of providing students with the real-life situation for mutual benefits. For example, there is the Pasadas Fashion Incubation in South Africa where students via various educational institutions are made to be incubated in school to acquire needed entrepreneurial skill-set in this direction. There is also the YAYA – Young Achievement Austria where entrepreneurial skill sets are taught in the area of business development (Wilfred-Bonse and Sam-Ngwu, 2014).

In Nigeria, the Students Industrial Work Experience Scheme – SIWES, is the umbrella covering the link between the students’ transformation and the industry. Like what is obtainable in most clime, the essence of this is to foster deliberate harmony between what is expected of the students and the industrial world at large. In order words, students are expected to gain industrial experience prior the final graduation

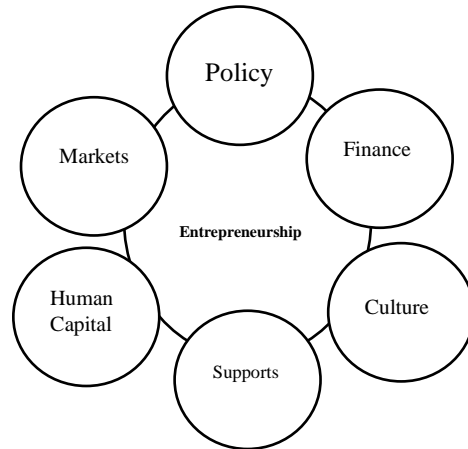
and, likewise, expected to have been stirred up in their individual future expectations. With this, a link that helps improve the standard of education, student and the country is harnessed.

Specifically, the SIWES is organized by the government under the Industrial Training Fund (ITF) for colleges of education, monotechnic, polytechnics and universities. The following are some of its responsibilities:

1. To make room for synergy between the students and the industry in acquiring industrial skills and experience in whatever course of study especially in engineering and related fields.
2. Allow students acquire the industry exposure in areas that are ordinarily not available in the institutions. For example, in the areas of machine operations, handling, maintenance and more.
3. Provide hand-on situation to the students on potential encounters after graduation
4. Provide an easy avenue for student on the world-of-work and for further/future work opportunity.
5. Give room for application of classroom knowledge in the real world.
6. Bring a form of dual participation between the industry and the educational sector. This can involve the industry narrating their expectations for the educational sector and, likewise, the latter prepares and sharpen its curriculum and students towards this direction.



The General Entrepreneurship Ecosystem



Adopted from Cooney (2021).

The Case of Kogi State Polytechnic, Nigeria

Kogi State Polytechnic was established in December 1992 by the 1st and 2nd Executive Governor of Kogi State, Prince Abubakar Audu through an amended edict No. 6 of 1994. The Polytechnic took off in January 1993 at the Government Science Secondary School, Lokoja and Osara Campus with Dr. Isa I.A. as the first Rector. Our Mission: ‘To provide a world Centre of learning and research in technological and vocational training for sustainable development’. Our Vision: ‘To be the leading Polytechnic that prepares students through hands – on – training to be work ready, life ready and world ready’ (www.kogistatepolytechnic.edu.ng) (office of the Rector 2020).

Entrepreneurial Education (Trades) at Kogi State Polytechnic

Like most tertiary institutions in the country, the Kogi State Polytechnic pride itself in array of entrepreneurship trades

at its centre of entrepreneurship development. From the available trades, students are allowed to choose based on their interest. A list of trade available at the Polytechnic for both the national diploma and higher national diploma are as listed below;

- i. Tie and dye / batik production
- ii. Fashion design and tailoring
- iii. Knitting
- iv. Beads and wire work
- v. Chemical product (cosmetology)
- vi. Wood work and carpentry
- vii. Blocks and interlocking – tiles production
- viii. Shoes and bags production
- ix. Photography and video production
- x. Welding and metal fabrication
- xi. Sachet water production
- xii. Millinery (turban and facinator)

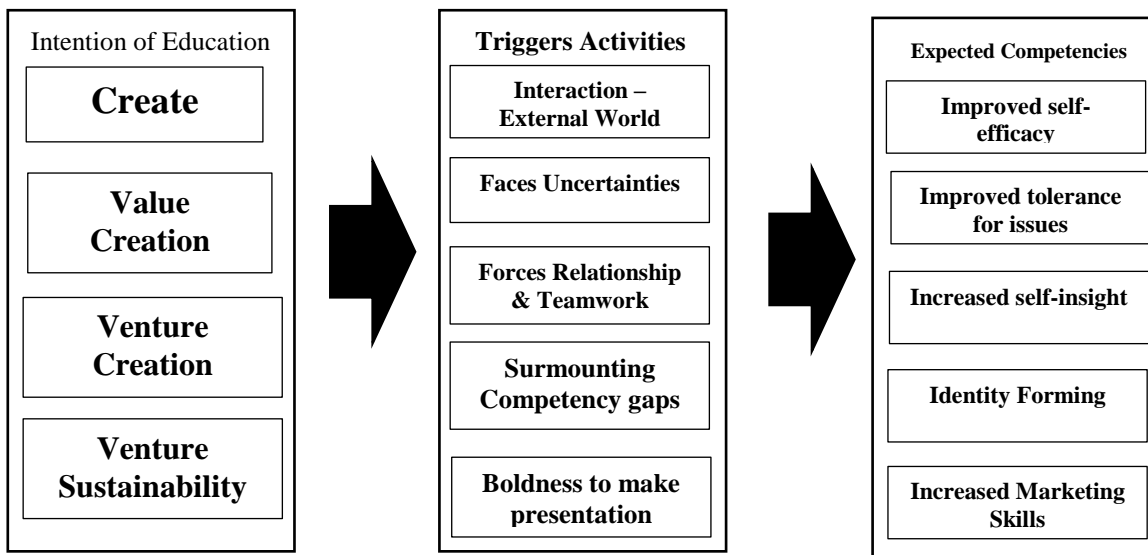
Entrepreneurial Competencies

	Central Theme	Sub-Theme	Description
Cognitive competencies	Knowledge	Mental Models	Knowledge about risk taking – ability to get things done with no/minimal resources – probability models.
		Declarative Knowledge	Possessing entrepreneurship basics – value creation, generation of idea, opportunities, accounting, finance, technology, marketing, risk, etc.
		Self-insight	Personal fitness knowledge
Non-cognitive Competencies	Skills	Marketing skills	Conducting marketing research assessment, marketing of products and services, persuasion, exciting people about ideas, relationship with customers, communicating a vision.
		Resources skills	Creation of a business plan, financial plan, obtaining funding, access to resources.
		Opportunity skills	Recognizing and acting on opportunities, product/service/concept development



	Interpersonal skills	Leadership, motivating others, managing people, listening, resolving conflicts, socializing and teamwork
	Learning skills	Active learner, adaptive, coping with uncertainties
	Strategic skills	Setting priorities, focusing on goals, defining a vision, developing strategy, identifying strategic partners.
Attitudes	Entrepreneurial passion	Need for achievement
	Self-efficacy	Belief.
	Identity	Deeper beliefs, role identity, values
	Proactiveness	Action-oriented, initiator, proactive.
	Uncertainty/ambiguity/tolerance	Comfortable with uncertainty, ambiguity, adaptable, open to surprises
	Innovative	Novel thoughts, actions, unpredictable, radical change, innovative, visionary, creative, rule breaker
	Perseverance	Ability to overcome adverse circumstances

Result models for Entrepreneurship Education



Adopted from:Lackeus (2015)

METHODOLOGY

The case study (CS) methodological approach is designed for this work. Generally, a CS provides a general in-depth and multi-faceted understanding of a complex issues in real life context. It allows a researcher to obtain feedback on what has been observed in certain persons/group of persons, and other things over-time for generalization purpose. At Kogi State Polytechnic, there are 6 Schools (Faculties) and 25 Departments. The Department of Business Administration (BA) is one of the departments domicile at the School of Management Studies. There is a total of four hundred students at the department. The composition is: Higher National Diploma (HND 1 & 2) – 160, and National Diploma (ND 1 & 2) – 240 respectively, making a total of 400 students. In addition, each department is mandated to take a course in Entrepreneur (theoretical and practical), as one of the major pre-requisites to graduation. This course comprises

of twelve (12) available start-ups – trades, which the students are expected to choose from based on their intrinsic drive. To achieve the objective of the study, the researcher purposefully selected (BA), being the department where the researcher is domicile. Based on this, the study designed a questionnaire to elicit feedback from the questions raised in the study. Likewise, to validate the empirical process, the students are made to response to a Likert Scale response rate measure of: Strongly Agree (SA), Agree (A), Strongly Disagree (SD), Disagree (D), and Not Sure (NS) responses at a scale of 5 to 1. These responses are subjected to a correlation analysis using the Spearman correlation regression test to ascertain the most significant learning strategies considered most suitable, and that yield the most impactful effect. This was done using the Statistical Package for Social Science (SPSS) software version 26. Prior this, the study demonstrates the visual plot of



responses. It also conducts a pre-test of Cronbach Alfa, and make the study to undergo a validity and reliability validation.

Population of the Study

The population of the study comprises of the entire students offering Entrepreneur at both the Higher National Diploma and National Diploma Levels at the Department of Business Administration. Presently, there are a total of 400 students – Higher National Diploma 1 = 80, Higher National Diploma 2 = 80, National Diploma 1 = 120, National Diploma 2 = 120.

Data collection Instrument

Levels				
HND 1	HND 2	ND 1	ND 2	Total
50	50	50	50	200

Validity of Instrument

Validity allows for ascertainment of the rightfulness of instrument adopted. Often, the face validity, content validity, criterion validity and construct validity are checked. For example, criterion validity is carried out by scholars and experts to test for originality of our variables used. Likewise, face validity, which allows the researcher makes an assertion of truth to have measured what it intends to measure is also checked. Similarly, content validity, which tells of the appropriateness of the wordings of the instrument and the objectives of the study is also carried out (Kothari and Gaurav, 2015; Baridam 2001). In order words, validating the face and content validity of the instrument, the work requested the contributions and opinions of scholars and academics, experts, individual business owners and government agencies and parastatals on the designed questionnaire. The essence of this is to ascertain the coverage, since the outcome of the study is expected to form a part in policy formulation for concerned authorities.

Reliability Test

This is to determine the consistency and or precision of the measures used in the study. In order words, to ensure that the measurement is consistently reproducible, a test re-test of Cronbach Alfa is applied. Cronbach’s Alpha is considered the most appropriate statistical test for reliability, given the nature of responses used to construct the scales. For this kind of data, this is equivalent to the Kuder-Richardson formula 20 (KR20) coefficient ((Kothari and Gaurav, 2015; Baridam 2001)). These evaluations are a more rigorous approach than traditional split-half statistics. The Cronbach’s Alpha ranges in value from 0 to 1. A coefficient equal to or greater than .6 is often considered a minimum acceptable level, although some authorities argue for a stronger standard of at least .70 ((Kothari and Gaurav, 2015;

Sampling Technique

It is imperative to perform a sampling test since the entire population may be too cumbersome. To achieve this, the study adopted the Taro Yameni sampling size determination for optimal selection. This is derived thus:

$$n = \frac{N}{1+N(e)^2} \tag{1}$$

Where: n = sample size sought
 e = level of significant
 N = Population size

$$\text{Thus, } \therefore n = \frac{400}{1+400(.05)^2} \tag{2}$$

A total of 200 hundred sampling is used.

Baridam 2001). The internal consistency for this instrument in this study is not expected to be different.

Data Analysis Technique

The Spearman Order Correlation coefficient data technique will be used to prosecute our findings through the software specified. This is derived thus:

$$rs = 1 - \frac{6 \sum d^2}{N^3 - N} \tag{3}$$

where:

$\sum d^2$ = sum of the squared difference in the ranking of the subject on the two variables.

N= number of subject being ranked.

Underlying Assumptions

Spearman correlation regression is depicted Rho or rho and assumes any value from -1 to +1 indicating perfect correlation and, 0 as no relationship between the hypotheses stated. A -1 +1 test of the hypothesis tells of the type of relationship existing between H₀ and H₁ while, a 0 shows no relationship. This immediately tells us of the kind of error that is committed while either rejecting or accepting the alternative hypothesis. In our case the Likert scale as stated earlier will be used to ascribe weight in the sequence based on the technique stated.

RESULT

Descriptive Statistics

The study presented the descriptive statistics – graphs, in trends of male and female population, age-grade, and choice of trade in the study. It is present here under



Age Range Classification of Respondents

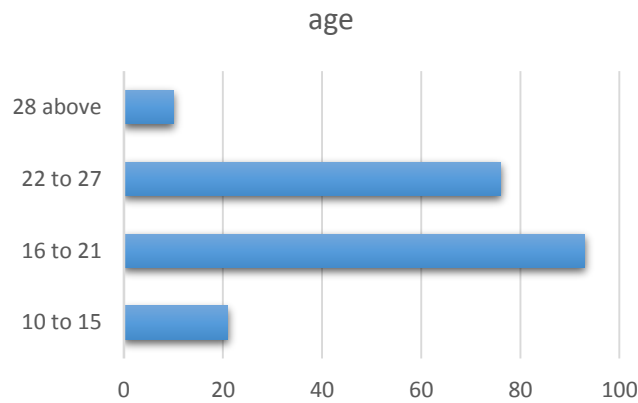


Figure 1

The study showed the age range of the respondents that are used in the study. Figure 1 indicates that those occupying the age bracket 16 to 21 represents the highest number of the

respondents. This is followed by those in age bracket 22 to 27, 10 to 15 and 28 and above respectively.

Sex Characteristics of Respondents

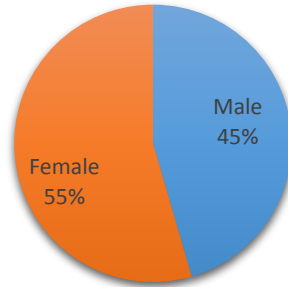


Figure 2

Likewise, Figure 2 showed the sex characteristics of the respondents. As indicated, a total number of 55 percent female are represented in the population. Also, 45 percent are male. By

implication, it means that the female population are larger than the male population of the study.



Trade Choice Trend of Respondents

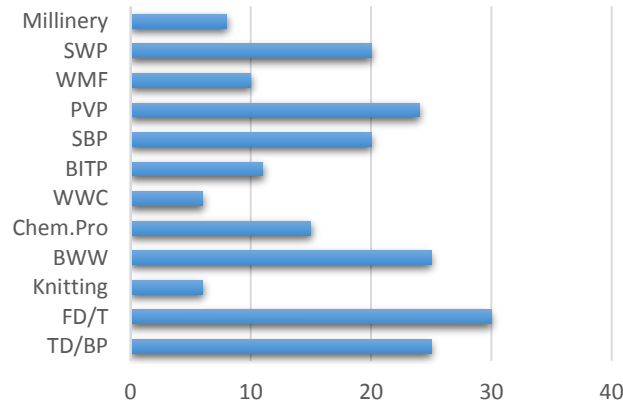


Figure 3

Going forward, Figure 3, shows the trend in choices made by the study's respondents of the trade that are available in the school for the purpose of their entrepreneurship training. FD/T, representing fashion designing and tailoring, provided the highest number of candidates. The next to this is: BWW –beads and wire works, TD/BP – tie and dye and batik production, and PVP – photograph and video production respectively. SWP –

sachet water production, SBP – shoe and bag production, chem.P – chemical production (cosmetology), followed in that order. Others are BITP -, blocks and interlocking, tiles production, WMF – welding and metal fabrication, WWC – wood, work and carpentry, Millinery and knitting are also in that order respectively.

Questionnaire Responses

Item	No. Distributed	No. Returned	No. Correctly Filled
HND	100	90	69
ND	100	82	41
Total	200	172	110

Source: Author's Compilation 2022

Table above represents the responses from the questionnaire distributed. Based on this, out of the 200 hundred distributed in equal streams to the HND and ND students', a total of ninety is returned by the HND students' while, a total of 82 is returned by the ND students'. Likewise, from the returned, a total of 69

questionnaire are correctly filled while, a total of 41 is correctly filled by the ND students'. In order words, a total of 110 are used as a basis of estimation as presented herein.

CORRELATION RESULT

Table 4:Correlations Result

			DTS	ITS	POT	EST
Spearman's rho	DTS	Correlation Coefficient	1.000	-.149	-.311**	.023
		Sig. (2-tailed)	.	.020	.001	.015
		N	110	110	110	110
ITS		Correlation Coefficient	-.149	1.000	-.076	.337**
		Sig. (2-tailed)	.020	.	.043	.000
		N	110	110	110	110
POT		Correlation Coefficient	-.311**	-.076	1.000	.106
		Sig. (2-tailed)	.001	.043	.	.000
		N	110	110	110	110
EST		Correlation Coefficient	-.023	-.337**	.106	1.000
		Sig. (2-tailed)	.015	.000	.000	.
		N	110	110	110	110

** . Correlation is significant at the 0.01 level (2-tailed).



Test of Hypothesis One

H₀₁: Direct teaching strategy does not significantly transform entrepreneurial skills among Kogi State Polytechnic students

Based on the result from the distributed questionnaire, the significant relationship subsisting between direct teaching strategy (DTS) and entrepreneurship skill transformation (EST) is positive and statistically significant at 0.015 percent. This is an indication that, direct teaching strategy is effectively influencing business education in Kogi state Polytechnic. Inversely, based on the correlation coefficient as depicted by rho, it shows that, the degree of responsiveness of this significant outcome is merely 23 percent. As such, it implies that, the magnitude of influence of the dependent and independent variable is relatively low.

Hypothesis Two

H₀₂: Interactive teaching is not a strategy that significantly transforms entrepreneurial skills among Kogi State Polytechnic students.

Similarly, the outcome of the result showed that the null hypothesis of no significant relationship between interactive teaching and entrepreneurship skill transformation in hypothesis two is also rejected. This is judging by the significant result which shows that it is 0.000. Thus, since this falls within the rejection region of the preferred 0.05 significant level, the null hypothesis is rejected and the alternative is accepted. As such, the study affirmed that, interactive teaching -process learning, learning from mistakes, group discussion, networking, problem solving, active learning is significant in transforming entrepreneurship skills among students of Kogi State Polytechnic. Likewise, the correlation coefficient which measures the degree of responsiveness of one variable over the other indicate that the dependent variable is impacted to the tune of 33 percent.

Hypothesis Three

H₀₃: Practical operational teaching strategy is not significant in transforming entrepreneurial skills among Kogi State Polytechnic students.

From the correlation result, this null hypothesis is also rejected. This is based on the significant value which shows that it is 0.00 percent significant. Thus, since is lower than the 0.05 percent level of significant, it is concluded that, practical operational strategy of teaching business education in transforming entrepreneurship skills among Kogi State Polytechnic students is also significant. Further, the outcome of the correlation coefficient, which measures the degree of responsiveness to a small change in independent variable shows that, the dependent variable is rarely impacted to the tune of 10 percent. Thus, practical operational teachings strategies such as: role-playing, training workshop, class practices, research projects, internship, practical experiences among others, are significant but, their impact, is relatively low.

CONCLUSION AND RECOMMENDATION

Based on the result of the study, which shows clearly that, all variables that are used in the study – direct teaching strategy: mentoring, training through curriculum, special lessons/assignment, tutoring and inviting guest entrepreneurs; interactive teaching strategy: process learning, learning from mistakes, group discussion, networking, problem solving, active learning, and practical teaching strategy: role-playing, training, workshop, class practices, research projects, internship, practical experiences; the study concludes that, there are statistically significant relationship of these independent variables in the transforming of entrepreneurship skills of students at the Kogi State Polytechnic. However, the significant conclusion revealed also that the extent to which neither the direct teaching strategy, interactive teaching strategy, nor the practical operational teaching strategy demonstrates sufficient strength in influencing the much-needed transformation of the entrepreneurship skills expected. This is judging by their respectively correlation coefficients of the results. In order words, this influence is far from 0 and 1, indicating a weak influence in all. With this outcome, the study concludes that, though, a statistically significant relationship exists among the variables used in the study, its impacts, as shown by the rho are relatively weak.

The significant outcome but relatively weak influence of the independent variables on the dependent variables leaves much to ponder upon. Based on this outcome, the study suggests that there are other likely cases that could warrant the overall sufficiently weak impact of the rho in transforming entrepreneurship skills among the Kogi State Polytechnic students', which are possibly not considered in this study. Among these are possibly students' innate habit/attitude/belief/confidence towards be transformed or other obvious economic conditions of the country. As such, a stronger but deliberate tripartite – lecturers-students-government arrangement for optimal result is recommended.

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THE ROLE AND IMPORTANCE OF SIMULATIONS IN EFL CLASSES

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ABSTRACT

The current article aims at providing general information about simulation, its effective use and importance in teaching English as a foreign language. The article deals with the term simulation and shows similarities and differences of simulations from other language activities, gives definitions by scientists and shows the role of simulations in foreign language learning teaching as well as improving writing and speaking skills. Suggestions, drawbacks and solutions by leading experts and how simulations are important in teaching foreign languages are discussed and proved in this article.

KEY WORDS: *simulation, game-based technologies, critical thinking skills, communication, outcome, interaction, reluctant students, active participants, target language, observation;*

English has become the most widespread language on Earth and it is spoken in the British Isles, the USA, Australia, New Zealand and much of Canada and South Africa. In Shakespeare's time only a few million people spoke English. All of them lived in what is now Great Britain. Through the centuries, as result of various historical events, English spread throughout the world. Today, English is represented on every continent and it is the world standard language. Over 80% of the world's scientists read English. About 85% of the world's mail is written in English. And 90% of all information in the world's electronic retrieval system is stored in English. The number of people who speak English as a second foreign language will exceed the number of native speakers.

The English language has been an international language for only 60 years. It would be to think that English would replace other languages as many fear. Instead it may coexist with languages and allow strangers to communicate across linguistic boundaries. It may become one tool that opens windows to the world, unlocks doors to opportunities and expands our minds to new ideas. So a lot of young people are learning foreign languages and using the opportunities that are given them.

Most of the students learn foreign languages better and can easily improve their linguistic skills when teachers use different competitive innovative

technologies such as role plays, group work, pair work and other game-based technologies during their lessons. A simulation is one of the most widespread forms of such technologies which can improve students' language, communicative skills as well as critical thinking skills and feeling responsibilities.

It is apparent that the English language is certainly more than the prescribed texts and objective questions. Therefore, a student getting a distinction for English in a public exam does not mean that he has caught the passion for learning English. Nowadays, students' ability to put forth their ideas by means of effective communication is expected apart from scores that just test their writing ability. This new area of focus, known as communicative competence, leads language teachers to seek task-oriented activities that engage their students in creative language use. Trying to make our classes interactive can be challenging but it remains essential because the concerns over educational relevance and quality coexist with the imperative of expanding educational opportunities to everyone not excluding those who feel vulnerable to use English both inside and outside classrooms.

In order to get learners involved in the language class and to ensure active participation of every learner, certain techniques could be applied. The best ways of getting them drawn into the language class is through Simulations. Also they are fantastic materials for the



language teachers to use with young learners because of their unlimited benefits. Every teacher and student is creative if he is given the opportunity, time and support to express that creativity. Simulations for language teaching can be based on everyday materials. We should not be afraid to try out unconventional tools based on personal experience in the classroom. In this way, lecturers can incorporate their creative skills into the teaching of oral skills. Students when allowed to explore their creative skills find speaking in the English language interesting, relevant and productive. Creative and imaginative activities help alleviate problems that hinder language learning. [1]

What is simulation? Simulation is a language learning model which allows students to express themselves to their peers in a group setting, groups comprising usually three or four. It is related to Role Play, but in Simulation students retain their own personas and are not required to pretend to be someone else. In Role Play one student might be told that she is a supermarket checkout assistant whilst another is a customer. Students might also be given fairly tight guidelines outlining the nature of their exchange or the language points they are expected to cover. In Simulation the group members would not be expected to place emphasis only on a given set of language points, and effective communication should be the outcome, rather than the strictly correct use of vocabulary and structures. The group is given a task which may last a single period or stretch over a number of sessions. These tasks may range from the fairly short to the longer-term, more wide-ranging and complex. [2]

The length of the Simulation need not be connected to the complexity of the language skills which students bring with them to the exercise are what determines its linguistic complexity. At the end of the exercise the group will have arrived at some decision or series of decisions and choices which they will be expected to explain and justify. However, the process of the exercise is of at least as great importance as the product in the sense that the linguistic interaction among the students will determine its effectiveness and success.

Simulations are instructional scenarios where the learner is placed in a "world" defined by the teacher. They represent a reality within which students interact. The teacher controls the parameters of this "world" and uses it to achieve the desired instructional results. Students experience the reality of the scenario and gather meaning from it.

A simulation is a form of experiential learning. It is a strategy that fits well with the principles of Student-Centred and constructivist learning and teaching.

Simulations take a number of forms. They may contain elements of:

- a game
- a role-play, or
- an activity that acts as a metaphor.

Simulations are characterized by their non-linear nature and by then controlled ambiguity within which students must make decisions. The inventiveness and commitment of the participants usually determines the success of a simulation. [2]

Simulations promote the use of critical and evaluative thinking. Because they are ambiguous or open-ended, they encourage students to contemplate the implications of a scenario. The situation feels real and thus leads to more engaging interaction by learners.

Simulations promote concept attainment through experiential practice. They help students understand the nuances of a concept. Students often find them more deeply engaging than other activities, as they experience the activity first-hand, rather than hearing about it or seeing it.

Simulations help students appreciate more deeply the management of the environment, politics, community and culture. For example, by participating in a resource distribution activity, students might gain an understanding of inequity in society. Simulations can reinforce other skills indirectly, such as Debating, a method associated with some large-scale simulations, and research skills.

According to Ken Jones "A simulation is an event. It is not taught. The students become participants and shape the event. They have roles, functions, duties and responsibilities – as ecologist, king, manager, explorer, reporter, survivor, administrator – within a structures situation involving problem solving and decision making." [3]

The teacher's role in simulation is a controller. He introduces the simulation and then observes and assesses. He does not interfere. It is a good position for monitoring the language, communicative skills and behaviour of the students.

There is no pretence in simulations – it is a reality of function in a simulated environment. Simulations and language are inseparable. Spoken language, written language or both can be used.



The language in simulations has two main characteristics – it is functional and cohesive. It has certain functions because the participants have their role and their problems to solve, jobs to do, tasks to fulfil. Therefore they have to choose appropriate language to achieve what they want to. It is a matter of the students to suit the language to the situation. Because there are usually a lot of opportunities for interaction, action and reaction in simulations, the other participants can deal with their colleague's inappropriate use of language. Although two participants start with opposite view, the situation brings them together. Because of the structure, the language is cohesive. [4]

Besides above mentioned characteristics simulations have another advantage. Students have fewer opportunities to learn from speaking practices and methodologies. Even worse, in a mixed-ability set up, working with students who are reluctant to maintain and extend conversations also limits already skilled students' opportunities for language use. Getting such students to speak English is one Herculean task for the teachers of English. More effective and innovative teaching techniques are required for tackling this complex language problem that is prevalent in the English classes of every rural set up. Some strategies beyond urging students to "speak English" are repeatedly called for. Yet, there is no authentic solution found subsequently. So every English teacher is pre-occupied with these persisting questions, "How can we challenge our students to speak and to participate?", "How can we motivate students who are not able to visualize the importance of the English language in the everyday world and subsequently do not see the need to master it well?" [5]

The answer to these questions is – simulations. They are really one of the most effective techniques to encourage and motivate reluctant students to speak the target language in the classroom.

Motivation is an integral part of simulations. It is one of the most important and interesting reasons for using simulation in teaching. The functions, duties and responsibilities given to the participants arise motives. The intensity of motivation depends on the quality of simulation. If the simulation is good, well prepared, stimulating and provocative, there is likely to be strong emotional component, which leads to motivation. The motivation may be strengthened by the participants' appreciation of being powerful, responsible for decision-making. They "own" the simulation.

Motivation can help to break down shyness, differences of sex, race, colour or status. Ken Jones mentions that simulation is a good event for students to get to know to each other and for a teacher get to know the students. A good simulation can be an icebreaker and can provide an interesting experience, which is good for social relations. Icebreaking may be needed not only at beginnings, but also always when a frosty situation occurs. Routine can be one of the reasons. Not all the simulations are good for breaking ice. A suitable simulation for that must be fully participatory, must not have any passive or part – roles and should involve a lot of interaction among the students. [3]

Students need opportunities to be active participants in tasks that require them to practice communication with their teachers, peers, and others. It involves shared experiences in a particular situation. Simulation is a kind of technique that consists of the scenario of role-play. A simulation is similar to role play except that in a simulation the participants are free to take their own decisions and are not directed in any way by constraints laid down on a role play.

The use of simulation techniques has been reported to be of high motivational value by researchers. According to Chauham this is one of the most distinctive features of simulation which makes it acceptable at all levels of teaching because if any teaching technique succeeds in creating motivation in learners all other problems may be drastically reduced.[5]

Another expert Watson explains that the use of simulation techniques where students are allowed to project themselves into new classroom roles helps to improve classroom dialogue, active participation and transfer of learning. Through active discussion, students discover how the language works.

Not just that, they are able to sort and order the information gathered and relate it to the lesson. The teacher in all possible ways guides the students but it is the students who actually discover for themselves how they can effectively carry out the acquired information that they received from simulation activities. [6]

In addition, you can build in opportunities for success rather than failure by ensuring that tasks are at an appropriate level of difficulty and that every lesson contains some "take-away" value, something that helps students leave the class knowing that they have moved forward in their learning. This could result in students' growing sense of confidence in writing a



paragraph, in using some appropriate expressions to communicate with friends and neighbours, in understanding useful vocabulary items, and so on.

Simulations also can help to break down cultural or ethnical prejudices.

When using simulations there are the following benefits:

- appease students' demand of realism in learning language
- increase of motivation, students' one as well as teachers' one
- typical teacher – student relationship breakdown (students are responsible for reaching their goals themselves)
- cross-cultural comparison and identification
- reduction of stress (it is one of the crucial points in successful language learning)
- possible noteless teacher's monitoring

Simulation has its own advantages and disadvantages, besides above mentioned benefits it has some drawbacks:

- reinforces students' faulty pronunciation;
- allows students to misunderstand and misuse new vocabulary and structures;
- works best with already effective speakers of the target language;
- requires preparation which detracts from target language contact time;
- might allow less motivated students to withdraw from participation;
- leaves teachers feeling ineffective or excluded;

Despite the drawbacks there are recommended solutions, according to these solutions teachers...

- conduct the preparation stage through the medium of the target language;
- ensure that the Simulation is of relevance and interest to the students;
- construct groups containing mixed or differentiated levels of ability depending on their students' needs;
- monitor the groups' language and participation levels during the simulation;
- base subsequent remedial work on observations taken during monitoring.[5]

Following above mentioned advantages and solutions the teacher may give the groups or students a simulation activity. By the end of the exercise the teacher will have gained an impression of how the students and groups performed in general terms, and

whether the exercise in itself was successful as an exercise.

In evaluating the efficacy of the exercise, the teacher must bear in mind whether the following questions may be answered positively:

- did the groups know what they were doing?
- were they able to operate without the assistance of the teacher?
- did they operate effectively and carry out all tasks as required?
- did they make decisions and exercise options?
- were all students/groups reasonably well motivated?
- were the bulk of linguistic interactions realistic and natural?
- did the students themselves feel the exercise was of benefit?

Although it is difficult to give a student a grade for work carried out as part of a group, by using the recorded material, or notes made during observation, the teacher will be able to assess each student diagnostically on the criterion of whether the majority of interactions would have been comprehensible to a fluent speaker of the target language.

It is for the teacher, in accordance with her institution's guidelines, to determine which levels of pronunciation and usage of vocabulary and structure students have reached as part of the exercise. No guidelines can be given without reference to local practice vis-a-vis grading in general.

Most language teachers are always foraging for ideas to keep the class „afloat“ in the sea of indifference and passivity. Although it is difficult, the EFL instructor can indeed help students develop the motivation to speak English and create the available situations to practice it and move students toward acquisition of their second language with the help of the above mentioned task-based activities. Using task-based learning to teach English does not fall into the well-trying comfort zone of traditional teaching. The average teacher feels comfortable with the prescribed textbook. This unfortunately denies students the opportunity to immerse themselves in the English language. It is necessary that teachers try using other materials as a teaching resource.

According to Genesee (1987) “activity-based approach provides opportunities for students to experience a much wider range of speech events and to use a much wider range of speech acts than is possible in



conventional medium-oriented classes in which the language is taught as a subject, or even in message-oriented classes in which regular content is taught through L2.” Therefore, using strategies such as Simulations and Language Games help students to recognize the value of the use of English and setting up situations in which it seems almost necessary to do so will keep students focused on using English in their EFL class—perhaps the only time they will have extended practice in their target language. [6]

To sum up, it is important to mention again that when using simulations resources and time are required to develop a quality learning experience with simulations. Assessment of student learning through simulation is often more complex than with other methods. Simulated experiences are more realistic than some other techniques and they can be so engaging and absorbing that students forget the educational purpose of the exercise. If your simulation has an element of competition, it is important to remind the students that the goal is not to win, but to acquire knowledge and understanding. At the end we can say that simulations are really effective in foreign language lessons and they can help students to feel free during lessons and improve their most needed skills.

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