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A PHENOMENOLOGICAL INQUIRY ON THE UTILIZATION OF EDUCATIONAL TECHNOLOGY IN PHYSICAL EDUCATION: GAMIFICATION IN FOCUS

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ABSTRACT

This research study employed a qualitative research design, specifically a phenomenological approach, to uncover and understand the lived experiences of PE 2 students who are in the gamified subject. The study involved 14 students who were selected through a purposive sampling technique in accordance with the inclusion criteria, and the data were analyzed using coding and thematic analysis. The findings of the study revealed the experiences of the participants, having difficulty in navigating the app, encountering poor internet connection, experiencing engaging tasks, enhancing motivation to learn, On-time and competitive learning, setting personal goals in learning, adaptation of game-like learning, and fostering sportsmanship and collaboration. Conversely, the participants employed the following coping mechanisms to get through the challenges they faced: Seeking Help or Assistance, utilization of data connection, making use of various learning resources, peer tutoring and teamwork, and continuous learning of the platform. Additionally, the following insights were drawn from their experiences: personal growth and tracking progress, significance of gamification in physical education, importance of technology Integration, useful and beneficial for Future educators, and cultivate confidence and self-improvement. The findings of the study suggest that by integrating gamified learning into physical education, educators have the opportunity to harness the power of technology and experiential learning to foster a deeper understanding of concepts and skills. Ultimately, the study's insights emphasize the transformative potential of gamified learning in enhancing both the enjoyment and effectiveness of physical education, paving the way for more immersive and impactful educational experiences.

KEYWORDS: *Physical education, Gamification, Phenomenological approach, Gamified subject, Lived experiences, Technology integration, Mati City, Davao Oriental.*

INTRODUCTION

One significant issue about student motivation in educational institutions is the over-reliance on conventional teaching methods and the limited application of novel approaches. The most common teaching strategies in classrooms are lecture formats and rigid frameworks, which must be revised to engage students or pique their interest in learning. Minimal technology integration and low student engagement in the learning environment block active participation and motivation. While some educators are diligent in integrating technology into their courses through innovative techniques such as gamification, issues such as inadequate internet access and misplaced equipment might hinder student's motivation to learn.

A case study in Taiwan found that cultural and traditional teaching methods are the main barriers to implementing gamification (Lampropoulos et al., 2022). These barriers resulted in resistance towards gamification because some teachers and students are used to traditional teaching-learning methods. In another investigation by Li et al. (2019), they observed that limited access to technology, cultural attitudes towards gaming, lack of training and support for teachers to design and implement effective gamification strategies and firm reliance on extrinsic rewards are the major drawbacks and challenges in implementing gamification in Asia. In addition, another study in Singapore reveals that existing case studies on gamification in education have limitations as they need to explore the long-term effects of its usage in the classroom. Consequently, students have had negative consequences, including a gradual decline in interest, undesirable behaviors, and decreased motivation (Su Xiang, 2020). Further, a study in Indonesia found training and support for teachers to design and implement effective gamification strategies; it was noted that despite the widespread enthusiasm for incorporating creative gaming concepts in educational settings to promote active learning, engage students, and address motivational challenges, an increasing body of research suggests that gamification is not practical in improving student engagement or enhancing learning outcomes (Chou, 2019).

In the Philippines, particularly in Laguna, one of the schools in the area, as highlighted by Antonio and Tamban (2022), states that the efficacy of gamification in education has produced inconclusive or no significant impact on certain behavioral aspects, the growing body of research showcasing positive, or outcomes demonstrates that gamification can indeed be an effective technique for enhancing motivation. However, teachers and students need more engagement and participation.

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Specific educational contexts where gamification is particularly beneficial have yet to be fully established. Most of the research on gamification has primarily centered on using specific gamified applications or video games. Additionally, in Quirino, various factors influence students' level of interest and motivation in gamification. One of the primary responsibilities of teachers is to promote active engagement among students in both synchronous and asynchronous modes of learning (Caballero et al., 2023).

Further, in Mati City, based on my firsthand experience as a Senior Lecturer in one of the colleges, I experienced problems with motivation it is challenging to deliver lessons, especially to students who are not interested in the class, so I started applying gamification strategies physical education, and I found them to be effective in increasing my students' motivation and academic performance However, there are drawbacks that I have encountered, such as the negative preconception of non-gamer students, devices and connectivity issues, and the inability to independently navigate and explore the online gamification platform.

During my literature review, I found that several studies have been conducted on gamification. In a survey by Perera and Hervás-Gómez (2021), the authors explored how gamification impacts students' perceptions of their learning experience. The result of their study suggested that it can significantly improve engagement, motivation, and learning outcomes. Moreover, a quasi-experimental study that investigated the impact on the motivation and physical activity of gamified intervention in PE found that it had increased the motivation and competitiveness of students under the intervention program (Fernandez-Rio et al., 2022). However, I have not encountered any studies that thoroughly explore the utilization of educational technology, focusing on gamification in the context of physical education. Additionally, the scarcity of literature in both national and local settings can be attributed to the recency of the issue. Thus, the absence of existing research has motivated me to investigate further.

The urgency and social relevance of conducting this study lie in the evolving landscape of education, particularly in physical education. With the rapid advancement of technology and the increasing prevalence of digital tools in educational settings, there is a critical need to understand the utilization of educational technology, specifically gamification, within physical education contexts. This research provides valuable insights into the effectiveness, challenges, and potential benefits of integrating gamification strategies in physical education curricula.

The study's findings will be disseminated via LAC sessions and research conferences. Targeting educators and stakeholders in physical education and the need for technology integration aims to facilitate dialogue and promote innovative practices such as gamification and educational technology for enhanced teaching and learning experiences.

RESEARCH QUESTION

The study aims to answer the following research questions:

1. What are participants' lived experiences regarding gamification in physical education?
2. How do participants cope with the challenges?
3. What are the insights that participants draw from their experiences?

METHODS

This study utilized a qualitative research design. As Maxwell (2012) emphasized, this is the procedure of uncovering an in-depth understanding of social phenomena that occur in a natural setting. It is a type of research that gathers and seeks answers to a specific problem without using numerical data. Creswell (2013) also highlighted that this design in research provides a clear point of view among a few people who would be represented as the voice of the whole. In this study, a qualitative design is applicable. This study aims to learn more about the phenomenon that students encounter in the gamified environment. The data will also be gathered through in-depth interviews and focus group discussions, not numerical data.

The participants of this study were fourteen (14) purposively selected students from one of the colleges in Mati City, Davao Oriental, who were in the gamified PE subject. According to Creswell (2014), the number of participants in a qualitative study depends on the research question, design, and data analysis approach.

Moreover, the study employed the following selection criteria for getting the participants: (a) those bonafide students in one of the colleges of Mati City, Davao Oriental, and (b) those under the gamification group in the PE 2 subject. Additionally, Exclusion Criteria: Participants will be excluded from the study if they: (c) are not currently enrolled as bona fide students in one of the colleges of Mati City, Davao Oriental.; and (d) are not part of the gamification group in the PE 2 subject.

Further, thematic analysis refers to the systematic process of reading and re-reading transcripts to identify patterns that will be grouped into themes (Braum & Clarke, 2022). In addition, Braum & Clarke (2022) suggest that this can be done generally through the following steps: familiarization of the data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the report. The researcher used this general guide to conduct a thematic analysis.

REVIEW OF RELATED LITERATURE

Gamification

Gamification, an essential practice in human-computer interaction, applies the components of game design and traits that seek to improve students' learning due to their natural inclination to enjoy games (Sanchez et al., 2020). Specific research suggests that gamification positively impacts student motivation, performance, and goal-setting(Bai et.al, 2020)

According to research (Nousiainen et al., 2021), gamification encourages students' creativity, imagination, and enjoyment.

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Conceptually, gamification is about applying gaming strategies to improve learning and make it more engaging for individuals. Gamification for learning can be beneficial because games instill lifelong skills such as problem-solving, critical thinking, social awareness, cooperation, and collaboration. (Buljan, 2021).

Additionally, the integration of gamification in education can boost students' engagement levels, akin to the captivating effects games offer, thereby enhancing their specific skills and optimizing the learning process (Smiderle et al., 2020). Inocencio (2018) added that gamification systems have the potential to foster students' engagement and enhance their learning performance.

According to Alhammad and Moreno (2018), integrating game technologies allows higher education institutions to restructure and innovate their e-learning frameworks, fostering student learning opportunities. According to Garone and Nesteriuk (2019), the introduction and rising popularity of gamification in educational settings encourage careful thought about developing initiatives to enhance students' learning journeys.

Challenges of PE 2 students in Gamified Learning

According to the experiences of PE 2 students in the gamified subject, their responses highlight how factors like financial constraints and living in remote areas contribute to these challenges. For many participants, limited access to affordable internet options means they often rely on data plans with restricted gigabytes. Consequently, using online platforms like Classcraft becomes a struggle. These connectivity issues directly impact their ability to engage in learning activities and access educational resources effectively.

Indeed, this study result aligns with the findings of the study by Zalat et al. (2020). A significant obstacle to online learning is the absence of reliable internet access. Many students need more infrastructure to access virtual learning platforms that require a stable internet connection.

Insights of the Importance of Technology

According to participants' responses, the importance of technology integration in education cannot be overstated. Their insights highlight how technology, including gamified learning platforms, revolutionizes the learning experience. By enhancing engagement and promoting critical skills, such integration prepares students for success in a digitally driven world. This exploration delves into the significant impact of technology integration on students' academic and personal development.

The findings of this study align with Bhat (2023). Several studies underscore the significant advantages of incorporating technology into educational environments. Foremost among these benefits is the heightened engagement it provides to students. Interactive multimedia, simulations, and gamified learning platforms are proven to seize learners' focus and promote their active involvement, representing a notable advancement in educational practices.

RESULTS AND DISCUSSIONS

Table 1
Major Themes and Core Ideas on the Lived Experiences of PE 2 Students on Gamification in Physical Education

Major Themes	Core Ideas
Having Difficulty Navigating the App	● finding it challenging due to a lack of knowledge about the app ● experiencing difficulty on the first encounter ● difficulty in getting notifications ● experiencing technical issues in navigating the app ● taking a longer time to use the app because it glitches and malfunctions
Encountering Poor Internet Connection	● living in a far-flung area where the connection is weak ● having trouble connecting the internet ● having internet connectivity problems at home ● finding it hard to participate due to power outage ● watching unnecessary videos has depleted the data balance
Experiencing Engaging Tasks	● changing perception towards physical education ● experiencing enjoyable learning in physical education ● adding spice to education, it enables students' engagement ● exciting and Challenging gamified approach
Setting Personal Goals in Learning	● getting high points in learning ● tracking progress and setting goals to engage gamification ● improving learning through management and goal-setting ● setting goals in the mastery of gamification

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Having Difficulty in Navigating the App

It was my first time, and I was shocked because even my classmates did not know how to navigate the app. IDI-03

At first, I did not know what to click next because it was my first time using that app. IDI-03

I could say it was difficult to understand and had difficulty receiving notifications. IDI-04

As anchored from the study's findings, the experiences of PE 2 students in the gamified subject come in various narratives. Participants expressed limited familiarity with the app, leading to difficulty navigating it. They shared similar initial experiences of finding the app hard to understand and use. Additionally, participants mentioned challenges in understanding instructions on how to use the app.

This is consistent with one of the study's findings conducted by Suyman et al. (2020). Students encountered numerous challenges in a home learning setting, including struggles with technology proficiency, expensive internet fees, and limited interaction or socialization opportunities among peers.

This is consistent with one of the study's findings conducted by Campillo-Ferrer et al. (2020). Participants encounter challenges when navigating the steps, including accessing the platform. Additionally, some students feel that certain game features hinder social interaction, increase anxiety, promote ineffective learning habits, and hinder course completion.

ENCOUNTERING POOR INTERNET CONNECTION

Most of the time we used class craft having trouble connecting to the internet because we lived in a far area, which is very hard for us. IDI-02

We do not have an internet connection because sometimes it has power Interruptions and forgetting to pay for the wifi; were the obstacles I faced. *IDI-03*

For me, the slow internet connection is the challenge I faced while participating the gamified physical education activities.FGD-06

According to the experiences of PE 2 students in the gamified subject, their responses highlight how factors like financial constraints and living in remote areas contribute to these challenges. For many participants, limited access to affordable internet options means they often rely on data plans with restricted gigabytes. Consequently, using online platforms like Classcraft becomes a struggle. These connectivity issues directly impact their ability to engage in learning activities and access educational resources effectively.

Indeed, this study result aligns with the findings of the study by Zalat et al. (2020). A significant obstacle to online learning is the absence of reliable internet access. Many students need more infrastructure to access virtual learning platforms that require a stable internet connection.

This is consistent with the findings of Matildi and Dagondon (2022), who revealed that despite the teaching methods utilized by the faculty, most students, especially those residing in rural areas, reported needing help to join the scheduled online classes due to technological constraints. Financial challenges notably affect their academic pursuits, including a lack of internet access, absence of a mobile phone, and insufficient data allowance

Experiencing Engaging Task

Based on my experience with gamification that my instructor utilizes, which is the class craft mainly, is when learning becomes exciting and, at the same time, challenging because it keeps us students engaged and motivated to do our assigned activities and changes our perception of learning Physical Education. IDI-07

Gamification turns into an exciting opportunity for growth and enjoyment, especially in physical education. IDI-02

gamification adds spice to physical activity or education; it enables me to enjoy and have fun while doing physical activities.FGD-06

According to a study by Caponetto et al. (2014), the idea behind gamifying learning is that by incorporating game elements into educational tasks, students become intensely engaged, much like they do when playing games. The study (Codish & Ravid, 2015) suggests that incorporating game mechanics into the learning structure can captivate learners in a meaningful educational journey, ultimately positively influencing their behavior. Research suggests that gaming improves the learning experience, resulting in heightened engagement, motivation, social influence, and academic performance among learners (Zainuddin et al., 2020).

Furthermore, in the study by Gami (2023), gamification adds excitement to learning and other activities, particularly those that might otherwise be less thrilling. It's an intelligent approach incorporating game elements to make things more enjoyable and captivating.

Setting Personal Goals in Learning

Improving learning through physical activities, setting goals, and time management. FGD-07

To achieve my goal of getting high points. FGD-04

Engage with gamification techniques and set personal goals to master gamification. IDI-02

According to Drew's study (2023), goal setting aids students and teachers in crafting a vision for self-improvement. Without defined goals, there's a lack of consensus and direction in the learning process. SMART goals assist students in contemplating their educational aspirations and devising strategies to accomplish them. They offer a structured framework for students to delve deeper into their objectives, ensuring they are not merely vague aspirations but actionable intentions.

Additionally, Ho (2023) stressed that while taking on numerous learning objectives simultaneously is tempting, prioritizing and perfecting one area before moving on is often more beneficial.

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Setting personal goals with specific timeframes attached can guide your learning journey.

Table 2
Major Themes and Core Ideas on the Coping Mechanisms of PE 2 Students on Gamification in Physical Education

Major Themes	Core Ideas
Seeking Help or Assistance	● utilizing gamification elements ● finding resources for using gamification ● seeking help from family ● asking for assistance in navigating the app ● Adapting and adjusting to the use of gamification
Utilizing Data Connection	● opting to go to Vendo Wi-Fi ● going to my cousin's place to connect to the internet ● having ready to have data connectivity ● finding a way to handle the consumption of load Efficiently
Making use of various Learning Resources	● coping with difficulties is finding other resources and being responsible ● watching videos on YouTube is one of the student's techniques used to imitate it ● improving physical activities by watching video tutorials
Having Peer Tutoring and teamwork	● helping each other to finish the task ● asking questions on how to navigate the app ● sharing thoughts and ideas ● practicing teamwork and collaborating with teammates to overcome obstacles ● appreciation of the competitive spirit and value of teamwork

Seeking Help or Assistance

I seek assistance from friends or peers on how to utilize gamification. FGD-02

through seeking help from my peers or classmates and also finding resources that I can use or help me use gamification. IDI-03

I seek help from my family and find a place suitable for me to join the gamified. FGD-07

This situation is reinforced by the findings of a study by Ardos et al. (2021) that students may face difficulties completing their assignments and may need assistance in their education. Academic help-seeking (AHS) involves seeking support from individuals and other sources to help students achieve good results in an academic context. Utilizing effective help-seeking strategies is pivotal in learning as it directly impacts academic achievement, often yielding noticeable results in a short timeframe. By promptly seeking assistance when encountering difficulties, students can address learning gaps, clarify misconceptions, and refine their understanding of course material. This proactive approach enables swift resolution of challenges and facilitates accelerated progress in mastering academic content.

Utilizing Data Connection

I will walk far to access the Wi-Fi vendo to enter the said platform. IDI-04

I always go to my cousin's house to connect to their internet so that I can submit even if it is late.IDI-05

To be a resilient person the way that I can handle my consumption of load. FGD-01

Similarly, one of the findings of a study conducted by Shabibi (2017) emphasized that the Internet is fundamental to advancing information technology. It has evolved into a crucial tool indispensable in today's knowledge-based society for information management, search, communication, research, and learning. Its widespread use is essential for navigating the contemporary landscape, facilitating access to vast knowledge repositories, enabling seamless communication, and supporting research endeavors. As a cornerstone of modern information exchange, the internet underpins various facets of daily life, driving innovation and shaping how information is accessed and disseminated.

Making Use of Various Resources

One thing I do to cope with those difficulties I've encountered during the gamification is to find resources and be responsible. FGD-01

The technique I used was watching a YouTube video so that I could imitate it. IDI-03

We also watched videos on YouTube and took videos to submit in the Classcraft app.IDI-05 Specifically, this supports the findings of Pratama (2020) that YouTube holds significant potential for enhancing students' learning skills. Educational videos on the platform are real-world recordings accessible via the World Wide Web, imparting specific learning objectives. With features like uploading, downloading, watching, and sharing, YouTube offers a versatile learning experience. Videos on the platform are accessible anytime, anywhere, boasting

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high-quality content that can be paused, replayed, or resumed at the learner's convenience. These multimedia resources integrate visual and verbal elements, fostering the development of diverse educational skills. Additionally, the interactive nature of YouTube videos promotes collaborative learning through shared viewing experiences, enriching the learning environment with engagement and enjoyment.

Having Peer Tutoring and Teamwork

We are helping each other so that we can understand the instructions. IDI-07

By inquiring about my classmates through messenger and interacting with them. FGD-04

We are helping each other understand the instructions, and then I will help my classmates understand. It is like sharing ideas. FGD-01

The blog post (LinkedIn, 2023) shared that peer tutoring and collaborative learning represent powerful educational approaches that empower students to participate in their learning actively. These methods improve academic outcomes and cultivate essential interpersonal, leadership, and communication abilities. Embracing the values of knowledge exchange and collaborative problem-solving, educational institutions foster dynamic and inclusive learning environments. Such environments equip students with the skills to succeed in a world of paramount collaboration and interconnectedness.

Comparatively, this result is aligned with the study conducted by Busljeta (2013), who stressed that the pervasive impact of various media forms, notably television, the internet, and digital communication, alongside rapid advancements in science and technology, profoundly influence society, including education. Consequently, students today harbor distinct interests, priorities, and educational perspectives compared to previous decades

Moreover, Tiria and Caballes (2019) suggested the utilization of gamification across diverse learning domains to evaluate its effectiveness in enhancing students' academic performance. They also recommended utilizing rewards to acknowledge students' diligence and dedication. Furthermore, the authors emphasized the significance of sharing this information within the learning community to cultivate peer motivation. In summary, they proposed using gamification, rewards, and community-wide communication to improve students' academic achievements and foster a supportive learning environment.

Table 3
Major Themes and Core Ideas The Insights of PE 2 Students on Gamification in Physical Education

Themes	Core Ideas
Provision of Personal Growth	● provision of exciting opportunities for growth and enjoyment ● setting a goal is the key to achieving what you have wanted ● provide a structured framework for goal setting and tracking progress ● participate actively in Physical Education Activities ● Celebrating achievement, staying motivated, and tracking progress
Importance of Technology Integration	● gamification needs technology integration ● integration of technology makes learning more engaging and interactive ● embracing new methods and technology integration ● do not focus on one approach and integrate technology ● using technology has a big impact on students ● adapting technology integration makes life easy
Useful and Beneficial for Future Educators	● beneficial for future educators and endeavors ● gamification apps will be helpful in the future, especially in technology integration ● gamification is useful in the field ● gamification is essential in the future
Cultivate Confidence and Self-Improvement	● each student has individual bits of intelligence ● students who are very good at dancing will put in high-level ● through gamified experiences in physical education, students learned its strengths and weaknesses ● accepting strengths and weaknesses wherein students can improve and grow

Provision of Personal Growth

The gamified approach in physical education promotes exciting activities and enjoyment because it is a fun platform. FGD-07

I always track my progress. That is my way of setting goals and knowing what to do to earn more points and rank up in the said gamification or application. FGD-06

Physical education provides a structured framework for goal setting and tracking progress, which has helped me stay motivated as a student. *FGD-05*

The results of this study agreed with those of Valero et al. (2020), which showed that adding games to physical education (PE) has been linked to better task completion and higher academic performance by changing different

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aspects of student motivation as seen through the lens of self-determination theory (SDT). By creating a suitable gamified environment, gamification positively influences students' learning motivations and dispositional flows. As a result, it supports their fundamental psychological needs, ultimately leading to improvements in academic performance in the PE context. In summary, the adoption of gamification in PE fosters favorable changes in student motivation, promotes a conducive learning atmosphere, and positively impacts their overall academic achievements.

Importance of Technology Integration

We are now in the 21st century, using more technology than the traditional approach. IDI-07

The new method is nice, like integrating technology in physical education because it is engaging and interactive. IDI-06

Integrating technology in physical education helps us not to focus on one approach. *FGD-07*

The findings of this study align with Bhat (2023). Several studies underscore the significant advantages of incorporating technology into educational environments. Foremost among these benefits is the heightened engagement it provides to students. Interactive multimedia, simulations, and gamified learning platforms are proven to seize learners' focus and promote their active involvement, representing a notable advancement in educational practices.

Additionally, the study by Alhammad and Moreno (2018), which found that integrating game technologies enables higher education institutions to restructure and innovate their e-learning frameworks, fostering student learning opportunities.

Useful and Beneficial for Future Educators

As a future educator, I might consider applying this approach in my future class. IDI-05

I think this will be beneficial since I am a future educator, so the insights I gained from this gamified experience will be useful in future endeavors. FGD-06

If I ever become a teacher, giving activities would be easy for me in the field. *IDI-03*

This Valverde et al. (2019) research stressed that the current trend in education and technological advancements led to the evolution of the subject (Valverde et al., 2019). These advancements served as a guide for teachers to adapt and become effective educators. Hence, the subject needed to explore and adopt innovations and strategies aligned with the current demands, such as digital literacy and critical thinking, to become effective. One of these innovations was gamification.

Cultivate Confidence and Self-Improvement

We have different bits of intelligence. IDI-04

Well, I better understood how to set realistic fitness goals and how I can practice improving my physical performance or being fit enough to put myself at a high level. IDI-07

I have gained insight into my strengths and weaknesses, which have helped me to understand areas where I can improve and grow. IDI-03

This finding aligns with Bradley (2023), who emphasized that building and maintaining self-confidence is vital for a rewarding and prosperous existence. Education is instrumental in bolstering self-assurance, offering a pathway to acquire knowledge, skills, and experiences that enrich one's perspective and expertise. Lifelong learning, emphasizing ongoing progress and adaptability, instills a growth-oriented mentality, enabling individuals to confront obstacles, seize fresh prospects, and navigate evolving environments. Education catalyzes personal growth, self-exploration, and the enhancement of cognitive faculties.

The growing trend of incorporating playful methodologies in education has positioned these strategies to be seen as practical solutions for addressing the shortcomings in the education system, as well as enhancing student motivation and learning. Game-based learning (GBL) and gamification are becoming increasingly prominent in education due to their rising popularity (Martin et al., 2020).

IMPLICATION FOR TEACHING PRACTICE

The findings of this phenomenological study on the utilization of educational technology in physical education, specifically focusing on gamification, provide valuable insights for educators aiming to enhance the learning experiences of PE 2 students in gamified subjects. Incorporating these insights into teaching practice can lead to more engaging, effective, and enjoyable educational experiences for all students.

First and foremost, educators should recognize the unique experiences and challenges faced by PE 2 students in the gamified subject. Understanding the lived experiences of these students is crucial for designing instructional strategies that effectively cater to their needs and preferences. By acknowledging the difficulties in navigating the app, addressing issues with internet connectivity, and leveraging engaging tasks to enhance motivation, educators can create a supportive learning environment that fosters student success.

Moreover, integrating gamified learning principles into physical education can benefit PE 2 students. The study highlights the importance of setting personal goals, fostering sportsmanship and collaboration, and promoting competitive yet supportive learning environments. Educators can leverage these insights to design gamified activities that enhance students' physical skills and develop critical socio-emotional competencies such as goal setting, teamwork, and resilience.

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CONCLUSION

Embarking on this research journey has been a transformative experience, academically and professionally enriching me. Every step has been incredibly motivating, from the initial conceptualization of the thesis title to the meticulous data analysis. Despite encountering challenges along the way, such as the difficulty in recruiting participants due to their busy schedules, I am grateful for the willingness of my participants to engage in interviews and discussions on the topic. Throughout the process, striking a balance between their availability and the demands of the study remained a significant consideration.

The insights shared by my participants have been invaluable, contributing to the formulation of results that hold promise for future researchers and practitioners in physical education. This journey has broadened my perspective as a PE educator, emphasizing the importance of fostering inclusivity and engagement within the classroom, particularly in gamified PE instruction

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LEADING FACTORS FOR FAILING THE QUALIFYING EXAMINATION AMONG CRIMINOLOGY STUDENTS IN CAVITE STATE UNIVERSITY-BACOOR CITY CAMPUS: BASIS FOR INTERVENTION PROGRAM

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ABSTRACT

This study aims to assess the leading factors for failing the qualifying examinations among criminology students at Cavite State University- Bacoor City Campus to serve as a basis for an intervention program. Quantitative methods were used in this study, it emphasized object measurements and statistical, mathematical, or numerical analysis of data collected through polls, questionnaires, and surveys, or by manipulating pre-existing statistical data and generalizing it across groups of people or to explain a particular phenomenon. Specifically, the descriptive survey method was used in this study to facilitate the investigation of social phenomena through gathering of opinion, observation and perception. Hence, the leading factors for failing the qualifying examination among criminology students in Cavite State University – Bacoor City Campus in terms of the following variables in terms of Inadequate study, Unable to understand Subject Matter, Insufficient Review, Previous Failures in Academic Subjects, Weak Strategies.

KEYWORDS: *Qualifying Examination of Criminology Students, Inadequate study, Unable to understand Subject Matter, Insufficient Review, Previous Failures in Academic Subjects, Weak Strategies*

I. INTRODUCTION

The qualifying examination provides an opportunity for students to demonstrate that they have attained a broad base of knowledge and research expertise in an area of inquiry within the field of higher education and to confirm that students are appropriately prepared to undertake and successfully complete the dissertation.

For the past years, qualifying examinations have been the answer to the rigorous board exams for the Criminology Licensure Examination since this requires preparation and thorough screening among students aiming to perform top nationwide. The examinees themselves, passed or failed, can properly assess how the examinations were administered and whether they reflect the true performance of the takers.

However, there are factors that are not under the control of the administrator. On the one hand, according to Aiken and Groth-Manat (2008), fatigue, the motivation level of the examinee, physical discomfort, and anxiety are psychological factors that can be considered as variables that may affect the results. For these reasons, test administrators must seek ways how to standardize or departmentalize to minimize the variability of results among examinees other than the ability to answer the exams. On the other hand, there are factors that can be controlled by the administrators that may affect the performance of the examinees while taking the examinations.

According to Boyle (2015), Qualifying exams often test foundational knowledge that is crucial for advanced study or professional practice. Comprehensive exams assess a student's grasp of core concepts and their ability to integrate this knowledge across different areas of their field. Carnevale and Hanseon (2012), These exams provide a standardized measure to ensure that all candidates meet a minimum level of competency. This standardization is critical in fields where practitioners must demonstrate a consistent level of expertise and skill. Banta (2009) states that the results of qualifying exams can provide valuable feedback to educational institutions about the effectiveness of their curriculum and instruction. This feedback can be used to make necessary adjustments to improve educational outcomes.

With this, the study focused on the leading factors of failing the qualifying examination among criminology students in Cavite State University – Bacoor City Campus: Basis for Intervention Program.

II.METHODOLOGY

The method of investigation utilized a descriptive quantitative research approach since its purpose is to obtain and present facts regarding the moral conduct of teachers towards the academic performance of students and the matters that should be further developed by the Department of Criminology. Observing and describing a subject's behavior is the focus of the descriptive technique, a type of research approach used in the scientific community. Research that falls under the category of "descriptive" seeks to accurately and methodically describe a population, situation, or event. The objective of descriptive research is to determine the condition that predominates in a group of variables that have been selected for study. Descriptive research is defined as fact-finding with adequate interpretation and the true meaning of data collected that are reported from

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the viewpoint of the objective and basic assumption of the research (McCombes, 2022). The study consists of a set of data or information analyzed, summarized and interpreted to pursue the specific purpose of conducting the study. Questionnaires were given personally by the researcher and collected as well. After the collection, the data will be tabulated to create a statistical treatment or output.

III. DISCUSSION

1. The Leading Factors for Failing the Qualifying Examinations among Criminology Students at Cavite State University-Bacoor Campus in terms of:

Table 6
Level of the Leading Factors for Failing the Qualifying Examinations among Criminology Students at Cavite State University-Bacoor Campus in terms of Inadequate Study

Indicators	Student		Faculty		Overall	
	M	VI	M	VI	M	VI
1. Engaging in less than five hours of study per week or poor time management.	3.45	A	3.25	A	**3.42**	**A**
2. Failing to review class notes beyond the designated class times.	3.14	A	3.45	A	**3.19**	**A**
3. Failing to establish clear study goals and objectives.	3.25	A	3.5	A	**3.29**	**A**
4. Reading only for the purpose of the examination	3.38	A	3.25	A	**3.26**	**A**
5. Focusing on certain topics while neglecting others.	3.38	A	3.2	A	**3.25**	**A**
Total	**3.32**	**A**	**3.33**	**A**	**3.28**	**A**

Legend: Verbal Interpretation (V.I.) of the computed weighted mean (M):
3.50 – 4.00 = Strongly Agree (SA) 1.50 – 2.49 = Disagree (D)
2.50 – 3.49 = Agree (A) 1.00 – 1.49 = Strongly Disagree (SD)

Table 6 shows the Level of the Leading Factors for Failing the Qualifying Examinations among Criminology Students at Cavite State University-Bacoor Campus in terms of Inadequate Study. This agrees with an overall mean of 3.28. The groups of respondents agree that the faculty has a mean of 3.33, and the student has 3.32. All indicators are interpreted agree. These are the following with the mean: "Engaging in less than five hours of study per week or poor time management" have 3.42; "Failing to establish clear study goals and objectives" have 3.29; "Reading only for the purpose of the examination" have 3.26; "Focusing on certain topics while neglecting others" have 3.25; and "Failing to review class notes beyond the designated class times" have 3.19.

This aligns with Johnson (2019), who emphasizes that poor study habits, lack of motivation, and ineffective time management skills are significant factors contributing to academic underachievement, highlighting that promoting effective time management practices can enhance student preparation and performance in qualifying examinations.

Table 7
Level of the Leading Factors for Failing the Qualifying Examinations among Criminology Students at Cavite State University-Bacoor Campus in terms of Unable to Understand the Subject Matter

Indicators	Student		Faculty		Overall	
	M	VI	M	VI	M	VI
1. The student lacks the motivation to learn the subject	3.48	A	3.45	A	**3.48**	**A**
2. The student is surrounded by numerous distractions	3.24	A	3.5	SA	**3.28**	**A**
3. The student finds it challenging to concentrate and struggles to maintain focus.	3.34	A	3.55	SA	**3.37**	**A**
4. The student encounters difficulty in recalling facts or information.	3.42	A	3.4	A	**3.42**	**A**
5. They lack the right resources or tools to comprehend the subject matter.	3.38	A	3.4	A	**3.38**	**A**
Total	**3.37**	**A**	**3.46**	**A**	**3.39**	**A**

Legend: Verbal Interpretation (V.I.) of the computed weighted mean (M):
3.50 – 4.00 = Strongly Agree (SA) 1.50 – 2.49 = Disagree (D)
2.50 – 3.49 = Agree (A) 1.00 – 1.49 = Strongly Disagree (SD)

Table 7 presents the leading factors for failing the qualifying examinations among Criminology students at Cavite State University-Bacoor Campus in terms of being unable to understand the subject matter. This agrees with an overall mean of 3.39. The groups of respondents agree that the faculty has a mean of 3.46, and the student has 3.37. All indicators are interpreted agree. These are the following with the mean: "The student lacks motivation in learning the subject" has 3.48; "The

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student encounters difficulty in recalling facts or information" has 3.42; "They lack the right resources or tools to comprehend the subject matter." have 3.38; "The student finds it challenging to concentrate and struggles to maintain focus" have 3.37; and "The student is surrounded by numerous distractions" have 3.28.

This aligned with the study of Orosz et al. (2017), who emphasized that low levels of motivation can influence low-grade achievement in students. Less motivated students tend to receive lower grades. Motivation plays an important role in the desire to achieve higher grades. Similarly, Azis (2023) emphasized the importance of motivation in helping students achieve positive academic results, highlighting the importance of motivation in learning the subject, which contributes to the result in the qualifying examination.

Table 8
Level of the Leading Factors for Failing the Qualifying Examinations among Criminology Students at Cavite State University-Bacoor Campus in terms of Insufficient Review

Indicators	Student		Faculty		Overall	
	M	VI	M	VI	M	VI
1. Insufficient review materials given by the campus/school.	3.47	A	2.6	A	3.33	A
2. Personal time constraints limit the effectiveness of the review process.	3.29	A	3.25	A	3.28	A
3. The lack of guidance or support from the faculty members affected the review process	3.26	A	2.6	A	3.15	A
4. Rarely engaging in group study to review lessons.	3.19	A	3.1	A	3.35	A
5. Accessibility of facilities in school to support the study efforts of the student	3.42	A	2.9	A	3.34	A
Total	3.36	A	2.89	A	3.29	A

Legend: Verbal Interpretation (V.I.) of the computed weighted mean (M):
3.50 – 4.00 = Strongly Agree (SA) 1.50 – 2.49 = Disagree (D)
2.50 – 3.49 = Agree (A) 1.00 – 1.49 = Strongly Disagree (SD)

Table 8 Contains the Level of the Leading Factors for Failing the Qualifying Examinations among Criminology Students at Cavite State University-Bacoor Campus in terms of Insufficient Review. This agrees with an overall mean of 3.29. The groups of respondents agree that the faculty has a mean of 3.36, and the student has a mean of 3.29. All indicators are interpreted agree. These are the following with the mean: "Rarely engaging in group study to review lessons" has 3.35; "Accessibility of facilities in school to support the study efforts of the student" has 3.34; "Insufficient review materials given by the campus/school." have 3.33; "Personal time constraint limiting the effectiveness of the review process" have 3.28; and "The lack of guidance or support from the faculty members affected the review process" have 3.15.

This is aligned with Algonquin College (2024), which emphasizes the benefits of studying in groups. Students can help each other to understand the material better than studying alone. A study group is a group of people who get together to study or work on class material. Similarly, Ephraim (2023) emphasizes the advantages of group study in academic performance and excellence in their study, highlighting the importance of engaging in group study to improve the learning outcomes of students.

Table 9
Level of the Leading Factors for Failing the Qualifying Examinations among Criminology Students at Cavite State University-Bacoor Campus in terms of Previous Failure in Academic Subject

Indicators	Student		Faculty		Overall	
	M	VI	M	VI	M	VI
1. Lack of understanding of the subject matter	3.33	A	3.35	A	3.33	A
2. Personal issues affect the academic study. (family problems, financial difficulties, work commitments)	3.19	A	3.25	A	3.2	A
3. Anxiety and stress are experienced during academic study and tests.	3.32	A	3.2	A	3.3	A
4. Difficulty in grasping complex concepts	3.29	A	3.3	A	3.28	A
5. Language barriers can impact academic learning	3.31	A	3.2	A	3.29	A
Total	3.28	A	3.26	A	3.28	A

Legend: Verbal Interpretation (V.I.) of the computed weighted mean (M):
3.50 – 4.00 = Strongly Agree (SA) 1.50 – 2.49 = Disagree (D)
2.50 – 3.49 = Agree (A) 1.00 – 1.49 = Strongly Disagree (SD)

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Table 9 Illustrates the Level of the Leading Factors for Failing the Qualifying Examinations among Criminology Students at Cavite State University-Bacoor Campus in terms of Previous Failure in Academic Subjects. This agrees with an overall mean of 3.28. The groups of respondents agreed that the faculty had a mean of 3.26, and the students had a mean of 3.28. All indicators are interpreted agree. These are the following with the mean: "Lack of understanding of the subject matter" has 3.33; "Language barriers can impact academic learning" has 3.29; "Difficulty in grasping complex concepts" has 3.28; "Anxiety and stress experienced during academic study and tests." have 3.3; and "Personal issues affect academic study. (family problems, financial difficulties, work commitments)" have 3.2.

This aligned with Balintucas (2021), who emphasized the factors that influence the difficulty in understanding the subject matter. Similarly, Valencia (2023) emphasized that the lack of understanding of the subject matter can be related to weak memory and difficulty focusing. Vanessa (2024) also notes that the poor understanding of the subject matter is due to poor comprehension of the subject material. Highlighting the importance of resolving the lack of understanding of the subject matter by creating a focused learning environment requires both teacher and student participation so students can conceptualize and understand the knowledge they have learned.

Table 10
Level of the Leading Factors for Failing the Qualifying Examinations among Criminology Students at Cavite State University-Bacoor Campus in terms of Weak Strategies

Indicators	Student		Faculty		Overall	
	M	VI	M	VI	M	VI
1. Procrastinating or act of delaying or postponing tasks, including studying or completing assignments, until the last possible moment.	3.51	SA	3.65	SA	3.53	SA
2. Multitasking or trying to study while engaging in distracting activities usually results in reduced learning efficiency	3.29	A	3.55	SA	3.33	A
3. Passive learning is merely listening to lectures or reading textbooks without actively engaging with the material through questioning, summarizing, or applying it.	3.41	A	3.5	SA	3.43	A
4. Rote learning or memorization without necessarily understanding the meaning or concepts	3.47	A	3.65	SA	3.49	A
5. Cramming or waiting until the last minute to study large amounts of material often leads to superficial learning and forgetting the information quickly.	3.49	A	3.6	SA	3.51	SA
Total	3.43	A	3.59	SA	3.45	A

Legend: Verbal Interpretation (V.I) of the computed weighted mean (M):
3.50 – 4.00 = Strongly Agree (SA) 1.50 – 2.49 = Disagree (D)
2.50 – 3.49 = Agree (A) 1.00 – 1.49 = Strongly Disagree (SD)

Table 10 shows the leading factors for failing the qualifying examinations among Criminology students at Cavite State University-Bacoor Campus in terms of weak strategies. This agrees with an overall mean of 3.45. The groups of respondents agreed that the faculty had a mean of 3.59, and the students had 3.43. Most of the indicators are interpreted as agreeing. These are the following with the mean: "Procrastinating or act of delaying or postponing tasks, including studying or completing assignments, until the last possible moment" have 3.53; "Cramming or waiting until the last minute to study large amounts of material, which often leads to superficial learning and forgetting the information quickly." have 3.51; "Rote learning or memorization without necessarily understanding the meaning or concepts" have 3.49; "Passive Learning or merely listening to lectures or reading textbooks without actively engaging with the material through questioning, summarizing, or applying it" have 3.43; and "Multitasking or trying to study while engaging in distracting activities usually results to reduced learning efficiency" has 3.33.

This aligns with Kim and Bong (2020), who emphasize the relationship between academic procrastination and failing to qualify for advanced exams. The study highlights how procrastination tendencies negatively impact students' preparation and performance, leading to suboptimal outcomes in high-stakes examinations. Similarly, Akpur (2017) and Kurtovic et al. (2019) emphasized the connection between procrastination and the academic achievement of students. Those who succeed more academically tend to be less procrastinating, and vice versa. This data backs up the claims made by Akinsola et al. (2007) that academic procrastination is associated with students' efforts to learn the assigned subject outside of the classroom and their ability to manage their time. Highlighting the effects of procrastination on the result of qualifying exams or academic achievement of students.

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2. Significant difference between the assessments of the two groups of respondents on the leading factors for failing the qualifying examinations among criminology students at Cavite State University - Bacoor Campus in terms of the above-mentioned variables

Table 11

SPSS t-test table at α = 0.05 and df = 122

Variables	Mean	t-value	P-Value	Remarks on t-value	Interpretation	Analysis
Inadequate Study	3.28	3.078	0.082	Greater Than α	Accept Ho	Not Significant
Unable to Understand the Subject Matter	3.39	1.743	0.189	Greater Than α	Accept Ho	Not Significant
Insufficient Review	3.35	13.681	0.000	Less Than α	Reject Ho	Significant
Previous Failures and Academic Subjects	3.28	2.861	0.093	Greater Than α	Accept Ho	Not Significant
Weak Strategies	3.45	0.586	0.445	Greater Than α	Accept Ho	Not Significant

If the p-value is less than α (0.05), reject the null hypothesis
If the p-value is greater than α (0.05), accept the null hypothesis

Table 11 states the significant difference between the assessments of the two groups of respondents on the leading factors for failing the qualifying examinations among criminology students at Cavite State University - Bacoor Campus in terms of Inadequate Study, Unable to Understand the Subject, Insufficient Review, Previous Failure in Academic Subject and Weak Strategies. The p-value of most variables (Inadequate Study = 0.082, Unable to Understand the Subject = 0.189, Previous Failure in Academic Subject = 0.093 and Weak Strategies = 0.445) are greater than the level of significance of 0.05. This is to accept the null hypothesis. This means that there is no significant difference between the assessments of the two groups of respondents on the leading factors for failing the qualifying examinations among criminology students at Cavite State University - Bacoor Campus in terms of these four variables. These four factors lead to the failing of the qualifying examinations among criminology students at Cavite State University - Bacoor Campus. However, in terms of Insufficient review with a p-value of 0.000, which is less than the level of significance of 0.05, this is to reject the null hypothesis. Insufficient review is not exactly a factor leading to failing the qualifying examinations among criminology students at Cavite State University - Bacoor Campus.

3. Proposed to Address the Leading Factors for Failing the Qualifying Examinations among Criminology Students at Cavite State University- Bacoor Campus

Table 12

Proposed to Address the Leading Factors for Failing the Qualifying Examinations among Criminology Students at Cavite State University- Bacoor Campus

Indicators	Student		Faculty		Overall	
	M	VI	M	VI	M	VI
1. Implement Academic Skills Workshops	3.71	HR	3.7	HR	**3.71**	**HR**
2. Enhance Access to Academic Support Services	3.46	R	3.65	HR	**3.5**	**HR**
3. Strengthen Faculty Mentorship Programs	3.47	R	3.7	HR	**3.51**	**HR**
4. Introduce Supplemental Instruction Programs	3.61	HR	3.65	HR	**3.61**	**HR**
5. Promote Student Engagement	3.52	HR	3.6	HR	**3.53**	**HR**
6. Provide Adequate Learning Resources	3.6	HR	3.55	HR	**3.59**	**HR**
7. Foster a Supportive Learning Environment	3.62	HR	3.65	HR	**3.63**	**HR**
8. Offer Mental Health and Wellness Support	3.54	HR	3.7	HR	**3.56**	**HR**
9. Implement Regular Progress Monitoring	3.54	HR	3.6	HR	**3.55**	**HR**
10. Promote Active Learning	3.73	HR	3.7	HR	**3.73**	**HR**
Total	**3.58**	**HR**	**3.65**	**HR**	**3.59**	**HR**

Legend: Verbal Interpretation (V.I.) of the computed weighted mean (M):
3.50 – 4.00 = Highly Recommended (HR) 1.50 – 2.49 = Less Recommended (LR)
2.50 – 3.49 = Recommended (R) 1.00 – 1.49 = Not Recommended (NR)

Table 12 presents the Proposed Address to the Leading Factors for Failing the Qualifying Examinations among Criminology Students at Cavite State University- Bacoor Campus. This is highly recommended, with an overall mean of 3.59. Some groups of respondents say this is highly recommended, with the faculty having a mean of 3.65 and the students having 3.58. All

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indicators are interpreted as highly recommended. These are the following with the mean: “Promote Active Learning” has 3.73; “Implement Academic Skills Workshops” has 3.71; “Foster a Supportive Learning Environment” has 3.63; “Introduce Supplemental Instruction Programs” has 3.61; “Provide Adequate Learning Resources” have 3.59; “Offer Mental Health and Wellness Support” have 3.56; “Implement Regular Progress Monitoring” have 3.55; “Promote Student Engagement” have 3.53; “Strengthen Faculty Mentorship Programs” have 3.51; and, “Enhance Access to Academic Support Services” have 3.5.

Escalona, (2022). In implementing qualifying examinations for criminology students, it is crucial to investigate various factors that influence success and challenges faced by the students. Factors such as home and family influence, student factors, school factors, review center factors, and personal factors play a significant role in the success of students in licensure examinations. Additionally, exploring themes like interest and focus on the program, availability of qualified faculty, lack of preparedness due to work, and personal/social pressures can provide insights into the challenges encountered during exam preparation. Understanding these factors and challenges can help in designing interventions and programs to enhance student's success by addressing specific needs and providing early remediations.

IV.CONCLUSION

The following are the generalizations have been raised by the researcher after the investigation:

1. Insufficient dedication to studying for less than five hours per week or inadequate time management can be a hindrance.
2. There is a lack of clear study goals and objectives, which is a significant issue.
3. The student demonstrates a deficiency in motivation towards grasping the concepts of the subject.
4. The student faces challenges when it comes to recollecting facts or information.
5. Students seldom participate in group study sessions to go over their lessons.
1. 6.There is insufficient accessibility to facilities in the school, which poses a challenge to the student's study endeavors.
6. Insufficient comprehension of the subject matter is evident.
7. Language obstacles may have an effect on academic progress.
8. The act of procrastination involves deliberately delaying or deferring tasks, such as studying or finishing assignments, until the latest possible time. This habit of postponing important obligations can have negative consequences, including heightened stress levels and reduced efficiency.
9. All proposed measures to address the leading factors for failing the qualifying examinations among Criminology Students at Cavite State University-Bacoor Campus are highly recommended.
10. There is no formal policy for Qualifying Examination for Bachelor of Science in Criminology at Cavite State University - Bacoor City Campus.

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WEB-BASED TOOL FOR CALCULATING MECHANICAL PROPERTIES OF FIBRE–RESIN COMPOSITES

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ABSTRACT

Fibre–resin composites are widely used for their excellent strength-to-weight ratio. Predicting their mechanical properties is crucial but often involves laborious calculations. This study introduces a web-based tool that automates the calculation of composite modulus and density using the Rule of Mixtures for parallel loading conditions. Developed with HTML and JavaScript, the tool allows users to input fibre and resin properties along with fibre volume fraction to obtain real-time results. This simplifies the design process and aids both educational and industrial applications.

1 INTRODUCTION

Fibre–resin composites are renowned for their superior strength-to-weight ratios and are extensively used in industries such as aerospace, automotive, and construction (Jayan et al., 2021). The mechanical properties of these composites depend on factors like fibre type, resin properties, and fibre orientation (Laranjeira et al., 2006). Accurate prediction of these properties is essential for effective design and optimisation.

Methods like the Rule of Mixtures are commonly used to estimate composite properties but often require manual calculations (Tam et al., 2012). These calculations can be time-consuming and prone to errors, especially when dealing with multiple scenarios or large datasets. Therefore, there is a need for tools that automate this process to enhance efficiency and reliability.

2 OBJECTIVE

This study aims to develop a web-based application that automates the calculation of mechanical properties of fibre–resin composites under parallel loading using the Rule of Mixtures. The tool seeks to:

- Simplify the calculation process.
- Provide an intuitive interface for inputting parameters.
- Offer real-time results for modulus and density.
- Support educational and industrial use.

3 METHODOLOGY

3.1 Tool Development

The tool is built using HTML and JavaScript for accessibility in web browsers without additional software.

3.2 Functionality

Users select fibre and resin types and input the fibre volume fraction (V_f). The tool calculates:

$$E_c = V_f E_f + (1 - V_f) E_m$$

$$\rho_c = V_f \rho_f + (1 - V_f) \rho_m$$

where E is modulus and ρ is density.

3.3 Implementation

Key code snippets:

```
<!-- HTML elements for user input -->
<label for="fiberSelect">Choose Fibre:</label>
<select id="fiberSelect">
  <option value="pineapple">Pineapple Fibre</option>
  <option value="carbon">Carbon Fibre</option>
</select>

<!-- JavaScript function for calculations -->
<script>
function calculateProperties() {
  const Vf = parseFloat(document.getElementById('fiberVolume').value);
  if (isNaN(Vf) || Vf < 0 || Vf > 1) {
    alert('Enter a valid fibre volume fraction between 0 and 1.');
    return;
  }
  const Ec = Vf * fiber.modulus + (1 - Vf) * resin.modulus;
  const density = Vf * fiber.density + (1 - Vf) * resin.density;
  // Display results
}
</script>
```

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4 Results

The tool was tested with pineapple and carbon fibres, and epoxy and polyester resins.

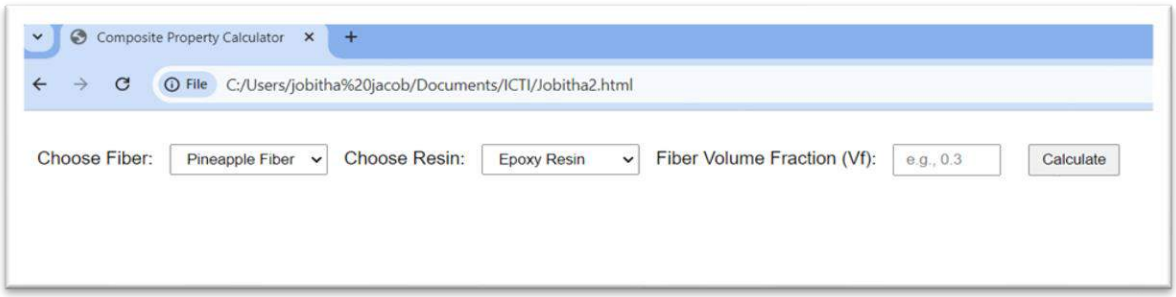


Fig 1 Indicates Basic Interface of the Web-Tool Developed

Example Calculation:

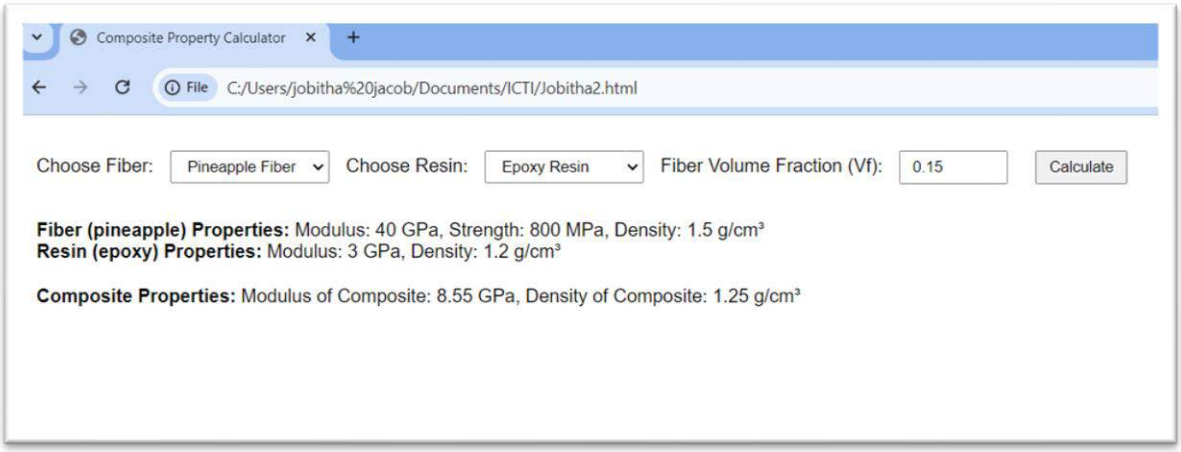


Fig 2 Showcases the result of the Pineapple Fibre-Reinforced Epoxy Resin Composite's Modulus which has a 0.15 volume fraction of fibre (Vf).

For a pineapple fibre–epoxy resin composite with V_f=0.15

- Modulus of Composite (E_c): Calculated using the provided moduli.
- Density of Composite (ρ_c): Computed based on fibre and resin densities.

5 CONCLUSION

The web-based tool effectively automates the calculation of mechanical properties for fibre–resin composites, enhancing efficiency and reducing errors. It is user-friendly and provides immediate results, aiding in material selection and composite design.

Future Work

- Expand material database.
- Allow custom material inputs.
- Include different loading conditions.
- Host on an open-access platform for wider accessibility.

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COGNITIVE AND CONCEPTUAL ANALYSIS OF IMITATIVE WORDS IN ENGLISH AND KARAKALPAK LANGUAGES

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ABSTRACT

This study explores the cognitive and conceptual aspects of imitative words (onomatopoeia) in English and Karakalpak languages, highlighting their role in enriching linguistic expression. Imitative words are shown to carry unique national and cultural characteristics, often distinguished by their expressiveness and syntactic features. Through comparative analysis, this research examines the conceptualization of sounds and actions conveyed by onomatopoeia in both languages, illustrating how these words enhance meaning by invoking vivid auditory and sensory experiences. Examples from Karakalpak folklore and English idioms demonstrate that onomatopoeic expressions not only reflect external realities but also serve as cognitive tools for categorizing and conceptualizing the world. Despite phonological and cultural differences, the functional purpose and emotional impact of imitative words are similar across both languages, contributing to a deeper understanding of human communication and perception.

KEY WORDS: *comparative typology, onomatopoeia, cognitive linguistics, conceptual analysis, idiomatic expression, proverb.*

Conceptual analysis is not a precise method, but an intuitive approach to research related to the ideas and life guidelines of the researcher. A concept that has the properties of being connected to other concepts is immersed in domains and described by the concepts of core/periphery [Langacker, 1987]. It is known that any knowledge obtained by a person is the result of conceptualization and categorization of the surrounding world.

The human brain is limited, but it gives a person the possibility to work with certain concepts [Kravchenko, 2001:204]. Using natural language as a manipulator of verbal symbols, using concepts as elements of the conceptual system, and creating new conceptual structures under the influence of the system itself is not a single signified truth, but a conceptual system is a stable and accurate information about the world, which is not real (moon-thought, knowledge) of the system is continuously built [Kubryakova, 2006: 12] (cit. from: [Boldyrev 2009: 39]).

Learning the semantics of language units based on the objectification of concepts gives an opportunity to enter the content of concepts while retaining thought units. However, the existence of complex nominatives of this concept shows the nominative density of the language system, and it proves the relevance of the concept of speech in the present day.

Language and the world are not interpreted independently from each other, our linguistic and encyclopedic knowledge is stored among sections within conceptual domains. It gives birth to a sentence that can be understood against the background of structural knowledge restored to information, which has a special effect on the one who understands the meaning. The speaker knows the meaning of the word only by the colors of the background domain that stimulates the concept encoded in the word. Under such a concept, the ways of governing words are not one-to-one, word-by-word relationships, but rather the ways of governing relatively large domains that are connected to each other are set by the rules that depend on how these domains correspond to the separate structural parts.

Linguistic and cognitive aspects are very important for imitative words, and it is possible to consider them as a part of the concept of the same name. It is worth noting that this concept is characterized by national and cultural character. This was confirmed by semantic and functional differences. Onomatopes are different from other expressions, and their effectiveness is distinguished by expressiveness.

According to O.A.Khabibullin, imitative words are distinguished by their syntactic features [Khabibullin,2003]. Imitative most of the emphasis on phraseology is on the emotional level in the semantic composition. Let's illustrate this with concrete examples:
Jas bala shıńǵırıp jiberip, ***gúrk-gúrk*** *etti.*

In the Karakalpak language *gúrk-gúrk etiw* verb phrase has two meanings: "to cry" and "to roar". In the example given above is directed to the person and if we take contextual meaning of the given phrase, it comes to the meaning of "to cry". In many cases, the meaning of "roaring" is used for animals. It is possible to express the true meaning of the speech in some situations with objects, so it is possible to add the phrase "a pig, a lion or a wild animal with an angry appearance". This phenomenon can be explained by extralinguistic factors.
Koridorda júre bereyin desem direktorımız Shavkat Shákirovich kórip qoyama dep ***ishim ulı-gúpildi****.*
Diywaldaǵı pıshıq kózli shınjırlı saat tıq-tıq, júregim dúrs-dúrs ***ishim ulı-dúbirli.*** *(Sh. Seytov)*

The phrases "ishim ulı-gúpildi" and "ishim ulı-dúbirli" in these examples are derived from emotional expressions, indicating the restlessness of the hero [J.Eshbaev, 91]. The emotional expressions in the examples help to create a sense of urgency in

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the depiction of the situation and enrich the meaning of the narrative by adding emotional depth.

*... awılda ne jańalıq bolǵanınıń **uńqıl-shuńqılın**a shekem qaldırmay tez-tez sóylep berdi. (T. Qayıpbergenov)*
The phrases "úńqıl-shuńqıl" and "nársesin qaldırmaw, shala qılmaw" are used in the sense of not leaving something unfinished or doing something carelessly. If we take these words in their true meaning, they are utilized to refer to an incomplete or incorrect path.

In English idioms, onomatopoeia is also frequently found. The cognitive and conceptual qualities of the onomatopoeic words in the following idioms are:
"***Tick-tock***, time is running out".
"Tick-tock" refers to the sound of a clock, indicating the passage of time. This phrase conveys the idea of time running out and emphasizes the rapid passage of time.

"**Bang** for your buck"
"Bang" is used to denote a loud, explosive sound. This idiom means getting more results or value for the effort you put in. "Bang" contributes to the conceptual meaning of the idiom, which is about effectiveness and value.

"**Hush-hush**"
"Hush-hush" is used to signify silence, secrecy, or quietness. This idiom denotes something that is kept secret or confidential. The onomatopoeic element of "hush-hush" adds to the conceptual meaning of the idiom by conveying a sense of quietness and secrecy.

As you see, the onomatopoeic words in idioms add conceptual meanings and provide cognitive and emotional-expressive qualities to the idioms.

In folklore, onomatopoeia serves as a method of verbal expression that adds vividness and immediacy to the narration. It can be seen as a technique for enhancing storytelling through sound imitation. Onomatopoeic words, verbs, and adjectives from folklore can be used to illustrate this concept. The cognitive domain of proverbs is characterized by its ability to create mental images and rational interpretations based on these sound imitations. Here's an example:
Bilgen tawıp aytadı,
*Bilmegen **qawıp aytadı**.*

In this example, the phrase "qawıp aytadı" (which could translate to "says with hesitation" or "speaks uncertainly") conveys meanings related to ignorance or lack of confidence.

According to conceptual meaning **t**his expression portrays a contrast between knowledge and ignorance, and between confidence and uncertainty. It illustrates the tension between having information and lacking it, or between being assured and being doubtful. This phrase effectively captures the nuanced emotional and cognitive states of hesitation and uncertainty, enriching the narrative by highlighting these internal conflicts.
*Elde **qiyqıw** jaman,*
Awırıwda shanshıw jaman. [Folklore, 184]
The proverb is translated as "In illness, moaning is worse; in community, noise is worse." It highlights how expressions of suffering and disturbances in social settings can exacerbate problems, emphasizing the importance of managing both personal pain and communal harmony.

Cognitive quality of onomatopoeic element "***qiyqıw***" – moaning - evokes a visceral reaction related to pain and suffering, while "noise" conjures images of chaos and disruption. This sensory contrast emphasizes the emotional impact of both individual and collective distress. The concept of moaning relates to vulnerability and the need for empathy, while noise signifies collective annoyance or disorder. This duality highlights how emotional expressions affect both the individual and the community.

According to conceptual quality the proverb delineates between internal struggles and external issues. It implies that managing personal suffering is essential and may prevent contributing to community disturbances. Emphasizing that moaning is "worse" suggests that maintaining composure in the face of illness is ideal. This reflects a cultural belief in resilience and the importance of not burdening others with one's pain.
The English proverbs also contain onomatopoeia. There are some examples:
"***The squeaky** wheel gets the grease" (Jılamaǵan balaǵa emshek qayda"*
Cognitive quality of onomatopoeic element "squeaky" is it mimics the sound of a wheel making a high-pitched noise. This onomatopoeia creates a vivid auditory image of a noisy, problematic wheel. The sound evokes a sense of something needing attention or repair, reinforcing the idea that issues that make noise or are expressed are more likely to be addressed.

Conceptual quality is the proverb suggests that those who make their problems known (i.e., those who "squeak") are more likely to receive attention and solutions. The metaphor of a squeaky wheel that gets greased symbolizes how issues that are voiced or are more apparent are prioritized for resolution. It emphasizes that being proactive and vocal about problems can lead to effective action and support, highlighting the importance of visibility and assertiveness in problem-solving.

"*Strike while the iron is hot*." (Tandırdı qızǵanda jap)

Cognitive quality of onomatopoeic element "strike" evokes the sound of a hammer hitting metal, which is a sharp, resonant noise. This onomatopoeia helps to create a vivid auditory image in the reader's or listener's mind, enhancing the immediacy and impact of the proverb.

Conceptual quality is the proverb advises taking action at the right moment - when the opportunity is most advantageous. The sound of striking hot iron is associated with the moment when the metal is malleable and can be shaped effectively. Similarly, the proverb metaphorically suggests that one should act decisively when conditions are most favorable, emphasizing the importance of timing and promptness. The use of onomatopoeia in this proverb helps to reinforce its practical advice with a

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sensory detail that underscores the urgency and effectiveness of timely action.

The use of imitative words contributes to the conceptual meaning of proverbs, conveying a sense of respect in human communication. As we have observed, the imitative words in proverbs reflect conceptual meanings and contribute to depicting emotions. Broadening our perspective, onomatopoeia refers to words used for imitation, such as mimicking emotions, sounds, movements, and visuals through language. Onomatopoeic words are found on all major continents of the world. It is important to note that onomatopoeic words may vary across different languages, and different cultures may express and describe sounds in unique ways. Additionally, certain imitative words may undergo changes or take on different forms depending on regional dialects. In general, onomatopoeia adds a sensory dimension to language, enhancing its dynamism and making it more engaging for the listener.

In summary, while there are indeed cultural, phonological, and regional differences in the use of imitative words in English and Karakalpak, their functional purpose and cognitive impact exhibit similarities. Despite slight variations in form and usage, in both languages, these imitative words (onomatopoeia) are employed to vividly depict and convey the sounds and movements of people, animals, nature, and various actions.

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A COMPREHENSIVE REVIEW ON THE INTRICATE RELATIONSHIP BETWEEN FINANCIAL INCLUSION AND WOMEN'S ECONOMIC EMPOWERMENT

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ABSTRACT

This study offers insights on financial inclusion for women's empowerment based on earlier research. Half of the population is women & girls, if we consider their involvement in formal financial system it will double the growth rate of economy. For Inclusive Growth of Country, Financial inclusion becomes the priority. Financial inclusion ensures the inclusion of all the class of the society in economic growth of country. It is important that the hard-earned money of poor people come into the formal financial system and not get clutch into the vicious circle of private money lender. Efforts are already been put to include the financially excluded people but this study throws light on specifically women entrepreneur (i.e. including women in formal financial system). Several study have already been done on the financial inclusion and women empowerment individually and here review of all several research has been done. Researcher found four dimensions namely availability (affordability), regularity, adaptability and attainability of financial needs. This study directed to understand the importance of financial inclusion for women empowerment as well as How economically empowered women can change the whole game of the economic growth as being the part of formal financial system.

KEY WORDS: *Financial Inclusion, Women, Economic Empowerment.*

INTRODUCTION

Financial Inclusion

The story of the blind men and the elephant can be applied to financial inclusion in India, as each person's limited experience results in a limited grasp of a much bigger notion. Financial inclusion is frequently oversimplified to mean opening a Zero Balance or No-Frills account. In actuality, it includes a wider range of services meant to give disadvantaged groups fair and impartial access to financial products. Among these products are Kisan credit cards, generic credit cards, No-Frills Accounts, and savings accounts with overdraft protection.

Financial inclusion, as defined by the World Bank, is the ability of people and organizations to obtain cost-effective and customized financial services, such as payments, transactions, savings accounts, credit, and insurance, all of which are provided in an environmentally friendly and sustainable way. Since it allows people to keep money and make payments, having access to a transaction account is essential to achieving financial inclusion. This is the reason why creating globally accessible transaction accounts is a top priority for the World Bank Group's Universal Financial Access 2020 strategy.

Based on how widely products are used in society, there are three levels of financial inclusion. The first category, known as the "super included," actively uses a variety of financial services and products. The second category, known as the "financially excluded," is primarily concentrated in impoverished areas and has little knowledge of the financial resources that are accessible to them. Those in the third group, who have access to basic banking services, are a combination of the two. The latter two classes are more common in emerging nations like India, noting the need for targeted strategies to enhance financial inclusion.

Banking excluded People

- Vulnerable or unemployed or low-income section of society
- People with history of bad debts with financial institutions
- People from rural or remote area which are either un-banked or under-banked area
- Very young or elderly individuals

OBJECTIVES OF THE STUDY

1. To understand the financial inclusion and its importance.
2. To understand the women economic empowerment and its importance.
3. To study the various schemes launched by GOI and role of RBI to achieve financial inclusion.
4. To understand the relationship between financial inclusion and women's economic empowerment.

ROLE OF GOI AND RBI

The origins of financial inclusion in India trace back to 1904 with the enactment of the Co-operative Society Act, aimed at ensuring easy access to borrowing for all members of society. Significant milestones followed, including the establishment of the State Bank of India in 1955, the nationalization of commercial banks in 1969 and 1980, the introduction of the Lead Bank Scheme in 1970, the formation of Regional Rural

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Banks (RRBs) in 1975, the launch of the Self-Help Group (SHG)-Bank Linkage Programme in 1992, and the creation of the Kisan Credit Card scheme in 2001.

The Indian government has focused on providing subsidies and preferential credit to disadvantaged populations to help them enhance their income. Since 1970, various poverty alleviation programs have been implemented, including the Small Farmers' Development Agency (SFDA) program (1971-79), Deen Dayal Upadhyaya Antyodaya Yojana (1978), the Integrated Rural Development Programme (IRDP) (1979-99), the Swarnjayanti Gram Swarozgar Yojana (SGSY) (1999-present), the Sampoorna Grameen Rozgar Yojana (SGRY) (2001-present), and the National Rural Employment Guarantee Act (NREGA) of 2005.

The Reserve Bank of India has prioritized expanding access to the organized financial system since 2004. In November 2005, banks were encouraged to offer basic "no-frills" accounts with low or no minimum balance requirements, aimed at broadening outreach. Additionally, KYC procedures for account opening were simplified, and the Reserve Bank mandated that all customer-facing materials be available in multiple languages, including English, Hindi, and regional languages. According to the Reserve Bank of India (RBI), the instructions outlined in the circular dated November 24, 2005, regarding No Frills Accounts have been superseded. As per the circular issued on August 17, 2012, banks are now mandated to provide a 'Basic Savings Bank Deposit Account' to all customers, which will include a set of minimum common facilities specified therein. Furthermore, banks are required to convert any existing 'no-frills' accounts into 'Basic Savings Bank Deposit Accounts.'

In 2006, banks were authorized to collaborate with non-governmental organizations (NGOs), SHGs, and other civil society entities to deliver financial services through business facilitators and correspondents. The Government of India has consistently emphasized the importance of inclusion in its development initiatives, including the Rural Employment Guarantee Scheme, Bharat Nirman programme, and Sarva Shiksha Abhiyan.

The Swavalamban scheme, initiated in 2010 and later replaced by the Atal Pension Yojana, launched on May 9, 2015, offers a pension plan allowing individuals to make voluntary contributions within a specified range, supplemented by government matching contributions. Additionally, the Pradhan Mantri Jan Dhan Yojana, launched on August 28, 2014, serves as a National Mission for Financial Inclusion, ensuring access to various financial services, including banking, savings accounts, remittances, credit, insurance, and pensions, in an affordable manner.

The Pradhan Mantri MUDRA Yojana (PMMY), introduced on April 8, 2015, aims to provide loans up to 10 lakh to non-corporate, non-farm small and micro enterprises without requiring collateral. This scheme also supports female entrepreneurs in establishing or expanding their businesses. The Micro Units Development and Refinance Agency (MUDRA) Bank plays a key role by providing loans to micro-finance institutions, which subsequently lend to MSMEs. MUDRA Yojana offers three loan categories—Shishu (up to 50,000), Kishor (50,000 to 5 lakhs), and Tarun (5 lakhs to 10 lakhs)—with flexible repayment terms ranging from 12 months to 5 years.

The Stand-Up India scheme, launched in 2016, aims to promote entrepreneurship among marginalized communities, including Scheduled Castes, Scheduled Tribes, and women, facilitating loans between 10 lakh and 1 crore for new enterprises.

The Pradhan Mantri Vaya Vandana Yojana (PMVVY) provides social security and safeguards against declining interest income for individuals aged 60 and above. The Pradhan Mantri Vaya Vandana Yojana (PMVVY) was introduced by the Government of India on May 4, 2017. Initially set to conclude on March 31, 2020, the scheme was later extended for an additional three years, with the new end date being March 31, 2023. The scheme was managed by the Life Insurance Corporation of India (LIC) on behalf of the Ministry of Finance. Its primary objective was to provide social security for the elderly and safeguard them against fluctuations in interest income resulting from volatile market conditions. The scheme guaranteed a return of 8% per annum for a duration of 10 years, with a minimum pension of Rs 1,000 per month and a maximum pension of Rs 1,11,000 per year.

Furthermore, Additional initiatives such as the Interest Subvention Scheme, and the Lead Bank Scheme have contributed significantly to enhancing financial literacy across India.

REVIEW OF LITERATURE

International Studies

Financial Inclusion

(Klapper, unknown) Financial inclusion is to make people access & use the financial services provided by various financial centers in sustainable regulated environment.

For financial inclusion, (Kempson, Atkinson, & Pilley, 2004) have given due importance to cater the people's need for banking services satisfactorily. The causes for financial exclusion are identity requirement, terms & conditions of bank account, several bank charges, physical access problems, cultural & psychological problems, banks' refusal for low-income group, etc. according to researchers the simple solution for rapidly increasing use of banking provision in developed country, provide overdraft facility to the customer with good credit score only.

(Finnegan, 2015) Financial inclusion product must be accessible, usable and being served the quality according to the need of client.

(Holloway, Niazi, & Rouse, 2017) Financial inclusion is an important element in the formulation of Sustainable Development Goals. For inclusive growth it is necessary to have quality financial product. Research shows that when

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people participate in the financial system, they are better able to manage risk, start or invest in a business, and fund large expenditures like education or a home improvement. According to study reason of financial exclusion present in the barriers in demand, supply and legal regulatory framework of the main four financial products provided by banks and other financial institutes on women's economic empowerment namely; Savings, Credit, Payment and Insurance.

(Hendriks, 2019) To include women and girls financially is a key importance on women's economic empowerment. studied the efforts focusing Financial Inclusion to advance women's economic empowerment and drive progress on gender equality SDG-5 which is all about stop discrimination with women in public & private, reforms to give women equal rights to economic resources and access to ownership property.

(Chatterjee, Gupta, Srivastava, & Tiwari, 2019) The Financial Service Space is a three-dimensional approach includes frequency of banking services, convenience in approaching and availability of influential factor.This study used a blanket approach wherein 6 categories of FSS (financial service space) has been described namely FSS Absent for financially excluded women, FSS Restricted for Dormant account holders, FSS Dummy for proxy users, FSS fragile for Irregular basic users, FSS Active for regular basic users and FSS Vibrant for Advanced women as users.

(Diwan, unknown)The schemes and policies devised by the RBI, GOI, and the public sector banks have enabled a conducive environment for financial inclusion. The change in perception from women being viewed as vulnerable and not creditworthy to being considered as potential bank clients in last few years in India.

Women Empowerment

(Finnegan, 2015) This study is focusing on the barriers & its solution. when it comes to including women financially in formal financial system, problems like legal and regulatory hurdles, access to education and training, culture and tradition, lack of collateral, anticipation of rejection, risk aversion, etc. arises. Empowering women economically with the strategies like change in regulatory frameworks and unfavorable cultural norms, Ensure collection of gender-disaggregated data on the financial center, Study women-specific needs and create appropriate financial products and services, Promote financial education and financial literacy, Encourage innovation and relaxation of financial rules and procedures to address barriers faced by women, Create support programmes for women's entrepreneurship, Promote women's leadership and strengthen women's organisation, Promote private sector initiatives in support of women's financial inclusion, etc.

(Peters, Astone, Malik, & Mar, 2016)have focused on tree main aspect in order to achieve womens' economic empowerment; first reducing unpaid work (burden of care), second moving from precarious to secure work, and moving into high-productivity and high-growth sectors of the economy. These three aspects are selected to focus on barriers and enablers to WEE.

(Hendriks, 2019) Melinda Gates concerned about why women & girls are considered as beneficiaries of development programme& to recognize as agents of change? By considering women & girls at the center of action it can bring transformative effects on economy. Women can make financial decision & control over resources allocation, access to individual private savings account. Financial choice for household increasing bargaining power in household and this will attract to less empowered women. It affects children education, Nutrition and also increases the health expenses by women.

(Bull, 2021) Women's economic empowerment is not only to do with bank accounts. But bank accounts are one of the most powerful tools with women for their independent lives. A woman with no control over resources generally lose control over her life and choices too. (Bull, 2021) CEO of Consultative Group to Assist the Poor has mentioned the need to keep women at the center of all the financial inclusion strategy for shared prosperity. Without including women, one cannot fully achieve the financial inclusion and this need to put the gender lens whatever we do. Where the troubles are cultural, financial, and legal restrictions and barriers in people's minds. Mainly the CGPA work for poor people and its own theory of change is framed around opportunities to women and resilience.

(Adera & Abdisa, 2023) With the use of sophisticated analytical techniques like instrumental variable analysis and Copula Switching Regression, the study in Ethiopia seeks to determine the factors that influence financial inclusion among a particular sample of women. By concentrating on women, the study illuminates the obstacles and possibilities that they encounter while attempting to obtain financial services, offering significant perspectives to decision-makers. The results are consistent with previous research, highlighting the beneficial effects of financial inclusion on gender equality and women's empowerment. The study emphasises the significance of customised interventions to support financial inclusion and women's empowerment in Ethiopia and the necessity of stakeholder collaboration in order to foster an atmosphere that is supportive of women's economic inclusion.

National Studies

Financial Inclusion

(Mohan, 2006)Formal savings are the part of financial inclusion. Higher the financial exclusion more the income inequality. Financial development is important from either a supply-leading (financial development enforce growth) or a demand following (growth generates demand for financial products) channel. Financial deepening accelerates economic growth through the expansion of access to those who do not have adequate finance themselves both in underdeveloped and mature financial system.

(Agrawal, 2007) Financial Inclusion means availing feasible banking product to the vulnerable class of the society. On the basis of interview of NGOs and SHGs, researcher pointed out

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the U.K.'s strategy of making easy access to bank, credit facility and banking advices. While U.S. has adopted the change in legal aspect like prohibition discrimination by law under Community Reinvestment Act. (Agrawal, 2007) has presented a three-dimensional model including 1. Basic Banking 2. Create Awareness & financial Literacy 3. Innovative strategies to achieve the goal of financial inclusion.

(Murari & Didwania, 2010)Financial inclusion is the tool to bring out the people from the clutches of poverty. Financial inclusion can be achieved but the changes are required from demand as well as supply side. Financial inclusion is all about searching the new way to improve the existing formal credit delivery and evolve new models. Unless the financially excluded class don't demand or utilize the available services, hardly any financial institution bring any change in the situation. the solution is the self-employment to beat the poverty and thus achieve financial inclusion.

(Garg & Agarwal, 2014)It is needed to get participation of all the section of society for inclusive growth. The development of banking services & technology opens the door for underprivileged people to get access of all online banking services & various financial products. Major problem in achieving the goal of financial inclusion are lack of money while the expensive banking services, uneasy procedure to avail facility and non-reachability of bank are also the hurdle in path of goal achievement. Financial inclusion can be achieved by working on the banking product, government initiatives, creation of awareness, technology & regulation etc.

(Santosh, Subrahmanyam, & Nara, 2016)Financial Inclusion is financial services such as saving accounts, insurance funds and credit provided to poor and low-income clients so as to help them to increase their income, thereby improving their standard of living. Study focus not only on accepting deposits to open account but also grant credit to meet their needs, focus more on increasing awareness about banking services and technological development in banking sectors.

Biggest obstacle in the way of achieving financial inclusion is lack of security & high operating cost in taking loan from Bank for poor people. SHG Bank Linkage Programme Model, MFI Bank Linkage Model can be the solution for this obstacle. Continuous efforts in team with all the stakeholders can make it possible to achieve.

Women Empowerment

Financial inclusion has helped women in becoming self-reliant. women entrepreneurship needs a change from superficiality to productivity.

(K, Johnson, & Babu, 2017) have shown the positive relationship between women empowerment and membership in SHG, availability of credit facility, income level, standard of consumption and expenditure, and awareness of financial services. Increase the awareness regarding banking services among women leads to more inclusion of women in economy. Financial inclusion has made an enormous contribution to economic development by finding innovative ways to empower the poor, women and other disadvantaged group. To empower women through financial inclusion it is needed to scale up the parameters like access, quality, training and welfare.
(Dharmarajan, 2018)Achieving Sustainable Development Goals could be difficult without gender equality. financial literacy can empower women to develop a financial identity of women, even with their household savings can help them to get access to formal for gainful occupation & economic freedom and power.

(Bhatia & Singh, 2019)Financial Inclusion is a priority, which focuses on gender equality and sustainable development goals. Women empowerment includes three dimensions; that is; social, political, economic. There is need to assess the impact of recently launched Financial Inclusion Schemes by GOI and advancing the literature on Financial Inclusion. (Batliwala, 2010) As women empowerment leads to gender equality which is important to raise self-dependency among women and living standard.

(Pandey & Parthasarathy, 2019) Women empowerment leads to increase in self-esteem, self-dependency, increase purchasing power, decision making power, and that's all an empowered woman has. Women's entrepreneurship has strong relation with the economic health of family and communities, poverty reduction and women's empowerment and meeting the Sustainable Development Goals. Financial assistance to women by government schemes, training facilities, infrastructure and its awareness, increases the motivation, confidence, the rate of women opting for entrepreneurship. Traditional role of women has been changed due to the economic need. Availability of cheaper credit leads to increase in entrepreneurship quotient of women.

(Jadhav, 2021)There is high rise in women availing the benefit of loan related financial inclusion scheme such as facilities under PMJDY, loan facility under Stand-up India and Pradhan Mantri Mudra Yojana. (Maurya, unknown) Still unlimited opportunities are untouched by women of which the result can be steep rise in economic growth. It is important that women make their own decision for their own benefits. Policies and Government schemes for financial inclusion of women and in financial literacy.

(Vosuri Sandya RaniA & Sundaram, 2023) With an emphasis on women-owned businesses in Vellore, Tamilnadu, the study intends to investigate how financial inclusion affects female entrepreneurs in India. A sample of 357 MSMEs owned by women was chosen from 1,274 firms located in strategic rural areas. Interviews and questionnaires were used to gather data, which was then subjected to multiple regression and correlation analysis. The results highlight the need for specialised financial services to empower women entrepreneurs and increase their competitiveness and sustainability. They also demonstrate that increased financial inclusion has a favourable impact on the performance and success of women-led firms.

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CONCLUSION

In a predominantly male-dominated society, women in rural areas often face constraints in their financial autonomy, frequently compelled to invest their earnings in male-led economic activities due to societal pressures. The remittance of funds by men who work away from home can create further difficulties in financial management for rural women. Enhanced access to financial services, such as online banking, could significantly empower these women. Similarly, in urban settings, many women remain financially dependent on their husbands, lacking control over their earnings.

Obstacles such as intra-household bargaining power and social status limit the benefits of financial inclusion for women's economic empowerment. Ensuring smooth consumption in times of income shocks is critical, as is the integration of women into the formal financial system to bolster their financial confidence and contribute to the overall economy.

The relationship between women's economic empowerment and financial inclusion was investigated by researchers. The researcher also discovered that financial inclusion plans, such as PMJDY, PMMY, etc., are available, and they learned how these schemes, or yojanas, aid female entrepreneurs. They also looked at the role that NGOs, financial literacy programmes, and SHGs play in assisting poor women.

These studies, which focused on particular populations like women, have proven insightful in the sense that they offer useful information for formulating public policy. Thus, as it is undesirable that this established illiteracy would affect these particular groups, policy makers who are specifically focused on addressing the issue of specific segments of society (e.g., the young, women, and the elderly) could take these inferences into consideration. Therefore, the research that focuses on these particular groups may draw attention to some implications that could serve as important indicators for the agendas of policy makers.

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FACTORS AFFECTING THE DECREASING INTEREST OF FILIPINO PEOPLE UNDER GENERATION Z IN PLAYING TRADITIONAL GAMES

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ABSTRACT

This study focused on the factors affecting the decreasing interest of Filipino people under Generation Z in playing traditional games. The descriptive method was used to determine the different factors affecting the Filipino people in playing Filipino games. The researchers collect data through data mining that can be used to find information about the study. The researchers choose to conduct a web-based analysis, where data were collected through browsing reliable and valid sources in the world web. Collected data results will be analyzed to find out the factors affecting Filipinos in playing Philippine traditional games that have 56.66% who still played Philippine traditional games while 43.33% prefers to browse and play online.

The factors that affect the Filipino citizen to have less interest in playing Philippine traditiona1 games are the cultural onslaught of western countries which has brought about change in the lifestyle and attitudes of people in tribal societies where traditional games are in mostly in vogue and the Western sports (e.g. basketball or volleyball). Also, the changes come as people turn away from traditional TV viewing and streaming TV, a trend that has only grown during the Covid-19 pandemic. Philippine traditional games decrease as television and other mass media are widely accessible, passive activities, such as watching TV, listening to music, and internet surfing, video games, and online chatting are among the most popular leisure activities among adolescents. Also, the reason why Philippine traditional games are declining because the young generation has turned to virtual games and other modern games (e.g. cricket, hockey and football) for sporting, entertainment, and use of leisure. However, it was also due to rapid technological development. People conserve and maintain the Philippine traditional games through spending time with other members of the community and continuous engagement. It is important to preserve the information and knowledge about traditional games for the generations to come and is essential to raise awareness about traditional games and keep them alive in the present day for Filipinos to enjoy. Filipinos must began building advocacy that will help to educate the next generation, the Filipino children. The advantages of technologies that may affect playing Philippine traditional games are the following, it enhances computer skills and keep the child up to date, it helps in teaching children how to play as team using technology, it improves language, it improves Math skills, and boosts decision-making, it develops mental health, it improves cognitive development. On the other hand, the disadvantages of technologies that may affect playing Philippine traditional games are shorter sleep duration, lack of socialization, the 'Bob' effect syndrome, high-tech health syndrome, computer eye syndrome and carpal syndrome.

INTRODUCTION

"Tomorrow, these children will play in the leagues of society, and they will play as team called Filipino race. Traditional games give happiness to both mind and body. These also help the children maintain good emotional stability and keep them fit and healthy. These games can also have a great benefit to them. These games require physical activity, social skills, creativity, imagination, competition and camaraderie.

Humans have been acknowledged to continue changing in every aspect of civilization over the millennial in a variety of ways. They have been given the task of ccontinuing to progress towards a better society and way of life to assure our future survival.

Nowadays, they have been ssurprised by the word of technology, which has brought about a dramatic change in human everyday life. Parents of today's generation are still extremely familiar with the classic games, but their children are not. The traditional games have historical significance and left an indelible impression to every human who has ever played them as a child. Traditional games do not require expensive equipment and are accessible to people of all ages and genders.

These games were taken over from the previous generation and handed on to the younger generation via oral, acoustic, or visual transmission. However, as a result of urbanization in recent years, traditional games have been forgotten.

Transmission of cultural knowledge, values, and skills to the younger generations are done through the mentorship of older peers (Hassan, et.al. (2013 of UNESCO Islamabad)

Through mentorship, the important character values of traditional games such as teamwork, acceptance, humility and healthy competitions are also imparted to the younger generation.

Teens are losing interest in playing traditional games, and prefer to play social or online games instead, according to a new survey of high school students by analyst firm Piper Jaffray (2012) . The group's report says participants in the survey stressed the importance of feeling connected to their friends.

MATERIALS AND METHODS

Research Design

This study is classified as a descriptive research design. It deals with variables and natural relationships between and among them. It is a study in which the researcher is primarily interested in getting information among variables rather than attempting to establish a causal relationship. There is a link between Filipino participation in traditional Philippine games and the involvement

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of Filipinos in traditional Philippine games. This study, in particular, used a fundamental research strategy.

The Office of Human Research Protections (OHRP) defines a descriptive study as "any study that is not truly experimental". Also, it is one in which information is collected without changing the environment.

Procedure of the Study

The researchers collect data through data mining that can be used to find information about the study. The researchers choose to conduct a web-based analysis, where data were collected through browsing reliable and valid sources in the world web. Collected data results will be analyzed to find out the factors affecting Filipinos in playing Philippine traditional games.

Statistical Analysis of Data

The researchers conducted secondary data analysis to gather information from published journals and publication about Filipino participation in traditional games in the Philippines. The data collected were analyzed and summarized to obtain the variables needed in the study.

Ethics in Research

This study will follow the specific research rules and ethics to construct a clean and ethical study and this study will secure permission to conduct the study in order to proceed in this research. The researchers will collect data from reliable sources which are open access for public consumption. To measure the plagiarism level of the study and did not own any. Further, it educates, monitors and ensures the high quality of ethical standards to avoid plagiarism cases; the researchers will use plagiarism test of the cited ideas, studies, and theories of other authors and credited them to the prospective owners or authors. This research study is aligned to our university college research thrust that is locally and internationally relevant in the sense of addressing the factors affecting the decreasing interest of Generation Z in playing Philippine traditional games.

RESULTS

Table 1. Filipino people play Philippine traditional Games.

Games in the Philippines	Percentage of Generation Z
Philippine Traditional Games	56.66%
Playing Online Games	43.33%

Table 2. Factors affecting Filipino people in playing traditional games.

Factors Affecting Generation Z to have Less Interest in Playing Traditional Games	Percentage of Generation Z
Social Media	24.1%
Video Games/Virtual Games/Modern Games	20.1%
Technological Development	18.2%
Western Games	14.3%
Cultural Onslaught	12.1%
Traditional TV Viewing	11.2%

Table 3. Advantage and Disadvantage of Technologies.

Advantages and disadvantages of technologies that may affect playing Philippine traditional games.	
Advantages	**Disadvantages**
1. It enhances computer skills and keeps the child up to date.	1. Shorter Sleep Duration
2. It helps in teaching children how to play as steam using technology, improves language, math skills, and boost decision-making.	2. Lack of Socialization
3. It develops mental health.	3. The 'Bob' Effect Syndrome
4. It progress children's emotional health and helps achieve optimal development.	4. High-Tech Health Syndrome
5. It improves cognitive development.	5. Computer Eye Syndrome
	6. Carpal Tunnel Syndrome

DISCUSSION

1. How many Filipino people under Generation Z play Philippine traditional games?

Based on the gathered results from the existing study, 56.66% of the participants still play traditional Filipino games despite their access to online games and 43.33% prefers to browse and play online (Booc, R.P., et al. 2019).

2. What are the factors that affect the Filipino citizen under Generation Z to have less interest in playing Philippine traditional games?

Philippine traditional games decrease as television and other mass media are widely accessible, passive activities such as watching TV, listening to music, and Internet surfing, video games, and online chatting are among the most popular leisure activities among adolescents (Pavlova & Silbereisen, 2015). Social media has 24.1% of Generation Z as a factor affecting their interest in playing Philippine traditional game.

Also, the reason why Philippine traditional games are declining because the young generation has turned to virtual games and other modern games which has 20.1% (e.g., cricket, hockey, and football) for sporting, entertainment, and use of leisure (Pfister, 2014).

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However, the present day has made traditional games now almost forgotten and the younger generations do not play these traditional games anymore due to rapid technological development which has 18.2% (Ismail, 2016). The advent of ICT (Information and Communication Technology) has also played a pivotal role in dwarfing the importance and charm of traditional games (Pfister, 2014).

According to the website entitled Traditional Games in the Philippines (2021), games such as patintero, tumbang preso, piko, sipa, turumpo, and many others, are played daily. However, one of the main reasons why some children stop playing Filipino games is because Western Sports (e.g., basketball or volleyball) which has 14.3% of Generation Z are featured in local barangays and in schools.

According to Liponski & Jaouen (2023), it is the cultural onslaught of western countries which has 12.1% of Generation Z and has brought about change in the lifestyle and attitudes of people in tribal societies where traditional games are in mostly in vogue.

According to the reports of the Wall Street Journal (2021), traditional sports, and other major leagues are seeing declines in younger viewership. The changes come as people turn away from traditional TV viewing and streaming TV which has 11.2% of Generation Z, a trend that has only grown during the Covid-19 pandemic.

3. How do people conserve and maintain the Philippine traditional games?

3.1 People conserve and maintain the Philippine traditional games through spending time with other members of the community and continuous engagement.

According to the quora.com, it states that it is important to preserve the information and knowledge about traditional games for the generations to come. It is essential to raise awareness about traditional games and keep them alive in the present day for Filipinos to enjoy. Filipinos must begin building advocacy that will help to educate the next generation— the Filipino children.

3.2 The best way to preserve culture, the Philippine traditional games are to keep it alive.

According to the website entitled “Preserve Your Culture”, Filipino people must spend time with other members of the community because the best way to preserve your culture is to keep it alive. Gather as a group not just for holidays, but for ordinary meals, events, or just conversation. Many aspects of culture are difficult to learn in books and museums, including etiquette, body language, and humour.

3.3 Laro ng Lahi can be preserved through employing continuous engagement.

As stated on the website entitled “How do you preserve and promote Laro ng Lahi?” (2018), it states on the report that traditional games such as Laro ng Lahi can be preserved employing continuous engagement in the respective houses and classroom integration by considering the use of native materials.

3.4 Filipinos must promote major campaigns about the revival of the Philippine Indigenous Games.

According to Magna Kultura Foundation (2012), a Non-Governmental Organization (NGO), it states that Filipinos must promote Philippine arts and culture via outreach activities. Major campaigns about the revival of the Philippine Indigenous Games through its Larong Pinoy Program is essential, which helps to raise awareness of traditional games and keep them alive in the present day for Filipinos to enjoy.

However, patintero, tumbang preso, luksong tinik, liksong baka, siyato, piko, luksong lubid, holen, and tutumpo are just a few of the traditional Filipino games that must be included and taught in the program.

3.5 Filipinos must began building the advocacy by means of establishing Sports Training Play Camps to educate the next generation of Filipino children the game mechanics of every Pinoy game.

The foundation states that Filipinos must began building the advocacy by means of establishing Sports Training Play Camps to educate the next generation of Filipino children the game mechanics of every Pinoy game, as well as how to properly play in a tournament setting. Official tournament rules and game officiating formats must implement by the foundation and are used in sports fests held in barangays, schools, and private corporations (Magna Kultura Foundation, 2012).

4. What are the advantages and disadvantages of technologies that may affect playing Philippine traditional games?

However, the advantages of technologies that may affect playing Philippine traditional games are (a) it enhances computer skills and keep the child up to date, (b) it helps teaching children how to play as team using technology, improves language, math skills, and boost decision-making, (c) it develops mental health, (d) it progress children’s emotional health and helps achieve optimal developments, (e) it improves cognitive developments.

On the other hand, the disadvantages of technologies that may affect playing Philippine traditional games are (a) shorter sleep duration, (b) lack of socialization, (c) the ‘Bob’ Effect Syndrome, (d) High-Tech Health Syndrome, (e) Computer Eye Syndrome, (f) Carpal Tunnel Syndrome.

The technologies from various legitimate gathered data.

4.1. According to the website entitled “The Benefits of Playing Video Games”, sometimes video games are more beneficial for the children because it can enhance their computer skills which is important for them later in the future and keep them up to date with the rogue and what is happening around them if it was in the technology field, games field or news.

4.2. According to the website entitled “The Educational Benefits of Video Games”, some other benefits of video games is that they help in teaching how to play as team using technology, many games are developed to help improve the children language and math skills and also some video games incite decision making where they teach children how to take their own decision without the help of their families.

4.3. According to the website entitled “Traditional Game as a way of Healthy”, play in children is considered important in achieving the development of his mental health, so the play is a type of therapy in children. Also, the website states that the play is considered to have many beneficial effects on the development of children’s emotional health. The play is significant part of a child and referred to as “child work” for achieving optimal development.

4.4. According to the article entitled Business Standard (2020), it states that playing video games can improve cognitive development such as greater sensitivity to contrasts, better eye-

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to-hand coordination, and superior memory. Moreover, games can be a powerful tool for cognitive training according to Dr. Liu)2020).

The disadvantages of technologies from various legitimate gathered data.

4.1. Due to the lack of physical activities, with lesser involvement in traditional games and more time on electronic devices, studies have found a negative association between technology uses and sleep duration. It has consistently been reported that increased time using technology is associated with an elevated risk of shorter sleep duration and other sleep problems among children and adolescents (Bartel, Gradisar, & Williamson, 2015; Hale & Guan, 2015).

4.2. According to the website entitled Larong Pinoy, the advent of modern technology like the high tech gadgets and computer games fascinated children and even adults. Playing computer games and gadgets lessen the physical activities and bonding for children among their neighbourhood friends, they have more "ka-Chat" at "ka-Facebook" or "ka-YM". Unlike those children who grew up playing in the streets, would have call and have memories with their "kababata" or childhood friend. In this case, the socialization among children is slowly vanishing, that's why many of the children nowadays are shy, has lack of self-confidence because they do not have the chance to play with other children or what we call socialization.

A part from this website entitled "What can we get in playing computer games", many of our Filipino children nowadays are neglecting the traditional Filipino games, instead of playing these, they rather choose playing computer games and other gadgets, they don't know that these games have no good effect in their body, they're just getting sick of playing these. The 'Bob' Effect Syndrome diseases can get through playing computer games where from a gamer's view, the most likely cause of simulation sickness is the 'Bob' effect, which is manifest in the FPS genre by the illusion of their character's moving, through their weapon and the scenery 'bobbing' up and down slightly with each step taken. As FPS games are generally fast paced, and then the effect of motion is accelerated to the point where eyes and ears get out of sync with one another and so become disoriented.

4.3. Our ancestors roamed the Serengeti with their sights set on the horizon. We sit at desks all day staring at a computer screen. The result for many: computer fatigue syndrome. It causes eye strain, dizziness, headaches, low energy, and neck, back, and shoulder pain.

4.4. The use of computers in the United States and the world is growing exponentially. The amount of time one spends looking at a computer screen is also increasing similarly. Humans evolved biologically as "hunters and gatherers". Our vision developed primarily for seeing distance (98% of all humans are born farsighted). Our eye muscle systems are in their most relaxed state when we use our vision for distance objects and space. In similar fashion, our bodies were designed for movement.

4.5. Maintaining a sitting posture for long periods of time is unnatural for us. As a result, working at a computer for a long period of time without breaks can cause unnatural strain on us that can result in a condition called "computer fatigue syndrome". Computer users have shown to have a reduced average blinking time while using computers, which, according to Japanese investigators, causes a major risk of developing transient, or short-term dry eyes. Over a period of time, excessive computer use can have cumulative negative effects on the user including the worsening of farsightedness, near sightedness, astigmatism, eye-focusing disorders and poor eye coordination. In addition, constant working from a set position can cause neck and shoulder stiffness, as well as stress headaches, which can then cause pain in the jaw (referred to TMJ or tempo mandibular joint).

4.6. When someone has carpal tunnel syndrome, or CTS, the "tunnel" of bones and ligaments in their wrist has narrowed. These narrowed tunnel pinches a nerve, causing a tingly feeling or numbness in a person's hand, especially in the thumb and first three fingers. Someone with carpal tunnel syndrome may have trouble typing on the computer or playing a video game. In fact, repetitive motions (doing the same thing again and again) from those activities may be to blame for causing the carpal tunnel syndrome in the first place.

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Preparation of Tables

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FOSTERING TOLERANCE AND UNITY: ANALYSIS OF SELECT INDIAN FILMS

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ABSTRACT

Life without the intrusion of media in all its forms and manifestations can no longer be imagined on our planet. Be it the print, cinema, television or its most pervasive form, the social media has engulfed the human life processes to an extent that the human mental make-up is defined by the media like never before. The exposure to all that's happening or trending, as it is called by not the citizens but the 'netizens' across globe has had an impact on the way people perceive things influencing their attitudes, behavior, approach, value systems or even as they live in the present times. The immense possibilities that science and technology powered media has, is by far unimaginable. The containment of the disastrous recent covid pandemic, by making people amenable to the new normal through the amalgam of science, technology and media is a case in point. It is in this backdrop of the ubiquitous media that hugely mediates even our relationships within societies, that this paper is formulated to highlight how the cinematic media has been utilized as a tool to mediate tolerance and unity among the Muslim and Hindu religious groups in India. An analysis of a few chosen films for exploring the theme is taken up here

KEYWORDS: *Covid, Cinema. Netizens, Religious Intolerance, Science and Technology*

INTRODUCTION

The Partition of the Indian Subcontinent into two eternally conflicted countries Pakistan and India has been one of the most heinous disasters that history of mankind has witnessed. The traumatic memory of the mutual mass murders of the two communities - Hindus and Muslims have left the psyche scared and has kindled the hatred time and again leading to repeated wars between India and Pakistan, and has fuelled terrorist activities threatening peace and harmony on the borders. The attempts at peaceful coexistence of people of the two religions by humanitarian leaders have not been successful as also the conscious propagation of 'unity in diversity' as the organizing principle of Indian over the years has failed to bridge the differences and prejudices between the religious groups. Yet, efforts to control the strife between the two religious communities by elevating the values of humanity that can transcend the sectarian attitudes are ongoing at several levels in India. The film industry too, because of its extensive appeal to the masses of all sections of the society has left no stone unturned to curb the lurking hatred between the two groups. Films like *Garam Hawa*, *Bombay*, *Roja*, *Veer Zaara*, *Gadar*, *Bajarangi Bhaijaan*, *Earth*, *Black Friday*, *Tamas*, *Firaq* and many others since the time of attainment of Independence have tried to showcase the natural instincts of love and cooperation present in all human beings transcending the barriers of caste, creed and religion. It is ironic that even after the celebration of the 'Amrut Mahotsava' of Indian independence from colonial rule of the British, wrested after a popular and protracted struggle for civil liberties, the concept of India as one Nation and all its people living in harmony with one another is unfortunately, far from reality. The very spirit of nationalism that had pollinated the entire India since the 1920's leading to the upsurge of a united goal of achieving independence, today needs to be revisited, as the very essence of nationalism is fraught with much disparities of thought and action. The post independent India has faced an onslaught of violent attacks, not just from her neighbours but also from within her womb, bringing to the fore the unresolved continuum of differences, hatred, bias existent among the people though they all belong to one Nation. Be it the Godhra incident, the burning problem of Kashmir, the repercussions of operation Blue star, the consequences of the assassination of Indira Gandhi, Rajeev Gandhi, the naxal violence, the attack on Parliament, the Kalisthan threat, the ethnic conflicts in North-East States, almost regular terrorist attacks and many more, all portray a Nation that is disturbed and in throes of pain, suspicion lurking among its peoples for one another divided into castes, classes, communities, religions, race, ethnicities and gender. In fact, in its annual report, the National Crime Records Bureau (NCRB) which functions under the Union Home Ministry indicated a rise in communal riots in the recent times. (Business Standard on October 12, 2022) As Dr. Ambedkar had so fervently opined in his speech that mere political unity without the social unity would not augur well for the nation, India today is a burning cauldron of various unresolved issues.

Even as early as in the 1920's the national movement had ignited the spirit of Nationalism in the minds of the people of India, the

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violence during the non-cooperation movement clearly hinted at what was to come. Although Gandhiji's faith in the emancipatory potential of nationalism caught the imagination of almost all the leaders of the freedom struggle including Gandhiji, resulting in independence of India, it was the anxiety and apprehension of Rabindranath Tagore about the aggressive edge of Nationalism that eventually came true. It is this vein of thought that has been sensitively captured by films like Arpana Sen in *Mr. and Mrs. Iyer (2002)*, Mani Ratnam's *Bombay(1995)* and the most recent mindboggling *Kashmir Files (2022)* directed by Vivek Agnihotri which are chosen for analysis here.

Mr. and Mrs. Iyer: A Representation of a Mini India

Arpana Sen's *Mr. and Mrs. Iyer* which bagged several national and international awards offers a sensitive projection of the notions of Nation as 'an imagined community', which has been theorized by Benedict Anderson, of how Nation is forged, the obstacles to it and the ultimate triumph of human spirit of love and cooperation. Although on a surface level it appears another Hindu - Muslim love story blossoming under threatening surroundings of communal riots, it offers a wonderful critique of the very making of notions of 'nations' that do not just draw borders on land, but divides minds and hearts too.

The characters of Meenakshi Iyer and Raja Choudhuri alias Jahangir Choudhuri evoke the natural sentiment of love that emanates out of caring and sharing for each other amidst dangers breaking apart the notions of religious differences between them. However a critical viewing of the film unravels it as a critique of Nationalism in India, which has failed to bring the disparate elements of the nation within the cultural-political logic of nationalism. Despite attempts to imbibe the consciousness of being a nation in the popular mind, through props of National boards, flags, captions and quotes, which are highlighted in visual screen shots all through the film, the communal differences among the people that is triggered off into violent hatred at the slightest provocation is sensitively captured. In fact the 'bus' that is headed from the North to the South of India itself is a microcosm of all that India is. Those on board the crowded bus constitute a cross section of Indian life—Muslims, Sikhs, Hindus, higher and lower castes, middle class and poor. Most of the passengers cannot speak each other's native tongues and so all of them need to speak in English, however faulty it is, revealing another ironic dimension of united India that needs to depend on the coloniser's language for its unity. With a focus on rendering the diverse Indian population represnting the regional distinctions, accommodating varied interests and attitudes of its people according to their age, sex, caste, class, religion and race the different people on board the bus comprise the populace of India. The old Muslim couple and their non-intrusive presence, the young gang of teenagers teeming with boisterous uproar, the bored middle-aged adults depending on drinks and cards to while away their time, the young mother Meenakshi with her demanding infant Santanam, the Muslim wild-life photographer Raja alias Jahangir alias Mr. Mani Iyer with his keen eye for human emotions, the newly married couple lost in each other oblivious of all else, the unfriendly older women easily irked by the younger woman's burden of motherhood, the autistic boy representing the disabled misfits in this world of self-reliant able bodied and finally the Jew who ends up betraying the old couple to save his own skin - all of them weave the fabric of Indian ethos of diverse multiplicity of cultures, religions, regions and languages.

The journey of this teaming mini-India stands tested at the outbreak of a Hindu-Muslim riot. In the face of a life threat from a Hindu fundamentalist group, all the passengers pulsate as one group negating the presence of any Muslims in the bus, but its only the Jew who yet again continues the legacy of betrayal by pointing at the harmless old Muslim couple, in order to divert the attention of the Hindu terrorists from himself, anxious of being mistaken as Muslim because of his circumcised reality. Hence, yet again, the betrayal does not emerge from within India, but the one who remains alien to its culture of sacrifice, tolerance and unity. It's from this point; the film clearly satirizes the made-made society, its structures and rhetoric of ethno- religious nationalism which in its attempts to unify people only ends up alienating them from their natural humanity.

The subtle portrayal of Meenakshi Iyer's consciousness and conscience is indicative of the natural instincts of humanity ever present in all versus the identity, bias and attitude formation based on the social grooming, that is repressive of natural harmony and fellow feeling. For instance, after unhesitant acceptance of help with her infant child, rendered by Raja at the beginning of the journey, very appreciatively, mistaking him to be a Hindu and then her sudden withdrawal from him after realizing his Muslim identity is noteworthy of how preconceived notions on the basis of religious differences can thwart the natural feelings of harmony between individuals. However, at the nick of danger, she overcomes her religious prejudice, recovers her humanity and saves Raja from violent extremists by claiming him to be her husband, Mr. Iyer, thereby saving not just his life, but also her humanity. The film from then on focuses on the natural fellow feeling of care and concern flowing between the two, irrepressible by any barriers. The emotional riot foregrounded against the external violent riot is explained in all fineness.

Bajarangi Bhaijaan: A saga of humanity

Directed by Kabir Khan and produced by Salman Knan and Rockline Venkatesh, "Bajrangi Bhaijaan," is a yet another saga of humanity that transcends borders and cultural differences. It is a heartwarming tale focusing the natural compassion that pulsates between fellow humans. Salman Khan in the lead is Pavan, a devout Hindu man who embarks on a journey to reunite a mute six year old Pakistani girl 'Munni' with her family in Pakistan, risking his life in the process. With all his attempts to procure a visa and Passport failed, Pavan enters Pakistan illegally and is chased by the police suspecting him as an Indian informer on the Pakistani soil. The grueling chase by the Pakistani authorities to capture Pavan, whose only intention is to reach the innocent child to her lost home, highlights the minds and hearts that are

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corrupted by the blinding hate that is incapable of perceiving goodness or nobility of heart. The character of a Pakistani reporter, played by the versatile Nawazuddin Siddiqui also showcase the role of media in keeping the wounds raw and open, through the insensitive reporting for monetary gains . The antagonism and violence in the region is sensationalized by the media rather than attempts of reconciliation. Nawazuddin's character appropriately summarizes with the statement "Hatred is easier to sell than love" critically pointing out the agencies that are contributing to the continued strained relationships between the two countries.

However, very rightly the movie also portrays most of the characters, except Rasika's father, as tolerant of other faiths, particularly the Imam who aids Pawan states that his mosque is open to all, and he even bids farewell using Pawan's signature Hindu greeting. It showed how ordinary citizens in both the countries, did not hate the other country, it was the officials who induced the hatred in the citizens. The media, the police, the secret agencies had the "enemy thinking", while people like bus conductor, the teacher at the Madrassa, and the border security officer flow with natural humanity wanting to help Pawan in his noble deed.

The narrative of the movie beautifully intertwines themes of faith, love, and religious tolerance and critiques the man-made political and religious boundaries that erode natural feelings of empathy and unity among people. It openly condemns the military-political establishment of both governments and their mutual antagonism. It also succeeds in portraying jingoism and fundamentalism as the true enemy, and not the individuals who are force fed the ideology of separatism and mutual skepticism.

The climax of the movie is heart wrenching. The movie tries to bridge the ties between the two countries. It eventually becomes a critique of Indo-Pakistan politics and tries to evoke feelings of shared humanity.

Bombay: Love vs. Fanaticism

It is almost in the same vein that *Bombay*, which became a box office hit and won National award for the evocative roles of Hindu-Muslim lovers played by Arvind Swami and Manisha Koirala. As Wimal Dissanayake & K. Moti Gokulsing have opined, Mani Ratnam "has highlighted the self-defeating nature of extremist thinking and xenophobia and stressed the need to take a more rational approach to the whole question of religious loyalties and ethnic affiliations in the context of multiracial, multi-religious India."

Having been fatally attracted to a girl (Shaila Bano) of a conservative Muslim Family, the Hindu boy (Shekar) ends up winning her amidst the opposition of both their families. Escaping their wrath and violence, they elope to Bombay which provides them their safe and anonymous life. With a set of twins, their life is blissful until the communal riots hit Bombay with the demolition of Babri Masjid disturbing it by dividing their union once again on the basis of their religious identities. The film seeks to promote values of secularism by placing the experience of an inter-religious family at the centre of the irrational violence caused by religious strife and has numerous moments that promote communal harmony and religious tolerance all through the film. Just as Jahangir and Meenakshi meet as simple humans devoid of any restrictive religious barrier between them in Mr and Mrs Iyer, the presentation of the post-marriage idyllic life of Shekar and Shaila Bano, before the breakout of riots highlight how their mutual love had enabled them to accept each other that they had no qualms following each other's religious 'codes' too. In a song sequence, there are glimpses of Shaila Bano praying at home with Shekar watching with a content smile and Shekar adorns the distinctly Muslim cap, while Shaila Bano applies a red tikka worn by a married Hindu woman. It is ultimately the twin boys of this couple that bring in the insanity of the religious strife, when they are separated from their family during the riots. It is through their innocent, religiously unmarked positions that the entire strife on the basis of religious differences is presented bringing out the irrational and blind hatred that damages the basic humanity and kindness present in all. Santanam's pure laughter, and the twin kids' blissful minds drive home the corruptive and mind-corroding structures dehumanizing the adult world.

Kashmir Files: Understanding Past to Purge the Present

The recent film Kashmir Files too chronicles yet another score of devastating incidents of violence in post-Independence India i.e. the terrorist attacks on Pundits of Kashmir, an intellectually inclined and prosperous community who became refugees in their own country. It brings to light the most underrepresented genocide, the rise of militancy in Kashmir in the 1990's. In the holocaust that unfolded, more than 400,000 Pundits were forced out of the state and rendered homeless, more than 4,000 were killed and uncountable atrocities were perpetuated against their women and children in the valley. The silence and inaction against such growing extremism of the militants and separatists destroyed the amicability that developed between Hindus and Muslims over generations as well as friendships between individuals and families. Although many question the need for this movie to been made as the exodus of Hindus that took place over 30 years ago is history today as it may rake up the issue now and open the wounds that may impact the already strained communal relations between the Hindus and Muslims, the movie actually ventilated the suppressed anger and hate, so as to go over it, by both communities. Both of these religious groups would introspect and see through the politicians' tactics of reaping benefits by putting them against each other which would bring in a change in their attitudes and conduct fostering unity, tolerance and harmony between the warring factions. The film by presenting the senseless slaughter and its repercussions holds a mirror to the sheer selfish vendetta of a few fundamentalists, thereby purging the negative emotions in the light of reason so as to help build a better environment for the happiness of all.

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CONCLUSION

Thus, with an analysis of these chosen films and many others that are made in order to nurture amiability among the multi-religious nations, it can be easily seen that cinema as a popular medium has been able to shape the perceptions of multitudes of people and bring them to a consensus on chosen attitudes and thoughts. And therefore cinema can be used as a potential tool to hold India together fostering unity among its dissenting factions.

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SEASONAL DIVERSITY OF SNAKES IN AMASSOMA AND ITS ADJOINING TOWNS IN BAYELSA STATE, NIGERIA

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ABSTRACT
A seasonal baseline assessment of the diversity and abundance of snakes in Amassoma and Its Adjoining Towns in Bayelsa State was conducted from January to December 2021. This was done to determine the current status of the distribution and abundance of snakes and measure the effect of weather on the availability of snakes and the stability of the ecosystem. Snakes samples were obtained using traps, fences, visual searches and from Collections of Killed & dead snakes. Result show that a total of 1,007 individuals were collected in the dry season and 1,276 individuals in the wet season representing 14 species of snakes belonging to 6 families was recorded from the different study areas. Of these, 1 species belong to the family Boidae, 5 species under family Colubridae, 2 species of Elapidae, 1 species belonging to family Viperidae, 3 species belong to the family Pythonidae and 2 species belong to the family Lamprophidae. There was more number of individuals captured in the wet season than in the dry season. This may be due to the fact that snakes are more prevalent in the wet season as they attempt to warm up due to decreasing temperatures in their hide-out. Snake diversity and abundance in this study are similar to those obtained in other studies in similar and comparable environments. It can therefore be concluded that snake populations in the Bayelsa state are not under any serious threat and the stability of the ecosystem is assured.

KEY WORDS: *Distribution, Abundance, Reptiles, Bayelsa State, Nigeria*

1.0 INTRODUCTION

Reptiles are vital members of any ecosystem. They occupy a diverse range of habitats and microhabitats, found from deserts to grass-lands, from forests to oceans and from hills to our living houses (Jadesh *et al.*, 2014). They vary from the 'gentle' mundane creatures to the 'dangerous' and fear evoking ones. They play a pivotal part in ecosystem stability as both prey and predators. Reptiles for instance are source of food to birds, carnivores and humans. They also play an important role by providing protein for humans, sold as a luxury food, source of generating income and medicine for the treatment of ailments (Kumar *et al.*, 2014). Conversely, reptiles also consume other animals ranging from rodents, other reptiles to other higher vertebrates including man.

Of all reptiles, Snakes are the most vilified, denigrated and hated. This may be as a result of their lethality and their frequent intrusions into human inhabitation. Therefore they are the most vulnerable and most prone to human attacks either by physical aggression or the use of modern chemicals. Sadly, as their numbers continue to reduce, the ecosystem becomes distorted and skewed, allowing undesirable insects and disease vector rodents to run uncontrolled and unimpeded.

There is therefore an acute need to assess the threat to snakes by determining its seasonal diversity and abundance. Research on the ecology, distribution, abundance, reproduction, and management of snakes nay reptiles is scanty in the Niger Delta particularly Bayelsa State when compared with the volume of available information on other organisms. A detailed study of the diversity, distribution and abundance of snakes is urgently needed to provide a data base for their present population status; inter-specific and intra-specific variations and to provide needed indicators for necessary management strategies. This is the intention of this study.

2.0 MATERIALS AND METHODS

2.1 Study area

Six (6) sampling stations were selected for this study with different activities taking place within and around the environment. These stations are located in Amassoma and its adjoining towns.

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Table 1 Coordinate of the Sampling Stations

S/No	Station	Coordinates		Description/Activities
		Latitude	Longitude	
1	Amassoma (Alomu)	04^0 58' 07.1'' N	006^0 05' 48.7'' E	Living area (Academic activities), farming, fishing, lumbering, hunting.
2	Amassoma (Ogoni)	04^0 58' 4.5'' N	006^0 06^1 06.5'' E	Living area (Academic activities), farming, fishing, lumbering, hunting
3	Toru-Ebeni-Ogobiri	$04^0$59'22.5'' N	006^0 06' 43.2''E	Living area (Academic activities), farming, fishing, lumbering, hunting.
4	Palm wine camp	04^0 59'18.9'' N	006^0 08' 19.7'' E	Natural, Farming, Palm wine tapping, Fishing, lumbering, hunting.
5	Ekeremor camp	04^0 58' 53.2'' N	006^0 09'12.6'' E	Farming, Palm wine tapping, Fishing, lumbering, hunting.
6	Old airport camp (OAC)	04^0 58' 46.7'' N	006^0 10' 19.2'' E	Farming, Fishing, lumbering, hunting.

2.2 Sampling Strategy

Extensive survey of snakes was made during day and night throughout the forests, and aquatic habitats such as streams, rivers, lakes, ponds, rice paddies, ditches and pools in these sampling locations. Drift fences and pitfall traps, refuge and pipe traps (Metal plates, PVC-tubes), Visual Search, Visual Encounter Survey (VES) and refuge examination was conducted to obtain live and dead samples of snake. Different snakes were collected in the sampling stations that were dead and killed either accidentally or deliberately.

2.3 Identification of Samples

After making careful observations, the collected specimens were identified; morphometric and meristematic measurements were taken and classified. Samples were identified using keys provided by Smith, 1943; Das, 2002; Leviton et al, 2003 and Whitaker and Captain, 2008.



Plate 1: ***Naja nigricollis***

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Plate 2: ***Naja Melanoleuca***



Plate 3: ***Bitis Gabonicus`***

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2.4 Data Analysis

Snake were identified and counted monthly and the seasonally counts recorded for each species counted. The dry season spanned from January – March and From November –December. The wet season spanned from April – October. Percentage Numerical Abundance for each family and percentage Species abundance was calculated for each season.

Diversity indices were calculated for each season to determine the ecological status of the survey areas and determine seasonal implications. Shannon-weaver diversity index was calculated using the following;

Shannon-weaver diversity index (Hs) = -∑Pi In Pi (Shannon weaver, 1963) …….. (1)

Where:

Hs = Shannon-weaver diversity index

I = count denoting the ith species ranging from 1n

Where Pi = proportion of the ith species represented

Equitability or Evenness index using the formular:

Equitability or Evenness (E) = Hs/Log_2S ……(2)

Where:

E = Equitability index

Hs = Shannon weaver index

Simpson's diversity index using the following:

Simpson's diversity index (D) = $1/Pi^2$ ……(3)

3.0 RESULT

The results of the study are captured in Tables 2 – 5 and Figures 1 and 2.

Table 2 below show the seasonal numerical abundance and Species diversity of Snakes in Bayelsa State

Table 2: Seasonal Species diversity and Richness of Snakes in Bayelsa State

Taxa	Common Name	No. of individual in wet season	No. of individual in dry season.
Colubridae			
Nerodia sipedon sipedon	Banded water Snake	77	65
Elaphe obsoleta obsolete	Black rat snake	152	112
Nerodia erythrogaster	Plainbelly water snake	84	48
Opheodrys aestivus	Grass snake or Green grass snake	102	84
Telescopus semiannulatus	Common tiger snake /Tiger cat snake	78	30
Pythonidae			
Python sebae	African rock python	107	92
Python regius	Ball Python, Royal Python	80	86
Python molurus	Black-tailed python, Indian python	152	96
Boidae			
Calabaria reinhardtii	Calabar python, Calabar ground boa	30	31
Viperidae			
Bitis gabonicus	Gaboon viper	28	33
Lamprophiidae			
Lamprophis fuliginosus	African house snakes	126	102
Boaedon fuliginosus	Brown House Snake/ African House Snake	200	167
Elapidae			
Naja nigricollis	Black-necked spitting cobra	29	15
Naja melanoleuca		31	46
Total		1276	1007

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Table 3 show the percentage Abundance of each family of snakes in the study locale. Result show that Colubridae (33.66%) > Pythonidae (27.20%) > Lamprophiidae (26.71%) > Elapidae (6.05%) > Viperidae (3.27%) and Boidae (3.07%).

Table 3: Seasonal % Abundance of Snakes in Bayelsa State

Taxa	Wet (No. of Individuals)	% Abundance	Dry (No. of Individuals)	% Abundance
Colubridae	493	38.63	339	33.66
Pythonidae	339	26.56	274	27.20
Boidae	30	2.35	31	3.07
Viperidae	28	2.19	33	3.27
Lamprophiidae	326	25.54	269	26.71
Elapidae	60	4.70	61	6.05
Total	1276	100	1007	100

Table 4 and Figure 1 show seasonal percentage (%) species diversity of snakes. Result reveal that wet and dry season have the same species diversity. Colubridae (35.71%) > Pythonidae (21.42%) > Lamprophiidae (14.28%) & Elapidae (14.28%) > Boidae (7.14%) & Viperidae (7.14%).

Table 4: Seasonal % Species Diversity of Snakes in Bayelsa State

Taxa	Wet (No. of Species)	% Species Diversity	Dry (No. of Species)	% Species Diversity
Colubridae	5	35.71	5	35.71
Pythonidae	3	21.42	3	21.42
Boidae	1	7.14	1	7.14
Viperidae	1	7.14	1	7.14
Lamprophiidae	2	14.28	2	14.28
Elapidae	2	14.28	2	14.28
Total	14	100	14	100

Table 5 and Figure 2 show the diversity indices of wet and dry seasons. Shannon -weaver index (2.46) in the dry season > Shannon-weaver index (2.45) in wet season. Equitability index (Evenness) (0.938) was also dry season > Equitability index (Evenness) (0.931) in the wet season. Simpson's Index was however higher in the wet season than in the dry season (10.95) > (10.92).

Table 5: Seasonal Diversity Indices of Snakes in Bayelsa State

Taxa	Wet Season (No. of Individuals	Dry (No. of Individuals)
Colubridae	493	339
Pythonidae	339	274
Boidae	30	31
Viperidae	28	33
Lamprophiidae	326	269
Elapidae	60	61
Shannon weaver index	2.45	2.46
Equitability index (Evenness)	0.931	0.938
Simpson's Index	10.95	10.92

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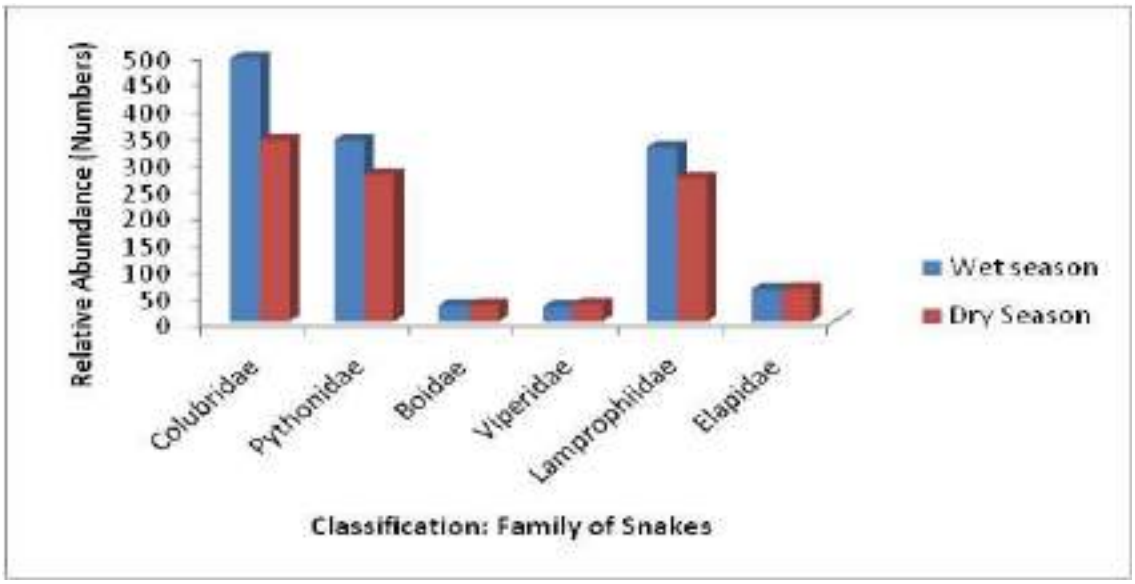


Figure 1: Season Abundance of Snakes in Bayelsa State.

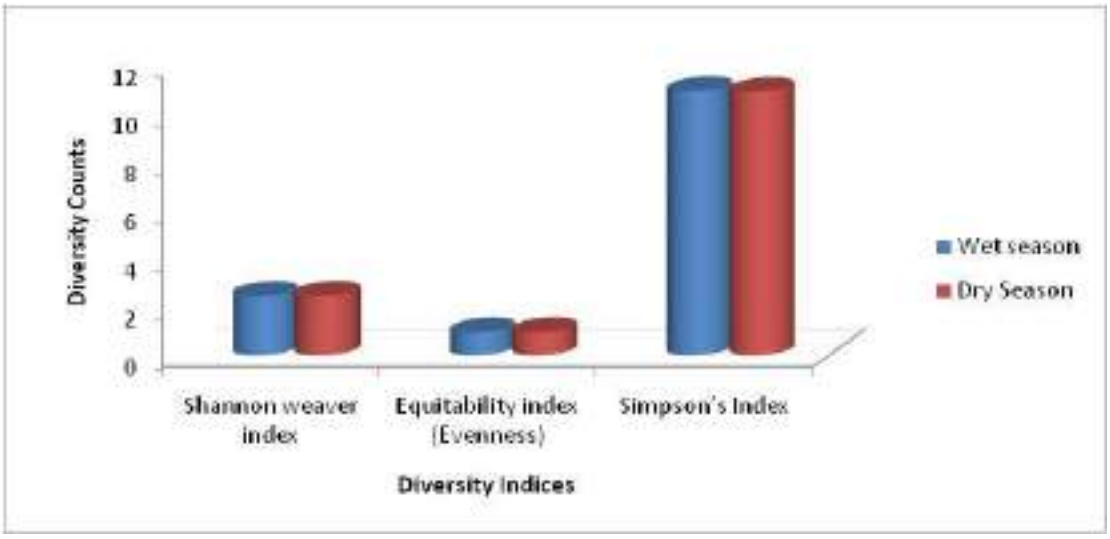


Figure 2: Season Diversity Indices of Snakes in Bayelsa State.

3.2 Discussion of Results

From the present study, it was found that 14 species of snakes belonging to 6 families were recorded from the different parts of Amassoma and its adjoining towns. Of these, 1 species belong to the family Boidae, 5 species under family Colubridae, 2 species of Elapidae, 1 species belonging to family Viperidae, 3 species belong to the family Pythonidae and 2 species belong to the family Lamprophidae. This observation is in contrast with the findings of Lalremsanga et al (2018) who observed more species (49) of snakes from fewer families (5)

There was more number of individuals captured in the wet season than in the dry season. The physical conditions of an organism's environment, temperature, light, moisture and the food resources it contains primarily determine the distribution of the organism in space and time (Daniels, 1992). It is indicated from the data that the appearance and abundance of snakes during the study period was highly influenced by the rainfall. Reptiles, which are homiothermic are sensitive to change in weather conditions and respond strongly to such changes in air and water temperatures, precipitation, and hydroperiod (length of time and seasonality of water presence) in their environments. Since snakes are cold blooded organisms, they tend to appear more during lower temperatures to receive warmth and regulate their body temperature. Therefore, they were more prevalent in the wet season. Another reason may be the higher hunting of human during flooding season and farming after flooding and rains. It may also be caused by the destruction of their hiding place, destruction of their common habitat and their increase search for prey to feed.

This may be caused by the vegetation type in the region, less human and industrial activities.

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4.0 CONCLUSION

The present study revealed the current status on the distribution of snakes in Amassoma and its adjoining towns. The findings of this study reveal a total of 1,007 individuals were collected in the dry season and 1,276 individuals in the wet season representing 14 species of snakes belonging to 6 families was recorded from the different study areas. Of these, 1 species belong to the family Boidae, 5 species under family Colubridae, 2 species of Elapidae, 1 species belonging to family Viperidae, 3 species belong to the family Pythonidae and 2 species belong to the family Lamprophidae. The percentage Abundance of each family of snakes in the study locale show that Colubridae (33.66%) > Pythonidae (27.20%) > Lamprophiidae (26.71%) > Elapidae (6.05%) > Viperidae (3.27%) and Boidae (3.07%).

The seasonal percentage (%) species diversity of snakes reveal that wet and dry season have the same species diversity. Colubridae (35.71%) > Pythonidae (21.42%) > Lamprophiidae (14.28%) & Elapidae (14.28%) > Boidae (7.14%) & Viperidae (7.14%).

The diversity indices of wet and dry seasons reveal that Shannon -weaver index (2.46) in the dry season > Shannon- weaver index (2.45) in wet season. Equitability index (Evenness) (0.938) in the dry season > Equitability index (Evenness) (0.931) in the wet season. Simpson's Index was however higher in the wet season than in the dry season (10.95) > (10.92).

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APPENDICES

Appendix I: Computation of Diversity Indices in Dry Season in Bayelsa State.

Taxa	No.	n/N	Pi	Pi^2	InPi	PiInPi
Colubridae						
Nerodia sipedon sipedon	65	65/1007	0.0645	0.004	-2.74	-0.176
Elaphe obsoleta obsolete	112	112/1007	0.111	0.012	-2.19	-0.243
Nerodia erythrogaster	48	48/1007	0.047	0.0022	-3.05	-0.143
Opheodrys aestivus	84	84/1007	0.083	0.0068	-2.48	-0.205
Telescopus semiannulatus	30	30/1007	0.03	0.0009	-3.50	-0.105
Pythonidae						
Python sebae	92	92/1007	0.091	0.00828	-2.39	-0.217
Python regius	86	86/1007	0.085	0.0072	-2.46	-0.209
Python molurus	96	96/1007	0.095	0.009	-2.35	-0.223
Boidae						
Calabaria reinhardtii	31	31/1007	0.031	0.00096	-3.47	-0.107
Viperidae						
Bitis gabonicus	33	33/1007	0.032	0.001	-3.44	-0.11
Lamprophiidae						
Lamprophis fuliginosus	102	102/1007	0.101	0.1	-2.30	-0.232
Boaedon fuliginosus	167	167/1007	0.165	0.027	-1.80	-0.297
Elapidae						
Naja nigricollis	15	15/1007	0.015	0.0002	-4.20	-0.063
Naja melanoleuca	46	46/1007	0.045	0.002	-3.10	-0.139
Total	1007			0.09154		-2.469

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Appendix II: Computation of Diversity Indices in Wet Season in Bayelsa State.

Taxa	No. of individual	n/N	Pi	Pi^2	InPi	PiInPi
Colubridae						
Nerodia sipedon sipedon	77	77/1276	0.06	0.0036	-2.81	-0.1686
Elaphe obsoleta obsolete	152	152/1276	0.12	0.0144	-2.12	-0.2544
Nerodia erythrogaster	84	84/1276	0.065	0.004	-2.73	-0.17745
Opheodrys aestivus	102	102/1276	0.08	0.0064	-2.52	-0.2016
Telescopus semiannulatus	78	78/1276	0.061	0.0037	-2.80	-0.1708
Pythonidae						
Python sebae	107	107/1276	0.083	0.0068	-2.48	-0.2058
Python regius	80	80/1276	0.062	0.0038	-2.78	-0.1723
Python molurus	152	152/1276	0.12	0.0144	-2.12	-0.2544
Boidae						
Calabaria reinhardtii	30	30/1276	0.023	0.00053	-3.77	-0.08671
Viperidae						
Bitis gabonicus	28	28/1276	0.022	0.00048	-3.81	-0.0838
Lamprophiidae						
Lamprophis fuliginosus	126	126/1276	0.09	0.0081	-2.40	-0.216
Boaedon fuliginosus	200	200/1276	0.156	0.024	-1.85	-0.2866
Elapidae						
Naja nigricollis	29	29/1276	0.022	0.00048	-3.81	-0.0838
Naja melanoleuca	31	31/1276	0.024	0.00057	-3.73	-0.0895
Total	1276			0.09126		-2.45376

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THE ROLE OF IMAGES AND SYMBOLS IN NON-REALISTIC LITERATURE

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ANNOTATION

This article delves into the multifaceted role of images and symbols within the realm of non-realistic literature. By examining texts characterized by surrealism, magical realism, and other imaginative elements, the study seeks to elucidate how images and symbols function as potent tools for conveying meaning, evoking emotions, and challenging conventional reality. Through a combination of close textual analysis, theoretical inquiry, and interdisciplinary perspectives, the research aims to unravel the intricate layers of symbolism inherent in non-realistic works. By shedding light on the significance of imagery and symbolism in shaping narrative worlds, the study contributes to a deeper understanding of the creative processes, thematic explorations, and aesthetic innovations within non-realistic literature. Furthermore, the research has implications for literary theory, cultural studies, and creative writing pedagogy, offering insights into the transformative power of imagination and the enduring allure of the fantastical in literary expression.

KEY WORDS: *symbols, literature, literary expression, images, non-realistic, imagery and symbolism, techniques, narrative worlds.*

INTRODUCTION

Non-realistic literature, characterized by surrealism, magical realism, and other imaginative elements, often relies heavily on the use of images and symbols to convey deeper meanings and themes. This literature challenges traditional notions of reality and invites readers to explore alternative interpretations of the world. In this literature review, we examine the role of images and symbols in non-realistic literature, drawing from a range of scholarly works and critical perspectives.

1. Symbolism and Its Significance: Symbolism in literature serves as a powerful tool for conveying abstract concepts and emotions through concrete imagery. Works such as «The Symbolist Movement» by Anna Balakian [4] provide insights into the origins and evolution of symbolism as a literary movement, highlighting its role in shaping non-realistic literature.

2. Surrealism and the Uncanny: Surrealist literature often explores the uncanny and the subconscious through surreal imagery and dreamlike narratives. Fiona Bradley's «Surrealism» [2] offers a comprehensive overview of the surrealist movement, examining its influence on literature and visual arts and its use of symbolic motifs to challenge conventional reality.

3. Magical Realism and Cultural Significance: Magical realism blurs the boundaries between the real and the fantastical, infusing everyday life with elements of the magical. «Magical Realism: Theory, History, Community» edited by Lois Parkinson Zamora and Wendy B. Faris explores [18] the cultural and historical contexts of magical realism, emphasizing its significance as a mode of storytelling rooted in diverse cultural traditions.

4. Interpretive Approaches and Literary Analysis: Literary theory provides various interpretive frameworks for analyzing images and symbols in non-realistic literature. Jonathan Culler's [5] «Literary Theory: A Very Short Introduction» offers an accessible overview of key literary theories, including structuralism, poststructuralism, and reader-response theory, which can inform the analysis of symbolic elements in literature.

5. Cross-Cultural Perspectives: The interpretation of images and symbols in non-realistic literature is influenced by cultural, linguistic, and historical contexts. Wendy B. Faris's article, [18] «Magical Realism and the Postcolonial Novel: Between Faith and Irreverence» examines how magical realism intersects with postcolonial literature, highlighting the cultural resonances and socio-political implications of symbolic imagery.

6. Reader Reception and Engagement: The role of the reader is crucial in interpreting images and symbols in non-realistic literature. Hal Foster's [3] article, «Surrealism and the Crisis of the Object,» discusses how surrealist artworks engage viewers in a dialogue between conscious and unconscious perceptions, inviting them to interpret symbolic imagery in subjective and multifaceted ways.

The research on “The Role of Images and Symbols in Non-Realistic Literature” holds significant importance for several reasons:

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1. **Understanding Literary Techniques:** Non-realistic literature, which encompasses genres such as surrealism, magical realism, and fantasy, relies heavily on imagery and symbolism to convey meaning. By studying the role of images and symbols in these works, scholars gain insight into the creative techniques employed by authors to evoke emotion, provoke thought, and engage readers in imaginative storytelling.
2. **Exploration of Human Imagination:** Non-realistic literature offers a window into the boundless realm of human imagination. By analyzing the use of images and symbols in these texts, researchers can explore the depths of creativity and the ways in which writers construct alternative worlds, challenge conventional realities, and grapple with complex existential themes.
3. **Cultural and Social Commentary:** Images and symbols in non-realistic literature often serve as vehicles for cultural and social commentary. Through metaphor, allegory, and myth, authors address contemporary issues, critique societal norms, and explore the complexities of human experience. Research in this area illuminates the socio-cultural contexts that inform literary expression and provides valuable insights into the relationship between art, society, and identity.
4. **Interdisciplinary Exploration:** The study of images and symbols in non-realistic literature transcends disciplinary boundaries, drawing upon insights from literature, psychology, anthropology, art history, and philosophy. Researchers in fields ranging from literary studies to cultural studies to visual arts can find fertile ground for interdisciplinary exploration and collaboration within this rich and multifaceted subject area.
5. **Pedagogical Applications:** Understanding the role of images and symbols in non-realistic literature has pedagogical implications for educators at all levels. By incorporating non-realistic texts into the curriculum and teaching students how to analyze imagery and symbolism, educators can foster critical thinking skills, creative expression, and cultural literacy among learners. Moreover, exploring diverse literary traditions promotes empathy, tolerance, and appreciation for cultural diversity in the classroom.

In conclusion, research on the role of images and symbols in non-realistic literature is vital for deepening our understanding of literary techniques, exploring the bounds of human imagination, uncovering cultural and social commentary, fostering interdisciplinary inquiry, and enhancing pedagogical practices. By delving into the rich tapestry of imagery and symbolism in non-realistic texts, scholars contribute to the ongoing dialogue surrounding the power and significance of literature in shaping our understanding of the world.

LITERATURE REVIEW

The exploration of images and symbols in non-realistic literature encompasses a rich and multifaceted field of study, offering insights into the complexities of human imagination, cultural expression, and literary interpretation. This literature review synthesizes key works that illuminate the role of imagery and symbolism in shaping narrative meaning and artistic representation within non-realistic literary contexts.

1. «Literature and the Visual Arts in Contemporary Society» by Edward A.Picot (2008). Picot's examination of the intersection between literature and visual arts provides a foundational understanding of how imagery and symbolism operate within non-realistic literary works [19]. He explores the interplay between textual and visual elements, highlighting the ways in which images and symbols convey thematic motifs and evoke emotional responses in readers.

2. «The Symbolist Movement» by Anna Balakian (1967). Balakian's [4] seminal work traces the origins and development of the Symbolist movement in literature and art. Through in-depth analyses of Symbolist texts, she demonstrates how symbols function as vehicles for conveying abstract ideas, subjective experiences, and philosophical concepts, transcending literal representation to evoke deeper layers of meaning.

3. «Surrealism» by Fiona Bradley (1997). Bradley's [2] comprehensive study of surrealism offers valuable insights into the role of imagery and symbolism in this influential artistic and literary movement. She examines surrealism's fascination with the subconscious, dreams, and the irrational, highlighting how surrealists subverted conventional reality to explore the depths of human psyche and imagination.

4. «Magical Realism: Theory, History, Community» edited by Lois Parkinson Zamora and Wendy B. Faris (1995). This seminal anthology delves into the theory, history, and cultural significance of magical realism in literature. Zamora and Faris [18] gather essays that explore the role of imagery and symbolism in magical realist texts, examining how these narrative devices blur the boundaries between the real and the fantastical, the ordinary and the extraordinary.

5. «The Poetics of Space» by Gaston Bachelard (1958). Bachelard's philosophical exploration of the poetics of space offers valuable insights into the symbolic dimensions of literary imagery [20]. Through an analysis of poetic language and metaphorical imagery, he delves into the psychological significance of domestic spaces, landscapes, and architectural forms, revealing how they evoke memories, emotions, and imaginative associations.

6. «The Interpretation of Dreams» by Sigmund Freud (1899). Freud's seminal work on dream analysis provides a psychoanalytic perspective on the role of symbolism in literature and human consciousness [21]. He elucidates how dreams serve as symbolic expressions of unconscious desires, fears, and conflicts, shedding light on the symbolic motifs and imagery that permeate non-realistic literary works.

7. «How to Read Literature Like a Professor» by Thomas C. Foster (2003). Foster's guide to literary analysis offers practical techniques for interpreting symbols and imagery in literary texts [3]. He demonstrates how symbols function as recurring motifs that convey thematic significance, cultural references, and allegorical meanings, inviting readers to engage critically with the symbolic language of literature.

8. «The Practice of Psychotherapy» by C.G. Jung (1954). Jung's exploration of archetypal symbolism and the collective unconscious provides a psychological framework for understanding the role of symbols in literature [7]. He argues that symbols embody universal patterns of human experience,

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serving as expressions of primal instincts, cultural myths, and spiritual aspirations, thereby enriching the interpretive depth of non-realistic literary works.

Furthermore, Ameri (2021) says that After modernism emerged in the 20th century, realist fiction largely lost the prominence it held in the 19th century. Modernism's emphasis on capturing the complexity of characters' inner lives was something realist fiction at the time struggled to achieve. Postmodernism's further questioning of reality and the ability to represent it dealt an additional blow to traditional realist fiction. In fact, various modernist, postmodernist, and poststructuralist critiques from the early 20th century onward have challenged realism, claiming it is insufficient for portraying the lives of contemporary individuals. These critics promote more experimental forms of fiction, where the plot is often non-linear, narration is complex, the text is self-aware in its representation, and the focus shifts from external circumstances to characters' internal experiences [28].

Also, Earnshaw (2020) states that Realism begins to influence the melodramatic style that was prevalent in theater at the time, and literary history largely overlooks the era between 'Sheridan and Shaw,' which spans from the late 1770s to the early 1890s [29]. Magical realism has roots in historical and cultural contexts, emerging after World War I in Europe. The term first appeared in the Weimar Republic during the political unrest and economic instability of the 1920s, as people sought new meaning amid a harsh reality. It was officially introduced in Germany by renowned art critic Franz Roh (1890-1965), who coined the term in 1925 to describe paintings that presented a transformed reality. These works marked a return to realism but with a fresh perspective, following the abstract Expressionist style that had dominated the previous century. This artistic approach aimed to portray reality while highlighting the mysterious elements of everyday life. In his article "Post-Expressionism," Roh describes this new style as one that is fully grounded in the real world and celebrates the ordinary. He saw post-Expressionism as a blend of two contrasting movements: Impressionism, which focused on how external objects affect the senses, and Expressionism, which emphasized the dominance of the inner self over the external world. Roh believed that this division between subject and object was resolved with the rise of post-Expressionist painters, who merged these two tendencies. As a result, the post-Expressionist paintings of the 1920s depicted real objects but incorporated the formal innovations and spiritual essence of Expressionism. This marked the official beginning of magical realism. By the 1940s and 1950s, the term "magical realism" was adopted to describe a unique form of realism used by American painters and writers [30].

This literature review underscores the diverse range of perspectives and scholarly inquiries that contribute to our understanding of the role of images and symbols in non-realistic literature. By synthesizing insights from various disciplines, including literary criticism, art history, psychology, and cultural studies, researchers can deepen their appreciation of the rich symbolic tapestry woven within non-realistic literary texts, unlocking new avenues for interpretation, analysis, and creative expression.

METHODOLOGY

This research employs a qualitative approach to examine the role of images and symbols in non-realistic literature. It involves in-depth analysis of selected texts to identify recurring motifs, thematic patterns, and symbolic representations. Here's a classification table on The Role of Images and Symbols in Non-Realistic Literature, dividing various types of images and symbols according to their functions and significance in such works. We have organized it by themes, symbol categories, their purpose, and relevant examples from literature (look at the table 1):

Table 1.

Classification Table: The Role of Images and Symbols in Non-Realistic Literature

Theme/Concept	Symbol/Image Category	Purpose/Function	Examples from Literature
Duality & Paradox	Mirror, Doppelgänger	Reflect inner conflicts, the dual nature of reality	*The Strange Case of Dr. Jekyll and Mr. Hyde* (Robert Louis Stevenson), *The Picture of Dorian Gray* (Oscar Wilde)
Time and Eternity	Clocks, Hourglasses, Circles	Represent cyclical time, eternity, or the illusory nature of time	*Slaughterhouse-Five* (Kurt Vonnegut), *Orlando* (Virginia Woolf)
Dreams and Subconscious	Labyrinths, Shadows	Express psychological exploration, subconscious fears, desires	*The Metamorphosis* (Franz Kafka), *The Trial* (Franz Kafka)
Death and Transcendence	Skulls, Ravens, Black Cloaks	Symbolize mortality, the afterlife, or transformative experiences	*The Raven* (Edgar Allan Poe), *Waiting for Godot* (Samuel Beckett)
Nature as Metaphor	Forests, Oceans, Storms	Represent unknown forces, chaos, or internal emotional states	*The Tempest* (William Shakespeare), *Heart of Darkness* (Joseph Conrad)
Social and Political Allegory	Masks, Puppets, Machines	Critique societal structures, reveal the dehumanization of individuals	*1984* (George Orwell), *Brave New World* (Aldous Huxley)
Religious and Mythological	Crosses, Phoenix, Serpents	Represent spiritual journeys, rebirth, temptation	*Paradise Lost* (John Milton), *The Divine Comedy* (Dante Alighieri)

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Alienation and Isolation	Islands, Deserts, Empty Spaces	Reflect physical and emotional separation from society	*The Little Prince* (Antoine de Saint-Exupéry), *The Castle* (Franz Kafka)
Madness and Unreality	Hallucinations, Fading Landscapes	Blurs the line between reality and illusion	*Through the Looking-Glass* (Lewis Carroll), *The Bell Jar* (Sylvia Plath)
Cultural and Historical Trauma	Wounds, Ghosts, Ruins	Symbolize unresolved historical pain, collective memory	*Beloved* (Toni Morrison), *One Hundred Years of Solitude* (Gabriel García Márquez)
Identity and Transformation	Masks, Mirrors, Metamorphosis	Represent personal growth, fragmentation, or changing identity	*The Invisible Man* (Ralph Ellison), *Metamorphosis* (Franz Kafka)
Fate and Free Will	Threads, Weaving, Labyrinths	Reflect destiny, choices, and the confusion between them	*The Odyssey* (Homer), *Oedipus Rex* (Sophocles)
Technology and Modernity	Machines, Mechanical Beings, Wires	Represent human relationship with technology and progress	*Do Androids Dream of Electric Sheep?* (Philip K. Dick), *Neuromancer* (William Gibson)

Symbolism, surrealism, and magical realism are literary devices that add depth, complexity, and layers of meaning to literary works. Each technique employs unique strategies to evoke emotional responses, challenge conventional reality, and explore the human experience. This comparative analysis examines the characteristics, applications, and implications of symbolism, surrealism, and magical realism, along with key literary analysis techniques (look at the table 2).

Table 2.

1.Symbolism:	Characteristics: Symbolism involves the use of symbols, objects, or images to represent abstract ideas, themes, or concepts. These symbols often possess multiple layers of meaning and can evoke emotional responses in readers. Applications: Symbolism is commonly used in literature to convey themes, develop characters, and create allegorical narratives. Authors may employ recurring motifs, colors, or objects to imbue their works with symbolic significance. Implications: The interpretation of symbols is subjective and open to multiple interpretations. Readers engage in active interpretation, uncovering hidden meanings and exploring the symbolic resonance of literary elements.
2. Surrealism:	Characteristics: Surrealism seeks to unlock the unconscious mind and transcend rational thought through the juxtaposition of seemingly unrelated elements, dream-like imagery, and absurd scenarios. It challenges conventional notions of reality and logic. Applications: Surrealist literature often features bizarre or fantastical elements, fragmented narratives, and nonlinear storytelling techniques. Authors employ free association, automatic writing, and stream-of-consciousness to evoke a sense of the surreal. Implications: Surrealism disrupts traditional narrative structures and invites readers to question the boundaries between the real and the imagined. It encourages exploration of the subconscious and the irrational aspects of human experience.
3. Magical Realism:	Characteristics: Magical realism blends elements of the mundane and the fantastical within a realistic narrative framework. It portrays magical or supernatural occurrences as ordinary events, seamlessly integrated into everyday life. Applications: Magical realism is often associated with Latin American literature, where it serves as a means of exploring cultural identity, history, and mythology. Authors employ vivid imagery, vivid descriptions, and sensory detail to create a sense of enchantment and wonder. Implications: Magical realism challenges the distinction between reality and fantasy, inviting readers to reconsider their perceptions of the world. It highlights the interconnectedness of the natural and the supernatural, the rational and the irrational.
4. Literary Analysis Techniques:	Close Reading: Close reading involves a detailed analysis of literary texts, focusing on language, structure, and thematic elements. It requires careful attention to textual details and the identification of patterns, symbols, and motifs. Contextual Analysis: Contextual analysis considers the historical, cultural, and social contexts that inform a literary work. It explores how external factors shape the meaning and interpretation of the text.

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	Reader Response Theory: Reader response theory emphasizes the role of the reader in interpreting and constructing meaning in literature. It acknowledges the subjective nature of interpretation and the influence of individual experiences, beliefs, and cultural backgrounds.

Symbolism, surrealism, and magical realism are powerful literary devices that enrich storytelling and invite readers to engage in active interpretation. While each technique offers distinct approaches to representation and narrative experimentation, they share a common goal of expanding the boundaries of literary expression and challenging conventional modes of perception. By employing close reading, contextual analysis, and reader response theory, scholars can deepen their understanding of these techniques and their implications for literary analysis.

RESULTS AND DISCUSSION

Non-realistic literature, characterized by surrealism, magical realism, and other imaginative elements, often relies heavily on images and symbols to convey deeper meanings and evoke emotional responses. This literature challenges traditional notions of reality and invites readers to explore alternative realms of consciousness and perception. In this literature review, we examine the role of images and symbols in non-realistic literature, drawing insights from a range of scholarly works and critical perspectives (look at the table 3).

Table 3

1. «The Interpretation of Dreams» by Sigmund Freud.	Freud's seminal work on dream analysis provides foundational insights into the significance of imagery and symbolism in the unconscious mind [21]. His exploration of dream symbolism and latent content illuminates how symbols convey hidden desires, fears, and unresolved conflicts, laying the groundwork for understanding the role of symbols in literary texts.
2. «Surrealism and Painting» by André Breton.	Breton is a key figure in the surrealist movement, explores the relationship between visual art and the unconscious mind in this influential text [13]. He emphasizes the importance of spontaneous creativity and the juxtaposition of seemingly unrelated images to unlock the mysteries of the psyche. Breton's ideas on automatic writing and the power of the irrational inform our understanding of surrealism as a literary and artistic movement.
3. «Magical Realism and the Postcolonial Novel: Between Faith and Irreverence» by Wendy B. Faris	Faris [16] examines the role of magical realism in postcolonial literature, focusing on its use of imagery and symbolism to negotiate cultural identity and historical trauma. She argues that magical realist techniques enable writers to transcend the limitations of realism and convey the complexities of lived experiences in colonized societies. Faris's analysis sheds light on the transformative potential of symbols in challenging dominant narratives and reclaiming marginalized voices.
4. «The Symbolist Movement» by Anna Balakian.	Balakian provides a comprehensive overview of the symbolist movement in literature and art, tracing its origins and development in late 19th century Europe. She highlights the symbolists' emphasis on subjective experience, mysticism, and the evocative power of symbols [4]. Balakian's analysis underscores the role of symbols in expressing abstract concepts and spiritual truths, setting the stage for the exploration of symbolism in non-realistic literature.
5. «The Poetics of Space» by Gaston Bachelard.	Bachelard's seminal work delves into the phenomenology of space and the poetic imagination [20]. He explores how spaces, both physical and metaphorical, evoke memories, emotions, and symbolic associations. Bachelard's insights into the poetic resonance of images and symbols deepen our understanding of their transformative power in literature, particularly in non-realistic works that challenge conventional perceptions of space and time.
6. «The Uses of Enchantment. The Meaning and Importance of Fairy Tales» by Bruno Bettelheim.	Bettelheim examines the psychological significance of fairy tales and their use of archetypal symbols to address universal themes and emotional conflicts. He argues that fairy tales provide a symbolic language through which readers can explore existential dilemmas and navigate the complexities of human experience. Bettelheim's analysis highlights the enduring appeal of symbols in literature as vehicles for psychological insight and emotional resonance.
7. «Understanding Comics. The Invisible Art» by Scott McCloud.	McCloud offers a unique perspective on the role of images and symbols in storytelling through the medium of comics. He explores how visual elements, such as panel layout, line quality, and iconography, contribute to the narrative structure and meaning-making process. McCloud's analysis underscores the symbiotic relationship between words and images in conveying complex narratives and engaging readers' imaginations.
8. «Symbolism» by Rodolphe Rapetti.	Rapetti's comprehensive study of symbolism in art and literature offers insights into the multifaceted nature of symbolic expression. He explores how symbols function as vehicles for conveying abstract concepts, emotions, and cultural values across different historical periods and artistic movements. Rapetti's analysis deepens our appreciation of the symbolic richness of non-realistic literature and its ability to transcend linguistic and cultural boundaries.

Also as Zalans (2023) mentioned that Socialist Realism demanded a positive hero who triumphed over adversity. In this way, it echoed elements of Romanticism, encouraging the elevation and idealization of heroes and events to shape the

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public's consciousness (Leighton 1983). The genre was required to portray an overly optimistic view of life in the Soviet Union (Reid 2001: 157). However, Marģeris Zariņš subverted and satirized this expectation in his works, as will be discussed later. Other key characteristics of Socialist Realism included formulaic plots, where characters succeeded through sheer determination, and an excessively favorable depiction of Soviet life and governance. Modernist techniques like stream-of-consciousness or genre-mixing were largely absent, and poetry tended to follow strict forms and rhyme schemes. By the 1970s, however, some writers began to introduce irony and fantasy (such as Vladimirs Kaijaks) and social critique (like Alberts Bels), or broke the "fourth wall" (as Regīna Ezera did in Zemdegas). Thus, while Zariņš was a pioneer in many respects, he was not the only one challenging the conventions of Socialist Realism.

In contrast, postmodernism is characterized by skepticism, relativism, and a general distrust of reason, often rejecting objective reality and playing with language, which is seen as having no connection to an external reality. In literature, this manifests in techniques like fragmentation, metafiction, intertextuality, and the blending of high and low culture [31]. Postmodernism opposes Socialist Realism and modernism's belief in order, stability, and unity by deconstructing these ideas and questioning them, even suggesting that every interpretation of reality is a form of power (Bertens 2021). It views history, politics, and culture as grand narratives constructed by those in power, often containing falsehoods and incomplete truths. As a result, representation, by trying to fix reality, is seen as inherently authoritarian, requiring a confrontation with the unpresentable (Bertens 2021).

The analysis provides a rich tapestry of insights into the role of images and symbols in non-realistic literature. From Freud's exploration of the unconscious mind to Breton's surrealist manifestos and Faris's analysis of magical realism, scholars have illuminated the transformative power of symbols in challenging conventional modes of representation and conveying the complexities of human experience. By drawing on diverse theoretical frameworks and critical perspectives, this literature review contributes to a deeper understanding of the symbolic language of non-realistic literature and its capacity to evoke profound emotional responses and stimulate the imagination.

CONCLUSION

In the realm of non-realistic literature, images and symbols serve as powerful tools for conveying complex themes, evoking emotions, and challenging conventional modes of representation. Throughout this exploration, it becomes evident that the role of images and symbols extends far beyond mere embellishments; they are essential elements that imbue narratives with depth, resonance, and meaning. Images and symbols in non-realistic literature act as conduits for exploring the subconscious, expressing abstract concepts, and transcending the limitations of reality. Surrealism, magical realism, and other non-realistic genres harness the evocative power of imagery to blur the boundaries between the tangible and the intangible, inviting readers into worlds where the fantastical coexists with the mundane.

Furthermore, the interpretation of images and symbols in non-realistic literature is inherently subjective, allowing readers to engage with texts on multiple levels and uncover layers of meaning that resonate with their own experiences and perspectives. This fluidity of interpretation underscores the richness and complexity of non-realistic storytelling, inviting readers to become active participants in the construction of meaning.

In conclusion, the role of images and symbols in non-realistic literature is multifaceted and profound. They serve as vehicles for exploration, expression, and interpretation, enriching narratives with layers of symbolism, metaphor, and ambiguity. By embracing the evocative power of imagery, non-realistic literature captivates the imagination, challenges perceptions, and invites readers on transformative journeys through the realms of the fantastic and the surreal.

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LEVEL OF COMPETENCE OF REGION IVA FORENSIC PERSONNEL

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ABSTRACT

Despite the crucial role of forensic resources in criminal investigations, there is a pressing concern about the adequacy of resources within Philippine law enforcement agencies. This issue includes shortcomings in personnel, knowledge, experience, and infrastructure that could prevent forensic instruments and procedures from being used effectively. The study focused on investigating the competence of forensic personnel in Region IVA using the combination of two theories as bases: Competence-based Theory (CBT) and Continuing Professional Development Theory (CPD). The study is important to address a huge gap in literature concerning forensic services in the Philippines. Using quantitative research design, it gathered data using an online survey questionnaire among 107 respondents. The results of the study indicate that forensic personnel in Region VIA is mostly male and 21-39 years old. There are also mostly S.O.C.O. personnel in the ranks. Sadly, there are only 7 forensic experts in the whole region. Region IVA forensic personnel are proficient in the performance of their roles across 8 forensic divisions, and highly proficient in 2 divisions. It was further discovered that there are no significant differences in the competencies when grouped according to gender and forensic unit/office, but there are significant differences when grouped according to age and current position. Reasons for the differences are highlighted and explained. The study contributes new knowledge concerning the state of forensic personnel in the country, which is important in data-driven policy-making, decision-making, and strategic planning for the forensic services of the Philippine National Police.

KEYWORDS: *forensics, competence, forensic officers, Region IVA, Philippines*

INTRODUCTION

Modern criminal investigations rely heavily on forensic science, which offers a methodical framework for analyzing evidence to bolster legal claims. The efficiency and efficacy of forensic personnel are critical to upholding justice and public confidence in the criminal justice system in the Philippines, an archipelagic nation with a diverse cultural terrain. This is why it is urgent to improve the Philippines' forensic skills in light of changing criminal tactics, advances in forensic science, and the growing complexity of criminal cases. There is a large vacuum in the literature when it comes to a thorough evaluation of forensic resources. By offering an overview of the current competencies of forensic personnel in the nation, this study will help close this gap. The goal of this study is to perform a thorough analysis of the competencies of Philippines' forensic personnel, highlighting their current strengths, pointing out their weaknesses, and suggesting areas for future development.

Literature Review

It is well acknowledged that forensic science can support a wide range of criminal justice system operations (Walsh, 2023). As a result, forensic science—which is defined as a collection of scientific disciplines concerned with applying their specific field of expertise to criminal, civil, legal, and judicial matters—has been incorporated into national security and policing (Woodman et al., 2020). Historically, the use of forensics has resulted in the exoneration of people who the public had previously believed to be guilty (Kelty et al., 2018). In other cases, the application of forensic science revealed the real criminals to be people who were thought to be innocent. Forensic analysis is important, especially in prosecution and defense (Hamid & Yusoff, 2022; Gupta & Singh, 2022).

Researchers like Motunrayo (2016) and Tengpongsthorn (2017) have acknowledged the significance of police readiness to use forensic science in carrying out their tasks. The reliability and validity of forensic science evidence rest primarily on the expertise of personnel and available equipment (Stern et al., 2019). Forensics operatives also need continuous upskilling. Rossinskaya (2018) enumerated problems related to forensic expert training and continuing education, so resources such as those provided by Williams et al. (2017) and Shishkina (2021) have been very helpful. There is no scarcity of literature advocating training of forensic agents, especially in the areas of forensic pathology (Spencer et al., 2017), geosciences (Spoto et al., 2023), digital forensics (Tiepolo, 2022; Moise, 2021), forensic psychology or psychiatry (Nishad & Hariharan, 2021; Healy & Healy, 2024), forensic anthropology (Vaswani & Ahmed, 2019; Ost et al., 2022), legal chemistry (Naquet, 2024), DNA profiling (Amankwaa & McCartney, 2021), autopsy (Hodge & Holjencin, 2020), S.O.C.O. investigations (Kuo et al., 2020; Spyropoulous, et al., 2023).

It would seem that formal education and informal training of forensics practitioners is a common concern in the world. Resources such as those published by Shishkina (2021) in investigative activities, Mayorova (2020) on judicial-ecological examination, on teaching neuropsychology (Hoy-Watkins et al., 2017), on doing android forensics (Kroger & Creutzburg, 2013),

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UKAS on forensic science process (2022), and Dvoryanskov et al. (2021) on the interpretation and application criminal law are important. In response to the need to equip forensics operatives, the U.S. National Institute of Justice published *Education and Training in Forensic Science: A Guide to Forensic Science Laboratories, Educational Institutions, and Students* in 2012.

The primary goal of police training has remained mostly unchanged over time: to enable police officers to carry out their duties (Koedjik et al., 2019). Changing policies and technological advances (Frenkel et al., 2021) necessitate upskilling. These days, police emphasizes extra competencies including decision-making, problem-solving, and communication (Blumberg et al., 2019). In terms police training, recent research has looked into ways to enhance some police training components and facilitate skills more effectively. Di Nota and Huhta (2019), for example, have demonstrated how police officers' situational awareness and decision-making abilities may be enhanced through realistic and immersive scenario-based training. The more recent publication addressing education and training in forensics was a book edited by Williams et al. (2017). In the book are insights and specific guidelines about education and training in digital forensics, forensic fire investigation, forensic anthropology, and DNA profiling. It is a helpful resource because it deals with other pedagogical topics such as teaching with limited resources, developing the research skills of forensics students, use of virtual teaching aids, available online teaching aids, use of simulations and virtual realities, and even suggestions concerning examinations and assessments.

There are many publications for forensic trainings and may be used as references and textbooks published recently. General textbooks include those written by Shrivastava et al. (2023), Lawless (2022), Cage (2022), Bell (2022), Mirakovits and Siegel (2021), Saferstein and Roy (2020), Fraser (2020), and Bell (2020). There are topic-focused references available. The use of data analytics in forensic science was dealt with by Curran (2019). Galbacs (2023) deals with laser technology. Elkins and Zeller (2022) deals with next generation sequencing in forensic science. A book by Inuwa et al. (2022) deals with medical biotechnology, biopharmacy, and bioinformatics. Singh and Sharma (2022) wrote a book on crime scene management (Newquist, 2021). Wilkes (2022) provides real life murder cases cracked by forensic science. There are also those written for cybersecurity and digital forensics (Joyce et al., 2022) and the relationship between digital forensics and crime science (Ijeh & Curran, 2021). Dealing with emerging and advanced technologies is also crucial (Johnson, 2021; Chen et al., 2021), especially those related to A.I. and machines (Misra et al., 2020). Franck and Frank (2020) wrote on ethical standards in forensic science while concerns for humanitarian action was the focus of Parra et al., (2020). Rogers and Drogin (2019) offer insights on psychological forensics, along with Marquez (2019).

Despite the fact that ASEAN Citations Index (ACI) does not have any literature written on forensics in the Philippines within the last 10 years, there are a good number of published writings from various scholars. It would seem that most Filipino scholars writing on forensics-related matters prefer to publish in journals based outside Asia. This can be because of a number of reasons, such as global visibility and impact, higher impact factors, access to diverse peer reviewers, opportunities for collaboration, and inclusion in prestigious databases.

There is a good number of journal articles that focus on appraising the current status of forensics in the Philippines. Although its major contributions to knowledge are its presentations of recent efforts in research, education, and legislation in the country, Go (2018) evaluated the situation of forensic anthropology in the Philippines and provided the need for its further development. As if responding to Go's challenge, Algee-Hewitt et al. (2019) proposed using an admixture approach to looking at the ancestry variation in the Philippines and its implication to forensic anthropology. This development goes hand in hand with the recent advances in forensic anthropological research in Southeast Asia (Go et al., 2019). Nikkimor et al. (2018) proposes regression analysis to determine stature from footprint anthropometry (Moorthy et al., 2021).

Other studies focus on exploring the need for development in other forensics areas. On forensic entomology, Pedales and Fontanilla (2018) lament that the Philippines has yet to put into practice forensic entomology policies and procedures, including creating local databases, and that the country has fallen behind in developing evidencebased investigations, especially when compared to other Southeast Asian nations. De Ungria (2010) also raised the same concern that the Philippines does not yet have a national DNA database or any legislation that would facilitate its establishment. Ethical governance of forensic DNA databases is another concern (De Ungria & Jimenez, 2022). Another challenge is the insufficient facilities and equipment for digital forensics in the country, which does not spell well for Filipinos, given that cybercrime has increased through the past few years, especially in online scams (Blancaflor et al., 2023).

The war on drugs initiated by the Duterte administration spurred interest on forensics, mostly to ensure that fair judicial trial is received by accused Filipinos and that judgements are based on forensic evidence (De Ungria & Jose, 2020; Go & De Ungria, 2019). After all, wrongful convictions without proper forensic evidence is a reality in the Philippines. This is why De Ungria et al. (2008) pushed for the improvement of forensic DNA analysis, especially in rape cases. Interview skills of police investigators is also crucial (Tañola et al., 2023).

There are many concerns related to sexual assault cases in the country that require DNA testing (Campbell & Fehler-Cabral, 2022). In the Philippines, the number of cases of sexual assault that are reported each year keeps rising. Identifying attackers quickly and correctly using DNA test results is a significant step towards solving this issue. Differential DNA extraction is a standard procedure used by foreign forensic laboratories to

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separate the sperm fraction (Rodriguez et al., 2017). To ensure that findings are accurate for court use as evidence, Rodriguez et al. (2019) recommends integrating presumptive and confirmatory semen tests in DNA profiling of sexual assault evidence. Determination of relationship between father-offspring, especially in rape cases, is also important (Maiquilla et al., 2011).

In whatever circumstance—whether crime-related or not—solving complex kinship relations is important in whatever nation (Salvador et al. 2018). On fingerprints analysis, the combination of sex identification and hand morphology is proposed by Liyana (2021) to advance the field. De Mesa et al. (2021) and Taduran et al. (2017) also propose sex determination using plain fingerprint ridge density. Different methods for estimating height in an available sample among Filipinos is also advocated to determine offenders (Taduran et al., 2017). Rey et al. (2022) suggests the combination of fingerprint and face recognition.

Orders from the Philippine National Police mandate that forensic science-based crime scene investigations be carried out by the Directorate for Investigation and Detective Management - Police detectives in criminal investigations. It is important, therefore, to assess whether the mandate is being performed well. Quiape and Painaga (2023) conducted a study to assess the capabilities of operatives in Antique. The findings revealed that police investigators were highly skilled in ballistics and photographic forensics, but displayed lack of forensic dactyloscopy experience. A similar study by Benter (2021) on selected Bulacan provincial crime laboratory revealed the following conclusions: (1) the most advanced technology used for drug testing and toxicology is Gas Chromatography-Mass Spectrometry (GC-MS); (2) Forensic Chemistry is the most commonly used forensic service in the laboratories; (3) SOCO courses are the training resources offered to its staff; and (4) inadequate staff, facilities, and office space are the challenges faced by its staff.

Theoretical/Conceptual Framework

Using a strong theoretical foundation, this research undertakes a thorough investigation of the competencies of Philippine forensics officers in Region IVA. The combination of two theories and models enabled the convergence of strategic insights: Competence-based Theory (CBT) and Continuing Professional Development Theory (CPD). A framework for evaluating and enhancing the particular skills, knowledge, and abilities required for efficient job performance is called Competence-based Theory (CBT). This theory entails identifying the fundamental skills required for forensic staff in Region IVA to perform duties including gathering, analyzing, and presenting evidence in court. According to this theory, performance assessments, testing, and observation would all be used to gauge an individual's competency in different areas. Organizations can guarantee that their forensic staff members have the necessary abilities to carry out their duties and support the administration of justice by implementing Competency-Based Theory (Shakurov et al., 2022).

According to the principle of Continuing Professional Development theory, or CPD, maintaining professional competence and adjusting to changes in the workplace need continual learning and skill improvement (Magwenya et al., 2023). It makes the argument that in order for professionals to be relevant and productive in their professions, they must continuously upgrade their knowledge, skills, and talents throughout their careers. CPD theory would entail offering chances for training, workshops, conferences, and other learning experiences pertinent to forensic science, legal procedures, and technical improvements to forensic personnel in Region IVA (Allen et al., 2020).

As the PNP Forensic Group 2021 Annual Accomplishment Report indicates, there is an increasing number of requests for forensic analysis in the country. This means that there is a need to increase the number of skilled forensic officers and ensure that their competencies are sufficient to make quick forensic analysis. The modernization of forensics in the country is also aligned with the recently released Philippine Development Plan 2023-2028, which highlights the need to advance research development, technology, and innovation (Chapter 8), the need to expand and upgrade infrastructure (Chapter 12), and the importance of ensuring peace, security, and the administration of justice (Chapter 13). Further, this supports several older laws that underscore the need to modernize the country's military and investigative capabilities such as RA 10867 for the National Bureau of Investigation (NBI) and RA 7898 for the Armed Forces of the Philippines (AFP).

Additionally, the PNP Patrol Plan 2030 includes human resources management and development as one of its key areas. According to the document, it is crucial to improve PNP's human resources management systems, including staffing, recruitment and selection, personnel administration, career development and promotion, police remuneration, police education and training, performance monitoring and evaluation, and police discipline. Finally, the PNP's *Crime Laboratory Scene of Crime Operations Manual* (2021) and the *PNP Forensic Group Citizen's Charter* (2022) served as the bases for the identification of the roles and responsibilities of forensic officers. They provided the list of competencies that each forensic officer in various divisions should necessarily possess to carry out their mandate. PNP Resolution No. 2020-0382 also provides the basis for the lifelong learning of forensic officers that will enhance their levels of effectiveness and efficiency.

Significance of the Study

The dissertation is highly relevant to a number of stakeholders, and its conclusions have the potential to improve both the criminal justice system and the field of forensics in the Philippines. The study is important because it can contribute the various stakeholders.

First, for *forensic units or offices,* the dissertation helps to improve the caliber and efficacy of forensic services rendered by evaluating the qualifications of forensic staff in Region IVA. It guarantees that forensic experts have the abilities and know-how

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required to carry out their responsibilities effectively, which eventually helps with the administration of justice and public safety. Moreover, forensic units can improve their recruitment and selection procedures by having a better understanding of the competencies required for forensic positions.

Second, for *forensic officers,* the study offers insightful information about the particular skills needed for forensic work in Region IVA. Using this data, specialized training and development programs catered to the requirements of forensic staff can be created, assuring ongoing development and advancement in the field. Third, for the *academia,* the study advances our understanding of forensic science in general and competency evaluation and workforce development in particular. It offers insightful information and useful data that can guide future investigations and academic discussions on the competencies of forensic specialists.

Fourth, for *law enforcement agencies,* the research will provide a thorough evaluation of the country's forensic capabilities and limitations. It provides information about areas in need of development, allowing agencies to improve their investigative procedures, implement best practices, and manage resources more wisely. This may result in criminal investigations that are more precise and effective. Finally, for *legislators and policy makers,* the study provides important information to help them create evidence-based forensic procedures policies related to human resources. It might draw attention to areas in which changes to the law are required, fill in the gaps in available resources, and encourage the creation of a legal framework that facilitates the efficient training and selection of forensic officers in the country.

Objectives of the Study

Despite the crucial role of forensic resources in criminal investigations, there is a pressing concern about the adequacy of resources within Philippine law enforcement agencies. This issue includes shortcomings in personnel, knowledge, experience, and infrastructure that could prevent forensic instruments and procedures from being used effectively. The study fills the current gap in knowledge concerning the current level of competence of forensic personnel in the Philippines by using Region IVA as the sample population. The study focuses on assessing the competence of forensic personnel that unquestionably influence effective investigations.

To accomplish the objectives of the research, aside from demographic profiling, the following two main research questions, each with two sub-questions, will be asked: (1) What is the level of competencies of the four groups of respondents in terms of the ten major forensic divisions? and (2) Is there a significant difference on the forensic competencies of the four groups of respondents in terms of the above-mentioned ten divisions?

METHODOLOGY

Research Design

The dissertation employed a descriptive research design. The goal of descriptive research is to characterize a population's or a phenomenon's features without manipulating the variables. Rather than supplying an explanation for why something is happening, its main focus is on giving an accurate description of the current state of affairs or circumstance. Descriptive research is a fundamental element in the research process that is frequently utilized by researchers who want to comprehend the fundamental characteristics of a research subject (Siedlecki, 2020). Descriptive research is suitable because the goal is to identify characteristics, frequencies, trends, and categories related to a topic or problem. It is often used when little is known about the subject, and before exploring the reasons behind certain phenomena. Descriptive research is appropriate for the dissertation topic because it promises measurement and objective observation of the topic of interest (Omair, 2015).

Research Method

The study used quantitative research method, a systematic and empirical approach to scientific inquiry that involves the collection, analysis, and interpretation of numerical data (Goertzen, 2017). This method uses variable quantification and relationship analysis to comprehend, explain, and forecast a phenomenon or situation. It is commonly used in fields such as psychology, sociology, economics, education, and the natural sciences. In quantitative research, objective measurement is emphasized. To collect data, researchers employ scales, numerical measures, or standardized equipment. This guarantees that the information gathered is trustworthy and replicable in other research projects or situations (Apuke, 2017).

A cross-sectional survey method was used. When conducting research on attitudes, perceptions, and related topics, a number of studies (Déverge, 2016; Fagernaes, 2015) have recommended using the cross-sectional survey method. It is deemed more significant and pertinent since it offers a timely and extremely valuable look at what the public is thinking and doing. According to Maxfield and Babbie (2012), surveys are most suited for examining broad issues and particular emotional states, as demonstrated by the studies under evaluation. A survey provides a researcher with the chance to learn more about the topic and all of its details and aspects (Sahu, 2016). In addition, because data collection is done at a single time point, cross-sectional surveys are time- and cost-efficient and offer a very quick data collection from a large number of respondents.

Population of the Study

There are a total of 141 forensic offices in the Philippines, although 8 of them are currently not functioning and 26 are not approved. There are 17 regional forensic offices, 77 provincial forensic offices, 29 city forensic offices, 5 district forensic offices, and 13 satellite forensic offices. The study only included the forensic units and offices in Region IVA. With 147 total number

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of personnel, the study employed *complete enumeration*. All team leaders, officers, personnel of the offices in Region IVA were included as target respondents. Unfortunately, even after the deadline of the data gathering was extended for three days, only 107 responded to the online survey questionnaire. With the help of the adviser, and using Slovin's formula with 5% margin of error (e) the total number of respondents was determined to be 107, which is precisely the total number of responses gathered.

Data Gathering Tools

A cross-sectional survey method was used. This method was chosen because a single time point is used to gather data, giving an overview of the status or features of the population. Thus, the method gives timely insights by offering a snapshot of the population's characteristics at a certain moment in time. Moreover, when it comes to saving time and money, cross-sectional surveys are more effective than longitudinal studies that take a longer time to complete. Third, a cross-sectional survey is perfect in conducting descriptive research and analysis. A standardized questionnaire was used to gather data. A series of preset questions intended to elicit data regarding the variables of interest are included in the survey instrument. Because the research is the first of its kind, it used a self-made questionnaire based on the 2022 *PNP Forensic Group Citizen's Charter* and the 2021 *Crime Laboratory Scene of Crime Operations Manual*. See Appendix E for the research instrument.

Date Gathering Procedures

The researcher distributed the survey questionnaire to the respondents. Data was gathered using an online survey, particularly using Google Survey, which means that the Google link was included in the letter to the respondents. All quantitative data have been gathered from 107 respondents, which is the allowed margin of error calculated through Slovin's formula.

Treatment of Data

The study used statistical analysis. Descriptive statistics like mean, median, and standard deviation were used to summarize data (Zybur & Pierides, 2020). First, to describe the central or average value of the data, the research measured central tendencies by using mean. Also, to indicate how spread out the values are, the research measured dispersion by standard deviation. Likert scale is used to assess the proficiency levels of forensic personnel. The scale provides a quantitative measure of proficiency, which helps in interpreting and analyzing the data effectively. The legend used is as follows:

3.25 - 4.00	Highly Proficient
2.50 - 3.24	Proficient
1.75 - 2.49	Slightly Proficient
1.00 – 1.74	Not Proficient

The verbal interpretations of the various means may be interpreted as follows. First, *highly proficient* (mean = 3.25-4.00) indicates that the forensic personnel demonstrate a high level of proficiency in their skills and competencies. Scores in this range suggest that the personnel are exceptionally skilled and are likely among the top performers in their field. They can handle complex tasks independently and often take on leadership roles or mentor others. Second, *proficient* (mean = 2.50-3.24) means that personnel in this category are competent and capable of performing their tasks effectively.

Scores in this range indicate a reliable level of skill and knowledge. These personnel are effective in their roles, consistently meet performance standards, and can handle most tasks without significant issues. Third, *slightly proficient* (mean – 1.75-2.49) reflects a basic level of proficiency. Personnel can perform some tasks adequately but may require additional support or supervision. Scores in this range suggest that while the personnel have some relevant skills, there is significant room for improvement. They may benefit from additional training and development to enhance their proficiency. Finally, *not proficient* (mean = 1.00-1.74) means that personnel in this category demonstrate a lack of proficiency in the required skills. Scores in this range indicate a need for substantial improvement. These personnel may not be adequately prepared for their roles and will likely need extensive training and development to reach a competent level of proficiency.

Kruskal-Wallis test was employed to assess whether there are any statistically significant differences between the competencies of the forensic agencies in Region IVA in relation to the demographic profile. This provided valuable insights into potential differences when analyzed by the demographic profiles of the respondents. Because the Kruskal-Wallis tests indicated significant differences for age and current position categories, further post-hoc tests were conducted using Dunn Bonferroni to identify which specific groups differ from each other.

Ethical Considerations

The research had no ethical issues to consider in the data-gathering and datatreatment. An Informed Consent Form was not used in the study, since no minors are among the respondents. However, the following steps were made to ensure informed consent, confidentiality, privacy, data security, and honesty. First, to ensure anonymity and confidentiality, respondents were not required to provide their names or contact details in the online survey. Second, by filling the survey, they have indicated their voluntary participation. A statement containing the possibility of withdrawal from the study was also included in the opening statement of the Survey.

RESULTS AND DISCUSSION

The demographic profile of the respondents were limited to gender, age, current position, and which forensic unit/office they belong. Concerning gender, 71.03 percent were male while 26.17 percent were females. Only 2 or 1.87 percent belong to the LGBTQIA, while 1 or 0.93 percent preferred not to reveal their gender. This means that forensic personnel in Region IVA is predominantly male. This is consistent with the fact that there are

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more male than female police officers in the country. Concerning age, 35.51 percent belonged to the age bracket of 21 – 29 years old and 30 – 39 years old, respectively, followed by 23.36 percent belonging to the age bracket of 40 – 49 years old, and 5.61 percent belonged within the age range of 50 – 59 years old. Concerning positions, the highest number of respondents are S.O.C.O. personnel with 35.51 percent, followed by other personnel with 28.04 percent. Third comes administrative/operative personnel with 11.21 percent, followed by 7.48 percent of chemistry personnel 6.54 percent of forensic experts, and 5.61 percent of medico-legal personnel and another 5.61 percent identified themselves as Chiefs. The demographic reveals that there is an abundance of S.O.C.O. and other personnel, while there is significant low number of chemistry personnel, medico-legal personnel, and forensic experts. This is a cause for concern (Benter & Cawi, 2021; Quiape & Painaga, 2023). Finally, the highest number of respondents are personnel from provincial units/offices of Region IVA, with 65.42 percent. This is followed by 20.56 percent of respondents from regional forensic units/offices. Also, there are 5.61 percent of respondents from district forensic units/offices, 4.67 percent from city forensic units/offices, and 3.74 percent from satellite forensic units/offices.

According to the respondents, all forensic divisions personnel are competent in their performance of their responsibilities. The mean of all divisions did not fall below 2.49. In fact, none of the divisions got a mean lower than 3.0, the lowest being 3.14 of the Questioned Document Examination division. The two highest ranking divisions in terms of competency are S.O.C.O. and Forensic Chemistry divisions, respectively with the mean 3.31 and 3.29. Moreover, all of the standard deviations of the division means are homogenous, which means that there is general agreement among the respondents about the competency of personnel.

Table 1
Level of competence of Divisions personnel

Divisions	Mean	SD	Verbal Description
Scene of Crime Operations Division	3.31	0.82	Highly Proficient
Forensic Chemistry Division	3.29	0.84	Highly Proficient
Firearms Identification Division	3.22	0.86	Proficient
Forensic Photography Division	3.22	0.85	Proficient
Physical Identification Division	3.21	0.83	Proficient
Fingerprint Identification Division	3.19	0.81	Proficient
Polygraphy Division	3.18	0.90	Proficient
Medico-legal Division	3.15	0.87	Proficient
Questioned Document Examination Division	3.14	0.87	Proficient
DNA Laboratory Division	3.07	0.90	Proficient

Scene of Crime Operations Division (mean = 3.31) and Forensic Chemistry Division (mean = 3.29) stand out with slightly higher mean scores. Their lower variability (SDs of 0.82 and 0.84, respectively) suggests a consistent high level of performance across their operations**.** Firearms Identification and Forensic Photography Divisions (both mean= 3.22) show slightly better performance among the "Proficient" group, but not significantly higher than the others in this category. Physical Identification, Fingerprint Identification, Polygraphy, Medico-legal, and Questioned Document Examination Divisions have very similar performance levels (means ranging from 3.14 to 3.21), indicating a consistent level of proficiency. DNA Laboratory Division (mean = 3.07), while still proficient, has the lowest mean score, suggesting a need for improvement relative to the other divisions. Although the SDs are relatively close, divisions with slightly higher SDs (e.g., Polygraphy Division with 0.90) might benefit from initiatives aimed at reducing variability, ensuring more consistent performance across all members. Moreover, regular assessments should be conducted to ensure all divisions maintain or improve their proficiency levels. Identifying best practices from the highly proficient divisions and applying them across other divisions will be beneficial.

Forensic Chemistry and Scene of Crime Operations divisions have been designated as highly proficient. This shows that these divisions have well developed competence that may be used to drive innovation and high performance. The personnel in the Forensic Chemistry and S.O.C.O. divisions exhibit higher competence over other personnel belonging in other divisions. The other eight divisions classified as proficient meet certain requirements for essential competence. To achieve higher proficiency, these divisions may benefit from focused development programs (Magwenya et al., 2023). Ongena (2023) recommends training in data literacy to improve governmental performance. It must be remembered, however, as Matwiejczuk (2022) argued, that division competence are grounded in personnel competence. In short, individual competence cannot be separated from the organizational context in competence-based analysis.

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The notion of competence-based focus recommends the strategic distribution of resources for the growth and maintenance of key competencies. Additional resources and training to improve competences may be given priority to divisions with lower mean scores, such as the DNA Laboratory Division (mean = 3.07). Although their verbal description is "proficient," the fact that they have the lowest mean in the ten division's ranking signify that there is room for improvement in their competence. On the other hand, to maintain and improve upon their already high levels of skill, divisions such as the Scene of Crime Operations (mean = 3.31) should get the same amount of support and encouragement it was getting before. In fact, for all division personnel to be relevant and productive in their professions, they must continuously upgrade their knowledge, skills, and talents throughout their careers (Mansour et al., 2014).

Moreover, developing a culture of ongoing learning and improvement is a fundamental component of competence-based thinking. This is also the focus of Continuing Professional Development Theory (Allen et al., 2020). It is recommended that regular training programs be undertaken, particularly in divisions where people exhibit a larger range of proficiency (e.g., Polygraphy Division, with an SD of 0.90). In addition, to improve overall competency levels throughout the company, highly skilled divisions can impart best practices and expertise to other divisions. Also, because competence must be viewed as a compound reality and not just an individual domain of skill, or that it must be related to the social composition of the larger group (Pedersen & Caviglia, 2019), the overall culture of competence in Region IVA is affected by all the divisions.

Concerning the results of the Kruskal-Wallis H test to compare the ranks across different genders within various divisions, the results reveal that there are no statistically significant differences in ranks across all divisions (See Table 2). This implies complete equality in ranks regardless of gender. There are observed differences in the Physical Identification Division (p = 0.15), Forensic Photography Division (p+0.24), Questioned Document Examination Division (p=0.13), Firearms Identification Division (p=0.34), Medico-legal division (p=0.22), Forensic Chemistry Division (p=0.25), Fingerprint Identification Division (p-value=0.41), Polygraphy Division (p=.061), and S.O.C.O. Division (p=0.23), but these differences are not statistically significant. The results indicate that gender does not influence the ranking or performance measures within these divisions. The rankings are fairly assigned without gender bias. The equality in ranks indicates that the processes and evaluations within these divisions are gender-neutral, promoting a fair working environment.

Table 2
Kruskal-Wallis Test for Gender Grouping

GENDER		N	Mean Rank	Kruskal-Wallis H	df	Asymp. Sig.
DNA Laboratory Division	Male	28.00 2.00	54.00	0.00	3.00	1.00
	Female	76.00	54.00			
	LGBTQIA+		54.00			
	Prefer not to say	1.00	54.00			
	Total	107.00				
Physical Identification Division	Male	28.00	58.52	5.38	3.00	0.15
	Female	2.00	88.50			
	LGBTQIA+	76.00	50.97			
	Prefer not to say	1.00	88.50			
	Total	107.00				
Forensic Photography Division	Male	28.00	61.14	4.19	3.00	0.24
	Female	2.00	78.25			
	LGBTQIA+	76.00	50.50			
	Prefer not to say	1.00	71.50			
	Total	107.00				

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Questioned Document Examination Division	Male	28.00	62.80	5.61	3.00	0.13
	Female	2.00	66.50			
	LGBTQIA+	76.00	49.95			
	Prefer not to say	1.00	90.50			
	Total	107.00				
Firearms Identification Division	Male	28.00	60.11	3.33	3.00	0.34
	Female	2.00	62.75			
	LGBTQIA+	76.00	51.08			
	Prefer not to say	1.00	87.50			
	Total	107.00				
Medico-Legal Division	Male	28.00	61.30	4.43	3.00	0.22
	Female	2.00	66.25			
	LGBTQIA+	76.00	50.52			
	Prefer not to say	1.00	89.50			
	Total	107.00				
Forensic Chemistry Division	Male	28.00	56.63	4.11	3.00	0.25
	Female	2.00	86.00			
	LGBTQIA+	76.00	51.77			
	Prefer not to say	1.00	86.00			
	Total	107.00				
Polygraphy Division	Male	28.00	55.84	1.82	3.00	0.61
	Female	2.00	64.00			
	LGBTQIA+	76.00	52.61			
	Prefer not to say	1.00	88.50			
	Total	107.00				
Scene of Crime Operations (SOCO) Division	Male	28.00	56.95	4.31	3.00	0.23
	Female	2.00	86.50			
	LGBTQIA+	76.00	51.63			
	Prefer not to say	1.00	86.50			
	Total	107.00				
Fingerprint Examination Division	Male	28	61.16	2.870	3	0.412
	Female	2	64.50			
	LGBTQIA+	76	50.91			
	Prefer not to say	1	67.00			
	Total	107				

Despite the fact that forensic science as a whole remains a male-dominated profession (Ward et al., 2019), the finding that gender does not influence the ranking or performance measures within forensic divisions indicates that both men and women are evaluated and perform their duties based on their skills, qualifications, and professional contributions rather than their

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gender. This suggests a level of gender equality within the forensic divisions. Also, the finding suggests that men and women in forensic science receive similar opportunities for education, training, and professional growth. Philippine universities and training institutions must be commended for offering forensic science programs that do not differentiate between male and female students, ensuring that all have equal access to the necessary knowledge and skills. A STEM program on forensic science like what the U.S.A. has been doing can be replicated in the country (Casey et al., 2023).

Second, it is evident that there are significant differences in the performance competencies in the various areas of forensic divisions when classified according to age (See Table 3). In all the forensic divisions tested, there are statistically significant differences between the groups. In the post hoc tests, it revealed that across all divisions, the groups with the meaningful differences are (a) 21-29 years old and 40-49 years old and (b) 21-29 years old and 30-39 years old. These results suggest that the different groups within each forensic division have different median values. The results further suggest that age influences the ranking in this division, or that age may play a role in performance evaluations, promotions, or other ranking criteria within these divisions. The significant p-values indicate that younger and older age groups are ranked differently, which might reflect differences in experience, skills, or other age-related factors.

Table 3
Kruskal-Wallis Test for Age Grouping

AGE		N	Mean Rank	Kruskal-Wallis H	df	Asymp. Sig.
DNA Laboratory Division	21-29 years old		54.00	0.00	3.00	1.00
	30-39 years old		54.00			
	40-49 years old		54.00			
	50-59 years old		54.00			
	Total	107.00				
Physical Identification Division	21-29 years old	38.00	35.04	24.76	3.00	0.00
	30-39 years old	38.00	66.49			
	40-49 years old	25.00	64.34			
	50-59 years old	6.00	51.92			
	Total	107.00				
Forensic Photography Division	21-29 years old	38.00	37.04	19.89	3.00	0.00
	30-39 years old	38.00	66.72			
	40-49 years old	25.00	60.78			
	50-59 years old	6.00	52.58			
	Total	107.00				
Questioned Document Examination Division	21-29 years old	38.00	36.83	20.09	3.00	0.00
	30-39 years old	38.00	64.36			
	40-49 years old	25.00	64.68			
	50-59 years old	6.00	52.67			
	Total	107.00				
Firearms Identification Division	21-29 years old	38.00	35.39	24.85	3.00	0.00
	30-39 years old	38.00	67.59			
	40-49 years old	25.00	62.66			

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	50-59 years old	6.00	49.67			
	Total	107.00				
Medico-Legal Division	21-29 years old	38.00	37.79	19.14	3.00	0.00
	30-39 years old	38.00	64.68			
	40-49 years old	25.00	64.08			
	50-59 years old	6.00	47.00			
	Total	107.00				
Forensic Chemistry Division	21-29 years old	38.00	33.79	30.72	3.00	0.00
	30-39 years old	38.00	65.17			
	40-49 years old	25.00	70.02			
	50-59 years old	6.00	44.50			
	Total	107.00				
Polygraphy Division	21-29 years old	38.00	35.18	24.64	3.00	0.00
	30-39 years old	38.00	66.53			
	40-49 years old	25.00	64.28			
	50-59 years old	6.00	51.00			
	Total	107.00				
Scene of Crime Operations (SOCO) Division	21-29 years old	38.00	36.34	24.20	3.00	0.00
	30-39 years old	38.00	67.49			
	40-49 years old	25.00 6.00	63.02			
	50-59 years old	107.00	42.83			
	Total					
Fingerprint Examination Division	21-29 years old	38	36.62	21.409	3	0.000
	30-39 years old 38	67.26				
	40-49 years old 25	59.72				
	50-59 years old	6	56.25			
	Total	107				

Age as a factor influencing competencies can be understood through various dimensions such as experience, physical capability, and familiarity with technology and new methodologies. First, older forensic personnel often have more years of experience, which translates into a deeper understanding of forensic techniques and the nuances of criminal investigation. They may have encountered a wider variety of cases, providing them with a broader perspective and better problem-solving skills. In short, the experience of older personnel is invaluable (Jaeger, 2023). Second, forensic work can be physically demanding, requiring personnel to be on-site at crime scenes, sometimes for extended periods. Younger personnel might have an advantage in

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terms of physical endurance and agility, which is essential in fieldwork (Poncio, 2020). In the Philippines, with its challenging terrain and often hot and humid climate, the physical demands on forensic personnel can be even more pronounced. Therefore, the age factor might play a significant role in determining who is more suited for particular types of forensic tasks. Finally, younger forensic personnel might be more adept at using the latest technology and digital tools, which are becoming increasingly important in forensic investigations. Third, it is evident that there are differences in the performance competencies in various areas on forensic divisions when classified according to current position (See Table 4), except for the DNA Laboratory Division (p-value=1.00), Forensic Photography Division (p-value=0.14), and Firearms Identification Division (p-value=0.14). The p-value of 0.05 in Physical Identification Division and the p-value of 0.06 in Polygraphy Division suggests there is a borderline statistically significant difference in the mean ranks among the positions in this division. This indicates some variation in performance or other measured attributes across different positions. The p-value of 0.07 in Medico-legal Division and the p-value of 0.08 in Fingerprint Identification Division are marginally nonsignificant, indicating potential but not definitive differences in mean ranks. Finally, there are statistically significant differences in Questioned Document Examination Division (pvalue=0.04), Forensic Chemistry Division (p-value=0.02), S.O.C.O. Division (pvalue=0.02), which suggest variability in the measured attribute across different positions, potentially indicating different levels of performance or other factors.

The post hoc test revealed that in the Questioned Document Division, the groups with the meaningful differences are (a) forensic experts and Chiefs (Adj. Sig.=.673), (b) others and Chiefs (Adj. Sig.=.410), and (c) others-chemistry personnel (Adj. Sig.=.246). For the Forensic Chemistry Division, the groups with the meaningful differences are (a) others and Chiefs (Adj. Sig.=.185) and (b) others and administrative/operations personnel (Adj. Sig.=.326). For the S.O.C.O. Division, the groups with the meaningful differences are (a) forensic experts and Chiefs (Adj. Sig.=.345) and (b) forensic experts and administrative/operations personnel (Adj. Sig.=.408), (c) forensic experts and chemistry personnel (Adj. Sig.=.207), (d) others and Chiefs (Adj. Sig.=.574), (e) others and administrative/operations personnel (Adj. Sig.=.892), and others-chemistry personnel (Adj. Sig.=.395). The significant differences suggest that the competencies, skills, or performance levels related to the measure in question vary based on the current position. This could reflect differences in training, experience, job responsibilities, or other positionspecific factors.

Table 4

Kruskal-Wallis Test for Current Position Grouping

CURRENT POSITION		N	Mean Rank	Kruskal-Wallis H	df	Asymp. Sig.
DNA Laboratory Division	Chief	12.00	54.00	0.00	5.00	1.00
	Administrative/Operation s Personnel	8.00	54.00			
	Medico-legal Personnel	6.00	54.00			
	Chemistry Personnel	7.00	54.00			
	Forensic Expert	6.00	54.00			
	Others	68.00	54.00			
	Total	107.00				
Physical Identification Division	Chief	12.00	67.50	11.04	5.00	0.05
	Administrative/Operation s Personnel	8.00	69.94			
	Medico-legal Personnel	6.00	63.17			
	Chemistry Personnel	7.00	70.50			
	Forensic Expert	6.00	39.50			

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	Others	68.00	48.51			
	Total	107.00				
Forensic Photography Division	Chief	12.00	65.21	8.21	5.00	0.14
	Administrative/Operations Personnel	8.00	55.81			
	Medico-legal Personnel	6.00	66.92			
	Chemistry Personnel	7.00	73.71			
	Forensic Expert	6.00	40.50			
	Others	68.00	49.83			
	Total	107.00				
Questioned Document Examination Division	Chief	12.00	68.92	11.56	5.00	0.04
	Administrative/Operations Personnel	8.00	61.56			
	Medico-legal Personnel	6.00	64.50			
	Chemistry Personnel	7.00	76.79			
	Forensic Expert	6.00	43.25			
	Others	68.00	48.15			
	Total	107.00				
Firearms Identification Division	Chief	12.00	65.13	8.39	5.00	0.14
	Administrative/Operations Personnel	8.00	68.06			
	Medico-legal Personnel	6.00	61.25			
	Chemistry Personnel	7.00	70.36			
	Forensic Expert	6.00	46.92			
	Others	68.00	48.68			
	Total	107.00				
Medico-Legal Division	Chief	12.00	71.67	10.08	5.00	0.07
	Administrative/Operations Personnel	8.00	60.31			
	Medico-legal Personnel	6.00	58.25			
	Chemistry Personnel	7.00	69.93			

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	Forensic Expert	6.00	36.67			
	Others	68.00	49.65			
	Total	107.00				
Forensic Chemistry Division	Chief	12.00	70.92	12.85	5.00	0.02
	Administrative/Operation s Personnel	8.00	73.13			
	Medico-legal Personnel	6.00	59.00			
	Chemistry Personnel	7.00	69.00			
	Forensic Expert	6.00	44.83			
	Others	68.00	47.59			
	Total	107.00				
Polygraphy Division	Chief	12.00	72.17	10.55	5.00	0.06
	Administrative/Operation s Personnel	8.00	51.06			
	Medico-legal Personnel	6.00	60.17			
	Chemistry Personnel	7.00	75.50			
	Forensic Expert	6.00	48.42			
	Others	68.00	48.88			
	Total	107.00				
Scene of Crime Operations (SOCO) Division	Chief	12.00	68.83	13.47	5.00	0.02
	Administrative/Operation s Personnel	8.00	70.50			
	Medico-legal Personnel	6.00	47.25			
	Chemistry Personnel	7.00	75.79			
	Forensic Expert	6.00	34.92			
	Others	68.00	49.48			
	Total	107.00				
	Forensic Expert	6	40.17			
	Others	68	49.03			
	Total	107				

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Fingerprint Examination Division	Chief	12 8	64.21	9.602	5	0.087
	Administrative/Operation s Personnel		64.50			
	Medico-legal Personnel	6	68.92			
	Chemistry Personnel	7	71.86			

Current positions can influence competencies through the specific responsibilities and tasks associated with different roles, as well as the access to resources and training opportunities. Different positions within forensic divisions require specialized skills and knowledge (Bitzer et al. 2022). For example, a forensic pathologist would need expertise in medical examinations, while a crime scene investigator focuses on evidence collection and preservation. In the Philippines, where forensic science divisions may have limited specialization due to resource constraints, personnel in higher or more specific positions might have developed greater competencies through targeted practice and on-the-job learning. Moreover, higher positions often come with greater access to training programs, workshops, and professional development opportunities.

Fourth, it is evident that there are no statistically significant differences between the groups in the forensic unit/office grouping (See Table 5). The lack of significant differences suggests that the groups perform similarly in these areas. This indicates a high level of consistency across groups in these forensic divisions. This could imply effective standardization of practices and potentially high-quality control within this division. This finding suggests that merely being part of a forensic unit or office does not significantly affect an individual's competencies. Factors such as individual dedication, continuous learning, and the nature of their specific roles might be more critical. In the Philippines, where resources for formal training might be scarce, self-motivated learning and the pursuit of additional certifications or online courses can be crucial for enhancing competencies.

Table 5
Kruskal-Wallis Test for Forensic Unit Grouping

FORENSIC DIVISION			N	Mean Rank	Kruskal-Wallis H	df	Asymp. Sig.
DNA Laboratory Division	Regional Forensic Unit/Office		22.00	54.00	0.00	4.00	1.00
	Provincial Forensic Unit/Office		70.00	54.00			
	District Forensic Unit/Office		6.00	54.00			
	City Forensic Unit/Office		5.00	54.00			
	Satellite Forensic Unit/Office		4.00	54.00			
	Total		107.00				
Physical Identification Division	Regional Forensic Unit/Office		22.00	48.16	5.98	4.00	0.20
	Provincial Forensic Unit/Office		70.00	58.02			
	District Forensic Unit/Office		6.00	53.33			

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	City Unit/Office	Forensic	5.00	27.90			
	Satellite Unit/Office	Forensic	4.00	49.38			
	Total		107.00				
Forensic Photography Division	Regional Unit/Office	Forensic	22.00	44.89	6.69	4.00	0.15
	Provincial Unit/Office	Forensic	70.00	58.66			
	District Unit/Office	Forensic	6.00	54.92			
	City Unit/Office	Forensic	5.00	30.60			
	Satellite Unit/Office	Forensic	4.00	50.50			
	Total		107.00				
Questioned Document Examination Division	Regional Unit/Office	Forensic	22.00	49.73	3.07	4.00	0.55
	Provincial Unit/Office	Forensic	70.00	56.93			
	District Unit/Office	Forensic	6.00	53.33			
	City Unit/Office	Forensic	5.00	35.50			
	Satellite Unit/Office	Forensic	4.00	50.38			
	Total		107.00				
Firearms Identification Division	Regional Unit/Office	Forensic	22.00	46.66	6.26	4.00	0.18
	Provincial Unit/Office	Forensic	70.00	58.51			
	District Unit/Office	Forensic	6.00	52.00			
	City Unit/Office	Forensic	5.00	30.30			
	Satellite Unit/Office	Forensic	4.00	48.13			
	Total		107.00				
Medico-Legal Division	Regional Unit/Office	Forensic	22.00	49.43	3.18	4.00	0.53
	Provincial Unit/Office	Forensic	70.00	56.91			
	District Unit/Office	Forensic	6.00	54.25			

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	City Unit/Office	Forensic	5.00	35.20			
	Satellite Unit/Office	Forensic	4.00	51.38			
	Total		107.00				
Forensic Chemistry Division	Regional Unit/Office	Forensic	22.00	46.25	6.61	4.00	0.16
	Provincial Unit/Office	Forensic	70.00	58.41			
	District Unit/Office	Forensic	6.00	49.25			
	City Unit/Office	Forensic	5.00	29.50			
	Satellite Unit/Office	Forensic	4.00	57.13			
	Total		107.00				
Polygraphy Division	Regional Unit/Office	Forensic	22.00	51.09	3.22	4.00	0.52
	Provincial Unit/Office	Forensic	70.00	56.39			
	District Unit/Office	Forensic	6.00	53.67			
	City Unit/Office	Forensic	5.00	32.60			
	Satellite Unit/Office	Forensic	4.00	55.38			
	Total		107.00				
Scene of Crime Operations (SOCO) Division	Regional Unit/Office	Forensic	22.00	47.43	5.87	4.00	0.21
	Provincial Unit/Office	Forensic	70.00	58.46			
	District Unit/Office	Forensic	6.00	49.58			
	City Unit/Office	Forensic	5.00	31.30			
	Satellite Unit/Office	Forensic	4.00	47.13			
	Total		107.00				
Fingerprint Examination Division	Regional Unit/Office	Forensic	22	42.09	8.640	4	0.071
	Provincial Unit/Office	Forensic	70	59.34			
	District Unit/Office	Forensic	6	53.50			

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City Unit/Office	Forensic	5	31.40
Satellite Unit/Office	Forensic	4	55.13
Total		107	

However, although no statistically significant differences were found in the divisions, the observed variability (particularly in mean ranks) suggests potential areas where performance or other attributes might differ slightly between groups. This variability, while not statistically significant, could still be relevant for internal reviews and quality assurance processes. Given the moderate variability in divisions like Physical Identification, Forensic Photography, and Firearms Identification, it may be beneficial to review training programs and resource allocation to ensure that any underlying causes of variability are addressed, even if they are not currently statistically significant. Since the categories show significant differences, no further post-hoc tests are necessary.

CONCLUSION AND RECOMMENDATIONS

Concerning the demographic profiles of the respondents, the Philippines is still progressing towards a more gender-inclusive workplace, coming out of its past sociocultural segregation and expectations between the roles of male and female in society. Forensic services in the country remains to be male-dominated. This follows the situation in the military and police services. Because a significant majority of forensic officers are aged below 40 years old, it means that most forensic personnel are considered young professionals. Forensic officers in the country are therefore simultaneously building their career and starting their family. There is a saddening dearth of forensic specialists in the region, as is the case in other parts of the country. Having one forensic expert per unit is not enough to meet the increasing demands for forensic analysis. Ideally, there should be ten forensic experts per unit, one for each of the ten major forensic divisions. Considering that Region IVA is a big region, having only 7 forensic units/offices is not sufficient to address the increasing demands for forensic services. There is a need to increase the number of forensic units, because having one provincial unit to address all the forensic needs of the entire province is not enough.

Concerning the level of competencies of the respondents, personnel of all ten divisions are perceived to be proficient in fulfilling their responsibilities, with S.O.C.O. and Forensic Chemistry divisions coming out on top, being the two divisions rated “highly proficient.” This means that despite challenges in resources, there is a great degree of confidence in the region regarding their performance competence. The competence of forensic personnel in every department suggests that they are skilled and equipped to perform their roles. Prolonged training and development programs are beneficial in maintaining and improving the abilities of forensic personnel, as indicated by the perceived proficiency across all divisions. Ongoing professional development is important and improves workforce proficiency overall.

Concerning the forensic competencies of the four groups of respondents in terms of the ten divisions, policing does not need to be a male dominated profession. The trend in juris doctor, for instance, is that there are more female law students now. For criminology, equal number would be ideal. Younger forensic officers see their competence level differently from their older counterparts and vice versa. The self-perception of younger versus older counterparts are influenced by the amount of experience they have on the field. Different positions within forensic divisions require specialized skills and knowledge, which is why current positions influence the competencies of forensic personnel in the various divisions. Competence in forensic science might depend more on personal dedication to continuous learning and professional development rather than affiliation in any forensic unit/office alone.

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OVERCOMING THE CHALLENGES OF REASSIGNING SCHOOL HEADS: A PHENOMENOLOGICAL STUDY ON THE RESHUFFLING POLICY

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ABSTRACT

This phenomenological study aimed to explore how school heads in Laak North District, Davao de Oro, navigate the challenges of reassignment during reshuffling through in-depth interviews. Anchored in Resilience Theory, Situational Leadership Theory, and Complexity Theory, the research focused on participants' lived experiences and coping mechanisms. Ten school heads who had undergone reassignment were selected through purposive sampling. The findings revealed five key themes regarding their experiences: enhancing managerial skills, experiencing diverse emotions, adjusting to new environments, facing community management challenges, and encountering various obstacles. Three coping mechanisms emerged: implementing school programs, fostering professional growth, and utilizing effective communication. Additionally, school heads emphasized the importance of moral and emotional support, embracing change in leadership, and learning through diverse interactions. The results indicate that while challenges arise during reassignments, overcoming emotional difficulties is vital for professional growth, and open communication and supportive policies are crucial for ensuring student well-being and institutional success

KEYWORDS: *educational management, reshuffling, school heads, reassignment, phenomenological qualitative approach, Davao de Oro, Laak North District*

INTRODUCTION

The provision of Department Order 7 series of 1999 mandates the transfer of school heads with five years of service to other educational institutions. This policy aims to instill new leadership and broaden professional experiences, fostering continuous improvement and excellence in school management by exposing leaders to new environments and stakeholders (Ramos, 2020). In addition, in the Philippine educational system reassigning school heads faces challenges due to lack of clear rules, forced transfers, political interference, and neglect of personal and professional responsibilities. This can lead to work-life balance issues, resistance to reassignment, and worsened staff and student resistance, inadequate communication, and lack of responsibility (Salazar, 2018).

Purpose of the Study

The purpose of this phenomenological study was to explore and understand the lived experiences of the school heads assigned in Laak North District, Division of Davao de Oro, in overcoming the challenges of school heads being reassigned due to the reshuffling policy.

Research Questions

1. What are the lived experiences of school heads regarding their reassignment in accordance with the reshuffling policy?
2. How do school heads cope with the challenges encountered during their reassignment in accordance with the reshuffling policy?
3. What insights do school heads have regarding their reassignment in accordance with the reshuffling policy that can be shared with others?

METHODS

The study employed a phenomenological approach to comprehend human experience, utilizing non-numerical data for a comprehensive understanding and retaining rich interpretation (Bhandari, 2023).

The participants of this study were the 10 school heads in the division of Davao de Oro division.

The following inclusion criteria were used for the selected school heads who took part in this study: (a) principal or school head in the public school; (b) school head who served for more than three years; and (c) each participant had to be a school head at a public school that had already undergone one or more reshufflings. I ensured that the participants varied in age, gender, and even school category. Meanwhile, the exclusion criteria were based on the following parameters: (a) teachers who do not hold the position of principal or school head; (b) principals or school heads who served for less than three years; and (c) principal or school heads who have not yet undergone the reshuffling policy.

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Additionally, the study employed thematic analysis to search for patterns among the concepts or codes that were previously acquired through the codification process.

REVIEW OF RELATED LITERATURE

Reshuffling Policy of School Heads

The 1999 Department of Education Order No. 7 requires school heads to be reassigned every five years to enhance professional growth and prevent complacency. Research supports the benefits of this reshuffling policy, which encourages knowledge sharing, diverse experiences, and innovative practices that improve student outcomes and school culture. Studies by Eda (2018), Harris and Lee (2019), and others highlight how reshuffling can lead to increased job satisfaction for administrators and foster creativity within the educational system. Further, Ng and Ma (2018) note potential positive and negative impacts of frequent leadership changes, Thompson et al (2022) emphasize the renewed community engagement that accompanies a new school head. Effective implementation of reshuffling policies, as suggested by Kumar and Chatterjee (2018) and Kim and Park (2023), can boost employee engagement and overall school performance, ultimately benefiting the educational landscape.

The Significance of Reshuffling Policy among School Leaders

Chen et al. (2019) argue that reshuffling policies can promote equitable leadership opportunities, improve educational quality, and enhance leadership skills among school leaders. Vasudeva (2021) adds that such policies foster innovation and collaboration in schools. Ngcobo and Mestry (2018) found that reshuffling improves student success and institutional efficacy. However, Musa and Bakar (2018) highlight challenges, such as managing new team dynamics and potential disruptions. Santos et al. (2020) noted that frequent leadership rotation can negatively affect job satisfaction, while Smith (2018) emphasizes the need for policy restructuring to achieve high-performing schools.

Challenges of Reassigning School Heads

Radha et al. (2019) highlight challenges faced by school leaders in understanding teacher selection criteria for reshuffling, which hinders policy implementation. Kreuzer et al. (2018) points out negative effects on school administrators' emotional health due to these changes. Winkler (2018) notes that shifting leadership can confuse and unsettle teachers and students, disrupting established routines. Nelson and Marlon (2020) identify difficulties such as stakeholder opposition, legal issues, and impacts on student performance. Dhami (2018) mentions that a lack of resources exacerbates the administrative burden during reorganization. Rosina et al. (2018) and Ngai and Chan (2018) find that adapting to new school cultures and building relationships is challenging for reassigned leaders. Rooney and Muijs (2018) discuss obstacles like resistance from administrators and cultural disruptions, while Shiekh (2019) highlights personal challenges in transitioning to new environments.

Strategies for the Successful Implementation of the Reshuffling Policy

Arja and Nokonen (2018) emphasize that school administrators rely on good communication, teamwork, and shared decision-making for effective implementation of reorganizing policies. Ahmad et al. (2019) highlights the importance of an efficient organizational structure, planning, and supportive attitudes from school leaders. Smith (2018) notes that thorough preparation and stakeholder participation are crucial for reshuffling policy success. Kotter (2019) asserts that effective leadership and a clear plan are essential for organizational transformation. Moyo and Nkabinde (2021) stress that successful implementation requires strong leadership, communication, and a deep understanding of the policy's goals. Aljuaid (2022) adds that engaging all stakeholders, especially parents, in decision-making is vital for effective policy implementation in schools.

Adapting to Leadership Transitions in Education

Taylor and Green (2020) noted that leadership transitions can enhance school effectiveness. Martin and Edwards (2021) found that accepting leadership reassignments is vital for sustaining effective leadership and a positive school environment. Chapman and Hughes (2021) highlighted that successful transitions often hinge on leaders' ability to adjust their strategies to new circumstances. Chang (2022) pointed out that seasoned school heads stress the significance of personal resilience and adaptability during these changes. Jackson and Lee (2018) argued that school leaders who actively manage transitions can greatly impact school culture. Martin and Thompson (2019) discovered that embracing transitions helps school heads forge stronger relationships with staff and stakeholders. Similarly, Nelson and Wright (2021) indicated that welcoming leadership changes enhances organizational effectiveness. Williams and Green (2020) emphasized that leaders who view transitions as growth opportunities are more likely to implement effective school reforms. Roberts (2022) highlighted the need for adaptable policies that can address the changing requirements of school heads. Carter and Jones (2022) stressed that accepting policy changes allows leaders to seek professional growth opportunities, benefiting both their leadership practices and overall school performance. Lastly, Gray and Murphy (2019) found that school heads who make strategic adjustments are more likely to successfully adapt to policy changes.

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RESULTS

Table 1
Major Themes and Core Ideas on Lived Experiences of School Heads Regarding their Reassignment in Accordance with the Reshuffling Policy

Major Themes	Core Ideas
Enhancing the Managerial Skills	• enriching new skills for the past experiences • sharing of managerial best practices from the previous assignment and applying them in the new station • helping school heads develop potential in leadership style • re-igniting and troubleshooting in a new reassignment • exposing the school heads to different scenarios to enhance managerial skills and ability to manage diverse situations effectively • being in a new environment, with new skills and new personalities to develop managerial skills • developing one's skills in how to handle different situations
Encountering Diverse Emotions	• experiencing happiness with opportunities in the new environment • being excited with a bit of anxiety in a new environment • having a mixed emotion • having a heartbreaking feeling leaving the beloved place • feeling anxious dealing with new individual • feeling lonely leaving the people and subordinates whom you have already grown fond of
Adjusting to a New School Environment	• observing the school's culture, behaviors of both teachers and students • becoming observant of the diverse environments and cultures in the school will lead to adjusting to the appropriate leadership style • observing the teachers and stakeholders on their habits to adjust to their behavior • adjusting one's leadership approach to fit in the new community and build relationships • adjusting to managing diverse characters and habits of new colleagues and community members
Having Difficulty in Adjusting to Managing the Community	• having problems adjusting to a new environment • having difficulty getting along with people • having great challenges at the same time you have to adjust
Encountering Various Challenges	• being challenged to prove to the people in the new place that you are worth as a school • realizing the need to learn to improve your leadership • having challenging opportunities to improve leadership skills

Table 2
Major Themes and Core Ideas on the School Heads Coping with the Challenges Encountered During their Reassignment Following the Reshuffling Policy

Major Themes	Core Ideas
Implementing School Programs and Policies for Improvement	• employing programs to recognize and monitor both teachers and students • treating the community equally by giving a school policy that enhances the learning capacity of the students • instituting routines like daily cleaning to students to instill discipline and responsibility • implementing a child protection policy to ensure the safety and well-being of students • being strict in the implementation of the rules and regulations • establishing recognition programs for both students and staff to encourage and reward desirable behavior
Developing Professional	• enhancing and increasing familiarity with the role

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Growth	• making new assign an avenue to grow professionally • sharing and acquiring different leadership styles and skills
Utilizing Effective Communication	• having clear communication with the teachers to reduce anxiety, and have common goals, vision, and mission • having open communication is necessary for mutual understanding • talking with the teachers to open for deeper understanding, of how to deal with them

Table 3
Major Themes and Core Ideas on the Insights of School Heads Regarding their Reassignment in Accordance with the Reshuffling Policy that can be Shared with Others

Major Themes	Core Ideas
Providing Moral and Emotional Support	• giving moral support when encountering difficulty • needing for moral support and encouragement from DepEd officials • showing understanding on difficulty of managing school • providing assistance and support through encouragement • giving an advance notice of reassignment
Embracing Change in Educational Leadership	• embrace and be happy to serve another new community • be physically and emotionally ready to accept challenges • expect that school heads will experience reshuffling • embrace change, including the inevitability of moving between schools. • accept and be open to any changes
Learning Through Diverse Interactions	• adjust and learn the habits of teachers to allow for a smooth relationship • learn the teachers' ability, strength, and weaknesses • adjust and learn from the experience in every transfer • learn to adapt to different kinds of people

DISCUSSION

Lived Experiences of School Heads Regarding their Reassignment in Accordance with the Reshuffling Policy

The selected school heads participating in this study shared various experiences related to their reassignment, both challenges and growth opportunities. Through a detailed analysis of the transcripts from the in-depth interviews, five (5) main themes emerged: a) Enhancing the Managerial Skills; b) Encountering Diverse Emotions; c) Adjusting to a New School Environment; d) Having Difficulty in Adjusting Managing the Community; and e) Encountering Various Challenges.

Enhancing the Managerial Skills

Research from the Department of Education indicates that regular reshuffling of school heads can help share best practices and improve managerial skills (Aquino et al., 2021). Hsu et al. (2020) acknowledge that while reshuffling presents challenges, it also provides leadership growth opportunities. Additionally, Smith and Johnson (2019) highlight that leadership succession is crucial for developing managerial skills among school leaders. Consequently, the literature supports the idea that reshuffling school heads every five years, as outlined in DepEd Order 7 series of 1999, aims to refresh leadership in schools and broaden the horizons of school leaders (Ramos, 2020).

Encountering Diverse Emotions

The result of the study is parallel with the study of Park and Datnow (2022) who noted that principals experience mixed emotions—such as anxiety, excitement, and uncertainty—when faced with transfers. Chua and Lim (2021) emphasized the complexity of these emotions, while Smith and Brown (2020) highlighted the conflicting feelings of sadness about leaving a familiar community and happiness about new opportunities.

Adjusting to a New School Environment

The result aligns with the study of Gurr (2018) discusses the benefits of successful adaptation for school heads. Smith and Johnson (2021) outline strategies such as building connections with staff, adapting to the school's culture, and seeking mentorship. Brown and Davis (2019) emphasize the need for school heads to modify their leadership styles to fit new contexts. Kim (2022) stresses that adapting leadership approaches during organizational reshuffling is essential for effective adjustment. Norton and Ali (2023) found that those who successfully adapt their strategies are more likely to maintain stability and effectiveness within their organizations.

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Having Difficulty in Adjusting Managing the Community
Ramos (2020) emphasizes that the reshuffling policy encourages school heads to engage with new colleagues and stakeholders, fostering continuous improvement in school management. Hoque and Raya (2023) found that the context of a school and the maturity of its staff influence the appropriate leadership style, requiring school heads to be adaptable. Additionally, Patel and Lee (2022) noted that school heads often face challenges in grasping the unique cultural, social, and economic contexts of the new communities they serve.

Encountering Various Challenges
When school leaders are transferred due to reshuffling, they encounter challenges in adapting to new school cultures, building relationships with staff and students, and managing change (Rosina et al., 2018). Ngai and Chan (2018) also found that these leaders face various difficulties in new environments. Additionally, Chiwamba and Kigobe (2022) noted that school heads must frequently understand and adjust to different school cultures, necessitating continual adaptation to new learning settings.

School Heads Coping with the Challenges Encountered During Their Reassignment Following the Reshuffling Policy
During the conducted interviews, the participants shared the different coping mechanisms with the challenges they encountered during their reassignment following the reshuffling policy. After a careful and thorough analysis of the data gathered, the following three (3) themes emerged: a) Implementing School Programs and Policies for Improvement; b) Developing Professional Growth; and c) Utilizing Effective Communication.

Implementing School Programs and Policies for Improvement
The result of the study conforms with the study of Wang (2021) who indicated that leaders using resilience strategies are more effective in implementing policies during reshuffling. School heads encountered challenges like insufficient financial and human resources, as well as negative student attitudes. To address these issues, they strictly enforced policy provisions, sought support from stakeholders, and enhanced communication efforts (Zamora, 2021).

Developing Professional Growth
The findings align with Anderson and Smith (2021), highlighting the importance of tailored professional development for school administrators facing reassignments. School leaders view reshuffling policies as valuable opportunities to enhance their leadership skills (Nguyen & Patel, 2019) and gain experience in varied educational settings (Johnson & Smith, 2021).

Utilizing Effective Communication
Improving productivity and collaboration is significantly aided by prioritizing tasks and ensuring clear communication (Olegario, 2024). Baker (2019) emphasizes the importance of transparent communication in managing school administrators' reassignments. Additionally, Rodriguez and Chan (2021) outline strategies for cultivating a positive organizational culture during reshuffling, focusing on transparency, inclusiveness, and aligning goals with stakeholder aspirations.

Insights of School Heads Regarding their Reassignment in Accordance with the Reshuffling Policy That Can be Shared with Others
During the conduct of interviews, the participants shared the different insights of school heads regarding their reassignment in accordance with the reshuffling policy that can be shared with others. After a careful and thorough analysis of the data gathered, the following three (3) themes emerged: a) Provide Moral and Emotional Support; 3) Embrace Change in Educational Leadership; and c) Learn Through Diverse Interactions.

Provide Moral and Emotional Support
Leithwood and Jantzi (2018) highlight the importance of moral support and resilience for school leaders during organizational changes, which helps maintain effective learning environments. Smith (2019) notes that supportive policies from the Department of Education shape the leadership landscape, while Garcia (2021) emphasizes the need for encouragement from DepEd officials to foster effective school leadership. Hargreaves and Boyle (2019) discuss the emotional challenges posed by sudden reassignments, and Day and Gu (2019) underscore the significance of emotional preparation and advanced notice in easing these psychological difficulties during leadership transitions.

Embrace Change in Educational Leadership
The findings align with Fullan (2022), who asserts that effective leaders recognize the inevitability of organizational restructuring in education. Despite the challenges faced by public-school heads in remote areas, Gallego (2022) notes that they find their work fulfilling, as it aligns with their true mission in academia. Gipson and Reddick (2019) explore the experiences of principals during transfers, focusing on career advancement and community integration, while Day (2021) highlights the role of school leaders in fostering a resilient organizational culture.

Learn Through Diverse Interactions
School heads play a crucial role in influencing teacher well-being, which creates an interconnected environment that affects both teachers and students (Echon & Cabal, 2022). Medford and Brown (2022) explain that school leaders familiarize themselves with the school culture by engaging with staff and implementing necessary changes to improve teaching and learning. Additionally, reshuffling policies can promote ongoing professional growth, as collaborative interactions encourage school heads to embrace continuous learning (Garcia, 2022). Engaging with diverse perspectives further enhances their decision-making and leadership effectiveness (Peterson, 2023).

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Implications for Administrative Practice

Based on the findings of this phenomenological study, important implications arise for school heads and beyond. The study highlights how school heads overcome challenges by employing various strategies such as improving managerial skills, fostering professional development, adapting to new school environments, using effective

Recommendations for Further Research

This study on overcoming challenges of reassigning school heads in Laak North District, Philippines, found essential themes but limited generalizations. The data could be expanded to include a larger sample size and diverse participants from different regions, educational levels, and experience levels. The methodologies used could be replicated by other researchers in their settings. Comparing reshuffling strategies across various leadership positions in education could provide insights into how demands during reassignments differ across

organizational levels. Addressing these research suggestions could advance understanding of reshuffling policies in educational leadership and promote effective leadership practices.

Concluding Remarks

This research study explores the challenges faced by school heads in reshaping policies in education, focusing on managerial abilities, professional growth, and adapting to new environments. Despite challenges in capturing the strategies of school heads and interpreting participants' experiences, the study found that effective reassigning school heads can improve organizational climate, teacher confidence, and student outcomes. The study aims to inspire further research and innovation in the field, exploring critical aspects of reshuffling policy techniques, organizational culture's role in supporting school heads, and the effectiveness of interventions enhancing leadership skills.

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EFFECT OF DYNAMIC CAPABILITIES ON PERFORMANCE OF SACCOS IN MANDERA COUNTY, KENYA

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ABSTRACT
Dynamic capabilities are the firm's ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments. By developing inspired capabilities that go beyond ordinary strategic capabilities, firms will be in a strong position to achieve a long-lasting competitive advantage. SACCOs play a critical role of savings mobilization for investments as envisioned in the Kenya's development blueprint, vision 2030. SACCOs have been facing financial challenges leading to closure while others have been put under receivership. The general objective of this study was to determine the effect of dynamic capabilities on performance of SACCOs in Mandera County, Kenya. The specific objectives was to examine the effect of markets technological sensing and effect of innovation and strategic renewal on performance of SACCOs in Mandera County, Kenya. The study was guided by dynamic capabilities theory and diffusion of innovation theory. This study adopted a descriptive research design. The study targeted 39 SACCOs distributed in all constituencies in Mandera. The target included 117 senior management staff of the SACCOs from which 117 senior management staff were subjected to the questionnaires through census. The study used content validity to confirm that the questionnaire would enable the researcher to achieve study objectives. A pilot study was conducted with 10% of the respondents hence 12 management staff in four SACCOs. Reliability was tested using Cronchba Alpha coefficient with a threshold of 0.7. Data was analyzed using descriptive and inferential statistics and presented in Tables. All ethical considerations were strictly adhered to. Findings show that; markets technological sensing has a strong positive significant correlation with performance of SACCOs in Mandera County (r = 0.542, p value =0.000), and innovation and strategic renewal has a strong positive significant correlation with performance of SACCOs in Mandera County (r = 0.842, p value =0.000). The study therefore recommends that; the management should invest in gathering and analyzing market intelligence, and make efforts to ensure that the staff who introduce successful ideas are rewarded..

KEY WORDS: *Markets technological sensing, Innovation and strategic renewal , Performance of SACCOs*

INTRODUCTION

Background of the Study

In todays' increasing volatile, uncertain, complex, and ambiguous world, it is imperative for organizations to have the ability to quickly and accurately adapt to changes in the marketplace or technology changes (Suddaby, Coraiola, Harvey, & Foster, 2020). Dynamic capabilities are the firm's ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments. By developing dynamic capabilities that go beyond ordinary strategic capabilities, firms will be in a strong position to achieve a long-lasting competitive advantage (Bogers, Chesbrough, Heaton & Teece, 2019). Jorge and Luiz (2020) defined dynamic capability as the potential to systematically solve problems enabled by its propensity to sense opportunities and threats to make timely decisions. The authors found that dynamic capabilities, creativity, and innovation competencies have a positive effect on business performance in Portugal.

Wu et al, (2021) asserted that dynamic capabilities in China is regarded as a kind of high-level capability, which is superior to common managerial abilities, it can guide and control their behavior to upgrade their capability to confront environmental uncertainty. It can also be treated as a dynamic process to sense, seize and reconfigure opportunities as well as develop unique resources. Business managers who effectively utilize dynamic capabilities are more sensitive to market opportunities, quicker to integrate external knowledge and to provide technical solutions to organizational problems. Aro (2020) identified three dynamic capabilities in Brazil which included sensing, seizing and transforming. Sensing relates to capabilities of mapping and updating trends in the market, analysis and definition of trends

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and strategies and mapping of internal resources. Seizing is the ability to establish what to do openly, to map potential partners and to establish partners. Transforming is related to changing the operations of an organization mainly from traditional to digitalized operations.

In Nigeria, dynamic capabilities assessments had been adopted by some players in the banking sector. The dimensions of organisational dynamic capability (sensing capability and integrating capability) have a significant and positive relationship with competitive advantage and organisational reputation (Okeke, Odey, & Akaegbobi, 2021). Organizations that enhances their dynamic capability are most likely to operate efficiently and gain competitive edge over competitors in the industry. Additionally, dynamic capabilities are enabling banks to remain alert on threats and opportunities presented by technologies (Eletu & Nwuche, 2021). Mashingaidze, Phiri, and Nyatsamb (2022) illustrate that sensing, integrating and reconfiguration capabilities play a significant role in the growth of small medium enterprises in Malawi. Dynamic capabilities permit firms to prepare for their future and also allow firms to monitor their external environments to assess the longevity of their existing business model. Wadajo and Kero (2023) showed that knowledge based dynamic capability enhance the competitive advantage of an organizations in Ethiopia. The dynamic capability dimensions are crucial for enhancing organization's competitive advantage. These dynamic capability dimensions include absorptive, innovative, and adaptive capabilities.

Kitenga (2020) found that dynamic capabilities help manufacturing firms in Kenya to sense and react to market changes and also facilitate firms to foretell and anticipate customer explicit and latent needs. The firms are also able to develop new products or employ existing products with new features and attributes to satisfy both the needs of current customers and new customers and thus ensure the stability and sustainability. Leah *et al*, (2021) found that manufacturing firms in Nairobi have a stronger commitment to deploying dynamic capabilities (sensing, seizing and reconfiguration). Adoption of dynamic capabilities have enabled the firms to be more successful in terms of profitability and market share. Odwaro, Abongo, and Mise (2022) found that in order to respond to the changing environment and attain competitive advantage, commercial banks in Kenya constantly launch new and substitute products to be in line with the changing market demands. The use of technology was highly adopted to enable banks respond to the changing market demands and upgrade their core capabilities. These dynamic capabilities that were put into consideration had a positive and significant effect on the performance of commercial banks.

Statement of the Problem

SACCOs play a critical role of savings mobilization for investments as envisioned in the Kenya's development blueprint, vision 2030. Home and business ownership in many rural and urban areas in Kenya are funded by SACCOs. However SACCOs have been facing financial challenges leading to closure while others have been put under receivership. According to CBK (2020), between 2009 - 2019, the Kenyan Deposit protection Fund Board placed three SACCOs under receivership within 10 years. In addition, six SACCOs including the once giant Metropolitan National had their licenses revoked by SASRA for failing to meet minimum capital requirements. This shows a worrying trend since it is an indication that for the eleven years, one financial organization was collapsing. According to SASRA (2020), the SACCOs financial performance has been decreasing. There has been a decrease in institutions numbers from 174 institutions in 2017 to 172 institutions in 2019 (SASRA, 2020).

The first SACCO in Mandera County was licensed in 2019 and since then other SACCOs have been licensed to operate in the county. The SACCOs have however been recording losses. According to CBK(2021), none of the SACCOs had attained their expected financial targets by December 31st 2021. Many Savings and Credit Cooperative Societies (Saccos) in the country witnessed a high default rate in 2023 owing to harsh economic conditions. The rate of bad loans went up since a section of members with loans were unable to service them leaving Saccos with low cash flow. The rate of the non-performing loans among registered SACCOs increased from 5.23% in 2016 to 6.14% in 2017, 6.30% in 2018, 6.45% in 2019 and 6.80% in 2020 (SASRA, 2021).

There exists various studies on dynamic capabilities; Mwajambia and Kising'u (2022) on effect of dynamic managerial capabilities on performance of travel agencies and tour operators in Kenya showed that dynamic managerial capabilities had direct positive effect on firm performance. Musa (2022) on the effect of effect of dynamic capabilities on financial performance of the oil marketing firms in Kenya established that sensing capabilities, seizing capability, organizational learning capability and reconfiguration capabilities had significant effect on financial performance. Mugambi (2021) on the consequences of dynamic capabilities on the performance of commercial banks in Nairobi City County, Kenya established that innovations capability, technical knowledge capability, quality service capability and learning culture capability had significant effects on the performance of a commercial bank. Rono (2021) on relationship between dynamic capabilities and competitive advantage of manufacturing firms in Nairobi, Kenya revealed that sensing capabilities; seizing capabilities; reconfiguration capabilities and dynamic capabilities had a positive and significant effect on competitive advantage. None of the studies focused on performance of SACCOs. This study hence sought to fill the research gaps by examining the effect of dynamic capabilities on performance of SACCOs in Mandera County.

Specific Objectives

The study addressed the following specific objectives:

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i. To determine the effect of markets technological sensing on performance of SACCOs in Mandera County, Kenya.
ii. To establish the effect of innovation and strategic renewal on performance of SACCOs in Mandera County, Kenya.

Theoretical Framework

Dynamic Capabilities Theory

The theory was first formulated by David Teece, Gary Pisano and Amy Shuen (1997). Dynamic capabilities theory examines how firms integrate, build, and reconfigure their internal and external firm-specific competencies into new competencies that match their turbulent environment. The theory assumes that firms with greater dynamic capabilities will outperform firms with smaller dynamic capabilities. The aim of the theory is to understand how firms use dynamic capabilities to create and sustain a competitive advantage over other firms by responding to and creating environmental changes. Capabilities are a collection of high-level, learned, patterned, repetitious behaviors that an organization can perform better relative to its competition (Nelson & Winter, 2012).

Dynamic capacities act as a buffer between the capital of businesses and the changing business climate by having an organization improves the resource base and thus preserves its competitive advantage, which could otherwise be compromised, in its longevity. Dynamic Capacities Perspective (DCP) relates to a company's ability to gain new ways of competitive advantage by expertise retention, organizational resources and the adjustment to a changing business environment. This ability is complex because the organization must constantly create, adjust and to the rate of technological as business environment changes (Teece, Pisano & Shuen, 1997).

Diffusion of Innovations Theory

Diffusion of innovation theory was developed by Rogers (1995). The theory originated in communication to explain how, overtime, an idea or product gains momentum and diffuses or spreads through a specific population or social system. Diffusion of innovation theory attempts to explain and describe the mechanisms of how new inventions in this case learning management systems is adopted and becomes successful (Clark 2012). Mannan (2013) stated that not all innovations are adopted even if they are good, it may take a long time for an innovation to be adopted. Rogers (1995) identified five critical attributes that greatly influence the rate of adoption. These include: relative advantage, compatibility, trialability and observability. According to Rogers, the rate of adoption of new innovations will depend on how the organization perceives its relative advantage, compatibility, trialability, observability and complexity. The diffusion of innovations theory is extensively used by marketers to promote the adoption of their products. In such cases, marketers generally find an early set of people passionate about the product.

Conceptual Framework

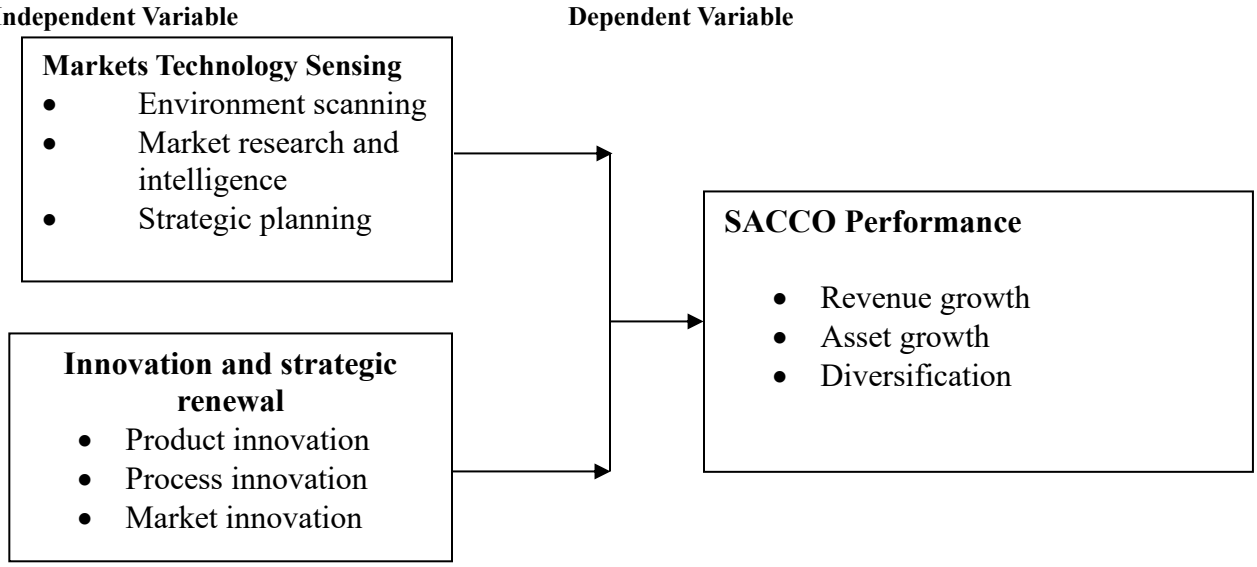


Figure 1: Conceptual Framework (2024)

Review of Conceptual and Empirical Literature

Markets Technological Sensing

Salih and Alnaji (2019) defined sensing capabilities describes an organization's scanning ability and knowledge development about its context, the internal assessment of its capacities and its alignment of functions and behaviour in a manner that advances it towards its goals and objectives. It involves interpreting and analyzing this information to understand the urgency, causes, and

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impact, thereby enabling the anticipation and detection of opportunities and threats in the business environment. Azikiwe (2021) concluded that superior firm performance begins with identification of opportunities in the market environment through sensing capabilities. Thus, firms that are better at 'sensing' in the market are able to know and understand changing consumer needs and preferences.

Victor and Isoboye (2021) investigated the relationship between strategic sensitivity and corporate responsiveness in the fast-moving consumer goods sector in Nigeria. The study employed a cross-sectional survey method. The sample size was 45 managers. The findings revealed that strategic sensitivity had a positive relationship with corporate responsiveness among these companies. Specifically, both strategic insight and strategic foresight were found to be significantly and positively correlated with the companies' responsiveness. Amarteifio and Agbeblewu (2020) examined effect of entrepreneurial orientation on performance of tourist accommodation establishment in Ghana. The study adopted explanatory survey design. Simple random sampling was used to sample 113 respondents. Questionnaires were used for data collection. The study revealed that managers were highly proactive but exhibited low levels of the other entrepreneurial orientation dimensions, specifically competitive aggressiveness and risk taking. The managers exploited new opportunities, which involved local marketing to increase their local clientele. They also sought to understand their clients better and improve the services to suit customers' needs.

Kimenye and Githira (2023) sought to examine the effect of strategic sensitivity on performance of commercial state-owned enterprises in Kenya. The study applied descriptive research design and sourced primary data using questionnaires. Results showed that there was a statistically positive significant effect of strategic sensitivity on performance of commercial state owned enterprises in Kenya. Okwemba (2018) sought to bring out how market sensing capabilities affected performance with emphasis on telecommunication entities in Kenya. The adopted design was survey design and 210 participants were selected through stratified random sampling. Established from the findings was the fact that market sensing capabilities and performance are significantly connected with each other.

Innovation and Strategic Renewal

Innovative capability refers to a company's ability to generate and implement new ideas, products, and processes. A company with a strong innovative capability is often able to stay ahead of the curve and offer unique solutions to meet customer needs (Sultana et al., 2022b). Innovation capability is the ability to continuously transform knowledge and ideas into new products, processes and systems for the benefit of a firm and its stakeholders. The technology development capability of the firm leads to technical change that allows for a successful innovation process. Once a new product has been thought out, the firm needs to produce it on a commercial scale (Akhtar, 2023). Organizations endowed with robust innovative capabilities are strategically positioned to introduce and market new products and services, which contributes to revenue growth and establishes a strong market presence. This can include conducting market research, gathering customer feedback, and continuously monitoring changes in consumer preferences(Ode & Ayavoo, 2020).

Leo (2021) studied the role on innovation capabilities in agribusiness in Brazil. Findings showed that agribusiness firms have an essential role in the innovation process. For upstream firms, transaction and management capabilities are the most important to achieve innovative performance, as these firms are further from the end consumers. For downstream firms, closer to the end consumers, transaction and development capabilities support innovative performance. Jabbar (2022) sought to determine the role of information technology on competitive advantage of insurance companies in Iraq. The study adopted a qualitative research design. The sample was 50 respondents. The findings revealed a significant relationship between information technology and competitive advantage of insurance companies.

Yelmi, Yahaya, and Muhammed (2021) assessed the impact of marketing innovation on the performance of SMEs in Nigeria. The study employed a cross-sectional survey design. The target population was 782 registered SMEs. The sample was 120 respondents derived using Fisher's formulae. Open-ended questionnaires were used to collect data. The study results revealed that marketing innovation had a positive and significant influence on performance of SMEs in Nigeria. Marketing strategy is necessary in any business organization and for it to compete in a global market it must ensure that resources are available and well utilized. The main goals of marketing innovation for business are to fill market needs, grow market share, and increase shareholder value.

Eltahir (2020) examined the impact of information technology on the cooperative insurance industry on a Sudan insurance company. The study adopted quantitative and qualitative method on all employees of Shiekan Insurance Company based in Sudan. The findings established that a positive relationship exists between the applications of information technology on the performance of insurance company. Mutegi (2018) examined the role of innovation strategy in insurance penetration in Kenya. This study employed a descriptive research design on 34 respondents. The study findings established that market innovation, technological innovations and process innovation contributes to insurance penetration.

RESEARCH METHODOLOGY

This study adopted a descriptive research design. This study focused on the 39 SACCOs distributed in four constituencies in Mandera County. The target was 117 top management staff drawn from every SACCO. Since the population of the study was relatively small and easily accessed, the study used Census. The study used questionnaires for data collection. The study used

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content validity which was achieved through designing the questionnaire based on the sub-variables in the conceptual framework . Reliability was tested using Cronchba Alpha coefficient. Data was analyzed using SPSS Version 28 to generate descriptive and inferential statistics. The descriptive statistics included the use of measurement of central tendency which include included percentages, mean, and standard deviation. The inferential statistics included correlations and regressions.

RESEARCH FINDINGS AND DISCUSSIONS

Table 1: Markets Technological Sensing

Key: SD=Strongly disagree, D=Disagree, N=Neutral A=Agree, SA= Strongly agree, M=Mean, Std.*=Standard Deviation*

Statements	SD %	D %	N %	A %	SA %	M	Std.
There are processes or mechanisms to evaluate and prioritize potential opportunities	4.1	19.4	6.1	9.2	61.2	4.04	1.354
The SACCO has tools or scanning the external environment and identify emerging trends and market shifts	7.1	8.2	5.1	71.4	8.2	3.72	1.314
The SACCO allocates resources to facilitate flexibility and responsiveness to changing market conditions	55.1	26.5	4.1	13.3	1.0	2.09	1.355
There are staff responsible for identifying and monitoring threats	57.1	22.4	7.1	13.3	0	1.90	1.358
The SACCO ensures that the identified opportunities align with its overall strategic goals and objectives	6.1	2.0	4.1	35.7	52.0	4.26	1.068
The SACCO provides resources and tools for employees to explore new ideas and think creatively	42.9	23.5	4.1	14.3	15.3	2.36	1.521
Our SACCO quickly understands new opportunities to serve our clients better	3.1	2.0	6.1	9.2	79.6	4.60	0.928
Average						**3.28**	**1.271**

N=98

Results show that there are processes or mechanisms to evaluate and prioritize potential opportunities as strongly agreed by 61.2 % and supported by the mean (M = 4.04, std = 1.354). This implies that the SACCOs have processes and mechanisms to assess opportunities. The Most significant opportunities are highly prioritized. The SACCO has tools for scanning the external environment and identify emerging trends and market shifts as agreed by 71.4% and supported by the mean (M = 3.72, std = 1.314). This is an indication that SACCOs scan the operating environment which helps to identify the emerging trends in the market and market shifts. This helps to identify the customer needs and develop services and products that meet the needs of the customers which may lead to customer satisfaction, customer loyalty and improved performance. The SACCO does not allocate resources to facilitate flexibility and responsiveness to changing market conditions as disagreed by 55.1% and supported by the mean (M = 2.09 std = 1.355). Findings imply that there are not adequate resources to facilitate quick response to market conditions which may imply that the SACCOs are slow in adopting to changes in the environment. The staff are not responsible for identifying and monitoring threats as disagreed by 57.1% and supported by the mean (M = 1.90, std = 1.358). The findings imply that there are poor risk management practices in the SACCOs which may lead to loss of assets and others costs involved in managing risks.

The SACCO ensures that the identified opportunities align with its overall strategic goals and objectives as strongly agreed by 52% and supported by the mean (M = 4.26, std = 1.068). This implies that the SACCOs cautiously identifies opportunities to ensure that only those opportunities that are aligned to the strategic plans are implemented. The SACCO rarely provide resources and tools for employees to explore new ideas and think creatively as strongly disagreed by 42.9% and supported by the mean (M = 2.36, std = 1.521). This is an indicates that there are limited resources to support employee creativity in the SACCOs. The SACCO quickly understands new opportunities to serve clients better as strongly agreed by 79.6% and supported by the mean (M = 4.60, std = 0.928). The average mean of 3.28 and

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standard deviation and mean of 1.271 shows that majority of the respondents agreed with statements on markets technological sensing. Findings are in agreement with Amarteifio and Agbeblewu (2020) that sensing capability is displayed through exploitation of new opportunities which involve local marketing to increase local clientele.

Table 2: Innovation and Strategic Renewal

Key: SD=Strongly disagree, D=Disagree, N=Neutral A=Agree, SA= Strongly agree, M=Mean, Std.*=Standard Deviation*

Statements	SD %	D %	N %	A %	SA %	M	Std.
Employees are encouraged to propose and implement innovative ideas that contribute to the organization's strategic goals.	4.1	12.2	1.0	8.2	74.5	4.37	1.222
The organization has a dedicated department or team responsible for managing and promoting innovation.	16.3	6.1	2.0	11.2	64.3	4.01	1.550
Strategic innovation is considered a priority in the organization's overall strategic planning process.	18.4	4.1	2.0	13.3	62.2	3.97	1.576
The organization regularly reviews and updates its innovation strategy to align with evolving market trends.	50.0	25.5	1.0	5.1	18.4	1.84	1.538
There are mechanisms in place to identify and evaluate emerging technologies that could enhance the organization's competitiveness.	5.1	8.2	1.0	12.2	73.5	4.41	1.174
The organization collaborates with external partners, and research institutions, to leverage external expertise and foster innovation.	3.1	5.1	1.0	8.2	82.7	4.62	0.969
Improving service quality through process innovation is one of the key objectives of the organization.	16.3	1.0	4.0	13.3	65.3	4.12	1.480
The use of online tools and social media has helped the SACCO grow and attract new clients.	6.1	9.2	1.0	6.1	77.6	4.32	1.250
Average						**4.20**	**1.345**

N=98

The findings show that organization has a dedicated department or team responsible for managing and promoting innovation as strongly agreed by 74.5 % and supported by the mean (M = 4.37, std = 1.222). This implies that the SACCOs have a team that is responsible for innovation which ensures that the SACCO is conversant with emerging technology. Strategic innovation is considered a priority in the organization's overall strategic planning process as strongly agreed by 64.3 % and supported by the mean (M = 4.01, std = 1.550). This shows that the strategic innovations are prioritized in the SACCO which may imply that there are resources that are set aside for strategic innovations. The SACCO regularly reviews and updates its innovation strategy to align with evolving market trends as strongly agreed by 6.2 % and supported by the mean (M = 3.97, std = 1.576). This implies that the innovation strategy is frequently monitored and updated if need be. There are mechanisms in place to identify and evaluate emerging technologies that could enhance the organization's competitiveness as strongly agreed by 73.5 % and supported by the mean (M = 3.84, std = 1.538). This indicates that the SACCOs are able to identify and evaluate emerging technologies which enhances competitiveness. The organization collaborates with external partners, and research institutions, to leverage external expertise and foster innovation as strongly agreed by 82.7 % and supported by the mean (M = 4.41, std = 1.174). This implies that there is strategic alliances in the SACCOs which enables them to acquire knowledge on innovation to achieve efficiency.

Improving service quality through process innovation is one of the key objectives of the organization as strongly agreed by 82.7% and supported by the mean (M = 4.62, std = 0.969). This is an indication that innovations have enabled the SACCOs to continuously improve service delivery. The use of online tools

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and social media has helped the company grow and attract new clients as strongly agreed by 65.3 % and supported by the mean (M = 4.12, std = 1.480). This implies that the SACCOs use online tools and social media that has helped them to attract and retain customers. The average mean of 4.20 and standard deviation and mean of 1.345 shows that majority of the respondents agreed with statements on innovation and strategic renewal. Findings are in support of Yelmi, Yahaya, and Muhammed (2021) that marketing innovation for business are to fill market needs, grow market share, and increase shareholder value.

Table 3: Correlation Results

Variables		SACCO performance	Markets technological sensing	Innovation and strategic renewal
SACCO performance	Pearson Correlation	1		
	Sig. (2-tailed)			
	N	98		
Markets technological sensing	Pearson Correlation	.542**	1	
	Sig. (2-tailed)	.000		
	N	98	98	
Innovation and strategic renewal	Pearson Correlation	.842**	.429	1
	Sig. (2-tailed)	.000	.000	
	N	98	98	98

Correlation is significant at the 0.05 level (2-tailed).

Markets technological sensing has a strong positive significant correlation with performance of SACCOs in Mandera County (r = 0.542, p value =0.000). This implies that an increase in markets technological sensing could lead to an increase in performance of SACCOs. Results are in agreement with Kimenye and Githira (2023) that there was a statistically positive significant effect of strategic sensitivity on performance of commercial state owned enterprises in Kenya.

Innovation and strategic renewal has a strong positive significant correlation with performance of SACCOs in Mandera County (r = 0.842, p value =0.000). This implies that an increase in innovation and strategic renewal could lead to an increase in performance of SACCOs. Findings concur with Eltahir (2020) that there is a positive relationship exists between the applications of information technology on the performance of insurance company.

Conclusions

Markets technological sensing has a strong positive significant correlation with performance of SACCOs in Mandera County. The sensing capabilities have enabled the SACCOs to gain knowledge on the technology trends by the financial sector in Kenya. Sensing enables the identification of capabilities required to integrate various channels that can enable growth of SACCOs. Market opportunities are identified through market research and that relevant data on customer needs is gathered during market research. By continuously monitoring the external environment, staying connected with market dynamics, and adjusting strategies and processes accordingly, SACCOs can obtain a sustainable competitive advantage.

Innovation and strategic renewal has a strong positive significant correlation with performance of SACCOs in Mandera County. Through innovating the systems and introducing new methods of service delivery, the SACCOs are able to achieve competitive advantage. The re-engineering processes are undertaken. The SACCOs also re-invent their service delivery techniques. Product innovation enhance performance of the SACCOs. Through new products and new services, the SACCOs are able to meet the customer needs thus enhancing their competitive advantage. Product research and development is a vital ingredient enhancing better SACCOs performance.

Recommendations

The SACCOs should allocate more resources to developing its strategic capabilities in insight and foresight to enhance its strategic sensitivity and improve its sustainable competitive advantage. SACCOs should invest in gathering and analyzing market intelligence. This includes staying updated on industries trends, competitor actions, and customer preferences. Market insights can inform strategic decisions and help SACCOs proactively adapt to changing circumstances. By preparing for various scenarios, SACCOs can develop proactive strategies that position them for success, even in uncertain times.

The management of SACCOs should embrace information technology innovations when coming up with new ideas and solutions of products to improve performance. The management

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should make efforts to ensure that the staff who introduce successful ideas are rewarded. This will motivate them to become more innovative and also encourage other staff to be creative and develop ideas that will result to development of new products.

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A STUDY ON THE PROSPECTS TO SUSTAINABLE URBAN REAL ESTATE DEVELOPMENT IN FREETOWN, SIERRA LEONE

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ABSTRACT

This research addressed the prospects to sustainable urban real estate developmentin Freetown, Sierra Leone. The study primarily focused on the following objectives: To identify the sources of accessing finance for real estate development by real estate firms. To learn how the land code of practice and population affect real estate development and to investigate technical constraints in providing real estate projects in Freetown. Data for this study were collected using a primary source, from which a semi-structured questionnaire was used for collecting the quantitative data. The study uses a case study design to achieve the study objectives. A non-probability purposively sampling was used to identify the respondents based on their experience aftera line listing process of real estate firms and their employees in Freetown. For the quantitative data, a sample frame of 130 participants was drawn, of which 100 were chosenpurposively based on their experience and understanding of real estate development, and 98participated in the study. Data analysis for this study was done using descriptive (percentage, mean, and standard deviation) and inferential (Pearson correlation and regression analysis) statistical analyticalmethods.

The study established that sources of finance, population impact, and technical constraints in real estate delivery have a positive significant association with urban real estate development, while land code of practice has a positive insignificant association with urban real estate development. The study recommends that, the country's financial institutions popularize a scheme that is of low interest to real estate firms so as to increase the source of income for real estate firms to expand their business; that the national land policy should be reviewed so as to create an avenue for access to land for real estate firms who are willing to provide affordable housing to the country; both the government and realestate firms should work accordingly in order to provide affordable housing for thepopulation, and effective institutional capacity strengthening and enhanced collaboration between government parastatals and private real estate firms should be popularized and implemented. For further research, it is recommended that similar wider study should bedone, which will be used for a broader generalization.

1.0 INTRODUCTION

Real estate development is a commercial activity including renovating and releasing existing structures in purchasing raw property and selling developed land or lots to others (Muiruri 2018). The socio-spatial implications of real estate development are an important way to understand the many externality effects of development activities on neighborhood and city scale real estate markets. Prompt spatial investments and reshape people'sperceptions of space, for example. In this context, it is crucial to comprehend the positivegains real estate entails in terms of social, spatial, and economic values (Squires and Heurkens, 2015). These emerging real estate markets are becoming increasingly important globally as urbanization and economic growth expand. In the Asia-pacific region, real estateis expected to grow as predicted from 10% ($2.6 trillion) in 2011 to 23% (12.8 trillion) in 2021 (Pramerica REI, 2012 cited in Newell et al. 2017). Housing has enhanced nationalcohesion and economic improvement in most parts of the developing world. Enhancing the supply of affordable housing has been a key policy priority for policymakers and has been delayed due to the presence of structured and sustainable housing finance markets. Butachieving this has been a setback due to non-functional housing finance markets, but othermodalities of financing the housing sector have been put in place to keep it going. (World Economic Forum, 2010).

Notably, the provision of commercial, retail, hotel, industrial and residential real estateas the development aspect of real estate development has served as motivation the economicexpansion. Similarly, the Kingdom of Bahrain, like other Gulf nations, has seen enormous development in its real estate over the last decade, with multibillion dollar investments in residential complexes, business centres, and retail malls (Mouzughi, 2014). In China, the real estate market is growing healthily and consistently. As a result of increased urbanization, improved housing affordability, and many prospective new home buyers, this emerging market has significant growth potential. However, this industry has substantial obstacles that provide foreigners with opportunities in areas including professional service, housing industrialization, and real estate financing innovation (Hongyu et al. 2004). Housing finance is one of the priority areas that support households' needs because it plays an important role in social stability. As it was mentioned by IFC, household wealth for personal housing in the developing world accounts for between 75% and 90%, whilst it also affects monthly expenditure by 15%–40%. This showed that to promote social stability, the housing sector has been promoting

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family self-sufficiency and community development immensely. Housing finance has been an instrumental development in regulating the country's economic growth and stability. Therefore, the IFC stated that investment in the housing sector accounts for 15–30% of the total investment in the whole world. As such, the housing sector boosts the sector and its affiliated entities, which account for 9% of all jobs in the world (World Economic Forum, 2010).

Real Estate 2020: Building the future report examines the worldwide trends and forecasts the real estate market through the year 2020. While some of these worldwide trends are already noticeable in the African real estate market, others won't be seen until later. Following are the six forecasts given by Real Estate 2020: Building the future for 2020 and beyond are: The world's pool of investable real estate will grow significantly, creating enormous new opportunities, particularly in emerging economies; Cities with rapidpopulation growth will provide more options for risk and reward; Value will be driven mostly by technological innovation and sustainability; Government cooperation will become more crucial; A wide range of dangers, including new threats, will develop as the competition for premium assets increases.

Therefore, real estate development is an investment that can take place in both the developed and developing world. Hence, in any country, it operates differently based on the existing regulations for its practice. These regulations mostly attract investors to invest in the real estate market. Kazimoto (2016) added that real estate is utilized to diversify investment portfolios in developed countries and has a strong link with where investors in the sector meet and closely collaborate on similar investments based on the information required. These emerging investments play a very vital role in any country's economic growth. It is a fascinating area of research at a smaller or broader level. As this is closely linked with both the financial and economic sectors, (Wang, 2003). Due to its importance to the national economy, real estate is a component of economic development. Strong real estate development will therefore support the economy's long-term expansion (Liu, et al., 2019), and Investment in real estate development has a big influence on economic development. Confirming the relationship between real estate development spending and economic expansion (Shen, 2021). A key challenge identified by Kazimoto (2016) highlighted that as a result of accessibility; land in Kenya for real estate is undervalued, posing challenges for surveyors to determine their value for real estate purposes.

Even though the real estate development process is complex, the difficulties (and obstacles) differ from one country to the next. It has been approached easily by some countries, while others have moved away from examining it critically. Several presenters at the ARES conference underlined that comprehending the real estate landscape throughout the African continent necessitates taking into account the region's different political, legal, and cultural frameworks. The objective for many African countries should not be to replicate the investment conditions and arrangements prevalent in more industrialized countries, but to develop an investment environment that is competitive with Asia and LatinAmerica. When an investor decides to invest in developing markets, the difficulty is to findmarkets that provide a reasonable balance of risk and reward (ARES conference, 2012).

In Sierra Leone, the real estate sector is still in its beginning. The market is led by both Government and private-owned housing firms, with little or no foreign participation in the industry to speak of Sierra Leone, just like other African countries, many institutional real estate investors in Western nations still regard African countries as a high-risk investment location, as this has posed challenged over the years for its growth. In the revised Sierra Leone Housing policy of 2006, it was mentioned that until after 2005 when a real estate development company was established, before then, there were no such companies in Sierra Leone. The need for such Firms for the vibrant growth of the housing sector cannot be over-emphasized. Investment in housing creates jobs and has a multiplier effect in associated sectors such as manufacturing. This will enable them to produce houses in a more efficientmanner and better residential areas. If Sierra Leone's government can design and implementa policy initiative that will encourage international and domestic investment in the real estatesector, it will provide significant investment opportunities that will improve GDP (African Housing year Book CAHF 2020). Despite, recent economic progress, Sierra Leone continues to struggle to meet fundamental requirements such as shelter. Housing investment in the form of updating or renovating existing homes, development of local and low-cost housing, and construction of modern homes is critical (Kargbo, 2020). As a result, the government of Sierra Leone invites investors to engage in the country's housing development. SALHOC is in charge of providing homes for the poor and vulnerable. SALHOC advocates judicious expenditure on low-cost housing to address the issue and make human settlement and cities in the country more sustainable (Kargbo 2020).

In Sierra Leone providing affordable housing is a crucial area considered and prioritized by both private and public sectors. If this is addressed, it will assist in providing dignified accommodation to the poorest in the country (Sierra Leone revised Housing policy, 2006). Although, the Government does not look to address this issue for the growing population. It is because the country cannot provide the data, finances, materials, and expertise in addressing this issue amidst the poor economy.

As a whole, there is little documented work on real estate development in Sierra Leone, let alone on the prospects to sustainable urban real estate development. The reason for this could be; the various state-owned or private Firms and expertise to research this topic may see this area as insignificant. However, understanding the prospects to sustainable urban real estate development, in general, is of great interest to the Government, private companies, and possibly to the broader public.
In view of this background, this paper will assess the prospects to sustainable urban real estate development in Freetown, Sierra Leone.

Statement of the problem

When there is a supporting operation situation among real estate developers, financialinstitutions, and land regulatory firms in

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Freetown, sustainable real estate development may continue. Sierra Leone's real estate business is a growing socioeconomic force. Despite many government transitions, Sierra Leone had no real estate development businesses until 2005, when one was founded. It is impossible to overstate the importance of such firms in ensuring the housing sector's vigorous expansion. Their operations result inimproved design of residential areas and create large numbers of dwellings more effectively.However, these businesses must have simple access to land and auxiliary services and finance at acceptable rates and conditions.

In a study on the importance of real estate in emerging countries' long-term growth, Mouzughi et al. (2014) discovered that public-private partnerships (PPPs) are very appropriate. Such collaborations are beneficial for attracting private sector investment intospecific development initiatives and ensuring that such development is carried out creatively, effectively, and sustainably. However, because the research was qualitative, no empirical findings are available. The study was also examined in the context of a 20-year vision and plan for the country. Similarly, a prospect of real estate markets in China-Challenges and Opportunities, Hongyu et al. (2004) focused on housing supply and housing conditions, development investment, prices, real estate finance, and opportunities. However, the study was a desk review. It did not focus on the sustainability aspect in termsof access to finance, land code of practice, population impacts, and critical technical constraints in the field of real estate.

In a research about developing real estate markets in Sub-Saharan Africa, Odame, W.K.A (2016) states that real estate markets in Sub-Saharan Africa (with the exception of South Africa) share developing market features such as inadequate transaction data, poor data quality, transparency difficulties, valuation norms, and the absence of active international market intermediaries.

Real estate developers' lack of awareness and access to these crucial aspects has harmed their capacity to provide a sustainable and cheap real estate market for the general public.

Simultaneously, from its establishment in 2005 in Sierra Leone, the central Government has given little attention to conducting a broader review of the circumstances of real estate development. As a result, a lack of information has enabled these firms and other development partners not to make educated judgments, and has posed a danger to thereal estate market in the capital city and beyond. Although, governments in other developing countries and realtors have been pushed to consider methods to meet the demand for real estate properties due to a rise in the number of new houses, fast expansion, expanding fast population expansion, movement of people from rural regions, and industrialization (Kenya National Housing Survey, 2011).

Additionally, most of the real estate is provided by the private sector. Still, there are also some constructed by NASSIT through the Government of Sierra Leone. These sectors, however, have catered mainly for the upper-middle and high-income households within Freetown. This point out the need to put mechanisms in place by understanding the real estate prospects in detail, which will allow specific and carefully targeted interventions by investors with the view of speeding up sustainable real-estate delivery, mainly for the urban poor. However, the sector continues to encounter obstacles such as high-interest rates, technical constraints, unfavourable land regulations, rapid population growth in the city, and little know-how of the current state of real estate in the country.

Against this backdrop, this study will be done, focusing on assessing the prospects to sustainable urban real estate development in Freetown, Sierra Leone. The study further provides information on the subject content by answering the central questions of the research.

Objectives of the study

This study aims to assess key prospects to sustainable urban real estate developmentin Freetown, Sierra Leone.
The specific objectives include

- To determine the sources of accessing finance for real estate development.
- To learn how the land code of practice and population influence real estatedevelopment.
- To investigate technical constraints in providing real estate projects in Freetown.
- To make recommendations based on findings.

2.0 LITERATURE REVIEW

Sources of access to finance

One of the most important inputs in the construction of houses is finance. Access to finance is the ability to obtain financial services, which include; insurance, credit, deposit, and payment (Kunt, Beck, & Honohan, 2008). The capital necessary to carry out real estatedevelopment and related operations is known as real estate finance. It's an essential part of modern real estate development, and most large-scale projects would be impossible to complete without it. As a result, real estate development and financing are inextricably linked .It is known that proper housing in any country is due to the systems put in place by instituting a well-functional housing finance system in place will enhance a sustainable real estate in a country(Okonkwo, 2017). Emirkadi (2017) argued that financial sustainability implies that financial policies would still be relevant in the future for this reason. Generally speaking, a company is deemed to be unsustainable if it cannot fund itself over the long run. According to Ibrahim Can (2019), who has a similar perspective, financial sustainability is the long-term financial performance that gives a corporation the capacity to value each stakeholder more than its financial resources and the assurance to ward off potential financial issues.

Zhu (2016) argues that the operation of the housing market in any country will be inadequate if there is no proper housing finance in place in that country. This means that allocation-wise and operationally efficient housing finance systems are needed to ensure sustainability. According to the AfRES 2012 conference, property traders, investors, and practitioners are increasingly interested in investing in Africa in search of higher yields. Nonetheless, as described in the preceding paragraphs,

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problems such as; access to financeand other emerging markets will be challenges to providing sustainable investment in the real estate sector.

Joint Venture, Equity and Debt Financing, Sale-Lease Back Financing, Advance Payment of Key Money, and Sale of Securities are six significant real estate financing strategies utilized across the world, according to Hines (1995). Due to the significant financial expenditure required for real estate development, developers frequently seek outside funding to supplement their equity capital. Large developers are likely to have many financial relationships with various financial institutions (Ogedengbe 2016).

According to CAHF (2013), there are two big stories in the housing finance picture. First, policymakers and practitioners' attention should cut across Africa, since it deserves attention, as the prospective opportunity is relevant. Africa developing mortgage market work hard to expand the reach of Africa's developing mortgage markets. The potential for growth in this sector is substantial, and it merits further attention. Second, mortgage markets have continued to serve the poorer population. Suppose this issue of affordability is not keenly looked at. In that case, the demand for housing in Africa will continue to increase as fewer and fewer people can afford mortgages. If investors do not address the reality of affordability throughout the continent and build their goods appropriately, they will missout on the market. Additionally, Tanzania's housing and mortgage credit markets were bothvery resilient, though the impact of earlier shocks lingered longer in the mortgage lendingprocess. These findings indicate that the sharp rise in housing prices may be a significantconcern for policymakers in particular because it portends a mortgage crisis. (Mushi, 2020). The financial Firms in Kenya fund approximately 20 percent of the country's housing needs and focus mainly on urban areas. In terms of access to finance, the only segment that can benefit is the middle-to-high income earners, which account for about 17,000 mortgages in the country. This demonstrates that the mortgage market is still tiny and out of reach forthe most populace (CAHF, 2012). The developer faces a significant challenge in obtainingfinancing to develop real estate. This is primarily due to economic volatility and thetightening of financial regulations enforced by the majority of banking institutions. This ismade worse because the interest rate structure has made it challenging to fund real estatedevelopment. Because real estate development is a continuing endeavour, it necessitates a sky-rocketing rate on the cash supplied for such reasons (Ezimuo et al., 2014).

Mwathi and Karanja (2017) investigated the impact of different financing sources on real estate development in Kenya and found that mortgage financing is the most widely used source of financing in Kenya. Equity and venture capital were found to be the least used. The data also revealed that mortgage finance and home development had a considerable favorable link. Additionally, a study conducted by Muiruri (2018) indicated mortgage financing and real estate development have a strong favorable association. According to Noppen (2012), mortgage loans and real estate finance are critical in most situations of home investment. Because they ensure transactions are feasible and profitable.

Ogedengbe et al (2016) in their investigation of the issues of funding real estate development in Nigeria discovered that real estate developers in Nigeria use a variety of financing sources. Equity capital, commercial bank loans, merchant bank loans, insurance firms, pension funds, government bonds, and accountancy are examples of these. Equity capital, often known as self-fund, is the most popular, accounting for 40.7 percent of all responses. The importance of real estate finance, particularly home financing, in the real estate industry is growing. In recent years, commercial banks have contributed around 60% of the investment in real estate development. The construction loan accounts for 25% of the total, while the mortgage loan for the forward sale of residential structures accounts for 35% (Hongyu et al., 2004).

A study conducted by NKYI (2012) in Nigeria found out that company age, yearly mean expenditures, and firm size are all positively associated to residential homes built for sale by developers in Nigeria. There are also persistent financial issues, primarily in the medium to long term, that influence developer credit. Barrell and Davis (2006) looked at the circumstance where the credit market isn't ideal because lenders and borrowers don't have enough information. Their models reveal that the property's worth ultimately determines the terms imposed on borrowers. When property values decline, real estate valuefalls in a negative spiral; therefore, lending institutions limit and ration mortgages. However, when land prices rise, majority of the population demand for mortgage and this create the demand for real estate to increase.

In Sierra Leone, before 2006, no specific housing finance institution was in place. Those established to mobilize savings and provide loans such as Sierra Leone Housing Cooperation (SALHOC) saving and loan facility have not taken off. Housing finance has primarily come from households' resources and other informal sources. Government attempts at the construction of housing have not been sustainable nor affordable (Sierra Leone revised Housing policy, 2006). Despite effort by the government to shorten the gap among financial institution and the interest for house loans by families, Sierra Leoneans continue to struggle to access the financial sector. As of 2018, the banking and non-bankingsectors of the country's financial service providers include; 68 exchange bureaus, 25 creditonly microfinance institutions, 95 financial service associations, 14 commercial banks, 17 community banks, 11 insurance companies, and two mobile financial service providers. (Sierra Leone's Central Bank (2020) Financial Services Report).

Commercial banks alone account for about 24.4 percent of Sierra Leone's GDP with ashare of Le 8.5 trillion and it is regarded as the leading financial sector in Sierra Leone, the microfinance industry grew significantly, becoming a key source of financing for low- income people. This was mostly due to the government's attempts to encourage financial inclusion as a vehicle for promoting growth and sustainability in the housing and banking industries (African Housing Finance year book CAHF 2020). In Sierra Leone, data for housing development and finance are unavailable sometimes and are very difficult to access.As a result, investors and decision-makers are unable to offer a housing stock for the most vulnerable people

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(African Housing Finance yearbook CAHF 2020). According to the same research, First Bank of Nigeria, Access Bank, and Commerce and Mortgage Bank Sierra Leone Limited offer mortgage loans to anyone looking to buy a home in the Western Area, but these banks mostly caters to high-net-worth individuals.

Land code of practice and population impacts

Land code of practice

According to the Scottish land commission, land code of practice cover issues such late rent payments, rights, and consenting to and recording tenant developments are all examples. They give a framework of processes and behavioural expectations that serve as afoundation for productive discourse. Land purchase is frequently the first substantial investment made by a real estate developer in a project. The character of a project is influenced by site selection, which is critical to success. However, the site acquisition process may be frustrating and unexpected since numerous circumstances, many of which are outside the control of the real estate developer, can impact its achievement. However, putting a well-researched land acquisition strategy is as a result of number of factors that'sneeds to be put in practice, and many of these factors are beyond the developer's control, and it is there that the process different, a lot relies on the possibilities available. (Adtokunboh et al. 2013).

The political economics of land in Africa is complicated because it includes emotionaland cultural bases in addition to institutional, financial, and economic ones. In reality, poor urban planning and strategy has made the land problem worse by upsetting the harmony between the urban and rural landscapes. The majority of urban growth in Africa is the result of the quick, haphazard, and low-density colonization of peri-urban and rural territory (Bahet al, 2018).

A study carried out by Kazimoto (2016) focused on challenges facing real estate investment and economic growth in Arusha. The study uses a purposive sampling and gathered data from 87 people. It recommends that reforms and improvements on land laws for requisition, registration, and communication infrastructure are key to solving the land code of practice challenges. Similar view was also noted by Muiruri (2018) that reforming and improving land laws for requisition, registration, and communication infrastructure are vital to the land code of practice.

Hesse (2014) study examined on Land for logistics: locational dynamics, real estate markets, and political regulation of regional distribution complexes. Rising locational rivalry leads to faster land consumption and dispersal, according to the study. Not only arecommodities flows being 'mobilized,' but also logistical infrastructure. Meanwhile, studieshave shown that land scarcity, regulatory hurdles, season, and regulatory processes relatedto planning, property development, and the construction process can all impact housing supply responsiveness. (Grimes, Hyland, Coleman, Kerr & Kerr, Collier, 2013). Another study conducted by Kazimoto (2016) found out that that accessibility and communication, pricing variance, land value and taxation policies, bureaucratic interest rates, government policies, economic growth, improved rent value, and consumer choice have all beenobstacles to real estate investment. However, they have also led to many challenges, such as ownership claims that aren't documented are also suspect (Fekade 2000).

Informal land markets can assist in the provision of low-cost land. The market, on the other hand, is marked by high transaction costs and property rights are also flawed in other cases. Other issues include ineffective information about accessible land; this pushes peopleto communicate by word-of-mouth, increasing the danger of fraud. (Kironde et al., 2003). As a result of these challenges, the majority of land in nations is unsuitable for real estate investment since they are inaccessible. Developers choose the optimal time because land isa desirable option for conversion or reconstruction rather than an asset that could be built on at any point in the future (Brown and Opong, 2012). Bah et al. (2018) further stated thatthe insufficient capacity present in both central and local governments—including weak land administration systems, dysfunctional cadaster systems, outdated equipment to map available land for urban development and housing, outdated land registries, and a lack of computerized land titling systems—prevents governments from having a good idea and measurement of the amount of land available for various purposes. Blockchain use in land administration might aid in addressing problems like inefficiency, fraud and corruption, and trust difficulties. There are several ways that inefficiencies appear. Due to the apparent inefficiency of the land and title registers' covering (Sarri et al, 2022).

According to Satsangi et al. (2006), landowners' desire to develop affordable housing on their land exists, but not uniformly. Planning rules or zoning, at 41%, lack of appropriate funds, at 25%, lack of suitable service supply, at 18%, and the remaining percentage a conglomeration of lesser variables is some of the key causes that hinder or prohibit propertyowners from developing their excess properties.

Sierra Leone revised housing policy act of 2006 explained that Land delivery for housing in Sierra Leone has legal, administrative, technical, and capacity elements that constrain the speedy delivery of land for housing and the overall development of the country. According to this statutory document, the main land delivery issues are; There is alack of measures which are aimed at controlling the way title to land is established which will also make land registration mandatory, the formal and informal land markets in Freetown in particular, and in the province, in general, are disorganized and are plagued bya dearth of information, there is an over-centralization of land administration procedures in Freetown leading to inefficient management and a slow adjustment of supply to demand in the land market, the existing policy for the allocation of State lands in Freetown isinequitable. This makes State lands accessible mainly to the rich and influential in society and largely excludes the poor, and also varies in prices per location within the Western Area.In addition, land management in Sierra Leone is difficult, according to the World Bank's Doing Business report for 2020. Colonial or freehold land and customary or leasehold landare the two types of land tenure in Sierra Leone. Foreigners are not allowed to possess landin either of these systems, although they are able to lease it for up to 99 years. Obtaining leasing rights is challenging because there is no structure in place to establish

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ownership. Inthe World Bank's 2020 Doing Business index, Sierra Leone is placed 163rd out of 190 countries. It takes 56 days to register a property in the United States, compared to 51.6 daysin Sub-Saharan Africa. Property registration costs 10.6% of the property value in Sierra Leone, compared to 7.3 percent in Sub-Saharan Africa.

Population Impacts

The housing sector of a country may enhance public health, spur economic growth, and have far-reaching social implications. The greatest housing sectors should be able to provide enough shelter to people from all walks of life. Slums are home to one billion people or one-third of the world's metropolitan population. (Warnock, 2014). Therefore, changes inpopulation size have resulted in rapid increases in the number of households, the basic unitfor which shelter is provided and has affected the prospects to sustainable urban real estate development when the demand for the population is not met.

The relationship between population size and wealth creation is the focus of Edwin Cannan's 1924 theory of the optimal population. The ideal population is the one that, whencombined with the nation's other resources or means of production, will result in the highestreturns or revenue per capita. In light of these presumptions, the ideal population size is one at which the highest income per person is achieved. Income per capita will decrease with every increase or decrease in population size above or below the optimal level. There is a certain population size that corresponds to the highest per capita income given the stock ofnatural resources, the method of production, and the stock of capital in a nation. This theoryapplies to this research since it examines how a country's economic circumstances relate to its demographic concerns. Affordable housing is a financial issue for the population in the study area, but supplying it through responsible urban real estate development would ease the strain on household income.

The population of Africa has increased significantly in recent decades, growing by anaverage of 2.53 percent year between 1950 and 2015. (UN Population world prospects, 2015). In the ensuing forty years, it is anticipated that this tremendous increase would persist. Africa's population is expected to increase from 1.18 billion in 2015 to 2.44 billion in 2050, according to the most recent estimates. Despite the fact that 60% of Africans live in rural regions, the rate at which rural residents are moving to urban areas is concerning. The world's highest rate of urbanization occurred from 2000 and 2015, when it averaged 3.5percent. By 2037, it's anticipated that more than half of Africans would live in urban areas (UN Population world prospects, 2014). Similarly, the Real Estate 2020: Building report viewed that the demand for real estate and other sorts of real estate will be fueled by Africa'syouthful population. Urbanization will continue to be formed; existing cities will expand, and recent ones will be formed as well.

According to the 2015 Census, the population of Sierra Leone has increased from 4,976,871 to 7,092,113; 1.6 households per house have been recorded in Sierra Leone basedon the report, and it showed a vast difference from the south to the western area of about 1.4 and 1.5, respectively. (SLPHC, 2015). Similarly, Rajwayi (2016) asserted that the demographic profile predicts available possibilities in emerging nations. Because each home or family has an average of four or more people, there is more attraction for the development of more shelter to accommodate the population, and because most economiesare capitalist, there are more individuals staying in apartment units than there used to be when whole families stayed together in the early modern era. Thus, the worsening global economic situation, increased poverty, and rise in unemployment have urged people to go in for any type of shelter without considering the basics of an apartment. The situation alsoresulted in the rise in the price of land for housing. Overcrowding is an even greater problemwith significant increases in persons per dwelling unit and per room (Rajwayi, 2016). Another key driver supporting the future expansion of the housing market, according to Hongyu et al. (2004), is the present floating population in metropolitan areas, which includes migrant workers and seasonal employees. Nonetheless, policymakers and developers continue to overlook housing issues for this group of people.

Rajwayi (2015) discovered that increasing demand for real estate in a given location leads to more excellent construction activity, which is often expedited, resulting in an increase in property supply in that area. However, when real estate is affected by a disaster, it disturbs the spatial dimension of metropolitan areas due to important factors like land loss,societal collapse, and changes in population distribution brought on by refugee movements. These factors then have an impact on properties and cause a change in equality. In this light,accurate spatial imbalance monitoring is a crucial tool for establishing socio-spatial sustainability through recovery initiatives. (Azzam et al, 2022).

Approximately 70% of the population lacks access to basic human necessities, while 26% are poor, according to the Sierra Leone Poverty Reduction Strategy Paper (PRSP). The proportion increases when non-food basic needs are taken into account. These include access to schools, health facilities, markets, and public transport.

In place of the aforementioned, the Real Estate 2020: Building the future report said that demographic changes will profoundly influence the demand for real estate. Urban middle-class populations are expanding in Asia, Africa, and South America, and they will require a lot more housing. Ageing populations in industrialized economies will need specialized real estate, but their needs for single-family dwellings will decline.

Technical Constraints

Howick et al. (2009) noted that most disruptions can be foreseen and efficiently planned for during the project's planning stages in delivering real estate projects. A few examples include defects and liabilities, normal errors in calculation by the project teams, monitoring team oversight issues, especially if the project is in a far-off jurisdiction, and many others. McMullen (1998) cited in Lau et al. (2006) constraints were divided into twogroups: those having a lower impact and those with a higher result. He claimed that there are numerous lower impact limitations in every circumstance but just one or a few more significant affect constraints. The restrictions with the greatest influence are referred to as core difficulties or fundamental causes. He claimed that because time

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is everyone's primary limitation, keeping an individual's or management's attention on recognizing and acting onthe more significant impact restrictions will help them make better use of their limited time. In research on the role of development financial firms in real estate in Kenya, Ngumi (2015) found out that key constraints in delivering real estate projects are mobilization, delayed approval and disbursement, poor sales, cost escalation, and inefficient professionalteam. His study also points out that, only a few (33%) identified that they can mitigate theseconstraints and therefore requested external support in key areas which are; to offer aprequalified list of employees, reduce conditions precedent (CP), join in as an equity partner, capacity building and Improve access to SMEs. These constraints are due to cost overruns, inflation, inaccurate material estimation, and degree of complexity, according toa study by Kaming, Olomolaiye, Holt, and Harris, (1997). Other obstacles identified in this study were financial and payment issues, inadequate planning, bad site administration, and insufficient experience.

Al-Kharashi and Skitmore (2009) noted that unskilled labor for skilled roles could delay building projects. Delays in attaining building permits, changes in scope, and poor implementation can all cause delays in project implementation. Bhavsar et al. (2020), in their research, identified key technical constraints in a construction project which are: practicability of completing the projects in a given duration, delays in solving designs problems, inappropriate project cost estimation, imperfect drawing and details, inappropriate power delegations, unavailability of skilled engineers and program managers, established labs for materials testing (present or not at the place of execution), unavailabilityof storage space, restricted site area, poor coordination between different agencies, improperresource levelling, and poor planning and design.

According to Lau et al. (2006), coordination of service activities is a technicalconstraint in construction. Following up on the conversation, they indicated that technical constraints had the lowest grade among the economic, social, and legal restrictions. If technical obstacles can be overcome during the design phase, they won't be a problem during construction; however, this type of technical constraint can consume a significant amount of design engineers' time before the start of construction, and new technical limitations may emerge from the actual working environment (Lau et al, 2006).

Dullisear (2001) and Newell and Steglick (2006) highlight**ed** a few constraints associated with the real estate development process as follows:

Pre-construction Constraints: the major Constraint is the experience of the developer and builder; so, a developer with a track record of successful constructions will be in a better position. Assess the project's location and variables, as well as the timing of its presentationto the market, to determine market Constraints. The most essential Constraint in the development process is feasibility Constraints; it is used to analyze project feasibility and determine whether they should be rejected or accepted.

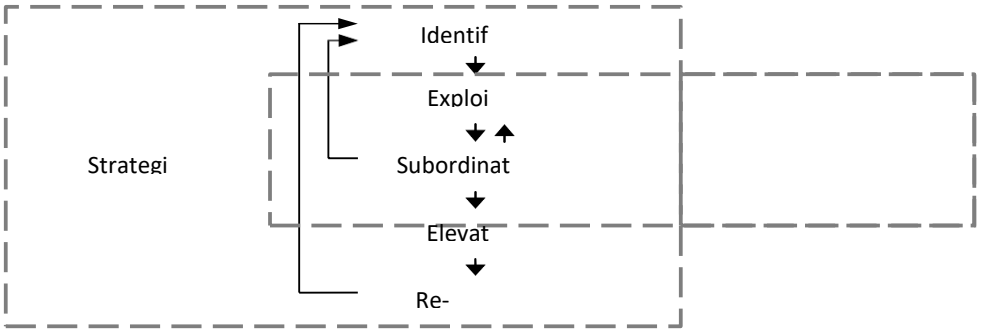
Financial Constraints, Building Contract Constraints, Acquisition and Land Cost Constraints are all part of the contract-negotiation phase. Measures must be taken throughout the contract negotiating phase to ensure that contractual responsibilities are understood and followed.

Constraints of Formal Commitment: This is an important stage in the development process. At this point, all contracts have been signed. For example, all renters' leases have been signed, and they know when they will be able to move in.

Construction Constraints: one of the most difficult stages to complete, it is linked to cost overruns, scheduling delays, and project management constraints. The work may fail if these constraints are not properly mitigated.

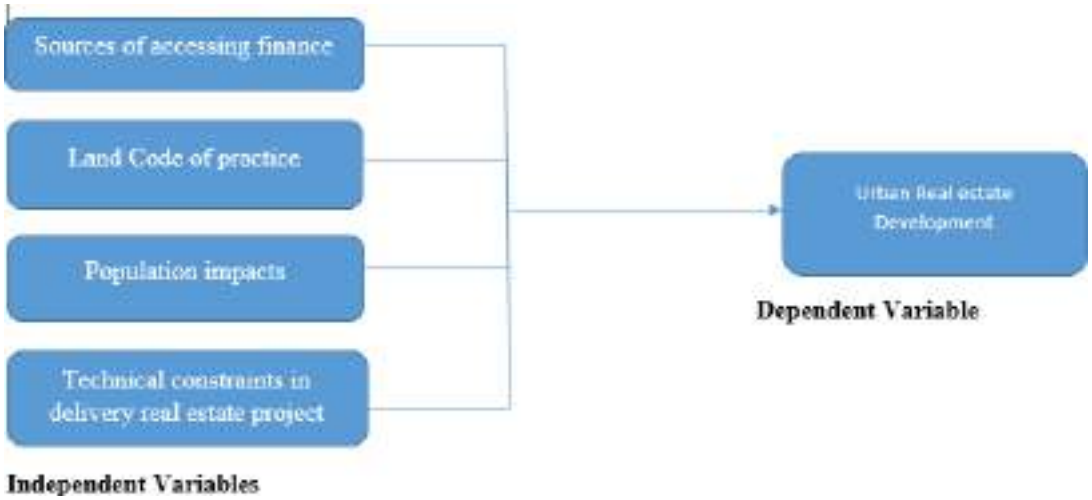
Post-construction Constraints: are concerned with delivery time constraints, and the development must be sold at a profit if it is to be sold. The constraints connected with formalcommitment, construction, and post-construction phases are more important to real estate property developers' start-ups. Banks need to know about the constraints that come with constructing a property in order to price it and reduce them. As a result, borrowing costs aretypically high Goldratt's (1990) approached the Theory of Constraints (TOC) which is a method for identifying and reducing limitations in organizational processes that are impeding the achievement of organizational objectives. Anything that prevents an organization or institution from progressing toward or attaining its goal is referred to as a limitation. TOC logic is an important part of the organization's continuous improvement philosophy. It's used to figure out what's preventing an organization from reaching its objectives, come up with a solution, and get people involved in the process to invent the necessary adjustments for themselves. The TOC application process is broken down into five phases (Goldratt, 1990).Finally, Goldratt’s theory of constraints outlines a five-step technique for finding and reducing conditions, known as the five focusing steps. These include the steps of identifying, exploiting, subordinating, elevating, and repeating. See as outline in the figure below;

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Source: Five Steps of Theory of Constraints (TOC) (Goldratt 1990)

Figure 1: Five steps theory of constraints



Conceptual Framework

(Source: Author, 2022)

Figure 2: Conceptual Framework

The dependent variable, urban real estate development will be determined by how these firms have access to finance, influenced by land code of practice and population impact, and the technical constraints face in delivery real estate project. All of these will be from the independent variables, for instance access to finance and land due to favourable land regulations within the country will ultimately provide affordable housings and will keep the real estate industry sustainable in a country

3.0 METHODOLOGY

Research Design

This research utilized a case study design, used quantitative data to collect data on sustainable urban real estate development in Freetown, Sierra Leone. The study collected detailed information from respondents through purposive non-probability sampling at firm levels to assess the prospects for sustainable development. Quantitative research strategies was employed to understand the sources of accessing finance for real estate development, land code of practice and population influence, technical constraints in real estate project delivery, and the state of urban real estate development in the country. A semi-structured questionnaire was administered to respondents in different real estate firms. The data collected was coded and analyzed using descriptive and inferential statistics using statistical packages for social science (SPSS 20.0) and Microsoft Excel 2017.

Data Collections

According to Leedy and Ormrod (2001), data collection is the act of acquiring research information regarding a certain study to determine the truth. Any form of research project relies heavily on data collection. Inaccurate data collection might skew the outcomes of an inquiry and lead to incorrect conclusions. Primary data was collected through the administering of semi-structured questionnaires. For this research, 130 employees from 11 private and government real estate firms who were identified through the listing process across different real estate firms in the city for the quantitative study. Out of the 130, a minimum sample size of 100 respondents overall was selected purposefully based on their experience and position held in their firms. This makes a total of 76.92% of the sample frame used for administering the quantitative questionnaire. For each firm, a letter was written to the authorities about the data collection exercise, and the purpose of the research was clearly clarified. After confirmation from the sources, the researcher makes a familiarization visit to all the firms and begins the proper data collection process for the semi-structured questionnaire through Google Forms, which was shared directly with the respondents.

Data Analysis

LeCompte and Schensul (1999) define qualitative research as the process of reducing and interpreting data to understand a story. This study utilized quantitative methodologies, including

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interviews and questionnaires, to collect data. The data was then analyzed using statistical tools, edited, coded, categorized, and tabulated to ensure its accuracy and usefulness.

The data was quantitatively analyzed using descriptive and inferential statistical analysis. For the descriptive analysis, mean, standard deviation, and percentage were used and were presented in the form of tables, frequencies, graphs, and charts. This was done through the use of Excel 2017 and the Statistical Package for Social Science Research (SPSS 20.0) computer software to analyze and evaluate data in order to conclude.

The inferential analysis includes a correlation coefficient and multiple regressions to determine the strength between independent variables and the dependent variable. The correlation coefficient (r) denotes the strength and direction of the association. SPSS 20.0 was used to determine the association.

The multiple regression model mentioned below was used to determine the relationships between these variables.

$Y = \beta 0 + \beta 1G1 + \beta 2G2 + \beta 3G3 + \beta 4G4 + \varepsilon$

Y = Real Estate Development$\beta 0$=Constant

G1=Access to finance

G2=Land code of practiceG3=Population Impacts

G4=Constraints in delivering real estate projects$\beta 1$, $\beta 2$, $\beta 3$, $\beta 4$ = Coefficient of determination

ε=Standard error

4.0 RESULTS AND DISCUSSIONS

Socio-demographic Characteristics of Respondents

Socio-demographic characteristics here mean the different variables that make up the respondents and the firm. It covers sex, age, marital status, levels of formal education attained, employee duration in the firm, institutional category, and firm units of housing. These variables are presented below in table 1 with their findings.

Table 1: Socio-Demographic Characteristics of Respondents

Variables		Frequency	Percentage (%)
Gender	Male	68	69.4
	Female	30	30.6
	Total	**98**	**100**
Age	21-30	42	42.9
	31-40	42	42.9
	41-50	7	7.1
	Above 50	7	7.1
	Total	**98**	**100**
Level of Education	Senior Secondary School	17	17.3
	Undergraduate	70	71.4
	Masters	11	11.2
	Total	**98**	**100**
Firm Category	Privately Owned	84	85.7
	Government Owned	14	14.3
	Total	98	100
Employee Duration	1-2 years	30	30.6
	3-4 Years	46	46.9
	5-6 Years	13	13.3
	Above 6 Years	9	9.2
	Total	**98**	**100**
Units of housing constructed	Less than 100 units	86	87.8
	More than 100 units	12	12.2
	Total	**98**	**100**

Field survey data, 2022

Firstly, table 2 above indicates that 69.4% of male respondents were interviewed, while 30.6% were females. This finding concludes that there are likely more male employees employed in real estate firms than females.

Secondly, 42.9 percent are within the age bracket of 21–30 years, and 42.9 percent are between the ages of 31 and 40, respectively, while only 7.1 percent are between the ages of 41 and 50, and only 7.1 percent are beyond 50. This indicates that the vast majority of those questioned were adults.

In view of the respondent level of education, 71.4 percent of respondents interviewed have attained an undergraduate level of education, while 17.3% have attained senior secondary school and 11.2% have attained only a master's degree level. These findings showed that respondents interviewed have attained a sufficient education level that will likely provide sufficient information for this study.

Morever, 85.7% of respondents interviewed are employees of privately owned real estate firms, while 14.3% are employees of government-owned real estate firms. According to the data,

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there are likely more privately owned real estate firms in Freetown than government-owned real estate firms.

Findings from this study indicated that 46.9% of respondents interviewed have spent between 3 and 4 years in the firm, while 30.6% have spent 1-2 years. Others include 5–6 years, 13.3%, and above 6 years, 9.2%. According to these findings, the majority of the respondents interviewed have been with the firm for more than two years and are likely capable of providing sufficient and accurate information on real estate in the city.

Finally, a majority (87.8%) mentioned that their firm has fewer than 100 units of housing, while only 12.2% indicated that their firm has more than 100 units of housing. This finding simply states that real estate firms in Freetown have a limited number of housing units and are likely the reason for real estate not solving the housing challenge in the city

Sources of finance

In this research, sources of finance refer to where a business gets money to fund its real estate firm. Respondents were asked to state their level of agreement with statements on the sources of finance for real estate development, and their responses are explained in table 2 below.

Table 2: Sources of finance

Source	N	Mean (M)	Std. Deviation (S.D)
Equity/Self-fund	98	2.30	1.007
Commercial Bank Loan	98	3.68	1.011
Pension Fund	98	3.92	0.858
Government bonds	98	3.26	1.303
Joint venture	98	3.83	0.885
Mortgage loans	98	3.90	1.030
Merchants bank loans	98	4.00	0.812
Valid N (listwise)	98		
Cumulative Score		3.56	0.99

Field survey data, 2022

Table 2 above indicated that respondents disagreed with the different sources of finance for real estate development, with a cumulative score of M=3.56 and S. D=0.99. Respondents are neutral to the statements of government bonds, with a score of (M = 3.26,

S.D = 1.303). The respondents disagreed with the statements that firms are using merchant bank loans, mortgage loans, pension funds, joint ventures, and commercial bank loans as sources of income, as shown by a Mean (M) score of 4.00, 3.90, 3.92, 3.83, and 3.68, respectively, and a Standard Deviation (S.D) of 0.812, 1.030, 0.858, 0.885, and 1.011, respectively. Furthermore, respondents strongly agreed that equity capital (self-fund) is themost common source of finance for real estate development. This is shown by a score of (M=2.30, S. D=1.007). This finding indicate that equity capital, or self-fund, is the mostcommonly used source of finance, and it is likely to be the case because most of these firmsare owned by private individuals with little or no support from the government. These findings also agree with Ogedengbe et al. (2016) in their investigation of the issues of funding real estate development in Nigeria that equity capital, often known as self-fund, is the most commonly used.

Obstacles to access finance for a real estate development

Obstacles to access finance refer to the various means by which firms cannot access finance to expand their firms. Respondents were asked to state their level of agreement withstatements on the obstacles to accessing finance for real estate development. Their responsesare explained in table 3. Table 3 below reveals that respondents strongly agreed with the statement on the obstacles to accessing finance for real estate development, with a cumulative score of (M=2.42, S. D= 1.193). Respondents agreed to the following statements as obstacles to accessing finance for real estate development: company age (M = 1.70, S.D= 1.047) and strongly agreed to the following statements: insufficient financial statements (M = 2.46, S.D = 1.228), company size (M = 2.05, S.D = 1.228), and short track record (M= 1.97, S.D = 1.296). Also, respondents were neutral to the following statements: lack of experience, higher financing costs, and lack of collateral, with a mean score of 3.03, 2.93, and 2.74, respectively, and a S.D of 1.107, 1.067, and 1.096, respectively. This study found that real estate firms face numerous challenges, which has likely resulted in a lack of financing or loans to expand their businesses and meet the growing demand for housing in the city overtime. This study supported the view by NKYI (2012) in Nigeria which found out that company age, yearly mean expenditures, and firm size can all contribute to residential homes built for sale by developers.

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Table 3: Obstacles to access finance for a real estate development

Obstacles	N	Mean (M)	Std. Deviation (S.D)
The Company Size	98	2.05	1.342
Finance statement that is insufficient	98	2.46	1.228
Short track record	98	1.97	1.296
The company Age	98	1.76	1.158
Lack of experience	98	3.03	1.107
Lack of collateral	98	2.74	1.096
Higher financing costs	98	2.93	1.067
Valid N (listwise)	98		
Cumulative Score		2.42	1.193

Field survey data, 2022

Land Code of practice and population impacts

Land code of practice

This sub-section provides a detailed explanation of how the land code of practice influences real estate development in the City of Freetown. Additionally, this subsection explains the land acquisition challenges faced by real estate firms. The land code of practice in this research is the framework of procedures and proscribed behaviour which provide a basis for constructive dialogue on land issues by real estate firms.

Land Code of practice influence on real estate development

Respondents were asked to state their level of agreement with statements on land code of practice influence on real estate development. Their responses are explained in table 4 below.

Table 4: land code of practice influence on real estate development

Statements	N	Mean (M)	Std. Deviation (S.D)
land code of practice influence real estate development	98	1.52	0.578
The current National Land policy for the allocation of land does not influence realestate development	98	3.69	1.549
lack of awareness about land code of practice procedures influences real estate development	98	1.41	0.623
The no- decentralization of land administration in Freetown influenced real estate development	98	1.60	0.570
State lands are very difficult to access and therefore have an influence on realestate development	98	1.74	0.562
Valid N (listwise)	98		
Cumulative Score		1.99	0.660

Field survey data, 2022

Table 4 above shows that respondents strongly agreed with the statements that land code of practice influences real estate development, with a cumulative score of (M= 1.99, S.D=0.660) In viewing these statements, respondents are neutral that the current national land policy for the allocation of land does not influence real developments of about (M=3.69, S.D=1.544). Furthermore, respondents agreed that the lack of decentralization ofland administration in Freetown influences real estate development. State lands are very difficult to access and have an influence on real estate development. Land code of

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practice influences real estate development and lack of awareness about land code of practice procedures influences real estate development, as identified by mean scores of 1.74, 1.1.60, 1.52, and 1.41, respectively, and standard deviations of 0.562, 0.557, 0.578, and 0.623. Thisresearch suggests that the city's land code has a significant impact on real estate development. Therefore, this finding is in line with the Sierra Leone revised housing policyof 2006 that stipulates that land delivery for housing in Sierra Leone has legal, administrative, and technical elements that constrain the speedy delivery of land. This could have been as a result of the many measures which are aimed at how land is controlled and owned in the city due to the different land tenure systems in the country.

Land Acquisition Challenges

Respondents were asked to state their level of agreement on land acquisition challenges faced by real estate firms in real estate development. Their responses are indicated in Table15 below.

Table 5: Land Acquisition Challenges

Statements	N	Mean (M)	Std. Deviation (S.D)
Lack of adequate and reliable data	98	1.74	0.483
No fixed land prices	98	1.84	0.398
Difficult procedures in registering land	98	1.77	0.450
Land owned by the extended family is very difficult to acquire	98	1.61	0.586
Conflict over land	98	2.18	0.912
Valid N (listwise)	98		
Cumulative Score			1.820.565

Field survey data, 2022

Findings from respondents in table 5 above showed that respondents strongly agreed that real estate firms faced land acquisition challenges in real estate development, with a Cumulative score of (M=1.82, S. D=0565). Furthermore, respondents strongly agreed that there is conflict over land (M = 2.18, S.D = 0.912), that there are no fixed land prices (M = 1.84, S.D = 0.39), and that land owned by extended family is extremely difficult to acquire(M = 1.61, S.D = 0.586). This finding suggests that respondents believe that land acquisition challenges, in general, have a significant impact on real estate development in the City of Freetown. This could have been a result of the land tenure systems and security in the city.This research is in line with the World Bank's (2020) doing business report that says land administration in Sierra Leone is challenging.

Populations Influence

This sub-question explains how population influences real estate development in the city. Respondents were asked to state their level of agreement with the statements providedin the table below on how population has influenced real estate development in the city.

Table 6: Population influence on real estate development

Statements	N	Mean (M)	Std. Deviation (S.D)
The increase in population influences real estate development in Freetown	98	2.33	0.822
The demand for housing in the city influences real estate development	98	1.93	0.853
The Household size influence real estate development	98	2.22	0.880
The Population age structure influence real estate development	98	1.59	0.800
Valid N (listwise)	98		
Cumulative Score		2.01	0.838

Field survey data, 2022

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Table 6 above indicated that respondents strongly agreed that population influence real estate developments, with a cumulative score of (M=2.01, S. D=0.838). These were followed by the statements: the increase in population influences real estate development in Freetown (M = 2.33, S.D = 0.822), the household size influences real estate development (M = 1.93, S.D = 0.853), and the demand for housing in the city influences real estate development (M = 2.02, S.D). Respondents agreed that population age structure influences real estate development (M = 1.59, S.D 0.800). This finding is in line with Rajwayi (2016) that the demographic profile predicts available possibilities in an emerging nation. Because each family or home has an average of four or more people, there will be a greater demand for more dwellings to house the population. This could have been as a result of widespread poverty, which has incurred greater desperation for affordable shelter for the growing population which has not been sustainably met over the years.

Technical Constraints

This section collects information from respondents on technical constraints in the delivery of real estate projects. Respondents were asked to state their level of agreement with the statements on technical constraints identified in project delivery and real estate development. To further understand this section, they were further asked to comply with the statements in which phase of the real estate development cycle did the real estate firm face more technical constraints. Their responses are presented in the sub-sections below.

Constraints in real estate delivery

Respondents were asked to state their level of agreement on constraints in real estate delivery. Their responses are indicated in Table 7 below.

Table 7: Constraints in real estate delivery

Statements	N	Mean (M)	Std. Deviation (S.D)
Poor coordination between different Agencies	98	1.85	0.484
Delayed approval and disbursement	98	1.85	0.615
Poor sales	98	1.93	0.677
Inefficient professional team	98	3.14	1.324
Poor site management	98	2.96	1.300
Improper planning and design	98	3.01	1.373
Estimation of project costs that is incorrect	98	3.01	1.089
Fluctuation in prices of building materials	98	1.80	0.453
Valid N (listwise)	98		
Cumulative Score		2.07	0.857

Field survey data, 2022

Table 7 above indicated that respondents strongly agreed to the statements' technical constraints in real estate delivery with a cumulative score of (M=2.07, S. D=0.857). Respondents strongly agreed that poor sales, with a (M=1.93, S. D=0.677), poor coordination between different agencies, delayed approval, and disbursement of budget are key technical constraints in real estate delivery, with a score of (M=1.85, S. D=0.484 and 0.615). Furthermore, with a score of (M=3.14, 3.01, and 3.01, and S. D= 0.677, 1.373, and1.089), respondents are neutral to the statements; inefficient professional team, improper planning and design, poor site management, and incorrect project cost estimation. This finding is in agreement with Ngumi (2015) that poor sales, delayed approval and disbursement are among the key constraints faced in real estate development projects. These constraints could have likely resulted for the real estate sector not to meet the standard that will provide sustainable real estate for the growing population.

Constraints in real estate development phases

Respondents in table 8 below strongly agreed with the statement on the phases in which they face constraints in real estate development with a cumulative score of (M=1.99 and S. D=0872). The respondents strongly agreed to the statements; constraints in the contract negotiation phase(M = 2.46, S.D = 1.057), constraints in the pre-construction phase (M = 2.01, S.D = 1.126), construction phase (M = 1.83, S.D = 0.477), constraints in the formal commitment phase (M = 1.69, S.D = 0.830) and These findings show that in real estate development, technicalconstraints are faced in all the phases of the real estate development phase.

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Table 8: Constraints in real estate development phases

Phases	N	Mean (M)	Std. Deviation (S.D)
Pre-Construction Phases	98	2.01	1.126
Contract Negotiation Phase	98	2.46	1.057
Formal Commitment Phase	98	1.69	0.830
Construction Phase	98	1.83	0.477
Valid N (list wise)	98		
Cumulative Score		1.99	0.872

Field survey data, 2022

State of Real Estate Development

These sections provide information from respondents' statements about the state of real estate in the city. Their responses are indicated in Table 9 below.

Table 9: State of Real Estate Development in the City

Statements	N	Mean (M)	Std. Deviation (S.D)
Real estate contributes to the increased income of real estate firm in the country	98	1.89	1.183
Real estate contributes to the country's National Economy	98	1.50	0.865
Real estate is only provided for the rich and affluence in the city	98	1.74	0.803
Real estate provides job opportunities to citizens in Freetown	98	1.55	0.863
The Government is closely working with real estate firms in the city	98	3.78	1.240
The know-how to construct modern and affordable housing by real estate firms is Limited	98	3.17	1.103
Valid N (listwise)	98		
Cumulative Score		2.27	1.009

Field survey data, 2022

Table 9 above indicated that respondents strongly agreed on the state of real estate in the city, with a cumulative score of (M=2.27, S. D= 1.009). Respondents disagreed with the statements that the government is closely working with real estate firms, with a score of (M=3.78, S. D=1.240). The statements about how to construct modern and affordable housing by real estate firm respondents were neutral, with a score of (M=3.17, S. D=1.103).Finally, respondents agreed with the statements that real estate is only provided for the richand affluent in the city, real estate provides job opportunities to citizens in Freetown, and real estate contributes to the country's national economy with a score of (M=1.74, 1.55,1.50and S. D=0.803, 0.863, and 0.865). Respondents strongly agreed with the statements that real estate contributes to the increased income of real estate firms, with a score of (M=1.89, S. D=1.183). This finding shows that despite real estate being an emerging socio-economic force in the city, it has really been challenged in providing sustainable and affordable real estates for the vulnerable poor, and government efforts towards enhancing cordial relationships between real estate firms are very limited.

Inferential Analysis

This study used inferential analysis, which includes correlation coefficient and multiple regressions to determine the strength of correlation between independent variablesand the dependent variable.

Karl Pearson's Correlation Coefficients

The Karl Pearson correlation coefficient was used to determine the association, strength and nature between the dependent variable and independent variables. Table 10 provides details analysis of this.

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Table 10: Karl Pearson's correlation coefficients

		Sources of finance	Land code of practice	Population Impact	Technical Constraints	Urban Real Estate Development t
Sources of finance	Pearson Correlation	1	.231*	.164	.260**	.227*
	Sig. (2-tailed)		.022	.107	.010	.025
	N	98	98	98	98	98
Land code of practice	Pearson Correlation	.231*	1	.564**	.493**	.096
	Sig. (2-tailed)	.022		<.001	<.001	.347
	N	98	98	98	98	98
Population Impact	Pearson Correlation	.164	.564**	1	.695**	.248*
	Sig. (2-tailed)	.107	<.001		<.001	.014
	N	98	98	98	98	98
Technical Constraints	Pearson Correlation	.260**	.493**	.695**	1	.422**
	Sig. (2-tailed)	.010	<.001	<.001		<.001
	N	98	98	98	98	98
Urban Real Estate Development	Pearson Correlation	.227*	.096	.248*	.422**	1
	Sig. (2-tailed)	.025	.347	.014	<.001	
	N	98	98	98	98	98

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

As indicated in table 10 above, the study computed the association between the variables using Karl Pearson's coefficient of correlation (r). The correlation index, when determined to understand the dependent and independent variables' association, showed that sources of finance, population impact, and land code of practice have a weak positive association withurban real estate development. This is shown by a correlation coefficient of 0.227, 0.248 and 0.096. Technical constraints showed a moderate positive association with urban real estate development with a correlation coefficient of 0.422.

These findings from the correlation coefficient suggest that sources of finance, population impact and technical constraints are statistically significant because the sig- value; sources of finance (0.025), population impact (0.014), and constraints in real estate delivery (0.001) are less than 0.05 (P<0.05) whiles land code of practice (0.347) in statistically insignificant (P>0.05). This view is similar to Mururui 2013 that access to finance, land regulations are key players in the real estate sector.

Multiple Regression

The multiple regression analysis was used to determine the strength of the associationbetween the dependent variable and several other predictor variables. Table 17 provides details information on this analysis.

Considering the equation $Y = \beta0 + \beta1G1 + \beta2G2 + \beta3G3 + \beta4G4 + \varepsilon$Y=1.593+0.126+0.009+0.096+0.007+ ε

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Table 17: Multiple Regression Analysis

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	1.593	.660		.1512.414	.021
Sources of Finance	.126	.145		.151.873	.039
Land code of practice	.009	.220		.008.041	.968
Population Impact	.096	.201		.099.479	.634
Technical constraints	.007	.254		.005.028	.048

a. Dependent Variable: Urban Real Estate Development

However, all the independent variables are considered in this regression equation. If all four independent variables (Sources of finance, land code of practice, population impact, and technical constraints in real estate delivery) are at zero, urban real estate development will be 1.593. Source of finance was found to be a positive predictor. This implies that for every 1 unit rise in sources of finance, an increase of 0.126 is projected. Land Code of Practice was also found to be a positive predictor of urban real estate development. This suggests that for every 1 unit rise in land code of practice, an increase of 0.009 in urban real estate development is projected. The population impact has also been found to be a positivepredictor of urban real estate development. This means that for every one-unit increase in population impact, an anticipated rise in urban real estate development of 0.096 is expected. Urban real estate development was also predicted by technical constraints in real estate delivery. This means that for every one-unit rise in technical constraints of real estate delivery, a forecasted increase of 0.007 at a higher level is expected. Furthermore, sources of access to finance and technical constraints in real estate delivery are found to be statistically significant. This is because their sig values, 0.039 and 0.048, are less than 0.05($P < 0.05$), while land code of practice and population impact are statically insignificant because their sig values, 0.968 and 0.634, are greater than 0.05 ($P > 0.05$). This finding demonstrates that a very low percentage is influenced by the dependent variable as one of the independent variables increases. This could have been a result of the challenges faced by these real estate firms to sustainably have access to finance, land regulations, and key technical constraints. This could have also created room for the real estate firms to primarily focus their market on the affluent rather than the urban poor.

Conclusions

The study concludes that sources of accessing finance have a positive and significant association with urban real estate developments. This was mostly due to the country's various financial institutions' failure to collaborate closely with real estate enterprises in providing loans and financing for real estate development. This was supported by the challenges they experienced in obtaining these loans, such as excessive collateral, a limitedtrack record, and a small business.

Urban real estate developments have a positive but not significant association with theland code of practice. This might be owing to the city's real estate enterprises' multiple property acquisition issues, such as a lack of appropriate and trustworthy data, no set land pricing, onerous land registration procedures, and so on.

Urban real estate development has a positive and significant association with population impact. Increased housing demand due to population expansion, household size,and population age structure might all contribute to this.

Technical constraints have a positive and significant association with urban real estatedevelopment. This link might be ascribed to a number of factors that hampered thepromotion of real estate development, including low sales, permission delays, inadequate coordination between enterprises and authorities, and price fluctuations in building supplies.

Recommendations

The following recommendations were made for practical action and future research based on the findings.

Recommendations for Practical Action

On sources of finance, it is recommended that the country's financial institutions popularize a scheme that is of low interest to real estate firms so as to increase the source ofincome for real estate firms to expand their business.

On land code practice, it is recommended that the national land policy should be reviewed so as to create an avenue for access to land for real estate firms who are willing toprovide affordable housing to the country. Additionally, data about land should be providedthrough a proper land management system that will reduce the bureaucracy of land issues.

For population impacts, it is recommended that both the government and real estate firms should work accordingly in order to provide affordable housing for the population. This will help curtail the impact of housing problems faced by the growing population.

For technical constraints, effective institutional capacity strengthening and enhanced collaboration between government

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parastatals and private real estate firms should bepopularized and implemented.

Recommendation for Future Research

From the findings and conclusions made from the research, there is a need to embark on further research;

This study is not representative of the whole country. Any area of Sierra Leone with real estate firms could be looked at to see if similar or different ideas will be identified. Therefore, it is recommended that, for a greater generality of the results, studies on the same path but with a broader sample be conducted. Considering the wider population and real estate firms, this kind of approach will give more representative results of the interaction between the population and real estate firms.

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WIND POWER GENERATION ELECTRICITY BY FAST MOVING VEHICLES – A REVIEW

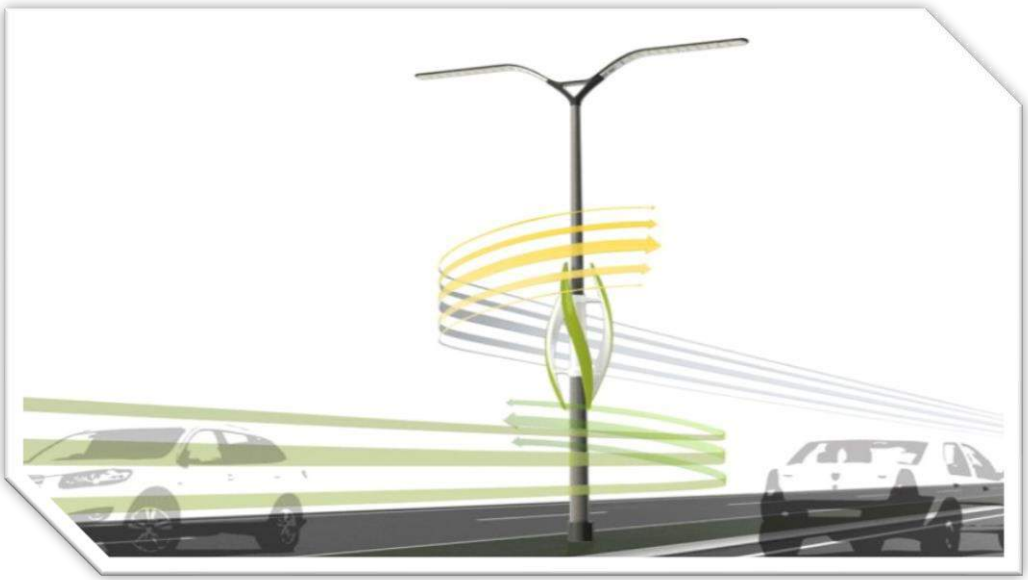
Prof.A.H.Patil, Prasad.V.Thorat, Samarth.A.Kadam, Samarth.A.Panadi
Patil A.H, Head of Civil Engineering Department, Y.B.Patil Polytechnic, Akurdi, Pune-411044.

ABSTRACT

A method for generating electricity using high wind pressure generated by fast moving vehicles controlling the induced wind in the direction of the wind turbine; changing the energy of the wind into mechanical energy by using wind turbine; and changing the mechanical energy into electrical energy by using a generating device and can be used for applications. The amount of wind energy production by strong places rises from the high-speed moving vehicles. At this study to use highway moving vehicles wake energy for the generation of electrical energy through horizontal axis wind turbine throughout the valuable to all over India's highway where vehicles speed is regularly high. The generated electrical energy is used for renewable self-powered applications for lighting purposes such as traffic signals, highway lights, and light guidelines in a highway by high-speed moving vehicles.

INTRODUCTION

The main goal of this project is creation of a highway windmill. This project changes wind energy into electrical energy. A windmill is a kind of machine. It usages the wind to make energy. To do this it uses vanes so-called blades. The energy made by windmills can be used in various ways. Modern wind power machines are used to produce electricity. These are termed as wind turbines. The windmill has been in history for several years. A wind turbine is a device that converts the wind kinetic energy into electrical energy. Wind turbines are manufactured in a wide range of vertical and horizontal axis categories. The smallest turbines are used for applications such as battery charging for secondary power for boats to power traffic warning signs. Slightly larger turbines can be used for making contributions to a domestic power supply while selling unused power back to the valuable supplier by the electrical grid. Selections of large turbines, known as wind farms, are becoming an more and more important source of alternating renewable energy and are used by many countries as part of a strategy to decrease their reliance on fossil fuels. An electrical maker is a machine which converts mechanical energy into electrical energy.



Induced EMF is produced in it according to Faraday's law of electromagnetic induction. This EMF sources a current to flow if the conductor circuit is closed. An inverter is an electronic device or electric circuit that changes direct Current (DC) to Alternating Current (AC). The input voltage, output voltage and frequency, and total power handling depend on the design of the specific device or circuitry. The inverter does not produce power at all, the power is provided by the DC source. It just changes direct current into alternating current. In this project wind turbine uses wind's kinetic energy and changes into mechanical energy. This highway windmill uses wind energy generated by the moving vehicles and converts into mechanical energy. The DC generator converts the mechanical energy into

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electrical energy. Then electric energy stored in battery and used for street light generation.

SCOPE OF WORK

1) It is useful for advertisement and in terms of safety we will provide warning signs or regulatory signs.
2) By decreasing reliance on fossil fuels, wind energy helps to reduce air pollution that causes respiratory and cardiovascular issues to mankind.
3) No greenhouse gases during operation, helping to mitigate climate change and reduce air pollution.
4) This entire project is sustainable in nature and material can be recycled.

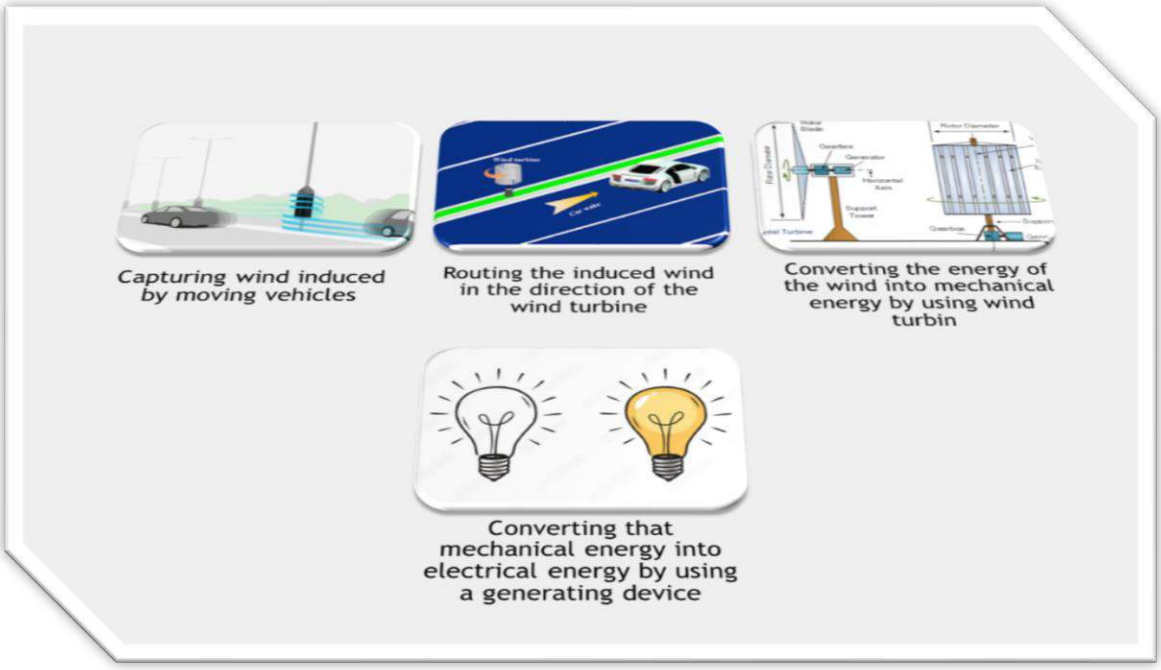
MATERIAL AND METHODS

Material

1) PVC PIPE: The full form of PVC is Poly Vinyl Chloride. PVC is a polymer which is made from Vinyl Chloride Polymerisation. PVC is being used in a various type of products, including raincoats, wires, pipes, bottles.
2) GRATAION MOTOR: A generation motor, also known as a motor-generator, is a combination of an electric motor and an electric generator that can convert electrical and mechanical energy.
3) WIRE: Wires are pieces of metal that transport electricity. They are frequently flexible which makes them easier to use.
4) BATTERY: A rechargeable battery is a battery that can be charged and used multiple times.
5) SWITCH: A small button or something similar that you press up or down in order to turn on electricity.

Methodology

1) Arrange the material and resources.
2) Placing the project on the Old Mumbai Pune highway.
3) Capturing the wind made by moving vehicles.
4) Directing the induced wind in the direction of the wind turbine.
5) Converting the wind energy into mechanical energy by using wind turbine.
6) Converting that mechanical energy into electrical energy by using a generating motor.
7) This electrical energy is used for generation of street light.



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SQUAMOUS CELL CARCINOMA OF THE SKIN

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ABSTRACT

Introduction: *squamous cell carcinoma is steadily increasing year after year, representing a major public health challenge. The mortality rates of dermal squamous cell carcinoma are comparable to those of melanoma, renal carcinoma and oropharyngeal carcinoma. Adequate surveillance, early diagnosis and prompt treatment are essential to reduce the risks of morbidity and mortality.*
Objective: *to detail current information related to cutaneous squamous cell carcinoma, etiology, epidemiology, pathophysiology, histopathology, examination, evaluation, treatment, differential diagnosis, prognosis and complications.*
Methodology: *a total of 37 articles were analyzed in this review, including review and original articles, as well as clinical cases, of which 25 bibliographies were used because the other articles were not relevant to 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: skin cancer, epidermoid carcinoma, squamous cell, clear cell, Mohs surgery, cutaneous carcinoma.*
Results: *cutaneous squamous cell carcinoma has a multifactorial etiology, with UV radiation being the main risk factor. It is the second most common form of skin cancer in the USA, with a higher incidence in men and fair-skinned, older people. The mortality rate is between 1% and 2%, although in some regions it may be comparable to other more aggressive cancers. It originates from keratinocytes and often has mutations in the tp53 gene. There are several histological subtypes with different characteristics and prognoses. Diagnosis is confirmed by biopsy, and staging is performed with systems such as BWH and AJCC-8, with surgical excision being the preferred intervention.*
Conclusions: *cutaneous squamous cell carcinoma represents an important public health problem, emphasizing the need for prevention and sun protection education programs. Early identification and appropriate treatment are crucial to improve prognosis. The diversity of risk factors, together with the variability in histologic subtypes and their clinical behavior, underscores the importance of a personalized approach to care. In addition, rigorous surveillance is essential in immunocompromised patients, who are at significantly increased risk of developing this neoplasm. Finally, continued research and development of new therapies, such as immunotherapeutic agents, promise to improve clinical outcomes and quality of life for affected patients.*
KEY WORDS: *cancer, carcinoma, skin, squamous, Mohs.*

INTRODUCTION

Squamous cell carcinoma is the second most common dermal malignancy in some countries. Risk factors include immunosuppression, chronic lesions, fair skin, male gender, advanced age, various genetic syndromes, environmental exposure such as UV radiation, and a history of squamous cell carcinoma. Although metastasis is uncommon, the most common site of spread is the lymph nodes. Since the incidence is steadily increasing, representing a significant public health problem, adequate surveillance, early diagnosis and prompt treatment are essential to reduce the risks of morbidity and mortality. Photoprotection and frequent skin checks at body level are suggested. Although most cases are treated with surgical excision, new therapeutic modalities continue to emerge. Systemic oncologic therapy and radiation therapy may be appropriate for more advanced cases(1-4).

Squamous cell carcinoma is steadily increasing year after year, representing a major public health challenge. Mortality rates for dermal squamous cell carcinoma are comparable to those for melanoma, renal carcinoma, and oropharyngeal carcinoma in the central and southern regions of the United States. Skin cancer is a condition with significant frequency worldwide and is generally classified into nonmelanoma skin cancer (NMSC) or melanoma. The exact incidence of skin cancer is complex to determine due to lack of diagnostic criteria and sometimes

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underreporting. However, multiple epidemiological studies have shown an increase in the incidence of both NMSC and melanoma in recent years. The diagnosis and treatment of this type of neoplasm constitutes a very relevant public health problem, especially in relation to patient and health care costs. Skin cancers are usually located in sun-exposed areas of the head and neck, leading to considerable morbidity during diagnosis and treatment. There are various therapeutic options such as cryotherapy, chemotherapy, immunotherapy, surgical excision and radiotherapy. Adequate sun protection is essential for the prevention of skin cancer(5,6).

This article details the current information related to cutaneous squamous cell carcinoma, etiology, epidemiology, pathophysiology, histopathology, examination, evaluation, treatment, differential diagnosis, prognosis and complications.

METHODOLOGY

A total of 37 articles were analyzed in this review, including review and original articles, as well as cases and clinical trials, of which 25 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: skin cancer, epidermoid carcinoma, squamous cell, clear cell, Mohs surgery, cutaneous carcinoma.

The choice of bibliography exposes elements related to cutaneous squamous cell carcinoma; etiology, epidemiology, pathophysiology, histopathology, examination, evaluation, treatment, differential diagnosis, prognosis and complications of the disease are presented.

DEVELOPMENT

Etiology

The development of dermal squamous cell carcinoma is related to the following risk factors and etiologies:
UV radiation: UVA and UVB rays are the most significant risk factors.
Environmental exposures other than UV radiation: This includes arsenic, polycyclic aromatic hydrocarbons, nitrosamines, alkylating agents and ionizing radiation.
Demographic factors: Fair skin, male gender and advanced age.
Immunosuppressed state: Iatrogenic, leukemia and AIDS.
Genetic syndromes: Huriez syndrome, xeroderma pigmentosum, oculocutaneous albinism, dyskeratosis congenita, Rothmund-Thomson syndrome, Werner syndrome, Bloom syndrome, dystrophic epidermolysis bullosa, epidermodysplasia verruciformis, Fanconi anemia, keratitis-ichthyosis-deafness syndrome and genetic immunodeficiency syndromes.
Pre-existing lesions: Chronic wounds (Marjolin's ulcer), human papillomavirus, actinic keratosis, porokeratosis, lichen sclerosus and atrophic lichen, hypertrophic or oral lichen planus and discoid cutaneous lupus erythematosus.
Medications: BRAF inhibitors, vismodegib and voriconazole, and immunosuppressive agents(7-9).

Epidemiology

Incidence and Growth:
Squamous cell carcinoma is the second most common form of skin cancer in the United States, underscoring its public health relevance.
A nearly threefold increase in its incidence from the 1970s to the early 2000s is cited, indicating an alarming trend that may reflect changes in exposure to risk factors, such as UV radiation.
Incidence Statistics:
Figures of 140 cases per 100,000 men and 50 per 100,000 women in 2012 suggest that men have a higher risk of developing this neoplasm. This may be related to sun exposure habits or differences in seeking medical care.
Mortality Rate:
The mortality rate of squamous cell carcinoma, which is between 1 % and 2 %, is relatively low compared to other types of cancer, suggesting that, although the disease is common, it may be treatable if detected early.
However, it is noted that in certain regions of the country, mortality resembles that of other more aggressive cancers, such as melanoma, which may indicate a greater aggressiveness of the disease in those geographic settings.
Risk Factors:
The higher prevalence in men, people with fair skin, and older age groups highlights the importance of demographic factors in susceptibility to squamous cell carcinoma. This may be related to cumulative sun exposure and immune response in older populations.
Public Health Implications:
The increased incidence and relevance of squamous cell carcinoma highlights the need for prevention programs, sun protection education, and early detection. This is crucial to address the public health problem posed by this disease(1,10).

Pathophysiology

Origin of Carcinoma:
Cutaneous squamous cell carcinoma originates from keratinocytes, which points to the importance of this cell in the skin and its fundamental role in the formation of this neoplasm.
Genetic Abnormality:
Mutation in the tumor suppressor gene tp53 is identified as the most common genetic abnormality in squamous cell carcinoma and its precursor, actinic keratosis. This highlights the relevance of genetic alterations in cancer pathogenesis and suggests that monitoring for this mutation could be key to early detection and prevention.
Immunosurveillance:
Decreased immunosurveillance in immunosuppressed patients may favor tumor growth. This aspect is critical, as it implies that the immune system's ability to detect and destroy abnormal cells is compromised in certain individuals, increasing their risk of cancer.
Risk in Immunosuppressed Patients:
The data on solid organ transplant patients receiving immunosuppressive therapy, who have a risk of developing squamous cell carcinoma 65 to 250 times higher than the general population, emphasizes the severity of immunosuppression. This suggests that prevention and

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surveillance strategies should be especially rigorous in these patients(2).

Histopathology

Subtype Classification:

There are several histologic subtypes of squamous cell carcinoma, indicating the heterogeneity of this neoplasm. Each subtype may have different clinical features, prognoses and responses to treatment, which is crucial for personalized patient care.

Histologic Description:

These tumors are composed primarily of atypical keratinocytes that exhibit eosinophilic or pink cytoplasm and a vitreous appearance. This description provides valuable information for pathologists and clinicians, aiding in identification and diagnosis through histologic analysis.

Common Findings:

Mention of additional features, such as parakeratosis, intercellular bridges, and keratin beads, reinforce the understanding of squamous cell carcinoma morphology. These findings are helpful to pathologists in histologic evaluation and in establishing an accurate diagnosis.

High-Risk Subtypes:

High-risk subtypes include acantholytic, sarcomatoid, and desmoplastic. Identifying these subtypes is critical, as they may be associated with a higher potential for aggressiveness, recurrence and metastasis, which influences therapeutic decisions and patient prognosis.

Squamous Cell Carcinoma in situ.

This subtype, also called Bowen's disease, is distinguished by full-thickness keratinocyte atypia that has not invaded beyond the basal layer of the epidermis. In contrast, invasive squamous cell carcinoma has penetrated the basal layer. The basal layer usually remains intact, forming the “eyeliner sign”.

Acantholytic/Adenoid/Pseudoglandular

This subtype is distinguished by grooves around clusters or filaments of robust polygonal neoplastic cells, producing a glandular appearance. The groove is a consequence of a desmosomal alteration. Unlike tumors of true glandular origin, such as adenosquamous carcinoma, carcinoembryonic antigen (CEA) staining is negative.

Clear Cell

This subtype is distinguished by clear or faint neoplastic cells that may or may not have an epidermal connection. Histologic differential diagnoses include clear cell acanthoma and renal cell carcinoma.

Spindle/Sarcomatoid Cells

This subtype is distinguished by spindle-shaped keratinocytes with pleomorphic nuclei randomly distributed throughout the dermis in a typically infiltrative pattern (see Image. Histologic slide of squamous cell carcinoma, sarcomatoid). Numerous mitotic figures can be observed. Atypical fibroxanthoma is a significant histologic differential diagnosis that typically stains negative for p63 and p40, unlike spindle cell or sarcomatoid squamous cell carcinoma (see Image. Histological slide of squamous cell carcinoma, staining positive for p40). Immunohistochemistry with p40 is more specific than that with p63.

Desmoplastic

This subtype may resemble the sarcomatoid or spindle cell variant of squamous cell carcinoma. However, desmoplastic carcinoma is characterized by desmoplastic (densely collagenous) stroma in more than 30% of the tumor. Perineural invasion is frequently reported. Desmoplastic melanoma is also included in the histologic differential diagnosis. Unlike desmoplastic melanoma, desmoplastic squamous cell carcinoma usually stains positive for p63 and negative for SOX10 and S100.

Keratoacanthoma

It is distinguished by a crateriform invagination filled with keratin (see image. Histologic slide of squamous cell carcinoma, keratoacanthoma). The neoplastic cells are usually well differentiated.

Verrucous Carcinoma

Distinguished by a verruciform acanthosis with blunt, broad projections that press into the dermis rather than infiltrate it. The cytomorphology associated with human papillomavirus in warty carcinoma is less pronounced compared to benign warts(4,11-13).

Physical Examination and Evaluation

Cutaneous squamous cell carcinoma is typically characterized by a scaly, erythematous or hyperpigmented papule or plaque. Some cases may present with ulceration, fungal features, or pain (see Image. Cutaneous squamous cell carcinoma). Because of its strong association with exposure to UV radiation, many cases appear on sun-damaged skin. This tumor can also develop from pre-existing lesions such as actinic keratosis, chronic wounds (Marjolin's ulcer), human papillomavirus infection, porokeratosis, lichen sclerosus and atrophic lichen, hypertrophic or oral lichen planus and discoid cutaneous lupus erythematosus(14-16).

To confirm the diagnosis of cutaneous squamous cell carcinoma, a skin biopsy is necessary. In addition, sentinel lymph node biopsy or radiologic evaluation for lymph node metastases by computed tomography or ultrasound is advised for cases classified as stage T2B-T3 according to the Brigham and Women's Hospital (BWH) staging system or stage T4 according to the American Joint Committee on Cancer, 8th edition (AJCC-8) staging system. For AJCC-8 stages T2-3, it is essential to evaluate each case on an individual basis. For patients with palpable lymphadenopathy, fine needle aspiration or lymph node biopsy is recommended(1,2).

Staging

The staging categories for cutaneous squamous cell carcinoma according to BWH and AJCC-8 are forthcoming.

BWH staging system

Stage T1: 0 high-risk characteristics

Stage T2A: 1 high-risk feature

Stage T2B: 2 to 3 high-risk features

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Stage T3: 4 or more high-risk features or bone invasion
High-risk features, as defined by BWH, include:
Tumor diameter of at least 2 cm.
Histologically poor differentiation
Perineural invasion of at least 0.1 mm
Invasion beyond the subcutaneous tissue
AJCC-8 staging system

Stage Ti: In situ
Stage T1: tumor diameter less than 2 cm
Stage T2: tumor diameter 2 to 3.9 cm
Stage T3:
Tumor diameter of at least 4 cm.
Mild bone erosion
Perineural invasion of at least 0.1 mm or invasion of a nerve located deeper than the dermis.
Invasion beyond the subcutaneous tissue
Invasion greater than 6 mm in depth
Stage T4A: macroscopic invasion of cortical bone or bone marrow
Stage T4B: Invasion of the skull or involvement of the foramen at the base of the skull(1,2)
Treatment.
The preferred therapeutic intervention for cutaneous squamous cell carcinoma is surgical excision. Mohs micrographic surgery is considered the ideal choice in cases that meet appropriate use criteria (AUC). Factors mentioned in the AUC include, but are not limited to, a clinical diameter of the visible lesion greater than 2 cm, high-risk histologic features, recurrent versus primary lesions, cosmetically sensitive and/or high-risk anatomic locations, such as the ears, lips, nose and periocular areas, as well as immunosuppression.

The reported 5-year recurrence rate for Mohs micrographic surgery is about 3.1%, while standard excision with 4 to 6 mm margins has a recurrence rate of about 8.1%. Mohs micrographic surgery provides significantly greater risk reduction compared with standard excision, especially in cases with high-risk features. For example, locally recurrent (previously treated) lesions showed a recurrence rate of 10% with Mohs micrographic surgery and 23.3% with standard excision. Electrodesiccation and curettage are alternative options for in situ cases, although they have slightly higher recurrence rates compared to Mohs micrographic surgery and standard excision(1,17,18).

For patients who are not suitable for surgery, options for treating cutaneous squamous cell carcinoma include superficial radiation therapy, 5-fluorouracil cream, imiquimod cream, cryotherapy, photodynamic therapy and/or ablative laser. However, these treatments often result in higher recurrence rates and lack histologic clearance confirmation. Lymphadenectomy of the associated nodal basin is recommended for lymph node-positive cases.
Radiation therapy is typically used in cases involving large caliber nerve invasion, lymphovascular invasion, multiple lymph nodes or extracapsular extension. Adjuvant systemic oncologic therapy for advanced cases may include chemotherapy, epidermal growth factor inhibitors, or immunotherapy. Recently, new immunotherapeutic agents have emerged that show superior clinical results compared to traditional systemic therapies(19,20).

Differential Diagnosis
There are several, the most notable of which are mentioned below:
Actinic keratosis.
Seborrheic keratosis.
Basal cell carcinoma.
Melanoma.
Lichen planus.
Lichen sclerosus and atrophic lichen.
Discoid cutaneous lupus erythematosus.
Extramammary Paget's disease.
Porokeratosis.
Lichen planus-like keratosis.
Verruca.
Psoriasis.
Nummular dermatitis(21-23).

Prognosis
The prognosis of localized disease is generally excellent. The overall mortality rate for cutaneous squamous cell carcinoma is approximately 1% to 2%, with about 3% of cases developing metastases. Lymph nodes are the most common site of metastasis. Cases involving single node metastases up to 3 cm are associated with a 5-year disease-specific survival of 90%(24,25).

Complications
Pain: indicates the physical suffering that the patient may experience. Pain management is crucial in oncologic treatment, as it affects quality of life.

Loss of function: this may refer to the inability to perform daily activities due to the disease or its treatments. This also suggests the importance of rehabilitation and functional support in cancer patients.

Metastasis: the spread of cancer to other organs is an indicator of disease progression. Metastasis complicates treatment and is generally associated with a worse prognosis.

Local invasion: this refers to how the tumor can spread to surrounding tissues, which can result in additional complications and more complex management.

Poor cosmesis: this points to the cosmetic effects of the disease and its treatment, which can have a significant psychological impact on the patient, affecting their self-esteem and quality of life.

Death: this is the most serious outcome and reflects the severity of the disease. Mortality rate and prognosis are essential considerations in treatment decision making.

RESULTS
Cutaneous squamous cell carcinoma presents a multifactorial etiology, where UV radiation emerges as the main risk factor, associated with an increase in the incidence of the disease since

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the 1970's. Epidemiology indicates that it is the second most common form of skin cancer in the United States, with a markedly higher incidence in men and in individuals with fair skin and advanced age. Epidemiology indicates that it is the second most common form of skin cancer in the United States, with a markedly higher incidence in men and in individuals with fair skin and advanced age. The mortality rate is between 1% and 2%, although in certain regions it may be comparable to that of other more aggressive cancers. The pathophysiology reveals that this carcinoma originates from keratinocytes and is frequently associated with mutations in the tumor suppressor gene tp53. Histologically, several subtypes are identified, each with distinct features and prognoses. Diagnosis is confirmed by biopsy, and staging is performed with systems such as BWH and AJCC-8, which determine the appropriate treatment, with surgical excision being the preferred intervention.

CONCLUSIONS

Cutaneous squamous cell carcinoma represents an important public health problem, emphasizing the need for prevention programs and sun protection education. Early identification and appropriate treatment are crucial to improve prognosis. The diversity of risk factors, together with the variability in histologic subtypes and their clinical behavior, underscores the importance of a personalized approach to care. In addition, rigorous surveillance is essential in immunocompromised patients, who are at significantly increased risk of developing this neoplasm. Finally, continued research and development of new therapies, such as immunotherapeutic agents, promise to improve clinical outcomes and quality of life for affected patients.

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ASSESSMENT OF STUDENT-ATHLETE ATHLETIC PERFORMANCE BASED ON MOTIVATIONAL CLIMATE

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ABSTRACT

The study on the assessment of the student athlete's motivational climate and their athletic performance was conducted utilizing descriptive research design. The student athletes from all the campus of the Nueva Ecija University of Science and Technology were chosen using purposive sampling technique. It used the survey method to gather data. Survey-questionnaire was administered online via Google Forms to collect the relevant data. Likert Scale of 1- 5 was utilized to quantify the assessment of the student athlete's motivational climate in two portion which is Coach-created and peer-created motivational climate of the respondents. Frequency count, percentage, and weighted mean were the statistical tools applied.

Results revealed that 143 student athletes of NEUST had experienced motivational climate in terms of coach created and peer created and evaluated their athletic performance in terms of tactical and technical domain. Highest weighted mean of their coach created motivational climate is 4.78 which is the coaches and trainers always motivate the athletes in all of their games. 4.58 was the highest weighted mean in terms of their peer created motivational climate said that the athletes motivate their co-athletes to have a strong desire to win the competitions. On their tactical domain, 4.75 was the highest weighted mean which the Coaches and trainers have plans on winning the games. Highest weighted mean of their technical domain was 4.50 which the coaches and trainers are active during training.

KEYWORDS: *Coach created motivational climate, Peer Created motivational climate, Tactical domain, technical domain, Student Athletes and Assessment*

INTRODUCTION

Motivational climate is experienced in terms of trainings and competitions even though in the physical activities of non-students like Physical education subject. Motivational climate is defined as the situational goal structure of the team environment created by significant others (Ames, 1992). Upgrading of the facility and equipment, monitoring of the student athlete's behavior and attitudes and giving them attention and motivation will give the student athletes a boost of their self-esteem and self confidence in prior to train and compete with their full confidence. Motivational Climate in sports is instrumental in an athletes' development. They contribute to enhanced motor competence, physical self- concept and self- esteem, as well as providing opportunities to learn better emotion regulation and develop peer and coach relationship. (Eime, Young, Harvey, Charity & Payne 2013)

In the climate of youth sports, there are many factors that influence how successful a team will be. The most notable influence for the purpose of this study is the interactions of the athletes with significant others, a person who is important to an individual's well-being. In the context of a team, every individual (including the peer and the coach) will have different goals for the team. The way that they approach these goals will have a significant affective influence on the individual that will contribute to how well teams will work together, since motivation is important to team success. There are many factors that might influence to the athlete's performance and one possibility involves significant others.

This study was designed to look at one aspect of social influence, namely the motivational climate. The question of the relationship between the athlete's motivational climate and their athletics performances is very important. It is inherent in the description of the concept of motivation that, in a situation where there is little motivation, low achievement level will result (Bakker, Whiting, & Brug, 1990). The central issue is whether or not there is a particular motivational climate created by the coach and the peer, in the sense that by not attaining the positive motivational climate for the athletes it will lead to a deterioration in performance; or is possible that by the motivational climate both created by the coach and the peer it will produce increasing gains in the athlete's performance.

Coaching is not just instructing to help a student athlete to train on specific sports but coaching is also being one of the bodies that will complete not just the physical aspects of a student athletes' but also emotionally and academically. Managing the timeframe of training and academics, learn how to improvise. Not all universities have the apparatus used on training a specific activity, though it is necessary what is provide shall be used and do the rest. The researchers want to emphasize what are the motivational climate and the student athletes' performances according to the needs and in need factors in the Nueva Ecija University of Science and Technology.

MATERIALS AND METHODS

This research used descriptive-case study method. Descriptive-case study involves the description, recording, analysis, interpretation of conditions that presently exist. In this case, this design shall define the "assessment of the student-athletes' motivational climate and their athletic performance" at the Nueva Ecija University of Science and Technology.

The sources of participants in this study are student athletes of the school year 2019 – 2020 in all levels and departments of Nueva Ecija University of Science and Technology a total of one hundred forty-three (143) student athletes from different sports were included in this study and the campuses are the following: Campuses Sumacab Campus, Cabanatuan City; General Tinio, Cabanataun City; Atate Campus, Palayan City; Fort Magsaysay Campus; Gabaldon Campus; San Isidro Campus; Satellite Campus; Talavera Academic Extension Campus.

The study used stratified and total sampling technique. To describe the assessment of motivational climate of student athletes and their athletic performance, the five-point Likert-type scale

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below was used 5 = Strongly Agree;4 = Agree; 3 = Neither agree nor disagree; 2 = Disagree; 1 = Strongly Disagree

RESULTS AND DISCUSSION

1.1 Coach Created motivational climate

The average weighted mean of the Coach Created motivational climate with a total of 4.51% and verbally interpreted as Strongly agree. The coaches and trainers always motivate the athletes in all of their games, which got the highest weighted mean of 4.78% and was verbally interpreted as Strongly agree.

It was revealed that most of the student athletes of Nueva Ecija University of Science and Technology had experienced coach created motivational climate in terms of their trainings, social life and competition. Student athletessuffered from different struggles in school, home and personal matter that results for having a mental problem or low self-esteem during training and competition. Furthermore, coaches and trainers stand as second parent at school theygive some pieces of advice and attention to the student athletes during training and competition that matters to the student athletes mental and emotional aspect and boost the self-esteem of the student athletes. According to Joan L. Duda on 02 June 2014, there is growing scientific evidence within motivational research indicating the salience of coaches, parents, and peers in creating quality sport involvement in which athletes are happy and active participants. While the home environment shapes the initial constellation of attitudes young athletes develop toward sport, coachesare a powerful influence in consolidating these attitudes, and peers are an agent that can facilitate or debilitate one's experiences.

1.2 Peer Created Motivational Climate

The average weighted mean of the Peer Created motivational climate with a total of 4.52% and verbally interpreted as Strongly agree. The athletes motivate their co-athletes to have a strong desire to win the competitions, which got the highest weighted mean of 4.58% and was verbally interpreted as Strongly agree.

Based on the data gathered 4.52% with a verbal interpretation of strongly agree, student's athlete experienced peer created motivational climate coming from their friend, teammates, co-athletes and even in the administration of the Nueva Ecija University of Science and Technology. Trainings and competitions make the student athletes preparedphysically when they are going to represent our university but not only the physical aspect of the student athletes is used in the competition also the mental and emotional aspect are needed to be 100% prepared in the competition. Being prepared and have a full confidence during the competition with wisdom of motivation coming from their peersis a full package to have a desire to win any competition that they will going to compete.

1.3 Tactical Domain

The average weighted mean of the Tactical Domain with a total of 4.66% and verbally interpreted as Strongly agree. Coaches and trainers have plans on winning the games, which got the highest weighted mean of 4.75% and wasverbally interpreted as Strongly agree. As the results revealed, the tactical domain of student athletic performance that used and gathered 4.66% overall weighted mean average with the verbal interpretation of strongly agree. Student athletes had experienced tactics that used in competition that can results in winning or losing it. Tactics are one of the most effective ways in order to win the competition. Coaches and trainers are the persons behind the tactics used by the student athletes in every game that they played. Tactics may not be perfect sometimes but it is very useful to the student athlete because they appreciate the efforts of coaches and trainers that make them motivate to have a desire towin the competition.

1.4 Technical Domain of the Athletic performances

The average weighted mean of the Technical Domain with a total of 4.31% and verbally interpreted as Strongly agree. The coaches and trainers are active during training, which got the highest weighted mean of 4.50% and was verbally interpreted as Strongly agree. The student athletes had experienced the technical domain and resultsfor having 4.31% overall weighted means with verbal interpretation of strongly agree. Technical domain helps the student athlete to improve their physical ability in terms of trainings. University plays a vital role in applying the technical domain of the student athlete in terms of the facility and equipment, allowance, discipline and rules and regulation through that support coming from the university and coach, student athlete may acquire motivation in trainings and competition.

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Preparation of Tables

Table 1 Coach Created Motivational Climate

	5	4	3	2	1	Weighted means	Verbal interpretation
1. The coaches and trainers are open for any suggestion to improve their difficulties.	93	48	2	0	0	4.64%	Strongly Agree
2. The coaches and trainers always motivate the athletes in all of their games.	112	31	0	0	0	4.78%	Strongly Agree
3. Training coaches always give the athletes one-on-one Feedback about their performance.	78	58	8	2	0	4.46%	Strongly Agree
4. There are lots of bonding moments between athletes, coaches, and trainers.	62	61	20	0	0	4.29%	Strongly Agree
5. The coaches and trainers comfort the athletes if they have a problem.	70	56	15	6	0	4.36%	Strongly Agree
Average weighted mean	4.51%						Strongly agree

Table 2 Peer Created Motivational Climate

	5	4	3	2	1	Weighted means	Verbal interpretation
1. The athletes have support from the administration, faculty, and staff during competitions.	81	51	9	2	0	4.48%	Strongly agree
2. The athletes have a clear understanding of strengths and weaknesses of their co-athletes.	74	62	7	0	0	4.47%	Strongly agree
3. The athletes motivate their co-athletes to have a strong desire to win the competitions.	94	40	8	0	1	4.58%	Strongly agree
4. The athletes have an innate ability to bring out the best in both themselves and those around them.	79	58	5	1	0	4.50%	Strongly agree
5. The athletes help each other to control their emotions during competition.	91	44	8	0	0	4.58%	Strongly agree
Average weighted mean	4.52%						Strongly agree

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Table 3. Tactical Domain of the Athletic performances

	5	4	3	2	1	Weighted means	Verbal interpretation
1. The coaches and trainers provide various strategies in the game.	95	42	5	1	0	4.62%	Strongly agree
2. Coaches and trainers instruct players about the right tactics to use during their games.	95	41	6	0	1	4.60%	Strongly agree
3. The training styles of the coachesand trainers are effective.	94	45	4	0	0	4.63%	Strongly agree
4. The training program improvesthe execution of the basic skills.	99	43	1	0	0	4.69%	Strongly agree
5. Coaches and trainers have planson winning the games.	111	29	2	1	0	4.75%	Strongly agree
Average weighted mean	4.66%						Strongly agree

Table 4. Technical Domain of the Athletic performances

	5	4	3	2	1	Weighted means	Verbal Interpretation
1. The training facilities of the University is enough in everysport events it is participating.	64	62	7	8	2	4.24%	Strongly agree
2. The training equipment of the University is enough in everysport.	57	56	21	6	3	4.10%	Strongly agree
3. The rules and regulations of the Sport is well emphasizedthroughout the training periods.	71	61	6	3	0	4.36%	Strongly agree
4. The needed basic skills in every sport is properly executed.	67	62	13	1	0	4.36%	Strongly agree
5. The coaches and trainers areactive during training.	86	46	9	1	1	4.50%	Strongly agree
Average weighted mean	4.31%						Strongly agree

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REVIEW OF TEXTILE PRINTING: DIFFERENTIATION OF BLOCK, SCREEN & DIGITAL PRINTING

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ABSTRACT

In India is well known for its traditional culture and art features. Hand block printing techniques are practiced in Rajasthan. Hence, the block printing is a slow process. Printing process of desired pattern is defined and repeated. The various styles for block printing are significant of the country in rich culture and heritage. It is a unique of each region will have a different variations of traditional craft. That was crafted for propagating Hindus mythology of depicted folk style story transform of imagination forms of God and goddess in literature. In this article, we will discuss about block printing, the development digital printing and manual of screen printing. The comparison of these three styles of textiles printing. It is a oldest method of art craft. The economics of ink jet printing are the main driver of digital printing technique. The costs of ink jet printing are lower for short run lengths than in traditional screen printing. This switches for longer runs production. Short-run textile printing commissions are the main source of jobs for small to medium scale textile producers in Ghana. And manual screen printing is the main process employed by these small-scale textile printers. These layers of limitations negatively affect the overall outcome of the prints. This is because, the large-scale textile factories in Ghana can print a minimum of 2400 yards due to their machine settings, calibration and running cost to make the least returns.

KEYWORDS: *Hand block printing, natural dyes, screen printing, techniques, digital printing.*

INTRODUCTION

Textiles are one of India's most popular and successful exports. Printing is an vital role in the textile manufacturing process. It is typically done on fabric, but can also be applied to finished garments. Textile printing implicate on applying of colour to fabric in particular patterns or designs. In well-printed fabrics, the colour is bonded to the material.

Woodblock printing is a method widely used in East Asia to print text, images, or patterns, with origins tracing back to ancient China. In the late 17th century, the French began directly importing Indian blue textile samples from their East Indian colonies by sea. As early as the 1630s, the East India Company was importing plain and printed cotton to the English market for large production. By the 1660s, British printers and dyers had started producing their own printed cotton for domestic sale. While these locally-produced prints were less colourful than the imported Indian textiles, they better aligned with British aesthetic preferences. Patterns were also dispatched to India for local artisans to replicate for sale back in England. Throughout the latter part of the 17th century, England boasted numerous dyeing facilities, with Lancaster and the River Lea near London being notable locations. To enhance the colour retention of English calicoes, the fabric underwent an extended bleaching treatment, which significantly boosted the longevity of the colours and necessitated a substantial amount of water from the surrounding rivers. A dyeing operation was initiated by John Meakins, a Quaker from London residing in Cripplegate. The Victoria and Albert Museum in London and the Smithsonian Copper-Hewett in New York hold examples of their textiles and patterns.

Textile printing is a process that involves applying colour to fabric in specific patterns or designs, creating a durable and long-lasting. Colour bonding: In properly printed fabrics, the colour is bonded with the Fiber, making it resistant to washing and friction. Difference from dyeing: Unlike dyeing, which involves uniformly covering the entire fabric with a single colour, printing applies one or more colours to specific areas of the fabric in defined patterns .Key characteristics: Colour is applied in specific patterns or designs, Colour is bonded with the Fiber for durability, Resists washing and friction, Involves applying multiple colours in defined patterns Textile printing offers a wide range of possibilities for creating intricate designs, patterns, and colours on various fabrics, making it a popular technique in the textile industry. Textile printing has a rich history in Europe, dating back to the 12th century, Dye liquification: European dyes tended to liquify, limiting the use of printed patterns, especially on fabrics that required washing. Design limitations: Larger, ambitious designs were reserved for decorative purposes like wall-hangings and lectern-cloths, which didn't require washing. Paper printing: With the advent of paper, textile printing technology was adapted for woodcut

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prints. Imported cloth: High-quality cloth was imported from Islamic countries, but at a higher cost.

Despite these challenges, textile printing continued to evolve, and new techniques were developed to overcome the limitations. The art form has since flourished, with various methods and technologies emerging to create stunning printed fabrics. Digital textile printing is a revolutionary technology that has transformed the textile industry. Design conversion: The design is converted into a digital format, typically a TIFF (Tagged Image File Format) file which are implemented in mechanically. Colour separation: The design is separated into individual colours, which will be printed separately. Inkjet printing: The design is printed onto the fabric using a large-format inkjet printer, which sprays tiny droplets of ink onto the fabric. Fixation: The printed fabric is then treated with heat and/or steam to fix the ink, ensuring durability and wash fastness. Digital textile printing offers numerous benefits, including: High-resolution images: Photorealistic prints with vibrant colours and intricate details. Short production runs: Print small quantities or one-off designs without significant setup costs. Flexibility: Print on various fabrics, including cotton, silk, polyester, and blends. Sustainability: Reduced waste and energy consumption compared to traditional printing method. This technology has opened up new creative possibilities for textile designers, enabling them to produce complex, high-quality designs with ease. Digital printing in textiles refers to the process of printing designs directly onto fabric using inkjet technology. Digital textile printing uses specialized inkjet printers designed for fabric. Digital textile printing is widely used in:

• Fashion: Custom apparel, accessories, and haute couture
• Home decor: Custom upholstery, curtains, and bedding
• Signage: Banners, flags, and displays

Textile printing in Ghana is a thriving industry with a rich cultural heritage. Ghanaian textile printing has a long history of traditional methods like Adinkra and Batik. Popular local fabrics like Kente, Adinkra, and Ankara are often printed using traditional methods Ghana has adopted modern digital textile printing technology, offering high-quality prints and quick turnaround times. Cities like Accra, Kumasi, and Takoradi have clusters of textile printing companies. Textile printing in Ghana caters to local demand for custom apparel, fashion, and home decor. Some Ghanaian textile printing companies export to international markets, particularly in Africa and Europe. The industry faces challenges like high production costs, limited access to finance, and competition from cheap imports Efforts to promote the industry include government initiatives, fashion events, and training programs.

Some popular textile printing companies in Ghana include:

• Ghana Textile Printing Company (GTP)
• Akosombo Textile Limited (ATL)

Ghana's textile printing industry has potential for growth, driven by increasing demand for local content, government support, and innovation.

1.1 THE PROCESS OF BLOCK PRINT

The technique of printing patterns using engraved wooden blocks is known as block printing. The textile printing techniques, this one is the oldest, most basic, and least quick. Manual block printing is a laborious procedure. However, it can produce extremely beautiful results, some of which are not achievable with any other technique. The process of block printing, often called stamping, involves carving a design into wood or other materials like linoleum, then rolling ink onto the raised portion of the block and pressing it onto cloth by hand. block diagrams are created by creating blocks, which are often rectangular forms that represent significant places of interest in the system from input to output. The relationships between these components are shown by the lines that connect the blocks.

- Carving the block is the first step in the centuries-old art of block printing, which involves a series of steps to create prints.
- To remove starch, the fabric is washed and bleached before it is ready to be used.
- When inking a flat surface, the artist begins by applying ink to the block and then rolls it onto the surface, covering the raised areas.
- Either by hand or with a printing press, the artist stamps the block onto the fabric.
- To ensure that the colors are completely absorbed, the fabric is cured for a few days.

1.1.1 Technique

Block printing is the ancient art of transferring designs from a Chiseled wooden 'block' onto a fabric or paper by dipped it in dye and colors. The wooden block has patterns that can be inspired by nature, birds, animals, and popular motifs.

A master block maker traces the chosen motif or design onto a wooden block, usually made of teak, a deciduous hardwood tree native to India. The wood block is oiled and sanded before the craftsman carefully chips away at the block, leaving behind the desired design for the stamp.

The creative process of printmaking involves transferring pictures from a matrix onto a different medium, usually paper or fabric. Woodcutting, etching, engraving, and lithography are examples of traditional printmaking methods; contemporary artists have broadened the range of techniques to include screen printing.

1.2 THE PROCESS OF SCREEN PRINTING

A popular printing technique used to create vibrant designs on various materials. Screen printing involves pushing ink through a mesh screen onto a surface which creating an image. By making specific areas of the screen impervious to ink, a stencil is formed, controlling the design. This versatile process requires From manual to automatic and digital methods, screen printing offers diverse applications and opportunities. It was in bullet and pointed.

1.2.1 Types of screen printing

1. Hand-screen printing: Manual process using a squeegee.
2. Automatic screen printing: Machine-based process.
3. Screen coating: Applying a layer of emulsion to screen.

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1.2.2Common Applications

T-shirts and apparel, Posters and prints, Labels and packaging Screen printing continues to evolve, offering creative possibilities for artists, designers, and industries worldwide.

1.3 THE PROCESS OF DIGITAL PRINTING

A revolutionary technology transforming the printing industry. Here's a comprehensive overview. The process of printing digital images directly onto a range of media substrates is known as digital printing. Unlike offset printing, this method does not require a printing plate. The digital printing press can be directly fed digital files, such as PDFs or desktop publishing files, to print on a variety of substrates, including paper, picture paper, canvas, fabric, synthetics, and cardboard.

1.3.1 Types of Digital Printing

- Inkjet Printing: Uses ink droplets to print images.
- Laser Printing: Uses laser beams to produce electrostatic charges.
- Toner-Based Printing: Uses dry toner for printing.
- Solvent-Based Printing: Uses solvent-based inks for vibrant colors.
- UV Printing: Uses ultraviolet (UV) inks that cure with UV light.

1.3.2 Digital Printing Techniques

- Dye-Sublimation Printing: Transfers dye onto materials using heat.
- Direct-to-Garment (DTG) Printing: Prints directly onto garments.
- Large-Format Printing: Prints large-scale images and banners.
- 3D Printing: Creates three-dimensional objects layer by layer.

1.3.3 Applications

Textiles (fabric, apparel, upholstery), Signage (banners, posters, displays), Graphics (photographs, artwork), Packaging (labels, boxes, bags), Industrial (metal, plastic, wood), Medical devices

Digital printing continues to evolve, offering innovative solutions for various industries, from textiles to industrial applications. Its flexibility, quality, and efficiency make it an essential technology for modern printing needs.

1.4 COMPARISON OF HAND PRINT, SCREEN PRINT, AND DIGITAL PRINT

ATTRIBUTE	HAND PRINT	SCREEN PRINT	DIGITAL PRINT
Design	Manual and highly detail	Low number of colour, high quantity, high durability	Lower quantity, more complex design
Process	Wood craved into block and ink applied	Ink forced to stencil	Ink applied in form of tiny droplets
cost	Less cost effective	Costly than digital printing	Cheaper than screen printing
Time required	1 day process	10 minutes for one colour but longer in stencils preparation	Each design in 8 to 45 seconds

Table 1

The table 1 shows that comparing of three methods of prints in textile printing.

RESULT

Textile printing can produce a variety of effects depending on the methodology employed. Vibrant hues When acid ink is required to reach the fabric's reverse side, it can create vivid hues on both natural and synthetic textiles. enduring prints Flex printing, another name for heat transfer vinyl (HTV) printing, creates strong prints that stick to the cloth. Bright, eye-catching designs High-resolution, color-accurate prints with fine details and intricate colour gradients can be produced with digital printing. Environmentally friendly Digital printing can be an environmentally friendly alternative to older methods, lowering water use and pollutants.

Hand block printing excels in uniqueness and sustainability. Screen printing provides high-quality images at scale. Digital printing offers speed, versatility, and precision. Integration of traditional techniques with digital technologies. Increased focus on sustainability and eco-friendliness. Advancements in ink and material technologies. Expanded applications in industries like healthcare and aerospace. Continued innovation in 3D printing and additive manufacturing.

CONCLUSION

In this, we are comparing the three methods of textile printing which are in still practicing. From hand block printing is traditional methods, consider rural areas and requires skilled labour. Screen printing is methods take place in textiles industry which will be in small scale and small production Digital textile printing is widely used methods and larger production. In this Ghana Textile Printing is more famous and modern technique of prints. It has completely transformed the home décor and fashion industries, and its use is only anticipated to grow in the future. Hand block printing, screen printing, and digital printing each offer distinct advantages and limitations. Hand block printing excels in uniqueness and sustainability, while screen printing provides high-quality images at scale. Digital printing revolutionizes printing with speed, versatility, and precision.

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RAINWATER HARVESTING AND ENERGY GENERATION USING MICRO-TURBINES IN DOWNPIPES – A REVIEW

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ABSTRACT

As the world population increases, the demand increases for quality drinking water. Surface and groundwater resources are being utilized faster than they can be recharged. Rainwater harvesting is an old practice that is being adopted by many nations as a viable decentralized water source. This paper reviews the methods, design of rainwater harvesting systems, and its impacts adopted in all parts of the world. Renewable energy sources are rapidly increasing in demand and importance as governments and countries around the globe begin to understand their vital role in reducing climate change. This project aimed to design and create an optimised micro-hydro turbine system for downpipes to harness the currently untapped potential energy from rainwater. The study determined that, during average rainfall in the UK, a single turbine could produce a maximum of 7.21 V of DC voltage, or 50.49 V during heavy rainfall – enough energy to power a mobile device charger or a vacuum cleaner, respectively. Therefore, this proves a high potential in rainwater energy harvesting as a renewable energy source.

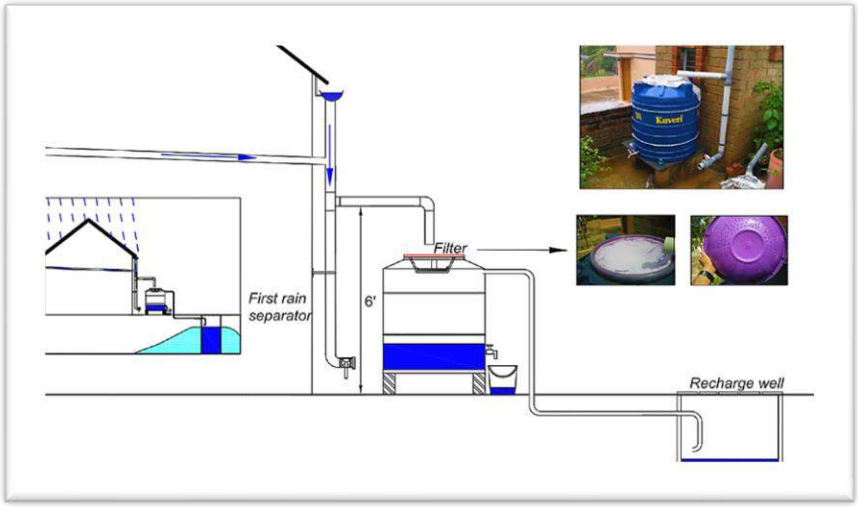
KEYWORDS: *(RWH), electromagnetic induction, rainwater, renewables, optimisation*

INTRODUCTION

Individual rainwater harvesting systems are one of the many tools to meeting the growing water demand. Rainwater harvesting is an environmentally sound solution to address issues brought forth by large projects utilizing centralized water management approaches. Population growth all over the world is causing similar problems and concerns of how to supply quality water to all. As land pressure rises, cities are growing vertical and in countryside more forest areas are encroached and being used for agriculture. In India the small farmers depend on Monsoon where rainfall is from June to October and much of the precious water is soon lost as surface runoff. While irrigation may be the most obvious response to drought, it has proved costly and can only benefit a fortunate few. There is now increasing interest in the low cost alternative-generally referred to as 'Rain Water Harvesting' (RWH).Rapid advances in technology and an ever-growing population have led global energy demand to increase rapidly in the last decade. Between 2000 and 2040, global energy consumption is expected to increase by 77% , reaching around 740 million terajoules. Roughly 84% of the world's primary energy consumption in 2019 was produced from fossil fuels . These unsustainable resources cause grave effects on the planet including environmental pollution, greenhouse effects, and CO_2 emissions. To ensure a clean and sustainable environment for future generations, governments have realised the importance of investing in greener energy sources, with the UK setting targets to generate 100% of its power from renewable energy by 2035 . With rapid improvements in technology, decreasing costs of renewable energy resources, and increased competitiveness of battery storage, renewables have become among the most competitive sources of energy in many countries. India has a long tradition of water harvesting. Many of the traditional water harvesting systems have either fallen into disuse due to a variety of physical, social, economic, cultural and political factors which have caused their deterioration, decline of institutions which have nurtured them (Agarwal and Narain, 1997) or have lost their relevance in the modern day context due to their inability to meet the desires of the communities.

While the first dimension of the decline in water harvesting tradition has been well researched and documented, the second dimension is much less understood and appreciated. The fact that different periods in history are marked by the genesis, rise and fall of some new water harvesting tradition (Pandey et al., 2003), is also not appreciated.

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SCOPE OF WORK

- Collection of rainfall data for 3year.
- Analysis of effective rainwater harvesting for various society in pune region.
- Analysis of effective rainwater harvesting for road infrastructure in pune region.
- Effective implementation of rainwater harvesting project.
- Generation of electricity using micro turbine technology.

YEARS	RAINFALL(mm)
2016	793.6
2017	756.3
2018	653.9
2019	982.4

Fig: The average rainfall in recent four years

MATERIAL AND METHODS

Material

1. **PVC Pipe:** The full form of PVC is Poly Vinyl Chloride. PVC is a polymer which is made from Vinyl Chloride Polymerisation. PVC is being used in a various type of products, including raincoats, wires, pipes, bottles.
2. **RCC material**: RCC is made by embedding steel bars, wires, or mesh into concrete. The steel absorbs tensile, shear, and sometimes compressive stresses in the structure.
3. **Grataion motor:** A generation motor, also known as a motor-generator, is a combination of an electric motor and an electric generator that can convert electrical and mechanical energy.
4. **Wire:** Wires are pieces of metal that transport electricity. They are frequently flexible which makes them easier to use.
5. **Battery:** A rechargeable battery is a battery that can be charged and used multiple times.
6. **Micro-turbines:** water flows through a pipe to produces electricity.

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METHODOLOGY

1. **Rooftop collection**
   Collect rainwater from a roof using a gutter and direct it to a storage tank or cistern. A filter can be used to remove debris from the water.
2. **Permeable surfaces**
   Create surfaces that allow rainwater to seep into the ground, such as using gravel, permeable pavers, or grass.
3. **Percolation pits**
   Dig pits and fill them with porous materials like pebbles or broken bricks to help rainwater seep into the soil.
4. **Groundwater recharge**
   Use artificial techniques to recharge groundwater aquifers with surplus rainwater.
5. **Treatment**
   Treat rainwater with disinfection methods like chlorination, ultraviolet disinfection, or heat treatment before using it.
6. **Energy conversion**
   When water will flow from the pipe the t pressure of water will come on turbines then the hydraulic power will convert into electrical energy. This electrical energy is used for generation of street light.

LITERATURE REVIEW

1. A relatively new water-harvesting treatment is the application of paraffin wax to soils to create a water-repellent catchment surface. The first two such catchments were installed at the Granite Reef test site in 1972 by applying ground paraffin wax (0.7 kg/m^2 average rate) atop smoothed, rain-compacted soils. Solar energy melted the wax into the soil. The catchments are still operational after 7 years of natural weathering. YEAR averaged 87% for the 7 years. Year 7 averages were 85%, i.e., only 2% less than the 7-year average. Also, the 7-year average runoff efficiency of the two catchments was only 10% less than that of a plastic membrane, but was more than four times greater than that of a simple, cleared and smoothed soil surface and nearly six times greater than that of a small untreated, natural desert watershed. Several operational wax-treated catchments have been built to supply water to livestock on arid rangeland. Ranchers are pleased with them — equating them to permanent springs. Both laboratory and field tests indicated that the wax treatment is most successful on sandy soils containing less then 20–25% clay plus fine silt**.**
2. Abhijeet Keskar, Satish et al. Investigated the rain water harvesting (RWH) system as an alternative source of water at the Government College of Engineering, Aurangabad (GECA) campus in the Indian state of Maharashtra. The study's expected outcome is the development of a rainwater harvesting system for the campus catchment area, which includes the parking lot, workshop area, and some of the electronics department area up to Hostel 'A.' According to the analysis, the current RWH system has a storage capacity of 53,96,816 litres per year and a construction cost of Rs.5 lakhs, and it performs reasonably well in comparison to conventional water sources. By taking almost all technical aspects into account, the developed system meets social requirements and can be implemented in rural areas.
3. Project Report on Design of Rainwater Harvesting System Lingaya's University, Faridabad :- The specialized parts of this paper are water gathering gathered from housetop which is thought to be catchment territories from all lodgings and Institutes departmental working at Lingaya's Institute of Management and Technology, Faridabad Campus. As a matter of first importance, required information are gathered i.e. catchment zones and hydrological precipitation information. Water gathering potential for the inns and workforce flats was ascertained, and the tank limit with appropriate plan is being considered. Rain Water Harvesting-A Campus Study, Govt College of Aurangabad: - The aim of this study is to use rainwater and thus taking close to the concept of nature conservation. In this study, the rain water harvesting system is analysed as a alternative source of water at campus of government college of engineering, Aurangabad in the state of Maharashtra, India. The expected outcome of the study is the development of rainwater harvesting system for catchment area of campus from parking area, workshop area, some of the electronics department area up to hostel. The result analysis shows that the present rain water harvesting system is having the storage 53,96,816 litres/year and construction cost of rs.5 lakhs respectively and is reasonably well in comparison

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INTEGRATING SERVICE LEARNING INTO MATHEMATICS PEDAGOGY FOR DEVELOPING PROSPECTIVE TEACHERS' METACOGNITION, PROBLEM-SOLVING SKILL AND PROFESSIONALISM

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ABSTRACT

Service learning is an educational approach that integrates community service with academic instruction and reflection to enrich the learning experience, teach civic responsibility, and strengthen communities. Integrating service learning into mathematics pedagogy for developing prospective teachers can have significant benefits in various areas, including metacognition, problem-solving skills, and professionalism. This research study objectifies to explore the strategies incorporated for integrating service learning into math pedagogy for developing prospective teachers' metacognition and problem-solving skills which is an essential skill for a math teacher to develop. The study aims to explore various strategies of social learning to develop prospective teachers' professionalism and last but not least, the study also aims to find out the influence of metacognition and problem-solving skills, gained through social learning, on the prospective teachers' professionalism development. For this study systematic literature review is followed to collect data and thematic analysis is done.

The findings of this piece of research study ensure a great educational implication by integrating service learning into mathematics pedagogy. These strategies aim to create authentic learning experiences that integrate mathematical problem-solving, community engagement, and reflective practices. By implementing these strategies, prospective teachers can develop metacognitive awareness, enhance their problem-solving skills, and cultivate essential professional dispositions and competencies necessary for effective teaching and community service. The result of the study also shows that by integrating service learning into mathematics pedagogy, prospective teachers have the opportunity to develop metacognitive skills, problem-solving abilities, and professional dispositions in authentic contexts. These experiences can contribute to their overall professional growth, preparing them to become effective, reflective, and socially responsible educators who are equipped to navigate the complexities of the teaching profession.

KEYWORDS: *Service learning, Mathematics pedagogy, Prospective teachers, Metacognition, Problem solving skill, Professionalism.*

INTRODUCTION

Service learning is a pedagogical approach that integrates community service experiences with academic learning objectives. It is a form of experiential education that allows students to apply their knowledge and skills to address real-world needs while reflecting on their experiences to gain a deeper understanding of course content and develop critical thinking, problem-solving, and civic engagement skills. Integrating service learning into mathematics pedagogy for developing prospective teachers can benefit significantly in various areas, including metacognition, problem-solving skills, and professionalism.

Service learning provides prospective teachers with real-world experiences that connect classroom learning with community needs. By engaging in service activities related to math education, prospective teachers can develop metacognitive skills by reflecting on their teaching approaches, problem-solving strategies, and ability to convey mathematical concepts effectively. They can also enhance problem-solving skills by encountering authentic challenges and diverse learner needs that require creative solutions, and in this way, professionalism is also fostered by interacting with community partners, parents, and students from diverse backgrounds, learning to communicate effectively and developing a sense of responsibility toward the broader educational community.

This study is about to analyze the strategies of integrating service learning into mathematics pedagogy for developing prospective teachers' metacognition, problem-solving skill, and professionalism and the challenges faced by prospective teachers during the process.

OBJECTIVES OF THE STUDY

1. To explore the strategies incorporated for integrating service learning into math pedagogy for developing prospective teachers' metacognition.

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2. To explore the strategies incorporated for integrating service learning into math pedagogy for developing prospective teachers' problem-solving skills.
3. To explore various strategies of social learning to develop prospective teachers' professionalism.
4. To find out the influence of metacognition and problem-solving skills, gained through social learning, on the prospective teachers' professionalism development.

METHODOLOGY

This piece of review work is based on systematic review research design, that involves few steps like identifying, analyzing and synthesizing the existing related literature. During article selection process few things have been considered like only peer reviewed journals focusing upon the concerned topic. For collecting data to conduct this piece of review research work, systemic searching and selection of relevant documents from different sources has been done in few steps.

1. Comprehensive searching of various electronic databases like Google Scholar, Scopus, ERIC etc. to identify relevant studies. Key words searching has been done for serving this purpose.
2. Initial screening has been done by reading the titles and thereafter reviewing the abstract of the retrieved articles. After this initial assessment selected papers have full text review.
3. Relevant data including author's details, publication details, research methodology, , key results of the research have been extracted.
4. According to the identified themes from reviewing the existed literature, the synthesized data has been analyzed by identifying common patterns, recent trends on concerned topic related to the present study.

During the study ethical consideration like proper citation, following copyright laws have been properly followed.

RESULT AND DISCUSSION

Objective 1: To explore the strategies incorporated for integrating service learning into math pedagogy for developing prospective teachers' metacognition

Integrating service learning into math pedagogy for developing prospective teachers' metacognition is a valuable approach that can provide several benefits. Here are some strategies that can be employed:

1. Reflective Journaling: Prospective teachers can be asked to maintain reflective journals during their service-learning experiences. These journals can serve as a platform for them to document their observations, experiences, and thought processes while working with students or community members. By reflecting on their learning experiences, they can develop a deeper understanding of their own thought processes and learning strategies, fostering metacognitive awareness.
2. Collaborative Problem-Solving: Service-learning projects can involve collaborative problem-solving activities, where prospective teachers work together to identify and address real-world mathematical challenges faced by the community they are serving. Through this process, they can engage in metacognitive strategies such as planning, monitoring, and evaluating their problem-solving approaches, and learn from one another's experiences.
3. Peer Observations and Feedback: Prospective teachers can be paired or grouped together to observe each other's teaching practices during service-learning activities. They can provide constructive feedback and engage in discussions about their teaching strategies, decision-making processes, and areas for improvement. This peer observation and feedback loop can facilitate metacognitive reflection and growth.
4. Structured Debriefing Sessions: After service-learning experiences, facilitators can conduct structured debriefing sessions with prospective teachers. These sessions can involve guided discussions, prompts, and activities that encourage prospective teachers to examine their thought processes, identify strengths and weaknesses, and develop strategies for improvement.
5. Modelling and Think-Aloud Techniques: Instructors or experienced teachers can model metacognitive strategies and thought processes during service-learning activities. By explicitly verbalizing their thinking and decision-making processes (think-aloud techniques), prospective teachers can observe and learn how to apply metacognitive strategies in real-world teaching situations.
6. Incorporating Metacognitive Prompts: Service-learning activities can be designed to include metacognitive prompts or questions that encourage prospective teachers to reflect on their learning processes, monitor their understanding, and evaluate their progress. These prompts can be embedded within lesson plans, worksheets, or activities to promote metacognitive habits.
7. Connecting Theory and Practice: Service-learning experiences can be coupled with theoretical concepts and frameworks related to metacognition and self-regulated learning. By making explicit connections between theory and their practical experiences, prospective teachers can develop a deeper understanding of metacognitive strategies and their applications in teaching and learning mathematics.

It is important to note that these strategies should be implemented in a structured and intentional manner, with ongoing support and guidance from instructors or facilitators. Additionally, providing opportunities for prospective teachers to reflect on their service-learning experiences and connect them to their future teaching practices is crucial for maximizing the development of their metacognitive skills.

Objective 2: To explore the strategies incorporated for integrating service learning into math pedagogy for developing prospective teachers' problem-solving skills

Here are some strategies that can be incorporated for integrating service learning into math pedagogy to develop prospective teachers' problem-solving skills:

1. Real-world Problem-Based Learning: Service-learning projects can provide prospective teachers with opportunities to engage in real-world problem-based learning activities. By working with community partners or organizations, they can identify authentic mathematical

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problems or challenges faced by the community and apply their problem-solving skills to develop solutions. This hands-on experience can help them develop critical thinking, problem formulation, and problem-solving abilities.

2. Collaborative Problem-Solving: Service-learning activities can be designed to encourage collaborative problem-solving among prospective teachers. By working in teams or groups, they can share their diverse perspectives, knowledge, and strategies, leading to a more comprehensive approach to problem-solving. This collaboration can also foster communication, teamwork, and effective problem-solving skills.
3. Inquiry-based Learning: Service-learning projects can incorporate inquiry-based learning approaches, where prospective teachers are encouraged to ask questions, investigate, and explore mathematical concepts and problems within the context of the community they are serving. This inquiry-based approach can nurture their problem-solving skills by promoting curiosity, critical thinking, and the ability to formulate and test hypotheses.
4. Structured Reflection and Debriefing: After engaging in service-learning activities, prospective teachers can participate in structured reflection and debriefing sessions. During these sessions, they can analyze the problem-solving strategies they employed, identify challenges they encountered, and discuss alternative approaches or solutions. This process can help them refine their problem-solving skills and develop a deeper understanding of effective problem-solving strategies.
5. Modeling and Mentoring: Experienced teachers or experts in the field can serve as mentors or models for prospective teachers during service-learning projects. By observing and learning from their problem-solving approaches, prospective teachers can gain insights into effective problem-solving strategies and techniques, which they can later apply in their own teaching practices.
6. Incorporating Technology and Computational Thinking: Service-learning projects can integrate technology and computational thinking to enhance prospective teachers' problem-solving skills. They can use various software, simulations, or coding environments to explore mathematical concepts, model real-world scenarios, and develop algorithmic thinking, which can strengthen their overall problem-solving abilities.
7. Connecting to Pedagogical Strategies: Service-learning experiences can be linked to pedagogical strategies and best practices for teaching problem-solving skills in mathematics classrooms. By making explicit connections between their service-learning experiences and effective instructional approaches, prospective teachers can develop a deeper understanding of how to foster problem-solving skills in their future students.

It is essential to provide prospective teachers with ongoing support, guidance, and opportunities for reflection throughout the service-learning process. Additionally, incorporating assessments or evaluation methods to measure the development of their problem-solving skills can help instructors refine and improve the service-learning activities for future iterations.

Objective 3: To explore various strategies of social learning to develop prospective teachers' professionalism

Metacognition and problem-solving skills, when developed through social learning strategies, can have a significant influence on prospective teachers' professionalism development. Here's how:

1. Reflective Practice: Social learning experiences that involve collaborative reflection and debriefing sessions can enhance prospective teachers' metacognitive abilities. By analyzing their thought processes, learning strategies, and problem-solving approaches with peers and mentors, they develop a deeper understanding of their strengths, weaknesses, and areas for improvement. This reflective practice fosters a growth mindset and a commitment to continuous professional development, which are hallmarks of professionalism.
2. Adaptability and Flexibility: Through social learning, prospective teachers can observe and learn from diverse perspectives and problem-solving strategies employed by their peers, mentors, and experienced educators. This exposure can broaden their repertoire of teaching approaches and problem-solving techniques, enabling them to adapt to various classroom situations and student needs with greater flexibility, a key aspect of professionalism.
3. Collaborative Problem-Solving: Social learning activities that involve collaborative problem-solving can foster teamwork, communication, and interpersonal skills among prospective teachers. By working together to tackle complex problems or challenges, they develop an appreciation for diverse viewpoints, learn to navigate conflicts constructively, and hone their ability to collaborate effectively with colleagues and stakeholders, which are essential professional competencies.
4. Decision-Making and Critical Thinking: Through case studies, scenario-based learning, and discussions with experienced educators, prospective teachers can enhance their decision-making and critical thinking skills. By analyzing real-life situations and dilemmas, they can practice weighing multiple factors, considering ethical implications, and making informed decisions, which are crucial for maintaining professionalism in various teaching contexts.
5. Self-Regulation and Lifelong Learning: Metacognitive strategies developed through social learning experiences can promote self-regulation and a commitment to lifelong learning among prospective teachers. By monitoring their progress, evaluating their practices, and seeking feedback from peers and mentors, they can develop habits of self-reflection and continuous improvement, which are essential for maintaining professionalism throughout their teaching careers.
6. Professional Identity Formation: Social learning experiences provide opportunities for prospective teachers to observe and interact with role models who embody professionalism. Through these interactions, they can develop a deeper understanding of the values, norms, and expectations associated with the teaching profession, shaping their professional identities and

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reinforcing their commitment to upholding high standards of professionalism.

7. Ethical and Legal Awareness: Social learning activities that involve discussions, case studies, or workshops related to ethical and legal considerations in teaching can heighten prospective teachers' awareness of their professional responsibilities. By exploring various ethical dilemmas and legal implications, they can develop a stronger sense of accountability and a commitment to upholding ethical standards, which are fundamental aspects of professionalism.

By intentionally incorporating social learning strategies that foster metacognition and problem-solving skills, teacher education programs can effectively nurture professionalism among prospective teachers. These experiences provide opportunities for prospective teachers to develop essential professional competencies, such as reflective practice, adaptability, collaboration, decision-making, and a commitment to continuous growth and ethical conduct.

CONCLUSION

Integrating service learning into mathematics pedagogy can be an effective approach to develop prospective teachers' metacognition, problem-solving skills, and professionalism. It is crucial to provide prospective teachers with ongoing support, guidance, and opportunities for reflection throughout the service-learning process. Additionally, incorporating assessments or evaluation methods to measure the development of their metacognition, problem-solving skills, and professional competencies can help instructors refine and improve the service-learning activities for future iterations.

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GENDER DIFFERENCES IN CYBERSECURITY COMPETENCE, AWARENESS, AND RESPONSE - COMPARATIVE STUDY AMONG FORENSIC SCIENCE STUDENTS IN BENGALURU

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ABSTRACT

This study examines gender differences in cybersecurity competence, awareness, and response among forensic science students in Bengaluru. A questionnaire assessing various aspects of cybersecurity knowledge and practices was administered to 14 male and 14 female students. Using R software, independent t-tests were conducted to compare mean scores between genders. The results indicated no statistically significant differences, suggesting that gender may not be a determining factor in cybersecurity proficiency within this demographic. These findings highlight the importance of inclusive educational strategies in cybersecurity training for forensic science students.

KEYWORDS: *Cybersecurity, Gender, Forensic Science Education, Statistical Analysis in R*

INTRODUCTION

The role of gender in cybersecurity competence has been a subject of debate. Some studies suggest that males are more engaged with technology due to societal influences, potentially leading to higher cybersecurity competence among male students (McGill&Thompson, 2021). However, other research indicates that when provided with equal educational opportunities, females perform on par with males in computer and information technology tasks (Gebhardt et al., 2019).

Students pursuing forensic science need to be proficient in cybersecurity to handle digital evidence effectively, defend against online threats, and respond to cybercrimes. These abilities enhance their capacity to protect confidential information, uphold the credibility of investigations, and adapt to the increasing influence of technology in contemporary forensic work.Gender variations in forensic science students' cybersecurity knowledge, competency, and response are important because they may indicate differences in male and female students' skill and readiness.

The aim of this paper is to examine these variations and determine how they affect students' ability to manage cybersecurity issues in forensic work. By being aware of these differences, resources, training, and educational programs can be adjusted so that both sexes are equally prepared to handle cybersecurity challenges. This realization may result in more diverse and productive learning environments, ultimately advancing the discipline of digital forensics.

METHODOLOGY

The study involved 28 forensic science students from Bengaluru, comprising 14 males and 14 females. Participants were selected based on their enrolment in forensic science programs and their willingness to participate in the study.A structured questionnaire was developed to assess participants' cybersecurity competence, awareness, and response strategies. The questionnaire included five items rated on a Likert scale from 1 to 5, with higher scores indicating greater competence or awareness. The questionnaire is provided in Appendix B.Participants were asked to complete the questionnaire anonymously.Responses were coded and analysed using R software. Mean scores for each participant were calculated. Independent t-tests were performed to determine if there were significant differences between male and female participants.The R code used for data analysis is included in Appendix A.

In this study, we conducted both a one-tailed and a two-tailed independent t-test using R software:

- **One-Tailed t-Test**: This test assesses whether the mean score of one group (females) is significantly greater than that of another group (males). The null hypothesis (H_0) states that the mean score of female students is less than or equal to that of male students. The alternative hypothesis (H_1) posits that the mean score of female students is greater than that of male students.
- **Two-Tailed t-Test**: This test assesses whether there is any significant difference between the means of the two groups, regardless of direction. The null hypothesis (H_0) states that there is no difference between the mean scores of male and female students. The alternative hypothesis (H_1) suggests that there is a significant difference between the mean scores.

RESULTS

The independent t-tests were performed using R, and the outputs are presented below as generated by the software.

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Fig. 1: One-Tailed Independent t-Test



Fig. 2: Two-Tailed Independent t-Test

One-Tailed Independent t-Test Output

- t-statistic: 0.25573
- Degrees of Freedom (df): 25.179
- Alternative Hypothesis: true
- Mean of Females (x): 4.157143
- Mean of Males (y): 4.11428
- 95% Confidence Interval: (-0.2433235, Inf) — It includes zero, indicating that the difference is not significant.
- p-value: 0.4001 — Since this is greater than 0.05, we fail to reject the null hypothesis.

Two-Tailed Independent t-Test Output

- t-statistic: 0.25573
- Degrees of Freedom (df): 25.179
- Alternative Hypothesis: true
- Mean of Females (x): 4.157143
- Mean of Males (y): 4.114286
- Confidence Interval: (-0.3021663, 0.3878806) — This interval contains zero, supporting the conclusion that there is no significant difference between the two means.
- p-value: 0.8002 — Again, greater than 0.05, so we fail to reject the null hypothesis.

DISCUSSION

For both the one-tailed and two-tailed tests, the p-values exceed the conventional alpha level of 0.05. This indicates that we fail to reject the null hypothesis in both cases. There is no statistically significant difference between male and female participants in terms of cybersecurity competence, awareness, and response.

CONCLUSION

The study concludes that there are no significant gender differences in cybersecurity competence, awareness, and response among forensic science students in Bengaluru. By ensuring equal access to resources and training, educational programs can prepare all students to handle cybersecurity challenges effectively, which is crucial in the field of digital forensics.

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Appendix A: R Code Used for Data Analysis

```
# Data for females and males
females <- list(
c(4, 4, 4, 4, 4),
c(3, 5, 5, 4, 4),
c(3, 5, 5, 4, 4),
c(5, 5, 5, 5, 5),
c(4, 4, 5, 4, 5),
c(3, 4, 5, 4, 3),
c(4, 5, 5, 4, 5),
c(4, 5, 5, 4, 2),
c(3, 5, 5, 4, 4),
c(4, 5, 5, 4, 3),
c(4, 5, 4, 4, 4),
c(3, 5, 5, 5, 4),
c(3, 4, 4, 4, 3),
c(3, 4, 4, 3, 3)
)
```

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```
males <- list(
c(3, 4, 4, 4, 4),
c(4, 4, 4, 4, 4),
c(5, 5, 5, 5, 5),
c(4, 5, 4, 5, 4),
c(3, 5, 4, 3, 3),
c(4, 5, 5, 4, 4),
c(4, 5, 4, 5, 4),
c(4, 5, 4, 5, 4),
c(5, 5, 5, 3, 4),
c(3, 3, 3, 5, 3),
c(4, 5, 4, 4, 5),
c(3, 4, 4, 2, 3),
c(4, 4, 4, 5, 4),
c(3, 5, 4, 4, 4)
)

# Compute the mean score for each participant
female_means<- sapply(females, mean)
male_means<- sapply(males, mean)

# Perform independent t-tests
# One-tailed test (H1: female mean > male mean)
t_test_one_tailed<- t.test(female_means, male_means, alternative = "greater")

# Two-tailed test (H1: female mean != male mean)
t_test_two_tailed<- t.test(female_means, male_means, alternative = "two.sided")

# Output results
print("One-tailed test result:")
print(t_test_one_tailed)

print("Two-tailed test result:")
print(t_test_two_tailed)
```

Appendix B: Questionnaire

1. What is your gender?

Male Female Prefer not to say

2. On a scale of 1 to 5, how would you rate your skills in identifying and mitigating cybersecurity threats? (1 being very poor and 5 being excellent)

1 2 3 4 5

3. How familiar are you with the following cybersecurity threats? Rate each on a scale from 1 to 5. (1 being not at all familiar and 5 being very familiar)

Phishing	1	2	3	4	5
Malware	1	2	3	4	5
Ransomware	1	2	3	4	5
Social Engineering	1	2	3	4	5

4. On a scale of 1 to 5, how concerned are you about your online privacy? (1 being not concerned at all and 5 being extremely concerned)

1 2 3 4 5

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5. How often do you update your privacy settings on social media? Rate on a scale from 1 to 5. (1 being never and 5 being very frequently)
1 2 3 4 5

6. If you discovered a security breach in your personal email account, how confident are you in your ability to handle it effectively? Rate your confidence on a scale of 1 to 5. (1 being not confident at all and 5 being extremely confident)
1 2 3 4 5

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REVIEW ON KNITTED FABRIC IN SPORTS TEXTILE

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ABSRACT

In recent years, there has been an increase in the revolution of sportswear to provide maximum comfort and the ideal fit. When creating fabric for sportswear, factors including fabric type, yarn technology, and methods for achieving great performance and comfort are taken into account. Textile science and technology have been used in the production of leisure and sportswear to meet the demands of athletic activities and improve performance. Sports fabrics are technically advanced materials that are designed to improve the wearer's comfort during physical activity. These materials are chosen for their high heat and moisture management capabilities, which include excellent elasticity, rapid drying, and extreme breathability

KEYWORDS: *Knitted fabrics, Sportswear, Ommc, Comfort property*

1. INTRODUCTION

Sportswear is a category of practical clothing that individuals wear when they work out, run, or do other physical activities. Clothing style worn during physical activities. Those who want to work out in comfort choose to wear clothes that allow them to move rapidly and absorb perspiration. Consequently, important sorts of material were used to develop sportswear. The revolution of sportswear to obtain the ideal fit and maximum comfort has accelerated in recent years. When creating fabric for sportswear, factors including fabric type, yarn technology, and methods for achieving great performance and comfort are taken into account. Textile science and technology have been used in the production of leisure and sportswear to meet the demands of athletic activities and improve performance. Sports fabrics are technically advanced materials designed to improve the wearer's comfort during physical activity. These materials are chosen for their exceptional elasticity, quick drying time, high heat and moisture management, and high breathability. Creating fabrics with multiple layers is crucial to achieving the desired level of comfort when wearing clothing. The usage of microfibre yarn results in improved thermo-physiological regulation. A tri-layer fabric's multi-layered composition also makes it very functionally supportive. (Philip A Bishop et.al, 2013)

The usage of microfiber yarn results in improved thermo-physiological regulation. A tri-layer fabric's multi-layered composition also makes it very functionally supportive. It is made up of three layers: the top or outer layer for evaporation, the middle layer for liquid transmission, and the base or inner layer for liquid absorption. (Shishoo R ,2005)

2. MATERIALS AND METHODS

2.1 KNITTED FABRIC

A textile called knitted fabric is produced by knitting, which is the interlacing of yarn loops for loop intermeshing. Its characteristics set it apart from woven fabric since it is more pliable and easily formed into smaller pieces, which makes it perfect for headwear and socks. Knitwear has the advantage of being able to stretch to your desired length and shape thanks to the loops.

2.1.1 Polyester

Sportswear designers particularly value polyester knits because of their remarkable moisture-wicking properties and exceptional durability. Even during the most strenuous workouts, athletes remain dry and comfortable because to these textiles' ability to drain sweat away from the body. Due to their durability and capacity to withstand wear and tear, they are a popular option for athletes who want clothes that will last and function well during high-intensity activities.

2.1.2 Spandex

The elastic material found in sportswear is called spandex, sometimes referred to as elastane. The exceptional flexibility of this synthetic material permits a complete range of motion without sacrificing the integrity of the garment. Compression garments made of spandex are especially well-suited for sportswear since they promote blood circulation, lessen muscular soreness, and expedite healing. Stretching, lifting, or sprinting—spandex gives you the support and flexibility you need to perform at your best.

2.1.3 Nylon

Another popular synthetic material for sportswear is nylon, which is renowned for its strength and longevity. Nylon is used extensively in sports bras, cycling shorts, and compression

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clothing because it offers superior support. Because of its strength, these clothes stay functional and in shape even after strenuous physical activity. Moreover, sportswear usually includes nylon as an additional layer of reinforcement to increase its durability.

2.1.4 Merino Wool

Merino wool is a natural material that is highly valued for its distinct characteristics, setting it apart from synthetic alternatives. This wool is very soft and has great moisture-wicking qualities. It comes from merino sheep. Sportswear made of merino wool is a great option for activities in cold weather since it efficiently controls body temperature and minimizes discomfort from perspiration. Although it is cozy and warm, its durability might not be as good as that of synthetics.

2.2 OVERALL MOISTURE MANAGEMENT PROPERTY

The findings suggest that the bi-layer knitted fabric composed of modal (outer layer) and micro-fibre polyester (inner layer) has superior moisture management properties due to its higher wetting radius, better absorption rate, and better sweat spreading speed. As a result, it offers superior comfort and is therefore a good choice for active sportswear.

2.3 COMFORT PROPERTY

Since knitted materials can stretch, breathe, and mould to the shape of the body, they are comfortable to wear.

Breathability

Knitted fabrics are more breathable than woven fabrics because of their open design that promotes ventilation.

Stretchability

Knitted fabrics can stretch in all four directions, making them easy to move around in.

Conforms to body contours

Knitted fabrics can mould according to the body's shape.

Temperature regulation

Knitted fabrics can keep you warm in cold weather and allow your body to breathe in hot weather.

Wrinkle resistance

As the knitted fabrics has looped structure they are resistant to wrinkles.

3. RESULT AND DISCUSSIONS

The below table explains the ommc property and comfort property of the knitted fabric used in sports textile.

Table -1

FABRICS	OMMC	COMFORT PROPERTY
Polyester	0.6	Uncomfortable
Spandex	0.8	Comfortable
Nylon	0.6	Uncomfortable
Merino wool	0.7	Exceptional Comfortable

Knitted fabrics are very desirable for sports textiles because of their many beneficial qualities Their breathability, stretchability, moisture management, and comfort significantly enhance athletic performance and overall user experience. As technology advances, innovations in knitted fabric construction and material science will likely lead to even more specialized applications in sports apparel. Continued research and development in this field will further optimize these properties, addressing the evolving needs of athletes and outdoor enthusiasts.

4. CONCLUSION

In conclusion, the features of knitted fabrics play a vital part in the performance and comfort of sports textiles. They are perfect for athletic wear because of their special structure, which offers flexibility, breathability, and moisture-wicking qualities. The elasticity of knitted materials provides for ease of movement, while its capacity to regulate temperature promotes overall athlete comfort during diverse sports. Additionally, improvements in knitting methods and yarn technology keep these textiles more functional and long-lasting. Innovative knitted materials will surely be utilized in sports as the industry develops, improving performance and providing a better experience for athletes of all levels. To satisfy the needs of contemporary sportswear, sports textile designers and manufacturers have to focus on these qualities in their product designs.

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ATTITUDE OF FEMALE STUDENTS IN PUBLIC TERTIARY INSTITUTION IN IMO ABOUT CERVICAL CANCER SCREENING

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ABSTRACT

Cervical cancer is a significant health concern and one of the leading causes of death among women globally. This study aimed to examine the attitudes related to cervical cancer screening among female students in public tertiary institutions in Imo State, Nigeria. The study, guided by three research questions and two null hypotheses tested at the 0.05 significance level used a descriptive survey design. A sample of 900 students was selected from a population of 11,825 female undergraduates. The research instrument, "Attitude towards Cervical Cancer Screening Questionnaire (ACCSQ)" was validated and found reliable with coefficient alphas of 0.89. Data were collected through direct delivery and analysed using SPSS, employing descriptive statistics of mean and standard deviation and inferential statistics of ANOVA. The findings revealed that most students had a positive attitude toward screening, with a mean attitude score of 53.35. Attitudes of the female students of this study towards cervical cancer screening did not significantly differ based on their ages or their level of education. The study recommended that given the generally positive attitude towards cervical cancer screening, awareness campaigns should be strengthened to further encourage screening participation. These campaigns should target all age groups, emphasizing the importance of early detection and regular screening for cervical cancer.

KEYWORDS: *Cervical cancer, screening, female students, attitude, public, tertiary institutions*

1. INTRODUCTION

Cervical cancer is a serious health issue and the most common genital cancer among women globally, including in Imo State, Nigeria. Despite its preventable nature through screening, many female students in public tertiary institutions in Imo State display a lack of awareness regarding cervical cancer risks and the importance of regular screening. According to the World Health Organization (2020), cervical cancer is the fourth most common cancer in Nigeria, yet many female students are not well informed about preventive measures such as screening, as noted by Nwosu et al. (2012). The absence of comprehensive health education on the subject contributes to negative attitudes towards screening.

Attitudes are fundamental in shaping behaviours, especially in healthcare decisions, including the decision to undergo cervical cancer screening. Bromberger (2015) defines attitudes as psychological orientations that influence individuals' thoughts, feelings, and actions. In the context of cervical cancer screening, a person's attitude towards the procedure directly affects whether they are likely to adhere to screening recommendations. A positive attitude, characterized by beliefs in the necessity, convenience, and health benefits of screening, enhances compliance with screening programs. On the other hand, negative attitudes, which may arise from beliefs that screening is unnecessary, time-consuming, or even dangerous, often discourage individuals from participating in screening efforts (Dowd & Ahluwalia, 2019).

Attitude development is often shaped by cultural norms, and personal experiences. Studies have shown that women who understand the importance of early detection and the risks associated with cervical cancer are more likely to develop a positive attitude toward screening (Nwosu, Anyaehie, Anyanwu, & Osunkalu, 2012). Furthermore, health education and awareness campaigns can significantly shift negative attitudes to positive ones. For instance, Adebayo, et al. (2017) found that increased health education led to more favorable attitudes towards cervical cancer screening among female tertiary students in Nigeria. This shift is essential in improving screening rates, as demonstrated in studies where positive attitudes correlated with higher screening rates.

Conversely, negative attitudes can be deeply rooted in myths, misconceptions, and a lack of trust in healthcare services. According to Dowd and Ahluwalia (2019), women who viewed cervical cancer screening as unnecessary or feared the procedure were less likely to get screened, even if they had access to services. Negative attitudes may also be influenced by social stigma surrounding cervical cancer screening, particularly in patriarchal societies, where women's health issues may be considered taboo (Okafor et al., 2018).

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In the context of female students in Imo State, attitudes towards cervical cancer screening play a pivotal role in determining the success of screening initiatives and overall public health outcomes. Cervical cancer remains a significant health concern globally, especially in Nigeria, where it ranks as one of the most prevalent cancers among women (World Health Organization [WHO], 2020). The fact that it is preventable through regular screening highlights the importance of fostering positive attitudes toward screening, particularly among young women in tertiary institutions.

Young women in public tertiary institutions are at a critical age for cervical cancer prevention, as they are often in the early stages of sexual activity, which places them at increased risk of contracting human papillomavirus (HPV), the leading cause of cervical cancer (Centers for Disease Control and Prevention [CDC], 2021). This age group is, therefore, an ideal target for cervical cancer screening campaigns. However, despite the availability of screening services, participation rates remain low, largely due to negative attitudes and misconceptions about the screening process (Nwosu, Anyaehie, Anyanwu, & Osunkalu, 2012).

Attitudes towards cervical cancer screening are shaped by various factors, including cultural beliefs, level of knowledge, access to healthcare, and the influence of peers and family. For instance, in many communities in Nigeria, cervical cancer screening is shrouded in misconceptions and stigma, leading to a reluctance to undergo testing. Research has shown that some women perceive cervical cancer screening as unnecessary or associate it with promiscuity, further fueling negative attitudes (Okafor, Nwafor, & Igboanugo, 2018). These attitudes can deter students from seeking screening, even when it is available and accessible.

Attitude plays a crucial role in determining whether individuals will likely engage in preventive health behaviours, such as cervical cancer screening. Research shows that women who possess positive attitudes towards screening are more likely to adhere to recommended guidelines (Dowd & Ahluwalia, 2019). These women tend to view screening as necessary, convenient, and beneficial for their health, leading to increased participation in preventive practices. Conversely, women with negative attitudes may perceive screening as unnecessary or burdensome, which reduces their likelihood of undergoing the procedure.

The importance of promoting positive attitudes toward cervical cancer screening cannot be overstated, especially in regions with high cervical cancer prevalence, such as Imo State. According to Igboanugo et al. (2019), cervical cancer is the second most common cancer in the state, yet awareness of the disease and screening remains low. This gap underscores the need for targeted health education initiatives that inform women about the risks and benefits of screening. Klug et al. (2020) emphasize the role of healthcare providers in fostering positive attitudes by educating patients, addressing fears, and providing patient-centred care. Gonzalez-Lorenzo et al. (2020) also point out that making screening more accessible, such as through flexible appointment times, can help overcome barriers and encourage participation.

Understanding the attitudes of tertiary institution students in Imo State is particularly important as these students represent an educated demographic that could potentially influence broader health behaviours in the community. Studies have shown that socio-demographic factors such as age, education, and socio-economic status significantly affect attitudes toward cervical cancer screening. For example, younger women and those with higher educational attainment are more likely to have positive attitudes and participate in screening (Rao et al., 2020; Ogunlade, Nata, & Ayeni, 2019). This suggests that any intervention aimed at increasing screening rates among students should be tailored to address these diverse backgrounds and perspectives.

Unfortunately, despite the critical importance of early screening in preventing cervical cancer deaths, there is limited research on the attitudes of female students in Imo State's public tertiary institutions toward cervical cancer screening. This lack of data is concerning, as it leaves these young women vulnerable to the risks associated with late-stage diagnosis. Without the right attitudes towards screening, female students may underestimate the importance of regular check-ups or avoid screening out of fear or embarrassment, increasing their risk of developing cervical cancer. Nwabueze et al. (2019) and Oyinlola et al. (2017) note that negative attitudes contribute to low screening uptake, a trend that is evident in many parts of Nigeria and other developing countries.

The dearth of research also hampers public health efforts to design effective interventions. Without sufficient data on the attitudes of students, it becomes challenging to develop evidence-based policies that target this vulnerable group. Therefore, more research is needed to understand the attitudes of female students in Imo State toward cervical cancer screening, particularly in public tertiary institutions. This study is essential for providing the evidence base required to develop cost-effective and impactful interventions aimed at improving screening uptake and ultimately reducing cervical cancer morbidity and mortality in the region.

Statement of the Problem

Cervical cancer is one of the leading causes of mortality among women worldwide, making it a major public health concern (Centres for Disease Control and Prevention, 2019). Despite the availability of screening and preventive treatments, WHO (2020) stated that cervical cancer remains a major problem in many parts of the world. In Imo State, Nigeria, the situation is particularly alarming, with cervical cancer accounting for the highest rate of cancer-related mortality among women in the State. Despite the efforts of the government, Non-Governmental Organisations (NGOs), associations, and other stakeholders, there seemed noticeable increases in the risk of developing cervical cancer, possibly due to attitude of the people leading to late detection and treatment of potential issues.

Despite various scholarly endeavours both within and outside Nigeria, there exists a noticeable dearth of empirical

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investigations specifically addressing the attitudes of cervical cancer screening among female students in public tertiary institutions in Imo State. Notably, studies like Okafor, et al. (2018) and Nwabueze, et al. (2019) highlight significant gaps in awareness and engagement with cervical cancer screening among tertiary education students in the region. The current study aims to bridge this gap by empirically exploring the attitudes towards cervical cancer screening among female students in public tertiary institutions in Imo State. The identified gaps in existing literature highlight a critical need for this research to contribute valuable insights and recommendations.

2. PURPOSE OF THE STUDY

The purpose of this study is to determine attitude of female students in public tertiary institution in Imo State about Cervical cancer screening. Specifically, the study determined the:

1. Attitudes of female students in public tertiary institutions in Imo State towards cervical cancer screening
2. Attitudes of female students in public tertiary institutions in Imo State towards cervical cancer screening based on their ages.
3. Attitudes of female students in public tertiary institutions in Imo State of cervical cancer screening based on their levels of education.

Research Questions

The following research questions guided the study:

1. What are the attitudes of female students in public tertiary institutions in Imo State about cervical cancer screening?
2. What are the attitudes of female students in public tertiary institutions in Imo State about cervical cancer screening based on their ages?
3. What are the attitudes of female students in public tertiary institutions in Imo State about cervical cancer screening based on their level of education?

Hypotheses

The following null hypotheses were tested at 0.05 level of significance.

1. There is no significant difference in the attitudes of female students in public tertiary institutions in Imo State about cervical cancer screening based on their ages.
2. There is no significant difference in the attitudes of female students in public tertiary institutions in Imo State about cervical cancer screening based on their level of education.

3. METHODOLOGY

The study adopted a descriptive survey design, which is appropriate for collecting and analysing data from a sample to represent a larger population. This method was chosen to gather opinions on attitude of female undergraduate students in tertiary institutions towards cervical cancer screening. The research was conducted in Imo State, Nigeria, a region with a diverse and significant population of female students in public tertiary institutions, providing a strong foundation for studying cervical cancer screening attitudes.

4. SAMPLING DESIGN

The target population consisted of 11,825 female students from eight tertiary institutions in Imo State, representing universities, polytechnics, and colleges of education. A sample of 900 female students was drawn using a multi-stage sampling method. Institutions were clustered based on type, and students were selected from 36 departments using a random sampling technique.

The instrument for data collection is titled, “Attitude towards Cervical Cancer Screening Questionnaire (ACCSQ)”. Attitude towards Cervical Cancer Screening Questionnaire was designed to measure the study participants’ attitudes towards cervical cancer screening. It contained 20 items each with 4-point response options of Strongly Agree 4, Agree 3, Disagree 2 and Strongly Disagree 1. The items encompass various subjects pertaining to cervical cancer screening, including understanding of the screening process, the perceived risks linked to cervical cancer, and the perceived advantages of undergoing screening.

The instruments was reviewed by experts to ensure face and content validity. Feedback led to adjustments in the research questions, hypotheses, and response formats. Reliability was tested on a sample of 40 students in Anambra State, yielding high reliability coefficients for attitudes (0.90), confirming the instruments' adequacy.

Statistical design

Data were collected directly from participants using research assistants who distributed questionnaires during lecture sessions. Data were analyzed using SPSS version 23. Descriptive statistics mean and standard deviation, were employed for answering research questions while ANOVA was used for hypothesis testing at a 0.05 significance level.

5. RESULTS

Research Question

What are the attitudes of female students in public tertiary institutions in Imo State towards cervical cancer screening?

Table 1: Mean Attitude Scores of Female Students in Public Tertiary Institutions in Imo State Towards Cervical Cancer Screening

Variable	n	ẍ	SD
Attitude towards Cervical Cancer Screening	832	53.35	5.565

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In Table 1, the mean attitude score of the female students towards cervical cancer screening was 53.35. The standard deviation was 5.565, indicating the extent of variability in the students' attitudes around the mean. This indicates that, on average, female students in public tertiary institutions in Imo State had a generally positive attitude towards cervical cancer screening.

Research Question 2

What are the attitudes of female students in public tertiary institutions in Imo State towards cervical cancer screening based on their ages?

Table 2: Mean Attitude Scores of Female Students in Public Tertiary Institutions in Imo State towards Cervical Cancer Screening Based on their Ages

Age Distribution	n	ẍ	SD
17-25 Years	555	53.47	5.611
26 – 34 Years	277	53.10	5.473
Total	832	53.35	5.565

In Table 2, the attitudes of female students in public tertiary institutions in Imo State towards cervical cancer screening showed a generally positive trend across different age groups. The mean attitude score for students aged 17-25 years was 53.47 with a standard deviation of 5.611, indicating a slightly more positive attitude compared to students aged 26-34 years, who had a mean attitude score of 53.10 with a standard deviation of 5.473. The overall mean attitude score for all age groups combined was 53.35 with a standard deviation of 5.565.

Research Question 3

What are the attitudes of female students in public tertiary institutions in Imo State towards cervical cancer screening based on their level of education?

Table 3: Mean Attitude Scores of Female Students in Public Tertiary Institutions in Imo State towards Cervical Cancer Screening Based on their Level of Education

EDUCATION LEVEL	n	ẍ	SD
200 Level	377	53.59	5.504
300 Level	316	53.34	5.540
400 Level	139	52.69	5.767
Total	832	53.35	5.565

In Table 3, the attitudes of female students in public tertiary institutions in Imo State towards cervical cancer screening showed a generally positive trend across different levels of education, with slight variations. Students at the 200 level had the highest mean attitude score of 53.59 with a standard deviation of 5.50, indicating a slightly more positive attitude towards cervical cancer screening. Students at the 300 level have a mean attitude score of 53.34 with a standard deviation of 5.54, showing a similar but slightly lower positive attitude compared to the 200 level. Students at the 400 level had the lowest mean attitude score of 52.69 with a standard deviation of 5.767, indicating a slightly less positive attitude compared to the other levels. The mean attitude score for all education levels combined was 53.35 with a standard deviation of 5.565.

Hypothesis 1

There is no significant difference in the attitudes of female students in public tertiary institutions in Imo State towards cervical cancer screening based on their ages.

Table 4: Summary of ANOVA on the Mean Attitude Scores of Female Students in Public Tertiary Institutions in Imo State towards Cervical Cancer Screening Based On their Ages

Source of Variation	SS	df	MS	F	P-value	Remark
Between Groups	24.940	1	24.940	.805	.370	Not significant
Within Groups	25707.368	830	30.973			
Total	25732.308	831				

Table 4 shows that at 0.05 level of significance and 1df numerator and 830df denominator, the ANOVA yielded an F-value of 0.805 with a significance level (p-value) of 0.370, which is greater than the typical threshold of 0.05. Therefore, the fifth null hypothesis was accepted. This indicates that the attitudes of female students towards cervical cancer screening did not significantly differ based on their ages.

Hypothesis 2

There is no significant difference in the attitudes of female students in public tertiary institutions in Imo State towards cervical cancer screening based on their level of education.

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Table 5: Summary of ANOVA on the Mean Attitude Scores of Female Students in Public Tertiary Institutions in Imo State towards Cervical Cancer Screening Based on their Level of Education

Source of Variation	Sum of Squares	df	Mean Square	F	P-value.	Remark
Between Groups	82.934	2	41.467	1.340	.262	Not significant
Within Groups	25649.374	829	30.940			
Total	25732.308	831				

Table 5 shows that at 0.05 level of significance and 2df numerator and 829df denominator, the F-value was 1.340, with a p-value of 0.262, which is above the standard significance level of 0.05. The sixth null hypothesis was accepted, indicating that the attitudes towards cervical cancer screening among female students did not significantly vary according to their level of education.

6. DISCUSSION

The finding of the study, which revealed that female students in public tertiary institutions in Imo State had a generally positive attitude towards cervical cancer screening is encouraging and suggests a foundational awareness and openness to the importance of screening. This positive attitude could be attributed to several factors, including the likely increased awareness campaigns, educational programmes, and the influence of health education within these institutions.

Firstly, the positive attitude might stem from the fact that educational efforts that highlight the risks associated with cervical cancer, the role of early detection in improving survival rates, and the availability of screening services could contribute to a more favourable attitudes towards screening. Secondly, the influence of peers and social networks within the academic environment might also play a role. Students who are part of health-related courses or who have friends in such programmes might be more likely to develop positive attitudes towards health behaviours, including cervical cancer screening. The sharing of information and positive reinforcement within these networks could help in shaping a supportive environment that encourages screening.

Furthermore, the generally positive attitude might be a reflective of broader societal changes in Imo State and Nigeria as a whole, where there is a growing recognition of women's health issues and the importance of addressing them. Media campaigns, government initiatives, and non-governmental organizations working to promote women's health could also have contributed to fostering positive attitudes among students. This reflects the impact of health education and likely societal awareness.

The current finding is consistent with previous related studies. For instance, Usman et al. (2023) assessed the knowledge, attitude, and practice of cervical cancer screening among female university students in Ishaka, western Uganda, and found that medical students had a better attitude towards screening compared to their non-medical counterparts ($p = 0.0043$). Similarly, Bekele, et al. (2022) found that a significant proportion (60.1%) of female college students in Dire Dawa City, Ethiopia, exhibited positive attitudes towards cervical cancer screening, even though the actual screening rates were low. This aligns with the generally positive attitudes observed in the current study. Moreover, Ogwunga, Nwadike, Ahumibe, and Nwakwasi (2021) reported that most female students in four tertiary institutions in Southeast, Nigeria had heard of cervical cancer screening and understood its importance, with 96.2 percent knowing that the human papillomavirus (HPV) was the causative agent, indicating adequate knowledge of screening. However, similar to the current study, the practice of screening was notably low. Similarly, Ojewola, Oridota, Balogun, and Ogundare (2017) found that women in Southwest Nigeria had relatively good attitudes towards cervical cancer screening.

The findings further revealed that students aged 17-25 years have a slightly more positive attitude towards cervical cancer screening. However, the overall mean attitude score suggests that the attitudes of female students towards cervical cancer screening were generally positive across both age groups. The lack of significant difference in attitudes based on age suggests that both younger and older students shared similar perspectives towards the importance and value of cervical cancer screening.

This finding could be attributed to several factors. First, awareness campaigns and educational programmes on cervical cancer screening might have been effective across different age groups within the tertiary institutions, leading to a generally positive attitude among students regardless of age. Additionally, the shared environment and exposure to similar information and peer influence in a tertiary institution could contribute to the homogenity of attitudes towards health practices like cervical cancer screening. Another possible reason for this lack of significant difference could be related to the common social and cultural backgrounds of the students, where attitudes towards health and preventive care might not vary substantially with age. In many cases, younger and older students may have similar levels of awareness about the risks of cervical cancer and the benefits of early detection through screening, leading to a convergence in their attitudes.

The current finding aligns with previous studies reviewed for this study. For instance, Usman et al. (2023) found that while knowledge and practices of cervical cancer screening varied among female university students in Ishaka, western Uganda, the attitude remained positive across different age groups. Similarly, Bekele, et al. (2022) reported that despite low knowledge and screening practices, the overall attitude towards cervical cancer screening was positive among female college students in Dire Dawa City, Ethiopia. Furthermore, Ogwunga, et al. (2021) found that while knowledge and practice rates were low among female students in South East Nigeria, their attitudes towards cervical cancer screening were predominantly

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positive. These studies collectively support the finding that positive attitudes towards cervical cancer screening are consistent across different age groups.

Findings of this study further revealed that attitudes towards cervical cancer screening among female students did not significantly vary based on their levels of education. This pattern might be explained by the heightened awareness and enthusiasm often seen in students at the earlier stages of their tertiary education. 200-level students might be more eager to engage with health-related information and preventive measures, including cervical cancer screening, possibly due to recent campaigns that emphasize the importance of early detection. As students' progress to higher levels, other academic pressures and priorities may begin to overshadow health concerns, leading to a slight decline in their positive attitudes towards screening.

The lack of a significant difference in attitudes across educational levels suggests that while students may start with different levels of enthusiasm, their overall attitudes towards cervical cancer screening remain relatively stable throughout their academic journey. This consistency indicates that factors other than educational level may play a more crucial role in shaping students' attitudes toward cervical cancer screening.

This current finding aligns with several previous studies. For instance, Usman, et al. (2023) found that while knowledge and practice varied significantly based on factors such as age and profession, the attitudes towards cervical cancer screening were generally positive and did not show significant variation based on educational level. This suggests that attitudes towards screening are relatively stable regardless of the students' academic progression. Similarly, the study by Bekele, et al. (2022) in Dire Dawa City, Ethiopia, found that despite differences in knowledge and practice based on the year of study and other factors, attitudes towards cervical cancer screening remained generally positive across different academic levels, indicating no significant variation based on educational level.

Ogwunga, et al. (2021) also found in their research on female students in four tertiary institutions in South East Nigeria that attitudes towards cervical cancer screening did not significantly differ among students based on their academic levels. Although awareness and knowledge might fluctuate, the general attitude towards screening was consistent, reinforcing the idea that educational level does not significantly influence attitudes. These studies collectively support the current findings, suggesting that while knowledge and practice of cervical cancer screening may vary, attitudes towards it remain largely unaffected by the level of education among female students.

7. CONCLUSION

Based on the findings, it can be concluded that female students in public tertiary institutions in Imo State generally hold a positive attitude towards cervical cancer screening. Additionally, age appears to slightly influence attitudes. This suggests that younger students may be slightly more receptive to cervical cancer screening initiatives, although the difference in attitudes between the two age groups is minimal.

8. RECOMMENDATIONS

Based on these findings, the following recommendations are made:

1. Given the generally positive attitude towards cervical cancer screening, awareness campaigns should be strengthened to further encourage screening participation. These campaigns should target all age groups, emphasizing the importance of early detection and regular screening for cervical cancer.
2. Since students aged 17-25 demonstrated a slightly more positive attitude, specific preventive health programs should be designed to capitalize on their receptiveness. Universities and public health institutions can collaborate to integrate cervical cancer education into orientation programs for younger students.
3. Public tertiary institutions should institutionalize regular health education programs focused on cervical cancer screening. This could include workshops, seminars, and collaborations with healthcare providers to provide easy access to screening services on campuses.
4. Since students in both age groups already show positive attitudes, peer-led initiatives could be beneficial. Female students who have undergone screening could be empowered to serve as ambassadors, encouraging their peers to prioritize cervical cancer screening as part of their health routine.

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FROM PREVENTION TO CARE: THE CRITICAL ROLE OF COMMUNITY HEALTH NURSES IN MANAGING CHRONIC ILLNESSES

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ABSTRACT
Chronic illnesses such as diabetes, hypertension, and cardiovascular disease are growing global public health challenges. Community health nurses (CHNs) are vital in managing these illnesses, offering both preventive and curative care. This article explores the multifaceted role of CHNs, emphasizing their interventions in chronic disease prevention, early detection, patient education, and continuity of care. By collaborating with multidisciplinary teams, CHNs contribute significantly to reducing healthcare costs and improving health outcomes for individuals and communities affected by chronic illnesses.

KEYWORDS: *Community health nursing, chronic illness management, preventive care, patient education, healthcare outcomes, interdisciplinary collaboration, chronic disease prevention.*

INTRODUCTION

Chronic diseases are increasingly recognized as one of the major health challenges worldwide. The World Health Organization (WHO) reports that non-communicable diseases (NCDs), including heart disease, diabetes, cancer, and respiratory illnesses, are responsible for 71% of all global deaths annually. Managing chronic illnesses presents a significant strain on healthcare systems, necessitating long-term care, sustained patient engagement, and comprehensive support networks. Community health nurses (CHNs) have become vital players in addressing these challenges, working on the frontlines of healthcare systems to promote wellness, prevent disease progression, and deliver essential care.

CHNs are uniquely positioned within the community, where they can engage directly with individuals and families. This proximity allows them to understand the social, cultural, and environmental factors that contribute to health outcomes. Through their work, CHNs are not only caregivers but also educators, advocates, and collaborators, bridging the gap between healthcare systems and the communities they serve. In the management of chronic diseases, their role encompasses both prevention and care, fostering long-term health improvements and reducing healthcare costs.

This review explores the multifaceted role of CHNs in managing chronic illnesses, focusing on their contributions to prevention, early detection, education, and long-term care management. The article will also highlight how their collaborative efforts with interdisciplinary teams contribute to more comprehensive healthcare solutions. Understanding the critical role of CHNs can provide insights into how healthcare systems can more effectively combat the rising burden of chronic diseases globally.

The Burden of Chronic Illnesses

The rise of chronic illnesses is a growing public health crisis. These conditions, including cardiovascular diseases, diabetes, chronic respiratory diseases, and cancers, often require lifelong management and complex care strategies. Chronic diseases not only impact individuals' health but also impose significant economic burdens on families and healthcare systems. As healthcare becomes more complex, particularly in managing long-term illnesses, the role of CHNs becomes indispensable.

Prevalence of Chronic Illnesses

In the last few decades, chronic diseases have rapidly increased due to factors such as aging populations, sedentary lifestyles, unhealthy diets, and tobacco use. Cardiovascular diseases (CVDs) alone are responsible for approximately 17.9 million deaths annually, making them the leading cause of mortality globally. Diabetes, another major chronic illness, affects more than 422 million people worldwide and is a significant risk factor for other conditions, including CVDs and kidney disease. The rapid rise in chronic diseases is placing unprecedented pressure on healthcare systems, necessitating new strategies to manage these conditions more effectively and efficiently.

Economic Impact

The economic burden of chronic diseases is staggering. In the United States, for example, chronic illnesses account for approximately 75% of healthcare spending, while in lower- and middle-income countries, chronic illnesses are responsible for increasing rates of poverty and strain on public health resources. The indirect costs, such as lost productivity and long-term disability, further exacerbate the financial toll on families and communities. Managing chronic illnesses through prevention, early intervention, and ongoing care can significantly reduce these costs, making the role of CHNs in chronic illness management all the more critical.

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The Role of Community Health Nurses in Chronic Illness Management

Community health nurses (CHNs) serve as vital components of the healthcare system, bridging the gap between community-based services and larger healthcare facilities. They play an essential role in the prevention, early detection, and management of chronic illnesses. Their work often involves patient education, counseling, home visits, community outreach, and interdisciplinary collaboration to provide holistic care. The following sections will explore the various aspects of CHNs' contributions to chronic disease management.

Prevention and Health Promotion

One of the key responsibilities of CHNs is to promote health and prevent disease. Prevention is a cost-effective strategy for managing chronic illnesses, as it reduces the incidence and progression of conditions that require expensive and long-term care. CHNs are often involved in initiatives to promote healthy behaviors, such as smoking cessation programs, nutritional counseling, and physical activity promotion.

For example, in diabetes prevention, CHNs can work with at-risk populations to educate individuals on the importance of maintaining a healthy diet, monitoring blood sugar levels, and exercising regularly. They may organize community workshops, provide one-on-one counseling, or collaborate with local organizations to implement diabetes prevention programs. By engaging directly with the community, CHNs are able to tailor their interventions to the specific needs and cultural contexts of the populations they serve.

CHNs are also instrumental in vaccination campaigns, screening programs, and public health education. In many low-income areas, where access to healthcare is limited, CHNs can provide essential preventive services, helping to reduce the incidence of preventable diseases such as hypertension, obesity, and respiratory conditions. Through their preventive efforts, CHNs not only improve individual health outcomes but also reduce the overall burden on healthcare systems by preventing the escalation of chronic illnesses.

Early Detection and Diagnosis

Early detection of chronic illnesses is critical to managing these conditions effectively. The earlier a chronic disease is identified, the more likely it is that interventions can be implemented to slow its progression and prevent complications. CHNs play a crucial role in early detection through screenings, community outreach programs, and education on recognizing symptoms.

For example, CHNs may conduct blood pressure screenings in local community centers or homes to identify individuals at risk for hypertension or cardiovascular diseases. They may also conduct glucose testing for diabetes detection or participate in cancer screening programs for early identification of breast or cervical cancer. By providing these services within the community, CHNs make healthcare more accessible, especially for those who may not seek regular medical care due to financial, geographic, or social barriers.

In addition to providing screenings, CHNs educate community members about the symptoms and warning signs of chronic diseases. This education empowers individuals to recognize potential health issues early and seek appropriate medical care. CHNs are often the first point of contact for individuals experiencing early symptoms, providing guidance and referrals to specialized healthcare providers.

Patient Education and Self-Management Support

Effective management of chronic diseases requires patients to be active participants in their care. CHNs play a pivotal role in educating patients about their conditions and empowering them to take control of their health. Patient education is a core component of chronic illness management, as it helps individuals understand their diagnoses, treatment options, and lifestyle modifications necessary for optimal health outcomes.

For individuals with chronic illnesses such as diabetes or hypertension, CHNs provide guidance on medication adherence, monitoring symptoms, and making lifestyle changes. For instance, CHNs working with diabetic patients may teach them how to monitor their blood glucose levels, administer insulin, and understand the importance of maintaining a balanced diet. Similarly, CHNs may work with hypertensive patients to monitor their blood pressure at home and make dietary adjustments to lower sodium intake.

Patient education also extends to family members and caregivers. CHNs often provide support and guidance to families who play an essential role in the long-term care of individuals with chronic illnesses. Educating family members about disease management and prevention strategies ensures a support system for the patient, which is critical for adherence to treatment and overall well-being.

In many cases, CHNs develop individualized care plans that align with the patient's lifestyle, cultural context, and health literacy. By working closely with patients and their families, CHNs help foster self-management behaviors that can lead to improved health outcomes, better quality of life, and fewer hospitalizations.

Continuity of Care and Long-Term Management

Chronic illnesses require ongoing care and follow-up, and CHNs are crucial in providing continuous, long-term support to individuals managing these conditions. CHNs often work within the community to ensure that patients have access to the resources they need, including medication, regular check-ups, and social support services. They coordinate care between various healthcare providers and ensure that patients adhere to their treatment plans.

In many cases, CHNs are involved in home care services, visiting patients who may have limited mobility or difficulty accessing healthcare facilities. Through home visits, CHNs monitor patients' health status, assess their living conditions, and provide personalized care. This continuity of care is essential for managing chronic conditions such as heart failure, COPD, and diabetes, where regular monitoring and timely

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interventions can prevent complications and reduce hospital readmissions.

The role of CHNs in case management is also crucial. They serve as liaisons between patients, healthcare providers, and social services, ensuring that individuals with chronic illnesses receive comprehensive care. This often involves coordinating medical appointments, arranging transportation, managing medications, and providing emotional support to patients and their families. CHNs' case management efforts help reduce the fragmentation of care and ensure that patients receive the necessary resources to manage their conditions effectively.

Addressing Social Determinants of Health

One of the unique aspects of CHNs' work is their focus on the social determinants of health (SDOH), which are the economic, social, and environmental factors that influence health outcomes. Individuals with chronic illnesses are often disproportionately affected by poverty, lack of access to healthcare, and other social challenges. CHNs are trained to assess these factors and address them through community-based interventions and advocacy.

For example, CHNs may work with patients who lack access to healthy food options due to living in food deserts. They may collaborate with local organizations to connect these individuals with resources such as food banks, nutritional counseling, or community gardens. In cases where patients face housing instability, CHNs may partner with social services to help secure stable housing or advocate for policies that support affordable housing initiatives.

By addressing the SDOH, CHNs are able to reduce the barriers that often prevent individuals with chronic illnesses from accessing the care they need. This holistic approach not only improves health outcomes but also contributes to broader efforts to reduce health disparities and promote health equity.

Interdisciplinary Collaboration in Chronic Illness Management

CHNs do not work in isolation. One of their strengths lies in their ability to collaborate with a wide range of healthcare providers, including physicians, specialists, social workers, and public health professionals. This interdisciplinary approach ensures that individuals with chronic illnesses receive comprehensive care that addresses both their medical and psychosocial needs.

Collaborative Care Models

In many healthcare systems, collaborative care models have emerged as an effective way to manage chronic illnesses. These models involve teams of healthcare providers working together to deliver coordinated care to patients. CHNs often play a central role in these models, serving as the link between patients and other members of the healthcare team.

For example, in managing diabetes, a CHN may work alongside an endocrinologist, dietitian, and pharmacist to develop a personalized care plan for a patient. The CHN coordinates the care, ensures that the patient adheres to the treatment plan, and provides ongoing education and support. This collaborative approach not only improves health outcomes but also enhances the patient experience by reducing the burden of navigating complex healthcare systems.

Public Health Partnerships

CHNs also collaborate with public health agencies to implement community-wide interventions aimed at preventing chronic diseases. These partnerships often involve initiatives such as vaccination campaigns, screening programs, and health education workshops. By working together, CHNs and public health professionals can reach larger populations and address the root causes of chronic diseases at the community level.

Challenges Faced by Community Health Nurses

While CHNs play a critical role in managing chronic illnesses, they face several challenges that can hinder their ability to provide optimal care. These challenges include limited resources, high patient caseloads, and the complex needs of individuals with multiple chronic conditions.

Resource Limitations

In many communities, particularly in low-income areas, CHNs may have limited access to the resources needed to effectively manage chronic diseases. This may include a lack of medical supplies, inadequate staffing, or insufficient funding for community-based programs. Resource limitations can make it difficult for CHNs to provide the level of care required to manage complex chronic conditions.

High Caseloads

CHNs often work with large caseloads, particularly in underserved areas where there are fewer healthcare providers. Managing a high volume of patients with diverse needs can lead to burnout and reduced quality of care. Additionally, high caseloads may limit the amount of time CHNs can spend with each patient, making it difficult to provide personalized care and follow-up.

Addressing Complex Patient Needs

Individuals with chronic illnesses often have multiple comorbidities, requiring complex and coordinated care. CHNs must navigate these complexities while also addressing the social and environmental factors that impact their patients' health. Balancing these multiple demands can be challenging, particularly when resources are limited.

CONCLUSION

Community health nurses are indispensable in the fight against chronic illnesses. Through their work in prevention, early detection, patient education, and long-term management, CHNs make a significant impact on the health outcomes of individuals and communities. By addressing both the medical and social aspects of chronic disease management, CHNs provide holistic care that improves quality of life and reduces the burden on healthcare systems.

As the global burden of chronic illnesses continues to rise, the role of CHNs will become increasingly important. Strengthening community health nursing programs, increasing

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resources, and promoting interdisciplinary collaboration will be essential for ensuring that CHNs can continue to provide high-quality care to those most in need. In doing so, healthcare systems can better manage the growing challenge of chronic diseases and work towards healthier, more resilient communities.

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THE RELATIONSHIP BETWEEN FDI AND ECONOMIC GROWTH IN INDIA. A TIME SERIES APPROACH

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ABSTRACT

Foreign Direct Investment (FDI) has gained importance after the second world war. In broader sense Foreign Direct Investment incorporates the establishment of up to date and advanced facilities, mergers and acquisitions, investing the profits earned from other overseas business activities, providing loans to other companies etc. In narrow sense the Foreign Direct Investment means investment in the country other than the investors own country.

FDI can be better understood by studying the real reason that why the companies have shown interest in investing abroad rather than exporting and outsourcing their products to domestic firms.

In due course of time many theories and approaches were developed to explain FDI. Although several researchers have tried to explain the phenomenon of FDI, we cannot say there is a generally accepted theory, every new evidence added some new elements and criticism to the previous ones.

FDI in India is playing a noticeable role in the growth and development of the country. India is one of the important countries of the world which is able to receive substantial amount of FDI.

The present study has made an effort to see the relationship between the FDI and Economic growth in India. GDP has proxies for economic growth. First the Johansen cointegration test result shows the long run relationship between variables and the Granger causality test result exhibits that there is unidirectional Granger causality between FDI and GDP. Next the Multiple Regression model result presents that the estimated coefficients on FDI & exports have a positive relationship with GDP. Therefore, it is statistically revealed that FDI and Exports are instrumental in influencing the level of economic growth in India.

India is having certain drawbacks like Weak infrastructure, Complicated tax structure, Restrictive labor laws, Bureaucracy and Corruption. Unless and until these challenges are met with, India will never compete with China regarding FDI inflows.

KEYWORDS: *Foreign Direct Investment, Gross Domestic Product, Economic Growth.*

1. INTRODUCTION

Foreign Direct Investment (FDI) has gained importance after 1945. To have the full knowledge of FDI how it works and what is its' significance in the economic growth and development of any country we have to focus on the theory behind the development of this concept.

FDI can be better understood by studying why the companies have shown interest in investing abroad rather than exporting and outsourcing their products to domestic firms.

In due course of time, many theories and approaches were developed to explain FDI. Although several researchers have tried to explain the phenomenon of FDI, we cannot say there is a generally accepted theory, every new piece of evidence adds some new elements and criticism to the previous ones.

1.1 The Theory Behind the Evolution of FDI

FDI theories can be put under the following four headings:

1) Production Cycle Theory of Vernon

Vernon developed the Production Cycle Theory in 1966. It explains the foreign direct investment by companies of the US which invested in manufacturing industries of Western

European countries after 1939 or during the Second World War.

According to Vernon, the production cycle has four different stages i.e. innovation, growth, maturity and decline stages. As per Vernon's explanation, in the innovation stage, the companies of US create the new products for the home market and whatever is left as surpluses are traded outside the country. The theory of the production cycle tells us that the demand for US-manufactured products in European markets has increased tremendously. Thus, the US companies having the edge on technological advancement started exporting and thus US export trade has increased.

As the technologies are raw in the first stage, they cannot remain new for a longer period and may be imitated by other foreign companies. The European companies started copying the US-exported products. The US companies were forced to open local manufacturing units in foreign lands to have market shares in those areas. Thus, the investments made by the US companies in Western Europe in 1950-1970 are well explained by this theory. The theory tells us how the monopoly of the US manufacturing trading companies in Western Europe ended and this was the actual beginning of the concept of Foreign Direct Investment.

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2) The Theory of Exchange Rates on Imperfect Capital Markets

There is foreign exchange risk involved in the international trade. According to Itagaki (1981) and Cushman (1985), there is the presence of an uncertainty factor concerning FDI. Cushman has tried to explain this in the US context that there is the enhancement of FDI with the increase of real exchange rate and with the appreciation of the foreign exchange rate there is the reduction of FDI. He has coated US, that with the appreciation of the US dollar, there was a 25% reduction in US FDI.

This theory at the same time lacks an explanation of FDI between different countries and currencies. However, the followers of this theory believe that the are many cases which prove the authenticity of this theory.

3) The Internalisation Theory

This theory explains the reason why transnational companies grow and what are the reasons behind their active participation in the FDI. This theory was initiated by Coarse in 1937 who tried to explain the theory in the national context. It was further developed by Buckley and Casson (1976), by Hennert (1982) and again by Cason (1983). It was Hymer (1976) who explained this theory in the international context. He says that there are two factors which majorly determine the FDI, first is the dismissal of competition and second, the advantage the firms enjoy while following a certain activity.

Buckley and Casson explain that transnational companies indulged in their internal activities for the development and exploitation of certain benefits. Dunning has also given importance to the Internalisation Theory. He has used this theory to explain his eclectic theory and maintains that this describes only a portion of the flow of FDI.

Hennart (1982) has expanded the concept of internalization and established the models which explain the vertical and horizontal integrations.

Hymer who was the main advocate of this theory explains that there is the possibility of FDI only when the advantage, the concerned firm is getting is more than the cost of its overseas activities. Hymer explains that the real reasons for the development of MNCs are the imperfections and distortions present in the market. Hymer has explained the problems of investing in transnational firms, regarding the costs indulged in getting information, the different governmental treatments and uncertainty related to foreign currencies. Hymer says that FDI should not be treated as the financial settlement of capital market but it can be treated as the policy decision at the firm level.

4) The Dunning's Eclectic Paradigm

Professor Dunning explains this theory as the mixture of three divergent theories of FDI. (OLI)

1) Ownership advantages:

This indicates the intangible assets which the company owns. The intangible assets are transferable among the transnational companies at nominal costs which may lead to an increase in incomes or reduction in costs.

The TNCs operating in different countries accrue few extra costs. For operating abroad, they should possess some qualities that could reduce their operating costs abroad. These qualities may be related to their property advantage or some special advantage of the company. These advantages of the firm lead to its profit enhancement and reduction in marginal costs.

The following are the three specific advantages discussed by Dunning:

a) Advantages related to Monopoly are seen as special rights in entering the markets because of owning limited natural resources, patents, and trademarks.

b) Technology related to all kinds of innovations

c) Economies of large size for example the economies related to learning, scale and scope and easy admission to capital related to finance.

2) Location is denoted by L: As soon as the initial situation is met it seems to be beneficial for the owner company to use them rather than either selling or renting them to foreign firms.

Locational benefits of different countries are the one which determines where the TNCs would perform their activities.

The specific benefit of each country has the following three classifications:

a) The benefits related to economics comprise all types of factors of production, the size of the market and the costs containing transportation, telecommunications, etc.

b) Benefits related to Politics: Both common and specific government policies which affect FDI flows.

c) Social advantages: include distance between the home and foreign countries, cultural diversity, attitude towards strangers etc.

3) "I" from Internalisation:

Supposing the first two conditions are met, it must be profitable for the company to use these advantages, in collaboration with at least some factors outside the country of origin (Dunning, 1973, 1980, 1988).

The third feature of the eclectic paradigm OLI refers to a structure, with the help of which the company can assess different ways for exploiting its powers from the selling of goods and services, to different agreements that might be signed between the companies. The firm will not want to engage in foreign production rather it will offer this right under license, or franchise when the cross-border market Internalisation benefit is lower.

Eclectic paradigm OLI shows that OLI parameters differ from company to company and depend on different situations and also it exhibits the economic, political, and social features of the host country. The different countries provide different types of opportunities to TNCs and thus the production types and quantities and the objectives and policies of the TNCs depend on the same.

1.2 FDI fosters economic Growth:

All the countries of the world are vehemently aspiring for economic growth and for that, they are trying to attract large amounts of FDIs from foreign investors. There are many factors

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which are responsible for promoting or obstructing the economic growth of the country and also act as catalysts for the growth of these countries. (World Investment Report UNCTAD, 1994) These factors are as follows: (1) Large amounts of investment capital, (2) Sophisticated Technological know-how (3) Highly trained and experienced labour force, (4) Proper and required infrastructure, (5) Stability in the political and social systems (6) Taxation rates should be low (7) Regulatory system should be conducive and supportive. Differences in the factor endowments show the extent of economic growth of the countries (Dondeti and Mohanty, 2007).

FDI has been accepted as the main source of technical knowledge for developing countries. FDI not only transfers the production techniques but also the management skills which makes it unique as compared to other types of investments. The foreign portfolio investments do accord for the capital accumulation in developing countries, but the transfer of capital through this is limited and also, they do not impart the technical know-how required to face the competition in the world markets.

FDI can speed up the growth process by creating employment opportunities in the host countries, satisfying the need for enormous investments and imparting managerial skills in the host countries. (Frenkel et al, 2004). To compete with the technologically advanced foreign firms the local firms start investing in technical gradation of their concerns, which boosts up the healthy competition between them. This again compels the foreign firms to introduce a high standard of technical skill and knowledge in the host country. FDI induces spillover effects on the productivity of the host country. (Blomstrom and Kokko 1998). The MNCs have higher-quality technical and managerial skills. Mostly some of these skills are transferred to or copied by the domestic firms. Thus, these stimulate the economic growth of the host country. (Wang and Blomstrom 1992). The spillover effects are caused by the forward and backward linkages of MNCs and domestic firms (Rodriguez-Clare 1996) and this happens because the MNCs render low-cost inputs to the domestic buyers or may increase their demand for the inputs supplied by domestic firms. (Ram and Zhang 2002) have considered the impression that FDI stimulates the growth of the host country after considering the following factors: 1) FDI is the provider of finance/capital required by the host economy. 2) Through FDI the advanced technical knowledge is transferred from the developed FDI-providing countries to economically less developed countries. 3) FDI enhances the competition in domestic countries' markets. 4) By export promotion FDI makes the host countries enlarge their foreign exchange reserves and thus improves their balance of payment positions. 5) It increases the management skills of the host countries. 6) FDI imparts training and skills to the people of the host countries and thus increases their employment options and possibilities 7) It also helps the host countries by reducing their import obligations. 8) FDI acts as a source of savings and investment in the host countries. FDI is the provider of admission to the host countries in world markets. FDI also acts as a channel of globalization for them. (Dondeti and Mohanty 2007). Although it is presumed that FDI acts as the catalyst for the growth process in the host countries growth can be possible only when the incoming capital can be used properly. (Bezuidenhout 2009) The extent of the use of FDI depends on the presence of a positive economic environment in the host countries.

2. LITERATURE REVIEW

Foreign direct investment plays a very important role in the economic growth and development of the different economies of the world especially the developing economies which possess low capital, underdeveloped technology, unskilled human resource and entrepreneurship. FDI is the main source of getting the required capital, technical knowledge and skills. FDI ensures the economic growth, development and technical enhancement of the FDI-receiving country. FDI also improves the exports of the receiver country. It fosters the favourable spillover effects in the FDI-receiving country. According to UNCTAD, foreign direct investors have a huge influence on the economy of FDI-receiving countries. Therefore, in developing countries, FDI should be motivated because through capital and technology transfer the growth and development of these countries are possible. FDI also supports the countries in their globalization.

Various works have been done regarding the question of whether there exists an intense relationship between the FDI and the economic growth and development of the countries. The researches are carried out either on a particular type of economy or comparative studies are made across various countries. Many research studies have shown that there exists an affirmative relationship between FDI and the economic growth of various types of FDI-receiving countries.

Balasubramanyam et al. (1996) studied the contribution of foreign direct investments of the forty-six developing economies through using improved production functions and concluded that there exists a favourable impact of FDI in those developing economies where stress has been given on promoting exports in place of substituting imports. Therefore, trade-related policies are responsible for having a positive impact of FDI on the growth of the economy.

Chadee and Schlichting (1997) have studied the characteristic features of FDI involved in the Asia Pacific regional area and concluded that all the countries of this area have favourable contributions to FDI. The World Investment Report UNCTAD (1999) has also explained a few econometric models for judging the quantitative effect of FDI on the growth of the economy.

Borensztein et al. (1998) have adopted the endogenous growth model for studying the effects of FDI inflows from developed countries to the sixty-nine developing countries. They have emphasized the positive role of technical skill enhancement in the growth of the economy. They felt that FDI could boost the economic growth of the country only with the help of proper human resources present in the country.

Zhang (2001), after examining the data from 11 East Asian and Latin American countries and using unit root and cointegration

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models concluded that FDI enhances the economic growth in those countries which have open trade policies and an educated and skilled workforce.

Nagesh Kumar (2001) has written about how the presence of good and required infrastructure positively attracts the FDI inflows in a particular country.

Chakraborty and Basu (2002) have used the error correction model and co-integration model to find the connection between the FDI and economic growth in India and emphasized that in India there is the Granger causality between GDP and FDI and not the other way round.

Hsiao and Shen (2003) have examined the two-way relationship between FDI and growth and confirmed the relationship between FDI and GDP.

Nunnenkamp and Spatz (2003) have adopted the multivariate regression model to see the effect of FDI inflows in developing countries and concluded that FDI inflows in the manufacturing sector which creates the technology spillover have an affirmative effect on the growth of their economies. As the foreign investment firms are not attached to internally produced goods or the internal labour market therefore the FDI inflows in the agriculture sector do not seem to be fruitful as it has no role in the growth process of the economy. The FDI inflows in the service sector will have a positive effect on the growth of the receiving country only with the launch of unconventional service types and enhancing healthy competition among the service providers. However, it is felt that the domestic service provider can't face the cutthroat competition for a longer period. Thus, the favourable effects of FDI inflows depend upon the chosen sector vis-à-vis the other conditions like favourable government policies, required infrastructure etc. They have also emphasized trade liberalization which is also one of the important conditions to be met for the favorable effect of FDI on the economic growth of the country.

Li and Liu (2004) with the help of the endogenous growth model and conducting a research study on eighty –four countries found the existence of a favourable FDI effect on the growth of the economy only in the presence of genuine human resources and proper absorption of technology.

Balasubramanyam and Mahambare (2003) as well as Fischer (2002) argue that the reforms implemented so far have not eliminated the distinct anti-export bias of India's trade policy. This may explain why, according to Arabi (2005) and Agarwal (2001), FDI in India has remained domestic market-seeking. It is widely believed that the type of FDI and its structural composition matter at least as much for economic growth effects as the overall volume of inward FDI.

Agrawal and Shahani (2005) reckon that it is the quality of FDI that matters for a country like India rather than its quantity. FDI is often supposed to be of higher quality if it is export-oriented, transfers foreign technologies to the host country, and induces economic spillovers benefiting local enterprises and workers (Ender wick 2005).

Agrawal (2005) estimates a fixed effects model based on pooled data for five South Asian host countries, among which India figures prominently, and the period 1965-1996. The coefficient of the FDI-to-GDP ratio turns out to be negative, though not significant. However, this approach ignores that FDI is endogenous. Moreover, the inclusion of exports as a right-hand side variable may bias the coefficient of the FDI variable downwards to the extent that the growth impact of FDI may run through export promotion.

Hansen and Rand (2006) through their publication, 'On the Causal Links Between FDI and Growth in Developing Countries' say that FDI does act as the promoter of growth in a country when that country has a proper trade policy, skilled labour force and is capable of absorbing the gains of FDI.

Baharumshah and Thanoon (2006) have studied the involvement of FDI in the growth of East Asian countries with the help of a dynamic panel model and concluded that FDI has contributed positively.

Chakraborty and Nunnenkamp (2008) have examined the impact of FDI on sector-wise growth in India and established that with the spillover effect across the sectors, the service sector has prompted the growth in the manufacturing sector and in turn has resulted in positive economic growth.

Whalley and Xin (2009) studied how the inflow of FDI contributed to the economic growth of China using a two-stage growth accounting model they emphasized that the export and overall economic growth of China depend predominantly on FDI inflow.

Adams (2009), has advocated liberalized trade and, the presence of a stable political, economic and social environment for the required FDI inflows. The countries differ in getting a favourable amount of FDI inflows because of the dissimilarity of political social and economic policies of their countries.

Wijeweera et al. (2010) by using the OLS panel research of 45 countries from 1997 to 2004 stated that the FDI inflows favourably effects the country's economic growth exclusively in the presence of highly trained human resources.

Egbo et al. (2011), studies based on the Granger causality test to see the effect of Foreign Direct Investment and Nigeria's economic growth using the time series (annual) and taking years 1981 to 2007 (27 years) tells that FDI increases the economic growth of the country.

Alkhasawneh (2013), had done the Granger causality test of GDP, FDI and Government Expenditure of Qatar from 1970 to 2010 and concluded that GDP and Government Expenditure Granger cause FDI in the short period. He has highlighted that to attract the required amount of FDI in the country the government should establish a favourable economic background in the country.

Moyo (2013) after applying the multiple regression model, concluded that a positive relationship exists between FDI and

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the growth of the Zimbabwean economy. For calculation, he has taken the data of FDI, Government Expenditure, Private Savings and GDP.

Barua (2013) has studied the dynamics of co-integration of the factors of FDI, exports and the growth of the Indian economy during the period 2000 to 2012. Simple and multiple regression models have been used by the researcher. She concluded that there exists a favorable correlation between the three factors FDI, exports and GDP in the country.

Younus et al (2014) with the help of their research work concluded that trade liberalization is very much required to have a favourable effect on FDI in the FDI-receiving country.

3. METHODOLOGY

3.1Data and its Sources

In the present research study, we have used the time series approach and annual data from 1970 to 2015 for our variables. We have taken the required data of Gross Domestic Product, Total Exports and foreign direct investment from the World Bank, To, see the long-term relations between variables we have used the Johansen cointegration test method. To see the short-run causality effect between variables we have conducted the Granger Causality test. In our study, the multiple regression method is used to see the effect of FDI on the Economic growth of India. Our multiple regression method is based on the Model used by Barua S. (2013) to see the quantitative relations between Foreign Direct Investment inflows, the country's Exports and Gross Domestic Products of the Indian economy. Barua (2013) takes two models, first, the simple regression model proves that there exists a positive relationship between the FDI and the country's Exports and second her multiple regression model analyses that the FDI and Exports have a favourable effect on the GDP of the country.

Our multiple Regression Method is based on the following function:

$$Y = \beta 0 + \beta 1X1 + \beta 2\ X2 + \mu$$

Y= Economic growth as shown by GDP X1= Exports of the country X2= Foreign direct investment inflows in the country β = Coefficient μ = the error term

The dependent variable in this study is economic growth measured as GDP. The independent variables are the Exports of the country and FDI the Foreign direct investment inflows in the country.

3.2 FORMULATION OF HYPOTHESES:

Null Hypothesis (H_0): There is no significant relationship between GDP, FDI and exports. Alternative Hypothesis (H_1): There is a significant relationship between GDP, FDI and exports.

4. TESTING OF HYPOTHESES AND DATA ANALYSIS

To investigate the magnitude of FDI and exports on growth, the Cointegration test is carried out first. The results are examined by taking into consideration the significant relationship between FDI inflows, exports of India and GDP. Data for the variables are taken from the period from 1975 to 2022.

4.1 Cointegration test

We have applied the Johansen cointegration test in our research study to identify the cointegration relationship of the variables used here. We have focused on the trace statistics test and the maximum Eigenvalue test. The two tests have been applied here to decide the presence of the numeric size of the cointegrating vectors. The null hypothesis for the trace statistics exhibits the absence of the existence of cointegrating vectors whereas, the alternative hypothesis shows the presence of ≤ 1 cointegrating vector. The null hypothesis of maximum Eigenvalue denotes the absence of the existence of cointegrating vectors but the alternative hypothesis confirms the presence of one cointegrating vector. The following Table 1 presents the calculative result of the Johansen cointegration test.

Table 1: The calculative result of the Johansen cointegration test

Hypothesized No of Ce(s)	Eigen Value	Trace Statistics	0.05 Critical Value	Max-Eigen Statistic	0.05 Critical Value
None	0.644291	77.52716	29.79707	45.48028	21.13162
At most 1	0.483670	32.04688	15.49471	29.08437	14.26460
At most 2	0.065113	2.962514	3.841466	2.962514	3.841466

Source: Authors' calculation results in E-views. The calculation shows the rejection of the null hypothesis at the 5% level.

The above Johansen cointegration test result confirms that the trace statistic and maximum Eigenvalue tests exhibit one ultimate cointegrating relationship at the 5% level of significance. Where there, is a rejection of the null hypothesis at the 5% level of significance. This means that there is a long-run relationship between all the variables.

4.2 Granger Causality Test

Johansen's cointegration test is followed by the Granger causality test in which the causal relationship between the variables is examined. For testing the causal links, the F-statistics and the P- values are considered.

Table 2: The Granger causality test results.

Null Hypothesis:	F-Statistics	Prob.
DX1 does not Granger Cause DY	22.5695	4.E-07
DY does not Granger Cause DX1	16.2322	9.E-06
DX2 does not Granger Cause DY	3.49993	0.0405
DY does not Granger Cause DX2	1.74303	0.1891
DX2 does not Granger Cause DX1	24.3138	2.E-07
DX1 does not Granger Cause DX2	3.19590	0.0521

Source: calculation conducted by the author by using E-views. The Decisive method: rejecting Ho if p-value < 5%.

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The table displays the test results and verifies the requirement of rejecting the null hypothesis Ho which says that FDI (X2) does not granger cause GDP(Y). This means that the FDI remarkably Granger causes GDP or the economic growth of the country. The test results also show that GDP does not granger cause FDI and therefore it can be concluded that the relation between FDI and GDP is unidirectional in the Indian context using the data from 1975 to 2022. Further, it can be observed that there is no causal relationship between FDI and Export because FDI does not Granger Cause Export and also Export does not Granger cause FDI. The result again verifies that there is no causal relationship between Export and GDP, which means that neither Export Granger Cause GDP nor the GDP Granger Cause FDI.

To study the relationship between the three variables namely GDP, Exports and FDI further the Multiple-Regression method is used.

4.3 Multiple-Regression Method

Here the Multiple-Regression Method is applied to observe that how much the dependable variable GDP relates to the independent variables Exports and FDI.

The functional form of the method is as follows:

$Y = \alpha + \beta_1 X1 + \beta_2 X2 + e$ ..... (2)

Where, Y = Gross Domestic Product

X1 = Exports

X2 = Foreign Direct Investment

e = Error term

Multiple-Regression Result:
Dependent Variable: Y
Method: Least Squares
Sample: 1975 to 2022
Included observations: 46

Variable	Coefficient	Std. Error	t-Statistic	Prob.
c	156848.4	16582.11	9.458894	0.0000
X1	5.460196	0.350886	15.56119	0.0000
X2	6.015929	2.503540	2.402969	0.0206
R-squared	0.978979	Mean dependent var		579603.7
Adjusted R-squared	0.978001	S.D. dependent var		614623.7
S.E. of regression	91161.77	Akaike info criterion		25.74165
Sum squared resid	3.57E+11	Schwarz criterion		25.86091
Log likelihood	-589.0580	Hannan-Quinn criterion		25.78633
F-statistic	1001.264	Durbin-Watson stat		1.198807
Prob(F-statistic)	0.000000			

Source: calculation by author by using E-views.

In the above growth model, estimated coefficients on FDI & exports have a positive relationship with GDP. Therefore, it is statistically revealed that FDI and Exports are instrumental in influencing the level of economic growth in India. The coefficient of determination i.e., R^2 explains that 97% level of economic growth is being influenced by FDI and exports in India. The F-test also confirms the significant relationship between FDI, growth and exports. The D-W statistic is 1.19 which confirms that there is no autocorrelation problem in the analysis.

CONCLUSION

FDI inflows have continuously increased since the liberalization period. From the cointegration test and Granger causality, it is clear that there is a relation between FDI and GDP and also FDI Granger causes GDP. In multiple regression, it is seen that a % increase in FDI causes a 2% increase in GDP and the relation between FDI and GDP is significant. GDP is taken as a proxy for Economic Growth. Thus, India seems to be the profitable country for FDI but India is still lagging behind China and other popular Asian countries like Indonesia, Vietnam etc. India has certain drawbacks like Weak infrastructure, Complicated tax structure, Restrictive labour laws, Bureaucracy, regulations and corruption. Unless and until these challenges are met, India will never compete with China regarding FDI inflows. To attract the required amount of FDI India needs to have flexible labour laws, FDI should be encouraged in the Education sector and R&D to strengthen the human resource and technological capabilities of the country. More sectors should be brought under the automatic route, the FDI cap should be increased and the procedural delays should be minimized.

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HYPERTENSIVE CRISES: HYPERTENSIVE EMERGENCY AND CRISIS MANAGEMENT DURING ANESTHESIA

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ABSTRACT

Introduction: *hypertensive crisis is characterized by an acute and massive increase in blood pressure. Hypertensive crises encompass several clinical situations with different severity and prognosis, including hypertensive urgency and hypertensive emergency. The difference between the latter depends on whether the situation is life-threatening for the affected individual.*
Objective: *to detail current information related to hypertensive crises, especially hypertensive emergency, definition, differentiation, etiology, epidemiology, pathophysiology, histology, clinical history, physical examination, management, differential diagnosis, prognosis and complications.*
Methodology: *a total of 28 articles were analyzed in this review, including review and original articles, as well as clinical cases, of which 15 bibliographies were used because the other articles were not relevant to 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: hypertensive crises, hypertensive emergencies, hypertensive emergencies, arterial hypertension.*
Results: *approximately 1-2% of adults with hypertension suffer hypertensive crises. Multiple case series show that short-term treatment of hypertensive emergencies has good results; however, long-term results are unknown. The main drawback is that follow-up of individuals is lost and the medication regimen is frequently modified. Untreated hypertensive emergencies have very high morbidity and mortality and if the patient does not receive adequate education about the severity of hypertension, this trend is likely to continue.*
Conclusions: *given the high prevalence of hypertension, it is crucial that health care professionals are able to differentiate between hypertensive emergencies and hypertensive emergencies to provide appropriate and timely treatment. Rapid blood pressure reduction is critical in the treatment of hypertensive emergencies. The choice of medications should consider both efficacy and safety to avoid further complications. A detailed clinical evaluation can help identify the underlying cause and guide treatment, highlighting the importance of an individualized approach. Lack of timely treatment can lead to severe consequences, emphasizing the need for proper management in critical situations. Constant training in the management of hypertensive emergencies is essential*

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to reduce the morbidity and mortality associated with this condition.The management of hypertension during anesthesia is critical, as its prompt detection and control are fundamental to prevent serious complications. Despite the lack of specific criteria to suspend surgery in hypertensive patients, it is essential to evaluate each case individually, prioritizing target organ damage over blood pressure levels.

KEY WORDS: *crisis, emergency, urgency, hypertension.*

INTRODUCTION

Hypertensive crises encompass a variety of clinical conditions with varying severity and prognosis. The distinction between hypertensive urgency and hypertensive emergency lies in whether this circumstance represents a vital danger to the affected individual. This danger is determined more by the severity of organ damage than by elevated blood pressure levels. Hypertensive emergency does not involve an immediate risk to the patient, so treatment can be completed after discharge. In contrast, hypertensive emergencies is a critical clinical condition that requires hospital care. When faced with a patient with severe hypertension, asymptomatic or with non-specific symptoms, we should proceed with caution. First, it is necessary to verify the blood pressure values by multiple measurements and to examine and treat the factors that provoked this situation. The purpose of medical treatment of hypertensive urgency is to lower blood pressure levels (at least 20% of the initial values) without causing a drastic reduction. In hypertensive emergencies, fast-acting drugs should not be used because of the risk of ischemic stroke, opting instead for drugs with a longer half-life. The cardiovascular risk in these patients is higher than in those who do not experience a hypertensive crisis. Treatment should be individualized for each hypertensive emergency, with the intravenous route being the most appropriate for these patients.

Hypertensive crisis is defined by an acute and considerable increase in blood pressure. Individuals with previous hypertensive disease usually show an increase in systolic blood pressure values > 220 mmHg and diastolic values > 120 mmHg. However, the severity of the condition is not determined by the absolute level of blood pressure, but by the magnitude of the acute increase in blood pressure. Thus, in the presence of mostly normotensive baseline values (as seen in eclampsia), even a systolic blood pressure > 170 mmHg may result in a life-threatening condition(1-3).

METHODOLOGY

A total of 28 articles were analyzed in this review, including review and original articles, as well as cases and clinical trials, of which 15 bibliographies were used because the information collected was not sufficiently important 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: hypertensive crises, hypertensive emergencies, hypertensive emergencies, arterial hypertension.

The choice of literature exposes elements related to hypertensive crises, especially hypertensive emergency, definition, differentiation, etiology, epidemiology, pathophysiology, histology, clinical history, physical examination, management, differential diagnosis, prognosis, complications and crisis management during anesthesia.

DEVELOPMENT

Hypertensive Emergencies

Definition and differentiation

A hypertensive emergency is defined as an acute, noticeable rise in blood pressure that is associated with signs of target organ damage. These may include pulmonary edema, cardiac ischemia, neurologic deficits, acute renal failure, aortic dissection, and eclampsia.

In contrast to this, a hypertensive emergency is characterized by a significant increase in blood pressure without evidence of target organ damage, such as pulmonary edema, cardiac ischemia, neurological deficits, or acute renal failure(4,5).

Etiology

Several triggers can cause a hypertensive emergency. Most of these emergencies occur in patients already diagnosed with chronic hypertension. Lack of adherence to antihypertensive treatment and the use of sympathomimetics are two of the most frequent causes, leading to a rapid increase in blood pressure that exceeds the body's innate capacity for self-regulation(6,7).

The levels of hypertension that define a hypertensive emergency, although frequently mentioned, are not universally fixed and are arbitrary. The rate of increase above baseline is probably a more relevant factor and explains why patients without chronic hypertension may present signs of hypertensive emergency at much lower levels, whereas those with prolonged hypertension can tolerate extremely elevated blood pressure without developing acute organ dysfunction(3).

Epidemiology

About 30% of adults in the United States have hypertension. Of these, approximately 1% to 2% will experience a hypertensive crisis, a term that encompasses both hypertensive emergency and hypertensive emergency. Acute pulmonary edema, cardiac ischemia, and neurologic emergencies are the most common types of acute target organ dysfunction.

Hypertensive emergencies and crises are clinical situations that may account for more than 25% of all emergency medical care. Given such a high prevalence, physicians must be prepared to properly identify these crises and distinguish between urgent and emergent hypertension. Approximately 3% of all emergency room visits are due to a significant rise in blood pressure. Along the spectrum of systemic blood pressure, hypertensive emergencies are the most critical clinical situation and therefore require special attention and care(9).

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Pathophysiology and histopathology

The pathophysiology that causes target organ dysfunction in hypertensive emergencies is not completely understood. However, it is likely that mechanical stress on vascular walls causes endothelial damage and a proinflammatory response. This generates increased vascular permeability, activation of platelets and the coagulation cascade, and fibrin clot deposition leads to hypoperfusion at the target organ tissue level.

Fibrinoid necrosis may be observed in renal arterioles, which is a classic feature of malignant hypertension. Most patients with this feature die within 24 months if the hypertension is left untreated.

Clinical history and physical examination

In patients presenting with markedly elevated blood pressure, a thorough history and physical examination is essential to determine which patient is having a true hypertensive emergency. Symptoms such as headache, dizziness, altered mental status, respiratory distress, chest pain, decreased urine output, vomiting, or visual disturbances warrant further evaluation. The source of the sudden onset of hypertension should also be investigated to direct treatment.

The expected findings of the examination vary according to the specific target organ most affected. In case of cardiac dysfunction, rales may be heard on pulmonary auscultation, jugular venous distension or peripheral edema may be noted, and additional heart sounds may be evident. In case of a very rapid rise in hypertension, often seen with sympathomimetic abuse, severe dyspnea may be found in the absence of peripheral edema due to sudden pulmonary edema.

Neurologic dysfunction may result in altered mental status, blurred vision, ataxia or other cerebellar dysfunction, aphasia, or unilateral numbness and weakness. A thorough neurological examination including cranial nerve evaluation, strength and sensory testing, and cerebellar and gait evaluations is necessary. Ocular examination may show papilledema, as well as flame-like exudates and hemorrhages.

Acute renal failure may also generate signs of pulmonary edema or peripheral edema(4,10).

Evaluation

Evaluation of hypertensive emergencies also depends on the symptoms and signs present. Once it is established that a true hypertensive emergency is present or likely to be present, laboratory tests such as metabolic panels, urinalysis, B-type natriuretic peptide, and cardiac enzymes may be useful. ECG is suggested in any patient with suspected cardiac ischemia. A head computed tomography (CT) scan is also recommended in patients presenting with acute neurologic symptoms or signs during the examination. A chest x-ray may be useful in patients with dyspnea. Also, a chest X-ray may show widening of the mediastinum in the setting of aortic dissection, although this is a relatively insensitive marker; therefore, CT angiography of the chest and abdomen should be performed to rule out or confirm dissection and to determine the extent of intimal tearing(11).

Management

Although the specific target organ affected may influence some aspects of treatment, rapid blood pressure reduction is the mainstay of therapy for hypertensive emergencies. The goal would be to lower mean arterial pressure by 20% to 25% in the first 1 to 2 hours. A variety of agents can be employed, but the common characteristics are that they act rapidly and are easily titrated. For this reason, oral medications, such as clonidine and nifedipine, have no role in the immediate management of a hypertensive emergency. Intravenous infusions of vasoactive agents such as labetalol, esmolol, nicardipine and nitroglycerin are typically effective options(4,12).

The key feature of treatment is that, if there is no evidence of organ damage, blood pressure reduction should be gradual over several days. On the other hand, severe hypertension during pregnancy requires immediate treatment. Patients who become pregnant should be prescribed nifedipine, methyldopa or labetalol during gestation; these women should not be treated with ACE inhibitors or ARA II. During the acute episode, intravenous hydralazine or oral nifedipine can be administered to lower blood pressure.

Patients with a hypertensive emergency require hospitalization with continuous blood pressure monitoring. It is critical to assess for target organ injury and start parenteral medications as needed. If the patient presents with an acute emergency such as aortic dissection, lower blood pressure to less than 140 mmHg in the first hour.

For adults without organ damage, lower blood pressure by 25% in the first hour and then to 160/100 for the next 2 to 6 hours, then gradually lower to normal levels over 2 days.

Differential Diagnosis

- Chronic renal disease.
- Eclampsia.
- Hypocalcemia.
- Hyperthyroidism.
- Acute kidney injury.
- Aortic coarctation.
- Aortic dissection.
- Pheochromocytoma.
- Renal artery stenosis.
- Subarachnoid hemorrhage.

Prognosis

In the past, hypertensive emergencies were usually associated with renal failure, myocardial infarction, stroke or death. With increased awareness and improved blood pressure control, mortality has decreased significantly over the past three decades. However, after acute treatment, more adequate blood pressure control is essential if morbidity and mortality are to be reduced. Unfortunately, the overall long-term prognosis of patients with hypertensive emergencies is uncertain. A substantial number of these patients may experience adverse cardiac events or stroke within 12 months(4,13).

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Complications

Failure to diagnose or treat a hypertensive emergency may result in the following:

- Myocardial infarction.
- Stroke.
- Kidney failure.
- Loss of vision.

Significantly elevated blood pressure is common in acute ischemic stroke and requires a specialized approach. According to AHA/ASA guidelines, patients eligible for thrombolysis should have their blood pressure reduced to an SBP below 185 mmHg and DBP below 110 mmHg, maintained at an SBP below 180 mmHg and DBP below 105 mmHg for the first 24 hours. For patients not receiving thrombolytics, only SBP levels above 220 mmHg or DBP above 120 mmHg should be lowered, as hypertension in acute stroke is usually transient and may have a protective effect. A reasonable target is a reduction of approximately 15% of mean arterial pressure.

In acute hemorrhagic stroke, reducing systolic blood pressure to less than 140 mmHg may improve functional outcomes. This requires an aggressive approach with rapid-dose intravenous antihypertensives, and careful monitoring is necessary to prevent hypotension, which can cause a decrease in cerebral perfusion pressure and aggravate ischemia. Easily titrated drugs with rapid onset and short duration of action, such as nicardipine, are recommended.

Aortic dissection also varies in the degree of blood pressure reduction that is recommended. Traditional teaching suggests lowering blood pressure to the level that the organs can tolerate, with close monitoring of the patient's mental status as a guide. Intravenous beta-blockers, especially esmolol, are first-line treatments because of their ability to lower blood pressure while avoiding reflex tachycardia and increased shear stress on the aortic wall. Traditionally, nitroprusside has been used as an adjunct to beta-blockers in the treatment of aortic dissection, but this has become uncommon due to its association with rapid and profound hypotension, tachyphylaxis, as well as the potential for cyanide toxicity. Nicardipine, in combination with a beta-blocker, would also be a reasonable option.

Preeclampsia is a notably worrisome and complicated hypertensive emergency to manage, as there are two affected individuals to consider. The therapy of first choice is magnesium sulfate, given in a loading dose of 4 g to 6 g, followed by an infusion of 1 g to 2 g per hour. It is important to monitor urine output, osteotendinous reflexes, and respiratory status. If further antihypertensives are required, beta-blockers may be used, but only to treat systolic blood pressure exceeding 160 mmHg. Hydralazine was once considered the preferred agent in pregnant patients; however, its slow onset of action, prolonged duration, and unpredictable hypotensive effects make it a less than ideal choice. Regardless of the drug used, the patient is likely to require intensive monitoring in a critical care setting(4).

Findings

Multiple case series show that short-term treatment of hypertensive emergencies has good results; however, long-term outcomes are unknown. The main drawback is that follow-up of individuals is lost and the medication regimen is frequently modified. Untreated hypertensive emergencies have a very high morbidity and mortality and if the patient is not adequately educated about the severity of hypertension, this trend is likely to continue.

Crisis Management During Anesthesia

Hypertensive crises are important complications that can occur during anesthesia and require a rapid and appropriate response. These crises usually manifest as a sudden increase in blood pressure, which can put the affected individual at risk, especially in those with pre-existing cardiovascular disease.

Hypertension is a common complication during anesthesia and its recognition depends on the correct calibration and operation of the monitors. If not promptly identified and corrected, it can result in significant morbidity or mortality. Once hypertension is confirmed, it should be controlled immediately using volatile anesthetic agents, intravenous opioids, or rapid-acting antihypertensives to prevent serious complications.

Common Causes

Drug reaction: may be caused by anesthetics, analgesics or drugs used during surgery.

Stress: the body's response to surgical stress can cause an increase in blood pressure.

Inadequate anesthesia: insufficient depth of anesthesia may result in increased blood pressure.

Management

Monitoring: Continuous monitoring of blood pressure, heart rate and other vital signs should be performed.

Assessment: Determine the underlying cause, as well as identify whether it is a reaction to medications or an event related to a surgical procedure.

Positioning: Place the patient in a semi-sitting position to facilitate breathing and reduce venous return.

Medications

Antihypertensives: administer intravenous drugs such as labetalol, esmolol, or nitroglycerin, depending on the severity of the crisis. The choice of drug will depend on the patient's clinical situation and blood pressure goals.

Controlled Doses: ensure that blood pressure reduction is gradual to avoid adverse effects.

If hypertension does not respond to adequate treatment, unusual causes such as pheochromocytoma, carcinoid syndrome, or thyroid storm should be considered. Currently, there are no established blood pressure levels that are safe for elective surgery; generally, there is a tendency to postpone surgery if the pressure exceeds 180/110 mmHg. However, each case should be evaluated individually, prioritizing target organ damage over blood pressure per se(14,15).

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The management of hypertensive crises during anesthesia is critical and requires prompt evaluation and effective treatment. Continuous communication with the surgical team and careful monitoring are essential to ensure patient safety.

CONCLUSIONS

Given the high prevalence of hypertension, it is crucial that healthcare professionals are able to differentiate between hypertensive emergencies and hypertensive emergencies to provide appropriate and timely treatment. Rapid blood pressure reduction is fundamental in the treatment of hypertensive emergencies. The choice of medications should consider both efficacy and safety to avoid further complications. A detailed clinical evaluation can help identify the underlying cause and guide treatment, highlighting the importance of an individualized approach. Lack of timely treatment can lead to severe consequences, emphasizing the need for proper management in critical situations. Ongoing training in the management of hypertensive emergencies is essential to reduce the morbidity and mortality associated with this condition. The management of hypertension during anesthesia is critical, as its prompt detection and control are fundamental to prevent serious complications. Despite the lack of specific criteria to suspend surgery in hypertensive patients, it is essential to evaluate each case individually, prioritizing target organ damage over blood pressure levels.

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CHALLENGES AND SUCCESSES OF IKPORO ONITSHA INDIGENOUS WOMEN-LED PEACEBUILDING EFFORTS IN ONITSHA, ANAMBRA STATE, NIGERIA

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ABSTRACT

The indigenous women of Onitsha known as "Ikporo Onitsha" have traditionally played critical roles in mediating conflicts, fostering dialogue, and preserving communal harmony through their cultural and social networks. This study investigates the challenges and successes of ikporo onitsha indigenous women-led peacebuilding efforts in Onitsha, Anambra State, Nigeria. Using a qualitative research design, data were collected through interviews and focus group discussions with 600 respondents, including key stakeholders and members of indigenous women's groups. Quantitative data from the questionnaires was analyzed using descriptive statistics such as frequency counts and percentages. These were presented in charts for clarity. Qualitative data from the interviews was analysed thematically. Key themes related to challenges, successes, and the roles of women in peacebuilding were identified and interpreted. The findings reveal that socio-economic constraints such as lack of educational opportunities, cultural norms, economic challenges, and political exclusion hinder the effective participation of women in peacebuilding. However, Ikporo Onitsha women have employed strategies such as mediation, group discussions, and the involvement of respected elders to successfully resolve conflicts. The women have also achieved notable success in promoting reconciliation, reducing violence, and fostering social unity within the community. The study concludes that while Ikporo Onitsha women face significant barriers, their peacebuilding efforts have made a positive impact on maintaining social harmony. The findings suggest the need for policy reforms to enhance women's participation in peacebuilding and greater recognition of their contributions. Additionally, the study provides insights for future research on indigenous women's roles in peacebuilding across different regions.

KEYWORDS: *Indigenous women, Ikporo Onitsha, peacebuilding, efforts, socio-cultural challenges, Onitsha, conflict resolution, community harmony*

INTRODUCTION

The challenges and successes of Ikporo Onitsha indigenous women in peacebuilding efforts represent a vital aspect of community resilience in Onitsha, Anambra State, Nigeria. Despite being pivotal in conflict resolution, these women face socio-cultural, economic, and political obstacles that limit their participation in peacebuilding initiatives (Nwachukwu, 2017; Eze & Umeh, 2017). Cultural norms often dictate women's roles as primarily domestic, thereby restricting their public engagement (Ogo, 2024). Additionally, economic constraints such as high unemployment hinder their active involvement in community decision-making. However, the women have employed effective strategies such as mediation and collaboration with community elders, leading to significant successes in fostering dialogue and reconciliation. This study aims to explore the complexities of their contributions, highlighting both the barriers they face and the impactful roles they play in enhancing social harmony within their communities, thus calling for greater recognition and support for their efforts in peacebuilding.

The history of Onitsha, like many African communities, highlights the significant roles played by women, especially in peacebuilding efforts. Indigenous women, including the Ikporo Onitsha (Onitsha Women), have historically been at the forefront of addressing social, cultural, and political conflicts (Chuku, 2013; Amadiume, 2000). Their approach to peacebuilding is deeply rooted in the traditions and values of the Onitsha community, embodying the principles of consensus-building, communal living, and conflict resolution. However, their efforts are not without challenges, though they have also recorded remarkable successes.

A significant challenge faced by Ikporo Onitsha women in peacebuilding is the deeply ingrained patriarchal structures of the society (Ekanem & Etim, 2022; Nnaemeka, 2004). Traditional leadership roles, such as those of the Obi (King) and the Ndichie (Council of Elders), are predominantly male-dominated, leaving women with limited official roles in decision-making processes (Amadiume, 2000). Despite their invaluable contributions to peacebuilding, Ikporo Onitsha women often find their efforts side-lined by male authority figures (Chuku, 2013). The cultural expectations placed on women in Onitsha society, which often restrict them to domestic roles, serve as another barrier. Although they are seen as moral custodians of the family, their participation in formal

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peace processes can be constrained by societal perceptions that women should remain in supportive rather than leadership roles. This tends to limit their ability to engage fully in formal negotiations or political resolutions.

Indigenous women-led groups, including Ikporo Onitsha, often face challenges in accessing the resources needed to sustain peacebuilding efforts (Oyewumi, 1997). Whether it is financial support, education, or platforms for wider advocacy, these women sometimes struggle to make their voices heard in larger national or international peacebuilding forums, where access to resources can be critical. Another significant challenge is the pervasive issue of gender-based violence, which is both a consequence of and a contributor to conflict in the region (Mba, 2019). The threat of violence and insecurity often deters women from participating openly in peacebuilding initiatives, making it difficult for them to lead such efforts safely and effectively. Economic hardship, exacerbated by national issues such as inflation and unemployment, presents a significant challenge (Nnaemeka, 2004). Many women in Onitsha, particularly those from poorer backgrounds, are preoccupied with meeting the basic needs of their families. This economic pressure can limit their participation in peacebuilding activities as they prioritize survival over community involvement.

Ikporo Onitsha women bring unique cultural insights to the peacebuilding process. Their deep knowledge of Onitsha's customs, traditions, and the local history allows them to mediate effectively in conflicts that require an understanding of the community's social fabric (Mba, 2019). For instance, these women play crucial roles in resolving disputes related to land, family, and domestic issues—areas where male leaders might struggle due to the sensitive nature of such conflicts (Okolo & Kalu, 2021; Uwakwe, 2020). The success of Ikporo Onitsha women's peacebuilding efforts lies in their ability to foster community-based approaches. By engaging with families, youth groups, and religious leaders, these women have created networks that promote dialogue and reconciliation (Adeyemi & Adekola, 2017). Their focus on grassroots mobilization ensures that peacebuilding is not just a top-down process but one that involves all members of society. Ikporo Onitsha women have also been advocating for the rights of marginalized groups, particularly women and children. Their involvement in addressing gender inequalities and social justice issues within their community seems to have contributed to more inclusive peace processes (Ekanem & Etim, 2022). This advocacy may have has led to better protection for vulnerable groups, ensuring that their voices are considered in community decisions.

In recent years, Ikporo Onitsha women have broadened their peacebuilding efforts to include environmental and economic concerns. For instance, their advocacy for environmental sustainability has led to initiatives that protect the local ecosystem from exploitation, while their efforts to promote economic empowerment through small-scale businesses have helped improve the livelihoods of women and families in the region (Mba, 2019; Ogo, 2024). Through their roles as caregivers and moral educators, Ikporo Onitsha women works on strengthening the social fabric of their community. By emphasizing family values, respect for elders, and the importance of communal living, these women foster a sense of unity that is essential for sustainable peace.

In addition, indigenous women's groups like Ikporo Onitsha have played an important role in advocating for the rights of their communities and raising awareness about the issues their communities face (Kamal, 2021). These women have demanded access to basic services and resources for their communities, working to ensure their inclusion in decision-making processes. Such actions have fostered a sense of inclusion and contributed to a more peaceful and equitable society. Studies such as Adeyemi and Adekola (2017), Adenyi (2015), Madu (2015), and Ibok and Ogar (2018) all emphasize the indispensable roles women play in conflict prevention, resolution, and peacebuilding. Walker (2015) argued that women often serve as a stabilizing force in post-conflict settings, playing key roles in reconstruction, rehabilitation, and the reintegration of former combatants, as well as the revival of basic economic activities. Sall and Yongo (2017) echoed this sentiment, stating that while conflict impacts all aspects of society, women remain an invaluable resource for maintaining peace.

Onitsha, a major commercial hub in Nigeria, is renowned for its economic significance and cultural heritage (Nwachukwu, 2019). Situated on the eastern bank of the Niger River in Anambra State, the city hosts the prominent New Yam Festival, a cultural event deeply rooted in Igbo traditions. The rich cultural practices, however, coexist with modern commercial activities, contributing to the complexity of societal interactions. This blend of traditional customs and modernity often results in conflicts, especially in matters related to chieftaincy, land ownership, and traditional leadership roles. Notable disputes include those over the diokpa and onyisi ofor titles, which traditional leadership positions are held in high regard in Onitsha's hierarchical structure (Eze & Umeh, 2017; Ogo, 2024). These conflicts typically arise from challenges in balancing ancient customs with the evolving socio-political landscape in the region. The presence of these challenges highlights the importance of conflict resolution mechanisms in Onitsha, which often involve community elders and customary authorities. Despite the tensions, the cultural richness of Onitsha continues to thrive, anchored by strong communal values and practices that ensure social cohesion even in the face of disagreements.

In response to such conflicts, indigenous women's groups like Umuada, Ndi Inyom (Ikporo), and Otu Odu society have taken up peacebuilding roles. These groups rely on dialogue, mediation, and traditional customs to foster understanding and resolve disputes (Ogo, 2024). Nwosu (2017) study highlighted how these women have been instrumental in mediation, advocacy, and education on conflict resolution, contributing to sustainable peace in Onitsha. However, their efforts face challenges, including lack of resources, limited peacebuilding knowledge, and insufficient support from the government or other organizations (Egbuonu, 2018). Patriarchy and traditional norms also restrict women's participation in decision-making, thereby limiting the effectiveness of their peacebuilding initiatives (Adiele, 2018).

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While substantial research seems to have examined the roles of women in peacebuilding across Africa, there is a noticeable gap regarding the specific contributions of indigenous women groups, particularly in Onitsha, Anambra State. The exclusion of Ikporo Onitsha women from peacebuilding studies suggests a broader oversight in recognizing grassroots, female-led initiatives. This lack of scholarly attention diminishes the understanding of how these indigenous women contribute to conflict resolution within their communities, often using traditional mediation, dialogue, and arbitration methods. By focusing on the challenges and successes of Ikporo Onitsha women in peacebuilding, this study addresses this gap and aims to provide insights into their unique strategies, including their role in resolving disputes over communal disagreements. The study also seeks to enhance the recognition of their efforts in fostering dialogue, promoting reconciliation, and maintaining social harmony in Onitsha. Consequently, this research contributed to the broader body of literature on peacebuilding by highlighting the critical but understudied role of indigenous women in conflict resolution.

STATEMENT OF THE PROBLEM

Despite the historical significance and active involvement of Ikporo Onitsha women in peacebuilding efforts in Onitsha, Anambra State, Nigeria, and their contributions are often overshadowed by deeply entrenched patriarchal structures and societal norms. These indigenous women have traditionally played critical roles in mediating conflicts, fostering dialogue, and preserving communal harmony through their cultural and social networks. However, the challenges they face, such as exclusion from formal decision-making processes, limited access to resources, and cultural expectations that confine them to domestic roles, hinder their ability to fully participate in or lead peacebuilding initiatives. Additionally, issues such as gender-based violence, economic hardship, and societal perceptions further limit the effectiveness of their peacebuilding efforts.

While the successes of Ikporo Onitsha women in conflict resolution and grassroots mobilization have been acknowledged, these achievements are often localized and remain insufficiently recognized at broader levels. Their ability to engage in formal political resolutions or influence larger policy frameworks is constrained, despite their proven capacity to mediate and resolve conflicts in areas like land disputes, family conflicts, and domestic issues. Furthermore, research on their peacebuilding efforts remains sparse, particularly regarding how these women navigate the complex socio-political and economic landscape of Onitsha to sustain peace.
This gap in understanding highlights the need to examine the specific challenges and successes of Ikporo Onitsha indigenous women-led peacebuilding initiatives. A better understanding of these dynamics is essential for developing more inclusive and effective peacebuilding strategies that harness the full potential of indigenous women as agents of peace. Without addressing the barriers they face and building on their successes, efforts to promote sustainable peace in Onitsha may remain incomplete. This study seeks to bridge the gap, explore these issues to examine the challenges and successes of Ikporo Onitsha indigenous women-led peacebuilding efforts in Onitsha, Anambra State, Nigeria.

PURPOSE OF THE STUDY

The purpose of this study is to examine the challenges and successes of Ikporo Onitsha indigenous women-led peacebuilding efforts in Onitsha, Anambra State, Nigeria. Specifically, the study aims to:

1. Identify and analyze the socio-cultural, economic, and political challenges that hinder the effective participation of Ikporo Onitsha women in peacebuilding initiatives.
2. Explore the peacebuilding strategies employed by these women in resolving conflicts related to land disputes, chieftaincy issues, and community disagreements.
3. Examine the successes of these indigenous women in fostering dialogue, reconciliation, and maintaining social harmony within the community.

RESEARCH QUESTIONS

The following research questions guided the study.

1. What are the socio-cultural, economic, and political challenges that hinder the effective participation of Ikporo Onitsha women in peacebuilding initiatives?
2. What are the peacebuilding strategies employed by these women in resolving conflicts related to land disputes, chieftaincy issues, and community disagreements?
3. What are the successes of these indigenous women in fostering dialogue, reconciliation, and maintaining social harmony within the community?

METHODOLOGY

This section outlines the research design, area of the study, population of the study, sample size and sampling techniques, instruments for data collection, procedures for data collection, and the methods of data analysis used in the study on the Challenges and Successes of Ikporo Onitsha Indigenous Women-Led Peacebuilding Efforts in Onitsha, Anambra State, Nigeria. This study adopts a descriptive survey research design. This design is appropriate for gathering data from a broad range of respondents in their natural settings to examine the challenges and successes of Ikporo Onitsha women in peacebuilding. The study involves both qualitative and quantitative approaches, allowing for an in-depth analysis of the perspectives, experiences, and contributions of indigenous women in peacebuilding efforts.

The study was conducted in Onitsha, Anambra State, Nigeria, a commercial hub located on the eastern bank of the Niger River. Onitsha, composed of two local government areas (North and South), is renowned for its business, industry, and education, housing the largest market in Africa. The native population, Ndi Onicha, is primarily Igbo. Onitsha faces socio-economic challenges such as youth unemployment and weak security, leading to conflicts. Traditional institutions like the Igwe-in-Council, Ndi Iche, and women's groups, including Ikporo Onitsha, mediate disputes through dialogue and

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arbitration, with women playing vital roles in peacebuilding efforts.

SAMPLING DESIGN

The population for this study consists of 186,000 the indigenous women of Onitsha, particularly the members of Ikporo Onitsha groups such as Umuada, and Otu Odu Society, as well as other stakeholders involved in peacebuilding like community leaders. The total population comprises 186,000 individuals. A sample size of 600 respondents selected for the study. This sample size was determined using Taro Yamane's formula, which provides a reliable sample size for a population of this size. The sampling techniques used include: Purposive sampling to select key informants and community leaders directly involved in peacebuilding efforts. Simple random sampling to select women from the Ikporo Onitsha groups, ensuring each participant has an equal chance of being included in the study.

INSTRUMENTATION

The study employed semi-structured interviews and focused group discussion as the primary instruments for data collection.

Questionnaire: The questionnaire consisted of open-ended questions aimed at eliciting responses on the challenges and successes of the women-led peacebuilding efforts. It covered aspects such as the roles of women, the obstacles they face, and their successes in fostering peace within the community.

Interview guide: The semi-structured interview guide was used to conduct in-depth interviews with key informants, including leaders of Ikporo Onitsha groups, traditional ruler, and local chieftaincy officials, to gain more insight into the peacebuilding efforts. The instrument was validated by experts in peace and conflict studies to ensure they measure what they are intended to measure. A pilot study was also be conducted with a small group of respondents to refine the questions for clarity and appropriateness.

STATISTICAL DESIGN

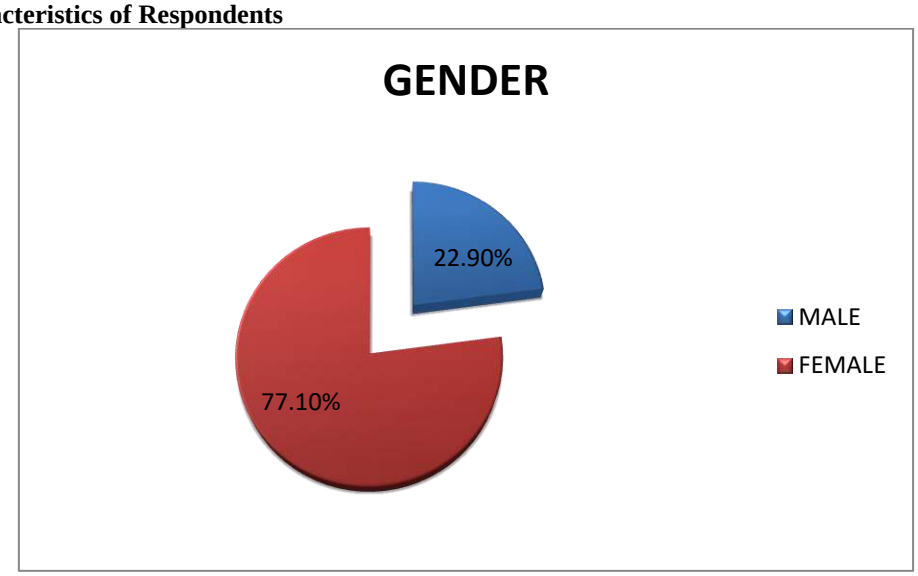
Data collection was carried out in two phases:
Phase 1: Distribution of questionnaires to selected respondents. Trained research assistants assisted in the distribution and collection of questionnaires.

Phase 2: In-depth interviews were conducted with key informants. These interviews were recorded with the consent of the participants for accuracy and thorough analysis. The survey was intended to collect data from 600 respondents, but only 576 successfully participated in the study and ultimately responding through questionnaires out of which 6 participants participated in the in-depth interview.

The data obtained were analyzed using both quantitative and qualitative techniques: Quantitative data from the questionnaires was analyzed using descriptive statistics such as frequency counts and percentages. These were presented in charts for clarity. Qualitative data from the interviews was analysed thematically. Key themes related to challenges, successes, and the roles of women in peacebuilding were identified and interpreted.

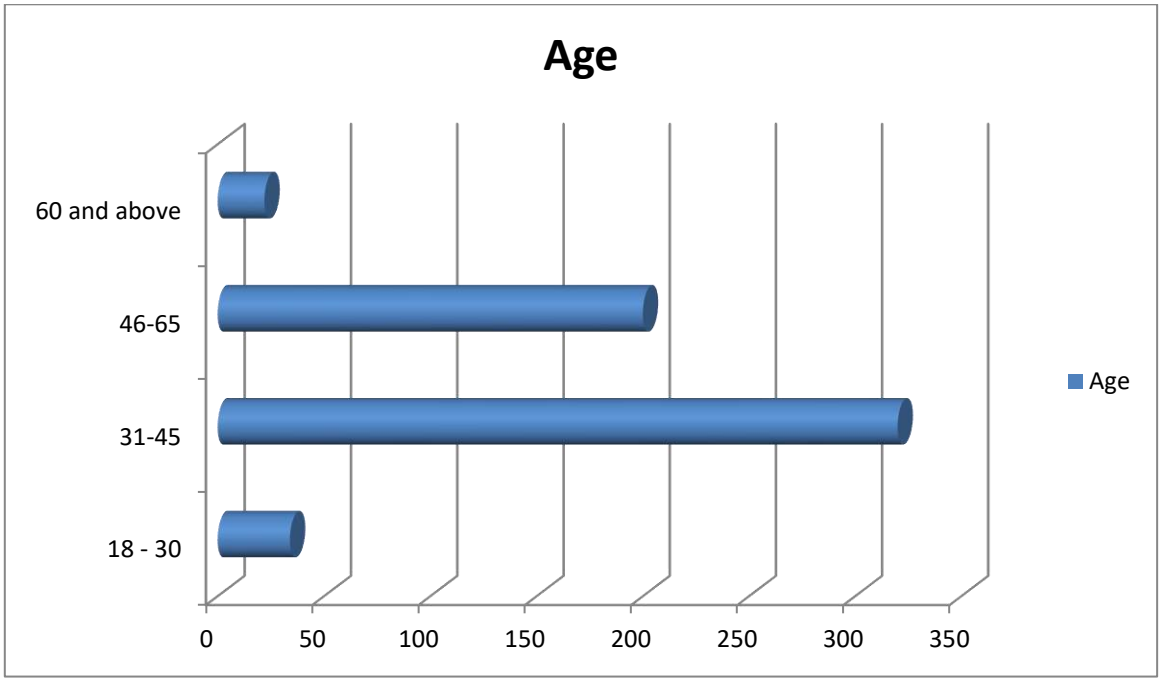
RESULTS AND DISCUSSION

Demographic Characteristics of Respondents



The chart above illustrate the gender distribution of respondents. Specifically, 444 (77.1%) respondents were identified as female, constituting the majority, while 132 (22.9%) were identified as male, indicating a minority among the respondents.

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In the chart above, the age distribution among the 576 respondents reveals significant insights into the demographic composition of the respondents. The largest group is comprised of persons aged 31-45 years, with 320 respondents accounting for 55.56% of the total. Following this, 200 respondents (34.72%) fall within the age range of 46-65 years, marking them as the majority group. Additionally, there are 34 respondents (5.90%) in the 18-30 years category and 22 respondents (3.82%) aged 66 and above. This data indicates a predominantly middle-aged demographic among the respondents, particularly concentrated in the 31-45 and 46-65 age ranges.

Research Question 1: What are the socio-cultural, economic, and political challenges that hinder the effective participation of Ikporo Onitsha women in peacebuilding initiatives?
Findings of the study based on the interview and focused group discussion conducted revealed that the socio-cultural, economic, and political challenges that hinder the effective participation of Ikporo Onitsha women in peacebuilding initiatives include:

a. Many women report a lack of educational opportunities that restrict their ability to engage in peacebuilding effectively.
b. Cultural norms often dictate that women should primarily focus on household duties, limiting their public participation. Certain beliefs may devalue women's contributions to community decision-making processes.
c. Some respondents highlight that male community members do not support women's involvement in peacebuilding efforts.
d. Most participants rate economic challenges as significant, indicating high unemployment rates and lack of financial resources that impede their active participation.
e. Many women feel that their voices are not represented in local governance structures.
f. Participants express distrust in local authorities, believing that decisions are influenced more by corruption than community needs.
g. Women report that there is minimal backing for their initiatives from local government officials.

The findings of the study highlight significant socio-cultural, economic, and political challenges that hinder Ikporo Onitsha women from fully engaging in peacebuilding initiatives. One major obstacle identified is the lack of educational opportunities for women, which limits their ability to effectively participate in conflict resolution processes. This finding aligns with broader research such as Fountain (2016) that shows education plays a key role in empowering women in peacebuilding efforts. Without access to education, women often lack the necessary skills, such as negotiation, leadership, and public speaking, which are vital in peace processes.

Cultural norms present another critical barrier. In many traditional African societies, including Onitsha, women are expected to focus primarily on domestic responsibilities, a practice that restricts their public engagement. The belief that women's contributions to decision-making are secondary to men's further entrenches their marginalization in peacebuilding. This is consistent with studies such as Kameri-Mbote (2018), which demonstrate that patriarchal norms often exclude women from public and political spheres, thus limiting their involvement in peace efforts.

The study also points to economic challenges, such as high unemployment and limited financial resources, as significant impediments. Economic instability prevents women from mobilizing resources for peace initiatives, and they often struggle to secure the necessary funding or material support to sustain their efforts. This finding reflects a global pattern, where economic barriers limit women's participation in peacebuilding, especially in resource-scarce regions.

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Political exclusion further hinders women's roles in peacebuilding. The lack of representation in local governance structures and distrust in local authorities highlight the political marginalization that Ikporo Onitsha women face. Corruption within governance systems worsens this issue, as decision-making often favours elites over the community's genuine needs. This exclusion from political processes aligns with studies suggesting that women's political marginalization is a significant obstacle to their effective participation in peacebuilding globally.

Lastly, the minimal support from local government officials for women-led peace initiatives suggests an institutional failure to recognize the importance of grassroots contributions to conflict resolution. Local governments often prioritize elite-driven solutions, overlooking community-based efforts led by women. This highlights the need for institutional reforms that integrate women's voices into formal peacebuilding frameworks, as advocated by the United Nations Security Council Resolution 1325 on Women, Peace, and Security (UNSCR 1325, 2000).

Research Question 2: What are the peacebuilding strategies employed by these women in resolving conflicts related to land disputes, chieftaincy issues, and community disagreements?

a. A significant number of respondents interviewed on peacebuilding strategies employed by these women in resolving conflicts related to land disputes, chieftaincy issues, and community disagreements emphasize the importance of open communication among community members to resolve conflicts.
b. Many women report that they organize mediation sessions, leveraging the influence of established women's groups to facilitate discussions. There is a common practice of involving respected elders to arbitrate disputes and lend credibility to the peacebuilding process.
c. Respondents revealed that they often gather community members for discussions to collectively address and resolve disagreements, especially concerning land and chieftaincy issues. Women frequently initiate conversations about land rights and ownership and many women turn to traditional leaders for assistance in resolving land disputes.
d. Also, the interview and focused group participants note that proper documentation is essential in addressing land issues and preventing conflicts.

The findings of the study on peacebuilding strategies employed by Ikporo Onitsha women demonstrate the importance of community-based and inclusive approaches to conflict resolution. These strategies, which emphasize open communication, mediation, and the involvement of respected elders, align with broader research on effective peacebuilding in traditional African communities. Open communication was highlighted as a key factor in resolving conflicts related to land disputes, chieftaincy issues, and community disagreements. This approach is consistent with conflict resolution theories that emphasize dialogue as a primary tool for addressing differences and building consensus. By encouraging transparent discussions, women in Onitsha are able to facilitate understanding and cooperation among disputing parties, which is crucial in mitigating long-standing grievances. This emphasis on communication supports the theory that involving all stakeholders in the peacebuilding process promotes a more inclusive and lasting resolution to conflicts.

The organization of mediation sessions by women's groups, often leveraging their social influence, shows the power of grassroots actors in resolving disputes. Women's mediation roles are significant, as they often act as neutral parties with the moral authority to guide conflicting groups toward reconciliation. Studies such as O'Reilly (2015)show that grassroots women's groups are effective mediators because they are deeply embedded in their communities and have a unique understanding of the social dynamics at play. Their reliance on the influence of respected elders to arbitrate further strengthens the legitimacy of the peace process, reflecting African traditions where elders hold significant moral and social authority. Lastly, the emphasis on proper documentation in addressing issues highlights the need for transparency and accountability in managing resources. Proper documentation helps prevent future disputes by clearly delineating ownership and rights, a practice that is becoming increasingly important as communities grow and resources become more contested. This finding aligns with Deininger and Feder (2009) research that suggests the formalization of land rights through documentation reduces the likelihood of conflicts by providing legal clarity and protection.

Research Question 3: What are the successes of these indigenous women in fostering dialogue, reconciliation, and maintaining social harmony within the community?

a. In responding to the successes of these indigenous women in fostering dialogue, reconciliation, and maintaining social harmony within the community, many respondents confirm that they have successfully facilitated dialogue within their communities, with specific instances of resolving conflicts through group discussions.
b. The women describe successful peace negotiations that led to the resolution of longstanding disputes, such as agreements over issues related to widows.
c. A significant number of participants view the involvement of indigenous women in peacebuilding as having a very positive impact on social harmony, citing examples of improved relationships among community members.
d. Finally, respondents report that the efforts of women have contributed to a greater sense of community unity and reduced instances of violence and discord.

The findings of the study highlight the notable successes of Ikporo Onitsha women in fostering dialogue, reconciliation, and maintaining social harmony within their communities. These successes can be justified by various socio-cultural factors and the unique role of women in community peacebuilding.

a. Facilitating dialogue: Many respondents confirm that women have successfully mediated community dialogues, often resolving conflicts through group discussions. This success is in line with existing research that shows women's ability to act

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as mediators in community disputes due to their deep-rooted social networks and relational roles within the community (O'Reilly, 2015). Women often possess the interpersonal skills necessary for dialogue, as their roles within families and the community center on communication and problem-solving. By initiating group discussions, they leverage their social influence to foster peaceful exchanges, particularly in situations where formal conflict resolution mechanisms may be inaccessible or ineffective.

b. Peace negotiations: The resolution of longstanding disputes, particularly those concerning widows, reflects the effective negotiation skills employed by these women. Historically, women in African communities have been at the forefront of advocating for the rights of vulnerable groups, including widows, whose rights to inheritance and land are often contested (Tripp, 2015). Through these negotiations, women act as both advocates and mediators, ensuring that fair outcomes are achieved for marginalized groups, such as widows. This aligns with the concept of "inclusive peacebuilding," where all stakeholders, particularly women and marginalized groups, are involved in the conflict resolution process.

c. Positive impact on social harmony: Many participants emphasize the positive influence of women's involvement in peacebuilding on social relationships within the community. This impact can be attributed to women's traditional role as custodians of social cohesion, often being viewed as neutral or non-threatening parties in conflicts. The inclusion of women in peace processes fosters a more balanced and harmonious social environment, as they often prioritize the well-being of the entire community over individual or factional interests. Their unique position allows them to rebuild trust among community members, which is crucial in post-conflict reconciliation efforts.

d. Community unity and reduction of violence: The women's contributions to enhancing community unity and reducing violence underscore the importance of grassroots peacebuilding initiatives. Studies show that community-based approaches to conflict resolution, especially those led by women, tend to result in more sustainable peace outcomes, as they address the root causes of conflict at the local level (Aning & Atuobi, 2009). The ability of women to build alliances across different factions and promote dialogue reduces the likelihood of violent confrontations, fostering a culture of non-violence and mutual respect.

CONCLUSION

This study has illuminated the critical role of Ikporo Onitsha indigenous women in peacebuilding efforts within Onitsha, Anambra State, Nigeria. It underscores the significant socio-cultural, economic, and political challenges that these women face, which include limited educational opportunities, cultural norms that restrict their public roles, and a lack of support from male community members and local authorities. These barriers hinder the full potential of women's participation in peacebuilding initiatives. Despite these challenges, the women have developed effective peacebuilding strategies that involve open communication, mediation, and the involvement of respected elders to resolve conflicts related to land disputes, chieftaincy matters, and other community disagreements. These strategies, deeply rooted in the social fabric of the community, leverage the collective influence of women's groups to facilitate peaceful resolutions. The study also reveals that the successes of these indigenous women are evident in their ability to foster dialogue, reconciliation, and social harmony within their communities. Through their efforts, longstanding disputes have been resolved, social relationships have improved, and a greater sense of community unity has been achieved. The positive impact of their work extends beyond conflict resolution, as their initiatives have contributed to the reduction of violence and increased community cohesion.

Implications and Recommendations

The findings of this study on the Ikporo Onitsha indigenous women-led peacebuilding efforts have several significant implications:

1. The study highlights the need for policies that actively promote women's inclusion in decision-making and peacebuilding processes. Local governance structures should be reformed to give women a greater voice, particularly in conflict resolution and community leadership roles. The exclusion of women due to cultural and socio-economic factors weakens the overall effectiveness of peacebuilding efforts.
2. There is a need for a cultural shift that challenges traditional norms limiting women to household roles. Community education and awareness programs should focus on changing attitudes towards women's roles, recognizing their contributions to resolving conflicts and fostering social harmony.
3. The success of Ikporo Onitsha women in using mediation and dialogue as peacebuilding strategies demonstrates the value of these traditional methods. Policymakers and community leaders can learn from these grassroots approaches, incorporating them into broader conflict resolution frameworks to maintain peace in other communities.
4. The role of indigenous women's groups in fostering dialogue and unity suggests that empowering these structures can strengthen social cohesion. Communities should invest in supporting and formalizing these groups' roles to make their peacebuilding efforts sustainable. The peacebuilding strategies employed by Ikporo Onitsha women offer a model for conflict-affected areas worldwide, particularly in Africa, where women often play vital roles in informal peace processes.
5. This study fills a gap in the literature and encourages further research into indigenous women-led peacebuilding efforts. Future studies should explore how similar groups in other regions of Nigeria and beyond contribute to conflict resolution, and how they can be supported to maximize their impact on peacebuilding.

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A STUDY ON THE LEADERSHIP STYLE AND ITS IMPACT ON VARIOUS FACTORS WITH REFERENCE TO ORGANIZATIONAL PERFORMANCE OF SELECTED PRIVATE SECTOR ORGANIZATIONS IN BHOPAL CITY

Om Nath Dinesh[1], Dr Kumkum Singh[2]
[1]Research Scholar Management SAM Global University Bhopal
[2]Research Supervisor Management SAM Global University Bhopal

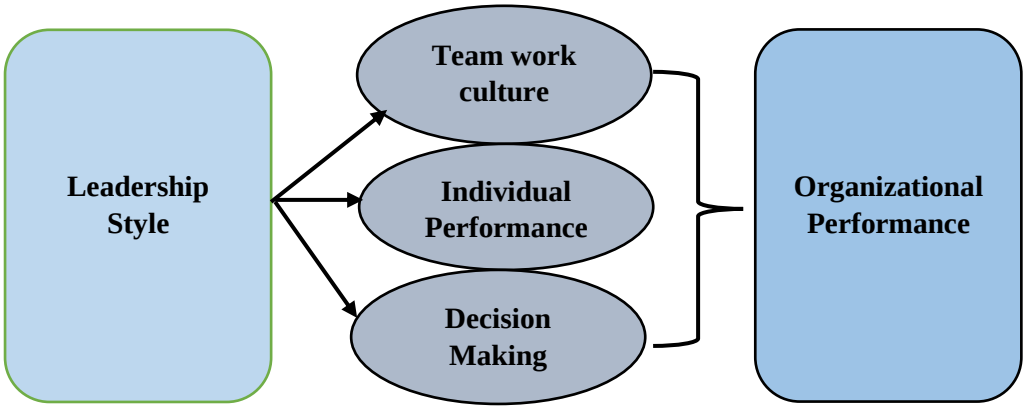
ABSTRACT

The purpose of the present study id to explore the impact of leadership style on organization performance with respect to various factors such as team work culture, individual performance and decision making. The study is based on primary data which has been obtained among the employees of selected organizations by using questionnaire method. The final questionnaire has been distributed among the 200 respondents in which 163 have positively replied. Data has been analysed by using ANOVA test at 5 % level of significance. The result of the study indicate that individual performance and decision making has been found two important factors of organizational performance related with leadership style and team work culture has not been found significantly and positively related with leader ship style.

STATEMENT OF THE PROBLEM

In the present scenario of the business leadership style of any leader has become significant and vital factors in order to improve organizational performance. However, it is important for both leader as well as organizations. With the advancement of competitive activities it has been observed that each and every organizations is concern with respect to enhancement of skill and capabilities of the leader working on different positions. Thus, various process and action is implementing to improve the style of leader along with effective qualities. There are various factors within the organization which may affect organizational performance and performance of these all factors is directly related with controlling of leader. Hence, Style of leadership must be more effective and result oriented in each and every working situations. The present study is related with impact of leadership style on various factors of organization such as team work culture, individual performance and decision making.

CONCEPTUAL FRAMEWORK



REVIEW OF LITERATURE

Holten and Brenner (2015), have performed the research to discover the (direct-indirect) association among styles of leadership (transactional & transformation) and appraisal of change of followers with the help of manager's engagement. It was examined that transactional and transformational styles of leadership are positively related to the manager's engagement. The results indicated that manager engagement influenced the change appraisal of followers and style of leadership found to have a direct relationship on followers change appraisal.

Nging and Yazdanifard (2015) reviewed the role of different leadership styles during implementing organizational change. The research study found that when executing the change in organizations, leadership styles have a positive relationship with change management (CM). Leaders should know their

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own strength and weakness to attain desirable results in complex changing environment. The study concluded that to cope up with the organizational change, leaders might require transformational approach to bring desired change. During the time of the execution of successful change exists in the organization, transformational leadership style and employees personal activities have shown to be essential contribution to organizational change.

Zogjani and Raci (2015) explored the leadership role in organizations and identified the approaches which were performed by the leaders in managing change. The study showed two aspects during change process in organizations. The first approach focused on decision-making to bring sustainable change in organization. During the second approach towards the organizational change, transformational leadership emerged as a catalyst to bring change and achieve goals of organization. Transformational leadership approach aims at achieving the objectives of organization through vision and strategic thinking.

Diab (2014) in his study assess the influence of styles of leadership in areas of organizational change management. For this study, the data was collected from 240 employees of pharmaceutical companies in Jordan. It was found that both type of styles such as transformational and transactional leadership was used in these companies but in different ratio as it is clear from the results of the study that Jordan pharmaceuticals companies used more transactional style of leadership than transformational style of leadership. This study also indicated a positive association between transactional & transformational styles and areas of organization change takes place. It was concluded that transformational leadership positively impact on change in technology and organizational structure changes whereas organizational change area such as change in human resource was impacted through transactional leadership.

Ikinci (2014) had examined the importance of leadership and training during organizational change, and found that for organizational change process to be successful, acceptance of transformational leadership is considered effective. The transformational leader should analyse the need for change, plan for the future, prepare the organization for the change, take up the participative approach and make the workers ready to adopt the strategies for organizational change through trainings. The study explained that in order to enhance the performance of employees to adapt towards organizational change, the training to the employees should be provided.

OBJECTIVES OF THE STUDY

The various objectives of the study are as under

1. To study the impact of leadership style on team work culture with respect to organizational performance
2. To study the impact of leadership style on Individual Performance with respect to organizational performance
3. To study the impact of leadership style on Decision Making with respect to organizational performance

HYPOTHESIS OF THE STUDY

The various hypothesis of the study are as under

H_{a1}: Leadership style is significantly and positively related with **team work culture** with respect to organizational performance

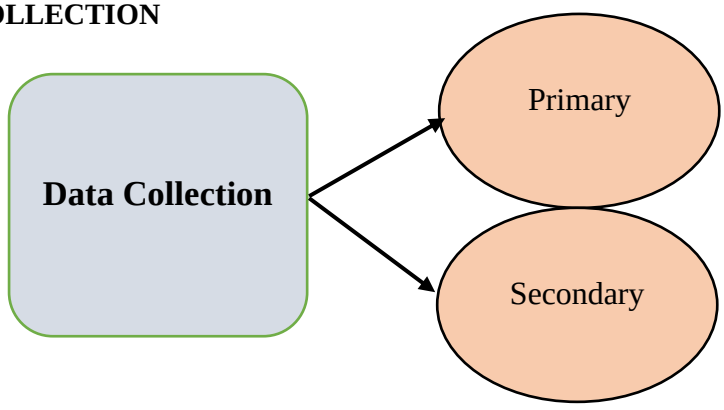
H_{a2}: Leadership style is significantly and positively related with **Individual Performance** with respect to organizational performance

H_{a3}: Leadership style is significantly and positively related with **Decision Making** with respect to organizational performance

RESEARCH METHODOLOGY

Research methodology is a systematic process to find the solution of any problem, the methodology for present study id related with examination of relationship between leadership qualities and its impact on organization performance with respect to certain factors such as team work culture, individual performance and decision making. The methodology for present study is analytical in nature and based on primary and secondary data

DATA COLLECTION



(Fig: Data Collection)

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Primary Data: Primary data for present study has been collected with the help of questionnaire methods. However, in this process a well-structured questionnaire containing 15 questions has been distributed among the employees of selected private organization.

Secondary Data: According to the requirement the secondary data has been collected from various sources such as Research paper, thesis available on shodhganga.

Sampling

Sampling is a system and process to collected pre-determined sets of observation among entire population. However, it is most important process of research. The entire sampling process can be completed in various steps such as

- Sample Method: in Order to obtain sample the convenient method of sampling has been adopted
- Sample Size: the final questionnaire has been distributed among 200 employees of selected private sector organization and 163 employee has given positive response and fill the questionnaire. Hence the final sample size of the study is 163.
- Sample Area: Sample area for present study is based on different geographical location of Bhopal city

Tools for Data Analysis

The data has been analysed by using statistical tools, first scaling process has been taken place by using five point Likert scale. After that ANOVA test has been applied at 0.05 level of significance to test the hypothesis.

Data Analysis (Testing of Hypothesis)

Table 1:
Impact of Leadership Qualities on Organizational Performance with respect to various factors

Hypothesis	Statements	df	F	P Value	Sig	Result
H_{a1}	Leadership Style with respect to Team work culture	5	6.288	0.089	0.05	**Rejected**
H_{a2}	Leadership Style with respect to Individual Performance	5	11.021	0.032	0.05	**Accepted**
H_{a2}	Leadership Style with respect to Decision Making	5	9.403	0.003	0.05	**Accepted**

FINDINGS

Various findings of the study are as under

1. Above table deals with testing of hypothesis result. However, in the first hypothesis relationship between leadership style and team work culture with respect to organizational performance has been discussed. The result of analysis reveals that the value of F is 6.288 and calculated p value is 0.089 (**p value is more than critical value)** which is not significant at 5 % level of significance. However, result strongly recommended to rejection of alternative hypothesis. Hence first hypothesis "Leadership style is significantly and positively related with **team work culture** with respect to organizational performance" **is rejected**

H_{a1}= Rejected

2. Above table deals with testing of hypothesis result. However, in the second hypothesis relationship between leadership style and individual performance with respect to organizational performance has been discussed. The result of analysis reveals that the value of F is 11.021 and calculated p value is 0.032 (**p value is less than critical value)** which is significant at 5 % level of significance. However, result strongly recommended to accepting of alternative hypothesis. Hence second hypothesis "Leadership style is significantly and positively related with **Individual performance** with respect to organizational performance" **is Accepted**

H_{a2}= Accepted

3. Above table deals with testing of hypothesis result. However, in the third hypothesis relationship between leadership style and decision making with respect to organizational performance has been discussed. The result of analysis reveals that the value of F is 9.403 and calculated p value is 0.003 (**p value is less than critical value)** which is significant at 5 % level of significance. However, result strongly recommended to accepting of alternative hypothesis. Hence third hypothesis "Leadership style is significantly and positively related with **decision making** with respect to organizational performance" **is Accepted**

H_{a3}= Accepted

CONCLUSIONS

Leadership style has become most important issue to each and every organization because it is directly related with performance of leader as well as organization. However, it is the most serious concern for every organization that how to improve leader performance by enabling them with high skill and capabilities. The present study deals with leadership style and its impact on various factors with respect to organizational performance. In order to examine the impact of leadership style on various factors, three important factors have been discussed

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such as team work culture, individual performance and decision making. Because, these all factors having significant impact on organizational performance. the findings of the study indicated that among all three factors individual performance and decision making is significantly and positively related with leadership style and impact on organizational performance on the other hand individual performance has not been found important factor related with leadership style.

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CLINICAL AND MOLECULAR CHARACTERIZATION OF A PATIENT WITH SYNDROMIC CRANIOSYNOSTOSIS, A CASE REPORT

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ABSTRACT

Introduction: *Craniosynostosis is a craniofacial disorder characterized by premature fusion of one or more cranial sutures, inhibiting bone growth perpendicular to the affected suture. In syndromic craniosynostosis, anomalies of the limbs, heart and central nervous system may be present, in addition to genetic mutations affecting the cranial vault. Its etiology is associated with paternal age, teratogenic factors and external pressure on the skull; the main genes causing syndromic craniosynostosis are the growth factor receptors (FGFR1, FGFR2, and FGFR3, TWIST1 and EFNB1), for these reasons it is of utmost importance to recognize the existing types of syndromic craniosynostosis, and its clinical and molecular characteristics to reach an optimal and accurate diagnosis.*

Objective: *to present the clinical and molecular characterization of an individual with syndromic craniosynostosis in a case.*

Methodology: *an objective description of the clinical case and a review with analysis of a total of 24 articles, including review and original articles, as well as clinical cases, of which 18 bibliographies were used because the other articles were not relevant to this study. The sources of information were indexed journals as well as search engines such as PubMed, Google Scholar and Cochrane; the terms used to search for information were: syndrome, craniosynostosis, gene, mutation, FGFR.*

Results: *the present report shows a clinical case of syndromic craniosynostosis. The diagnosis was made during an evaluation by means of radiographic analysis in a 15-year-old female patient, and corroborated by genetic blood tests with the following results: heterozygous variant at position 755 of the c.DNA, where a variant in Cytosine is visualized by a Guanine. This determines a change at the level of the FGFR2 protein.*

Conclusions: *the case report describes the clinical and molecular diagnosis of a 15-year-old female patient, revealing a heterozygous genetic variant in the FGFR2 gene (c.755>G), associated with changes in the FGFR2 protein. This finding is relevant, as similar variants have not been reported in Ecuador or South America, underscoring the need for further research on syndromic craniosynostosis and Apert syndrome. A multidisciplinary approach to treatment is recommended, involving various medical specialties to ensure proper brain development and improved esthetics. In addition, the existence of similar cases in Indonesia and Congo is mentioned, suggesting a possible founder effect related to the migration of people with character.*

KEY WORDS: *syndrome, craniosynostosis, gene, mutation, FGFR*

INTRODUCTION

Craniosynostosis is a pathologic craniofacial disorder and is defined as the premature fusion of one or more cranial sutures. Cranial sutures are fibrous joints consisting of unossified mesenchymal cells that play an important role in the development of healthy craniofacial skeletons. Early fusion of these sutures results in incomplete brain development(1).

During cranial vault development, condensation of undifferentiated mesenchymal cells surrounding the sutures begins. After condensation has begun, cells begin to proliferate from the osteogenic fronts; the main regulatory pathway for this differentiation is the fibroblast growth factor (FGF) signaling pathway. Bone overgrowth from non-mineralized bone matrix

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or early arrest of brain development may be the cause of premature suture fusion and may lead to morphological, physiological and functional abnormalities, such as craniosynostosis(2,3).

Craniosynostoses usually inhibits the growth of bone that is perpendicular to the affected suture. These premature fusions may affect a single cranial suture or occur in varied patterns of multiple suture closure combinations; it may occur as part of a syndrome or in isolation. However, this growth arrest is usually compensated for by increased growth of other skull bones not neighboring the premature one. This results in an altered skull shape and dysmorphic facial features that depend on the involvement of the specific suture, in syndromic craniosynostosis (CS) multiple sutures are usually affected (Virchow's Law)(4).

Cases of craniosynostosis are typically divided into groups; syndromic and non-syndromic, more than 70% of patients have been diagnosed with non-syndromic craniosynostosis, although autosomal dominant inheritance is responsible for the majority of syndromic cases(5).

In syndromic cases, additional findings of craniosynostosis may be seen including anomalies of the limbs, heart and central nervous system, as well as encompassing a variety of diagnoses and genetic mutations affecting the cranial vault with anomalies at embryologically distinct anatomical sites(6).

In general, patients affected by syndromic craniosynostosis are thought to have involvement of multiple sutures with significant potential for restricted brain growth, increased intracranial pressure (ICP) and facial dysmorphias in the context of a spectrum of additional anatomic abnormalities, are also more likely to have ventricular expansion, hydrocephalus, expanded subarachnoid space and cerebellar tonsillar herniation compared to patients with sporadic single suture synostosis(7).

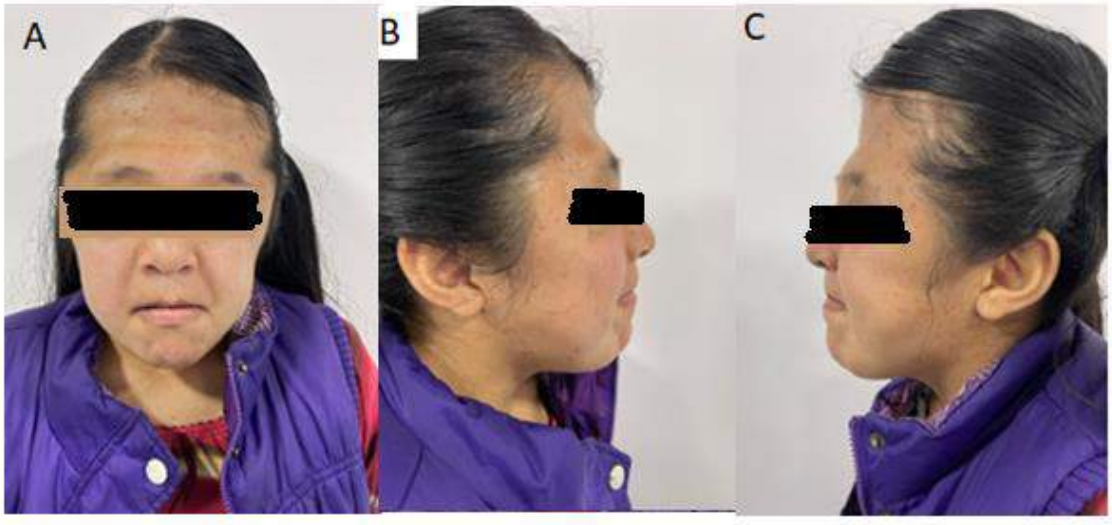
The TWIST protein has been shown to play a key role in the regulation and differentiation of sutural mesenchymal cells to form the skull(8).

The FGF family has 23 members that bind to different receptors (FGFR1 and FGFR2) to induce cellular responses, whereas FGFR1 signaling regulates osteogenic differentiation, FGFR2 signaling directs stem cell proliferation. In syndromic craniosynostosis, mutations are mainly found in FGFR2. It is of utmost importance to recognize the existing types of syndromic craniosynostosis, and their clinical and molecular characteristics to reach an optimal and accurate diagnosis(9,10).

DESCRIPTION OF THE CASE

The finding of syndromic craniosynostosis was made when clinically observing the craniofacial characteristics of a 15 year old female patient, in a diagnostic evaluation upon admission to the Multidisciplinary Clinic of Cleft Lip and Palate of the Catholic University of Cuenca, for dental treatment consultation.

Figure 1. Extraoral clinical photographs (A). Frontal view: Skull with oxycephaly, regular high hairline, broad frontal, hypoplastic supraciliary arches with low hairline implantation, downward directed oblique palpebral fissures, left palpebral ptosis, bilateral epicanthus, hypertelorism, low eyelash implantation and low implantation in the outer third of the eyebrows, depressed low-set nasal root with a wide bridge with bulbous tip with anteverted nostrils, long philtrum grade 2, thin upper lip, thick lower lip, downturned labial commissures and midfacial hypoplasia, square facial shape with facial asymmetry. (B). Left lateral view: high frontal, low hairline, anteroposterior deficiency of maxillary growth and short neck (C). Right lateral view.



Source: The Authors.

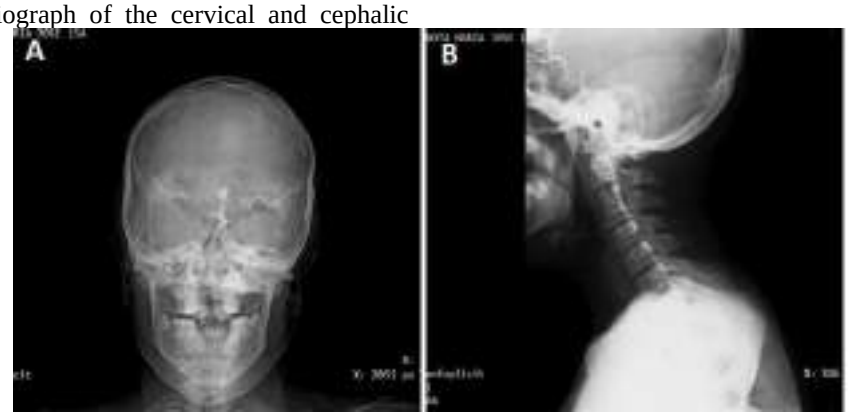
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Figure 2. Intraoral clinical photographs.
A: Occlusal view
B: Upper arch view
C: Lower arch view
D: Right oblique view
E: Left oblique view
Generalized enamel development defects with white, yellow and brown shades are observed. Dental pieces with amelogenesis imperfecta (Type lll-hypocalcified), with periodontal disease associated with defects in enamel formation, as well as dental crowding in both arches. (D) Piece 6.3 is in the mouth, because it is retained. (E) Agenesis of the piece 3.1. Carious lesions with ICDAS 03 at molar level. It presents apparent retention of canines.



Source: The Authors.

Figure 3. Cranial radiographic studies. A. Cranial radiography, showing oxycephaly, brachycephaly, with alteration of the semicircular ducts and lack of pneumatization of the paranasal sinuses. B. Lateral radiograph of the cervical and cephalic spine, showing opacification of the semicircular canals, loss of intervertebral space between the first four vertebrae, rectification of cervical lordosis.



Source: The Authors.

Figure 4. Radiographic and clinical study of hands. Distal complex syndactyly of phalangeal bones of both hands, hypoplasia of distal phalanges of both hands with cutaneous syndactyly.



Source: The Authors.

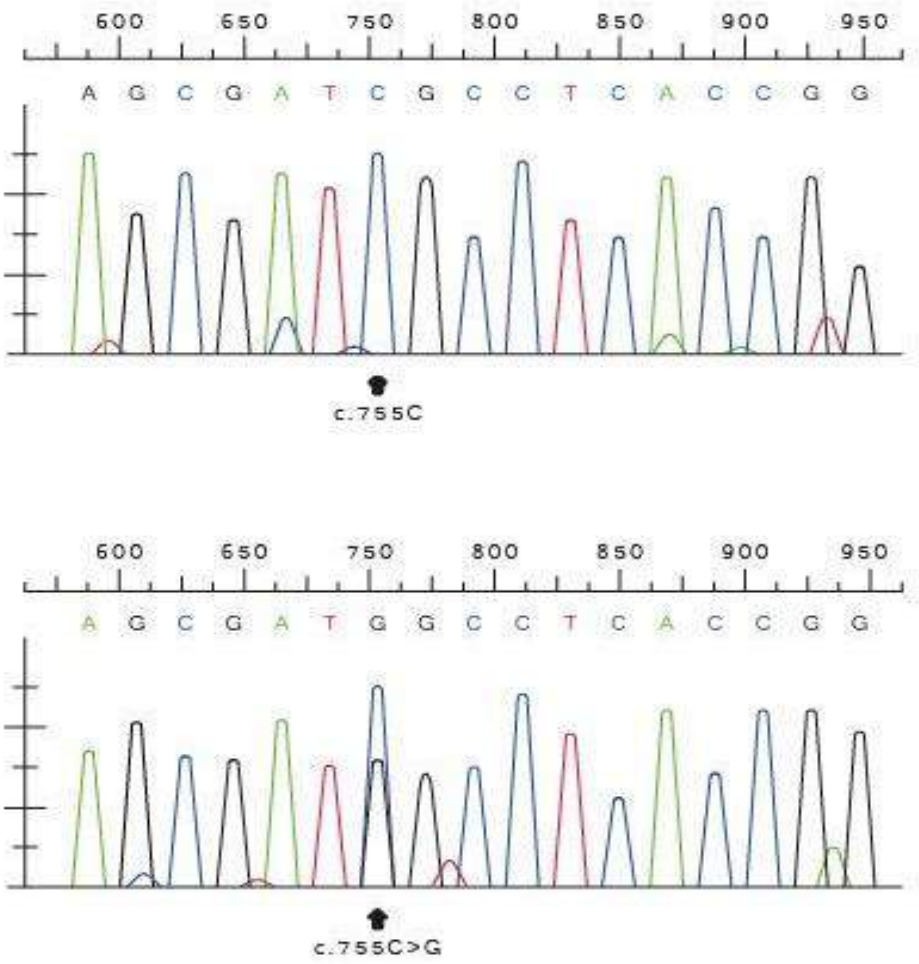
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Figure 5. Radiographic and clinical studies of the feet. A. Complex bony syndactyly of the distal phalangeal bones of both feet, lateral deviation of all the proximal and distal phalangeal bones. B. Complex cutaneous syndactyly of the toes and hypoplasia of the first toe of both feet, the toes are widened.



Source: The Authors.

Figure 6. Molecular confirmation of the genetic study.



Source: The Authors.

In Figure 6 we can see an electropherogram with normal sequence: normal sequence of the FGFR2 gene at position 755 of c.DNA, the presence of a cytosine in the homozygous state is observed. Electropherogram of the patient's sequence: she presents a heterozygous variant at position 755 of the c.DNA, where a variant in the aforementioned cytosine is visualized by a guanine, which determines a change at the level of the FGFR2 protein (p. Ser252Trp).

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DISCUSSION

Syndromic craniosynostosis is defined as a clinical genetic disorder associated with the fusion of the cranial sutures, which play an important role in the formation of the craniofacial skeleton; however, alterations in the early fusion of these sutures produce an incomplete development of the brain mass and the entire maxillofacial set, and alterations are also described in the upper and lower extremities. In the present report, we present the case of a 15 year old female, who was initially clinically diagnosed with syndromic craniosynostosis and corroborated by molecular genetic diagnosis by finding a mutation in the fibroblast growth factor receptor number two (FGFR2). As for the clinical features observed, in addition to syndromic craniosynostosis, there is symmetrical syndactyly in feet and hands, alterations at the level of the mid-facial line and a history of psychomotor developmental delay. These characteristics are reported by Wang JC in his research, who exposes more than 180 syndromes associated with CS, the five most common being: Apert syndrome and Crouzon syndrome with alteration of FGFR2, Pfeiffer syndrome with alteration in FGFR2 and FGFR1, Muenke syndrome (FGFR3) and Saethre-Chotzen (TWIST1)1. Similarly, the study by Ko JM agrees that the FGFR2, FGFR3, FGFR1 genes are the main causes of the genetic syndromes associated with syndromic craniosynostosis, in addition to TWIST1 and EFNB17. Likewise, the research by Celie et al. agrees with the bibliographic study carried out, since it establishes that the main syndromes associated with CS such as Apert, Crouzon, Pfeiffer and others not only affect the sutures, but are also related to other signs in the upper and lower extremities such as hands, feet, skeletal and cardiac defects, as well as neurodevelopmental delay(11).

Similarly, in the study by Abraham P, et al. it is observed that among the main characteristics of patients with CS are anomalies in the tissues that make up the face and skull, as well as an alteration in the normal growth of the head due to premature closure of the sutures, where it is observed that the main pathophysiological signaling pathway affected corresponds to the fibroblast growth factor(15).

However, in the study by Yee ST, et al. it is observed that in the clinical presentation of CS, anterior scaphocephaly, plagiocephaly, trigonocephaly and brachycephaly can be identified, for which specific genetic tests are recommended, which in the present study were performed to reach the reported diagnosis. Lumaka A, et al., in Indonesia and Congo, respectively, have already reported cases similar to the present one, in which a clinical and molecular diagnosis was made in patients with Apert syndrome, and the same genetic variant identified in our patient with syndromic craniosynostosis was found, thus confirming the genotype-phenotype correlation of Apert syndrome with a genetic variant in the FGFR2 gene(12,16-18).

All the aforementioned studies state that the definitive diagnosis of syndromic craniosynostosis is associated with genetic tests specifically directed at FGFR1, FGFR2, FGFR3 and even TWIST1. However, the study by Goldstein et al. states that the main findings identified in patients with CS also include hydrocephalus, herniation in the cerebellar tonsil, renal alterations, as well as alterations of the axial skeleton(13,14).

In view of the above, it is nowadays important to always have clinical diagnostic studies and to have them corroborated by genetic studies, since these type of pathologies are similar to each other and sometimes a definitive diagnosis cannot be reached. It is important to mention that years ago it was not as easy to perform molecular studies and genetic tests as it is today, so it is much easier to reach a definitive diagnosis.

CONCLUSIONS

The present case report has allowed to identify the clinical and molecular diagnosis of a 15-year-old female patient, through clinical, radiographic and genetic studies, concluding with the presence of a genetic variant in heterozygous state at position 755 of c.DNA in the FGFR2 gene, where a change of a cytosine by a guanine (c.755>G) is visualized, which determines a change at the FGFR2 protein level. However, it should be considered that in the literature there are no similar investigations that have reported this genetic variant in Ecuador or South American countries, so the present study is relevant, novel and contributes to the knowledge, promoting the initiation of new research in the future that will allow the development of appropriate protocols in the management of patients with syndromic craniosynostosis as well as patients with Apert syndrome, as in this case.

Due to the importance of the reported manifestations, it is recommended that treatment should always be multidisciplinary (neurology, neurosurgery, cardiology, plastic surgery, maxillofacial surgery, pediatric dentistry, genetics, traumatology, nephrology, psychology, among others); It is suggested that if the possibility of the presence of a generally congenital CS is observed, clinical and radiological studies, as well as molecular analyses, should be carried out in order to diagnose the presence of syndromic craniosynostosis and reach a specific diagnosis, as in the case of Apert syndrome, in order to achieve normal brain development in the patient through early, appropriate and timely treatment, providing sufficient space inside the skull and a better aesthetic appearance.

In addition, it is important to note that similar cases are reported in countries such as Indonesia and the Congo, which are geographically located in continents distant from Ecuador, which could suggest that at some point in history there may have been migration of people with these same genetic characteristics, so we could be talking about a founder effect in these countries.

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MANAGEMENT OF HEPATITIS THROUGH AYURVEDA: CASE SERIES

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ABSTRACT

Hepatitis, characterized by liver inflammation, poses significant health risks, including chronic liver disease and cancer. This case series explores the management of hepatitis through Ayurveda treatments, correlating the condition with Kamala Roga, which is associated with Pitta Dosha and Rakta Dushti. Two cases were treated using Ayurveda interventions, specifically Mridu Shodhana and Shamana Chikitsa, aimed at balancing Pitta Dosha and Shodhana of Rakta. Formulations such as Arogyavardhini Rasa, Patolakaturohinyadi Kashaya, and Tab Nirocil, along with dietary adjustments. The treatment resulted in significant clinical improvements, with notable reductions in total bilirubin, SGOT, and SGPT levels, indicating enhanced liver function and reduced inflammation. These outcomes suggest that classical Ayurveda treatments can offer a precise and effective therapeutic approach for Kamala with the help of Samprapti Vighatana Chikitsa.

KEY WORDS : *Hepatitis, Kamala, Samprapti Vighatana , Shodhana, Case Series*

INTRODUCTION

Hepatitis, a condition characterized by the inflammation of the liver, leads to damage and subsequent death of hepatocytes, the liver's primary cells. This inflammation can result from various causes, most notably infections by Hepatitis A, B, C, D, and E viruses. Each of these viruses affects the liver in distinct ways, leading to varying clinical outcomes. While acute hepatitis often resolves with complete recovery, it poses significant health risks, including chronic liver disease and liver cancer. Hepatitis A virus (HAV) is particularly has high infectivity. It primarily spreads through the fecal-oral route. Hepatitis B and C, on the other hand, are primarily transmitted through blood and bodily fluids, often leading to chronic infections that can cause severe liver damage over time. Hepatitis D is a defective virus that only coexists with Hepatitis B, while Hepatitis E, similar to HAV[1]. Patients with hepatitis exhibit several common symptoms, including the yellowish discoloration of the eyes, skin, nails, and face, which is a hallmark of jaundice. Other symptoms include reddish-yellow discoloration of feces and urine, indicating the excretion of bilirubin; a burning sensation in the body; loss of appetite; general weakness; and anorexia. Additionally, patients may experience fatigue, abdominal pain, nausea, and vomiting. In the realm of *Ayurveda*, hepatitis can be correlated with *Kamala Roga* based on symptoms. This condition is categorized under *Pittajananatmaja Vyadhi*[2] and *Raktapradoshajavikara*[3], denoting its connection with disorders caused by imbalances in the *Pitta Dosha* and *Rakta*.

CASE REPORT

CASE I

A 18 year old male patient who is a student with no relevant medical history or family history came to OPD of Alva's Ayurveda medical college, Moodubidire for the symptoms mentioned in **Table 1.** Since 5 days

CASE II

A 14 year old female patient who is a student with no relevant medical history or family history came to OPD of Alva's Ayurveda medical college, Moodbidri for the symptoms mentioned in **Table 1.** Since 4 days

Table. 1 : *LAKSHANA* AND *DOSHADI* INVOLVEMET

Lakshana		***Dosha***	***Dhatu , Upadhatu, Mala***	***Srotas***
CASE I	**CASE II**			
Jwara(Fever)	*Jwara*(Fever)	*Pitta*	*Rasa*	*Rasavaha*
Mutra, twak, netrapeetata (yewllowish discoloration of skin urin and sclera)	*Mutra, twak, netrapeetata* (yewllowish discoloration of skin urin and sclera)	*Pitta*	*Rakta*	*Raktavaha*
Hritklesha (Nausea)	*Hritklesha* (Nausea)	*Kapha*	*Rasa*	*Rasavaha*

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Atisara (loose stools)	*Atisara* (loose stools)	*Tridosha*	*Purisha*	*Purishavaha*
Aruchi (loss of appetite	*Aruchi* (loss of appetite	*Kapha*	*Rasa*	*Rasavaha*
Angamarda (generalized bodyache)	*Angamarda* (generalized bodyache)	*Vata*	*Rasa*	*Rasavaha*
Udara shoola (stomach ache)	*Udara shoola* (stomach ache)	*Vata*	*Rasa*	*Rasavaha*
Chardi (vomiting)	*Chardi* (vomiting)	*Kapha*	*Rasa*	*Rasavaha*
Shrama (exersion without exercise)	*Shrama* (exersion without exercise)	*Tridosha*	*Rasa*	*Rasavaha*

(both cases presented predominantly with *pitta* and *kaphavriddhi* and having *Rasa pradoshaja vikara* with *Dusti Prakara* being *Sanga.)*

NIDANA

Since the causative factor in hepatitis A is a viral infection[4], the *nidana* can be considered as *agantuja*, which is *bahya hetu*[5]. As the *lakshana* and *nidana* are independent of each other, it can be recognized as a swatantra vyadhi. Based on this, it can be classified as *Shakashrita Kamala* or *Swatantra Kamala*[6]

Table. 2 : ***DASHAVIDHA PAREEKSHA***[7]

	CASE I	***CASE II***
Prakruthi	*Pitta Vata*[8]	*Kapha pitta*
Vikruthi	*Nidana – Agnimandya, TridoshaPrakopakaNidana*	*Nidana – Agnimandya, TridoshaPrakopakaNidana*
	Dosha – pitta pradhanatridosha	*Dosha – pitta pradhanatridosha*
	Dhatu – Rasa,rakta	*Dhatu – Rasa,rakta*
	Prakruti – pitta Vata	*Prakruti – Kapha pitta*
	Desha – Anupa,	*Desha – Anupa,*
	Kaala – no specific Rtu Kala was observed for the Lakshana to manifest	*Kaala – no specific Rtu Kala was observed for the Lakshana to manifest*
	Hetu and LingaBala is Pravara hence ***RogaBala is Pravara***	*Hetu and LingaBala is Pravara hence* ***RogaBala is Pravara***
Sara	*Madhyama*	*Madhyama*
Samhanana	*Pravara*	*Pravara*
Pramana	*Pramanavatishareera*	*Pramanavatishareera*
Satmya	*Pravara*	*Madhyama*
Satva	*Pravara*	*Pravara*
Aharashakti	*Abhyavaranashakti – Avara*	*Abhyavaranashakti – Avara*
	Jaranashakti – Avara	*Jaranashakti – Avara*
Vyayamashakti	*Madhyama*	*Madhyama*
Vaya	*Baala*	*Baala*
Rogabala	***Pravara***	***Pravara***
Rogibala	***Pravara***	***Madhyama***

Table. 3 : ***SAMPRAPTI*** [9]

Sankhya	-
Vidhi	*Agantuja Vyadhi*
	Tridosha
	Sukha Sadhya
Pradhanya	*Pitta Pradhana Tridosha*
	Swatantra vyadhi
Vikalpa	*Teekshna ushna and Sara Guna* of pitta *Manda guna* of *Kapha* *Ruksha guna of vata*
BalaKaala	–

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CHIKITSA

Table.4 – *SHODHANA CHIKITSA*

Procedure	**Medicine**		***Matra***		**Days**	
	Case I	**Case II**	***Case I***	***Case II***	***Case I***	***Case II***
Nityavirechana	***Trivrit leha*** + ***Draksha Kashaya***	***Trivrit leha*** + ***Draksha Kashaya***	***5 gm*** ***50 ml*** At 7:00 AM	4 gm 40 ml At 7:00 AM	***15 days***	***15 days***

Table.5 – *SHAMANA CHIKITSA*

Aoushadhi	***Matra***	***Kaala***	***Anupaana***
Arogyavardhini rasa	1 – 1– 1	After food	*SukoshnaJala*
Patolakaturohinyadi Kashaya	20ml – 0 – 20ml	Before food	*SukoshnaJala*
Tab. Nirocil	1 – 1 – 1	After food	*Sukoshna Jala*

Table. 6 : INVESTIGATION : CASE I

TEST PARAMETER	**16/06/24**	**17/06/24**	**19/06/24**	**22/06/24**	**26/06/24**	**01/07/24**	**08/07/24**
TOTAL BILIRUBIN(MG/DL)	**9.9**	**11.8**	**11.8**	**4.0**	**2.6**	**2.3**	**1.7**
DIRECT BILIRUBIN(MG/DL)	**4.0**	**5.2**	**5.2**	**1.3**	**1.1**	**0.9**	**0.7**
INDIRECT BILIRUBIN(MG/DL)	**5.9**	**6.6**	**6.6**	**2.7**	**1.5**	**1.4**	**1.0**
SGOT (IU/L)	**1748**	**1960**	**708**	**155**	**89**	**48**	**55**
SGPT (IU/L)	**1792**	**1660**	**1124**	**434**	**189**	**92**	**58**
ALKALINE PHOSPHATE (IU/L)	**388**	**318**	**308**	**306**	**260**	**226**	**150**

Table. 7 : INVESTIGATION : CASE II

TEST PARAMETER	**07/07/24**	**08/07/24**	**09/07/24**	**15/07/24**	**22/07/24**	**29/07/24**	**05/08/24**
TOTAL BILIRUBIN(MG/DL)	**2.4**	**3.6**	**3.8**	**3.7**	**2.1**	**1.7**	**1.3**
DIRECT BILIRUBIN(MG/DL)	**0.8**	**1.2**	**1.6**	**1.5**	**0.8**	**0.7**	**0.4**
INDIRECT BILIRUBIN(MG/DL)	**1.6**	**2.4**	**2.2**	**2.2**	**1.3**	**1.0**	**0.8**
SGOT (IU/L)	**460**	**640**	**412**	**167**	**58**	**48**	**34**
SGPT (IU/L)	**816**	**848**	**628**	**198**	**93**	**78**	**52**
ALKALINE PHOSPHATE (IU/L)	**325**	**752**	**705**	**510**	**590**	**407**	**290**

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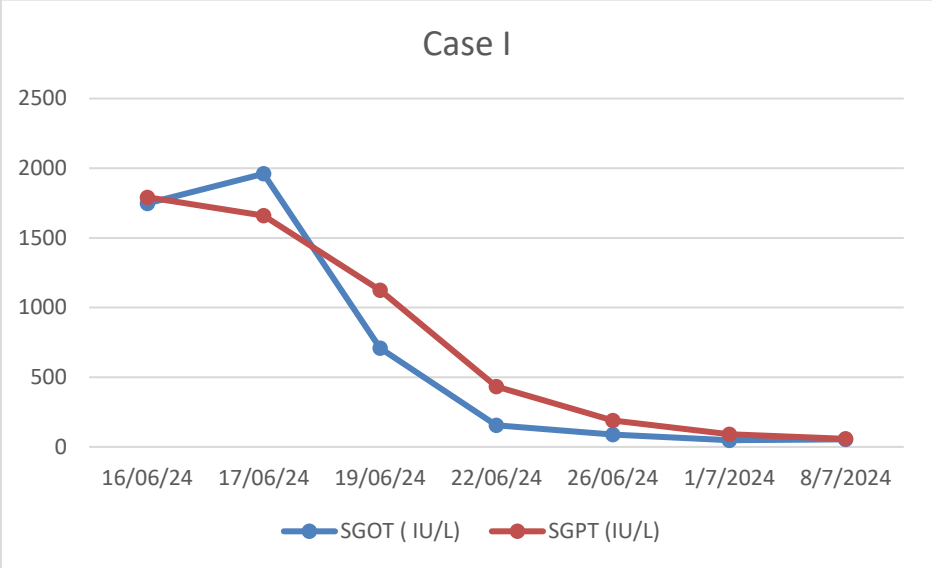


FIGURE.1 : RESULT OF CASE I

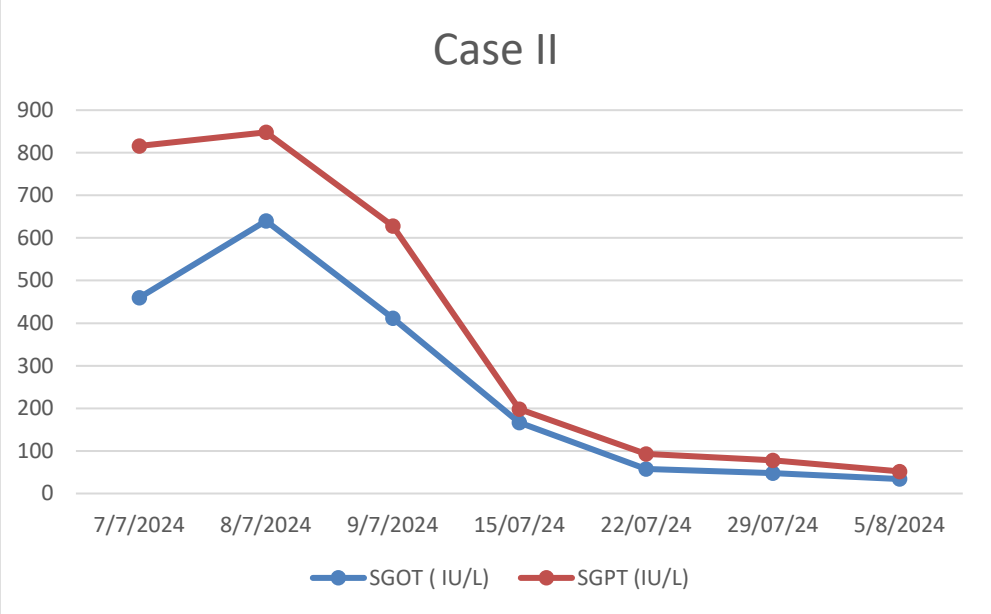


FIGURE.2: RESULT OF CASE II

DISCUSSION

Acharya Charaka has classified *Kamala* under *Pittaja Nanatmaja Vyadhi*, where he suggests to treat on the principle of *Paittika Vikara* "*Virechanam Tu Sarvakramabhyam Pitta Pradhanatamam Manyate Bishajah*" and He also quotes "*Shamshodhyo Mrudubitiktastya Kaamale Tu Virechane*"[10]

In *Kamala Pitta Dosha* is vitiated by its *Ushna, Tikshna Guna* and leads to *Rakta Pradosha*. Along with this because of *Drava Guna* accumulation (*Sanchaya*) of *Pitta Dosha* occur. In this state if we give *Tikshna Shodhana*, it leads to vitiation of *Vayu*. So, there is need to eliminate *Sanchita Dosha* and to avoid *Dhatukshaya Mrudu Shodhana* i.e., *Mrudu Virechana* (mild purgation) is useful. Here treatment of choice for *Kamala* is *Mrudu-Virechana* as *Virechana* is best therapeutic procedure for *Pittadosha*. *Virechana* is a specific treatmentfor *Pitta Doshas* and *Pitta Samsarga Doshas*. *Virech ana Dravyas* will have properties of *Ushna, Tikshna, Sukshma, Vyavayi* and *Vikasi Guna*. These drugs consist of *Prithvi* and *Jala Mahabhutas*. *Virechana* drugs have a specific property of removing the *Doshas* through *Adhobhaga*.[11]

The cases presented in this study demonstrate the beneficial effects of Ayurvedic interventions on these symptoms. The *Ayurveda* treatment regimen utilized in these cases included *Mridu Shodhana* and *Shamana*, which were specifically aimed at balancing the *Pitta Dosha* and *Shodhana* of *Rakta*. The treatments resulted in significant clinical improvements, as evidenced by the reduction in total bilirubin levels, SGOT, and SGPT. These improvements indicate enhanced liver function and a reduction in hepatic inflammation.

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Key *Ayurveda* formulations used in the treatment included *Arogyavardhini Rasa*[12] which acts on *Yakrut Vikara* and does *Malashodhana* and *Kshudhavardhana*, *Patolakaturohinyadi Kashaya*[13] which have the action on *kamala* and does *Kapha Pittahara* , Tab *Nirocil* acts as *yakrututtejaka*, *jwaraghna*, and *rechaka*. These formulations, combined with specific dietary additions like *Draksha*, *Ikshu Rasa*, *Ganji* in patient's diet were integral to the patients' recovery process.The findings from these cases align with the principles of Ayurveda pathology and therapeutics, emphasizing that a simple and effective classical treatment approach can provide precise treatment based on *Samprapti Vighatana* and timely results, as evidenced by objective parameters.

CONCLUSION

This case series highlights the effectiveness of *Ayurveda* management in treating hepatitis. The combination of *Mridu Shodhana* and *Shamana* therapies, aimed at balancing *Pitta Dosha* and *Shodhana* of *Rakta*, demonstrated significant clinical improvements. Notable reductions in total bilirubin, SGOT, and SGPT levels suggest enhanced liver function and decreased hepatic inflammation. *Ayurveda* formulations such as *Arogyavardhini Rasa*, *Patolakaturohinyadi Kashaya*, and *Tab Nirocil*, along with specific dietary interventions, played a crucial role in the patients' recovery. These outcomes underscore the potential of classical *Ayurveda* treatments as a precise and timely therapeutic approach for hepatitis, reinforcing the importance of *Samprapti Vighatanameva Chikitsa*.

DECLARATION OF PATIENT CONSENT

The authors certify that they have obtained patient consent form, where the patient has given his consent for reporting the case and other clinical information in the journal. The patient understands that his name and initials will not be published and due efforts will be made to conceal his identity, but anonymity cannot be guaranteed.

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There are no conflicts of interest.

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A WOMAN PRADHAN IN MADHUBANI DISTRICT OF BIHAR: A CASE STUDY

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ABSTRACT

Elected Women Representatives (EWRs) have been instrumental in driving positive change at the grassroots level. India stands at the forefront globally, with 1.4 million women serving as elected members of Panchayati Raj Institutions / Rural Local Bodies, constituting 46% of the total elected representatives of PRIs. India's remarkable success stories, where EWRs have driven positive and impactful change through community leadership and engagement, advancing SDG localization can be seen . EWRs play catalytic roles in championing gender equality, poverty alleviation, and inclusive development at the grassroots.
This paper is a case study which will examine the role and functions of a woman Pradhan (Head of Gram Panchayat) Smt.Savita Chaudhary in Madhubani district of Bihar and she is the Pradhan of Panchayat Satghara.

KEYWORDS-*Pradhan, PRIs, EWR, Panchayats*

INTRODUCTION

It is now an emerging fact that women are changing the nature of Local Governance in India post 73rd Constitutional Amendment,1992. Panchayati Raj Amendment Act 1992 pave the way for increased political participation for women in Local Self-Governance.The percentage of seats reserved for women in Panchayati Raj Institutions (PRIs) varies by state, with some states reserving 50% of seats for women. Now after 30 years of enactment of Panchayati Raj Act, it has yielded some positive results—in development issues such as education, health, nutrition, increase in family income. Women representatives have demonstrated that they have critical information about community resources, are able to learn quickly about how to lead effective community-centered development, are inclined to be more inclusive and are adept at managing funds. Role of women is now becoming an essential part of fulfilling objective of Rural Development. Currently Government of Developing Countries are working toward achievement of Sustainable Development Goal 2030 in which Local Self-Government is playing positive role towards achieving this goal. Sustainability has became an essential part of overall development process because after globalization the way we tried to achieve development put human lives at risk although we have achieved rapid economic development.

Environment degradation, deterioration in human health and deterioration in many essential value in society is a negative impact of globalization which make it imperative for policy planner to think development in a sustainable way. If women become a part of policy planning the goal of achieving Sustainable Development become easy.

Katharina Raabe et al. (2009), in their research paper published based on the field-based study done in the districts of Karnataka, reveals the constrains that are hindering the initiative of 73rd Amendment of India's Constitution to bring gender equality through women seats reservation in Panchayati Raj Institutions. They have shown decision making power for the women are still not sufficient to give them freedom of equal status with their male counterparts, due to the active social restrictions.

Santosh Kumar and Nishith Prakash (2012), in their case study have chosen districts of Bihar to observe the improvement of health and hygiene problems of these rural parts after the participation of EWRs(Elected Women Representatives) in PRIs (Panchayati Raj Institutions). Apart from that, they have extended towards noting the amount of women encouragement and support from the society given for the women leaderships in Panchayati Raj Institutions.

Anuradha Ranjan Kumari and Neeraj Singh (2015) observed that in Indian Constitution, there are provisions for equal rights for all citizens irrespective of their social and economic status. It was only role performance by the elected women members that was not directly influenced substantially by caste or personal education or family size or family type or house type or even empowerment. In fact it was the degree of participation which acted as deciding factor in performance by the elected women members in Gram Panchayat. Participation played the single most vital role in the role performance of elected women members of Gram Panchayats.

As per Pahel Project Report (2015), women PRIs(Panchayati Raj Institutions) members have gained sufficient decisive senses to give their opinion on public health, school midday meal, raising PRIs(Panchayati Raj Institutions) funds and others.

Pragya Rai (2016) shows that although it is very hard to participate for women in Panchayat work, some manages to do it and are very serious and active in scheme implementations, e.g. Self-Help Groups, MGNREGA and sanitation. Specially, women are very much engaged in MGNREGA. They are also active in health scheme implementation. Women stated that before the reservation system they were not so vocal and aware about many schemes. But after the reservation they attained

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new knowledge, and now they have got a chance to do something for their people.

Under the Panchayati Raj Amendment Act 1992 and Bihar Panchayati Raj Act,2006, women were kept as essential partner for grassroot development which is a major takeaway for this policy intervention. The question is how women participation in grassroot politics help create a sustainable society? Arguments for this, as per research studies by B Montanari,2019 found that women are always a repositor of traditional knowledge system which is transferred from generation to generation as far as rural society is concerned. Women is leading the family, so leadership is already inbuilt in her quality in matter of family health, child education and tradition. Despite women not always being a family head in patriarchy system but in day-to-day family health and hygiene, children education, environmental protection quality is inbuilt in her character.

M Bijlani,2022 found that rural women pro environmental behaviors and their conservationist nature help to create a sustainable rural society.

Why this case study was taken up?

Bihar became the first state to implement 50 percent reservation to women. It created a new hope in grassroot politics in Bihar. But after 18 year of its implementation women are struggling to perform their assigned duties. Patriarchy, lack of education and people apathy towards government institution pushed Panchayat work in the stage of underdevelopment. In this scenario, searching a performing Panchayat especially headed by women is a herculean task. During pilot study of research an elected woman Pradhan who possess all quality of empowered woman Pradhan was found. This paper will highlight her success story . So, this case study examines the role and functions of a woman Pradhan Smt.Savita Chaudhary in Madhubani district of Bihar and she is the Pradhan of Panchayat Satghara.

Who is a Pradhan?

Pradhan is head of village Panchayat. A Pradhan hold constitutional authority to lead Panchayat for overall socio-economic development of rural area. Pradhan of the Gram Panchayat shall be directly elected by the voters enrolled in the voters list of that Gram Panchayat. In Bihar, head of the Panchayat is called Mukhiya as per Bihar Panchayati Raj Act ,2006. Pradhan is known for different name in different states. In most of the northern stats they called Pradhan or Sarpanch.

The case study has the following objectives:

1. To understand the factors that enabled women representatives to participate and lead in the PRI (Panchayat Raj Institution)at the Gram Panchayat level despite the challenges and constraints they face.
2. To understand how women's participation and leadership in the PRIs(Panchayat Raj Institutions) is changing the dynamics in Local Self-Governance, leading to changes in different aspects of their life. The following aspects have been explored

i. Self-confidence and self-initiative
ii. Reason for contesting elections
iii. Freedom of speech and expression
iv. Nature of meetings of the Gram Sabha
v. Dealing with administration
vi. Decision making and empowerment at home
vii. Leadership in PRI as team leader at Gram Panchayat level
viii. Cooperation with multiple stakeholders and beneficiaries including co-partners Factors motivating EWRs (Elected Women Representatives) to participate in Panchayat.

Research Tools

Interview schedules were used to obtain the required informations. The interview schedules investigated demographic profile of the respondents, factors affecting EWR (Elected Women Representatives)in performing their roles (as per research questions) and expectation and suggestions for better leadership. The data was collected in the months of March and April 2024.

Case Presentation

Interview schedules were used to elicit the required information including the demographic profile of the respondents, factors affecting EWR(Elected Women Representatives) in performing their roles and in obtaining their expectations and suggestions for better leaderships. Smt. Savita Choudhary story is an inspiring story of women-empowerment, leadership in PRIs(Panchayat Raj Institutions) and community development. She won second term as Mukhiya in last Panchayat election held in 2021 and successfully completing her term. She won second term with higher margin of votes.The Panchayat she is representing has a high number of upper caste Rajput population. Interestingly it has a higher number of Rajput population, she managed to win second term with higher margin despite belonging to extremely backward class. Smt.Savita Choudhary has significantly contributed to the development of her Panchayat. Both intrinsic and extrinsic factors led to her success. These factors include developing herself first through awareness and trainings from odd jobs for her livelihood, good intention to do something for herself and others through network with agencies like DISHA (Development Coordination and Monitoring Committee) before taking up the leadership role of becoming an effective and capable Pradhan. Her role in Covid management is exemplary as she helps those people who have no ration card to get free ration. She said '*jinke pass ration card nahi hai unko bhukhe nahi marne denge'* (those who do not have ration card will not let them starve to death). She uses her own fund to manage food for underprivileged people during the time of crisis.

Secondly, among the community she always follow unbiased approach. She confidently goes to meet the Block Development Officer, attending district level meeting, deal with community dispute and also goes to visit police station to settle disputes. She did commendable job by engaging people in PRI (Panchayat Raj Institution)not by just knowing and understanding the PRI (Panchayat Raj Institution)process, issues and challenges but doing concrete action for results. Some examples of her work in her 1st and 2nd term exhibited this very well i.e. infrastructure development, women mobilization, livelihood improvements, etc. As Pradhan, she further built positive relationships with all stakeholders within and without the Panchayat including local MLAs, ministers and

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made sure that her activities and policies did not alienate those who opposed her. By displaying maturity and active engagement in her interactions and using a direct and focused approach in problem solving, Smt. Savita Choudhary from marginalized family has been able to bring people together and demonstrate positive changes in the community and local-self-governance. She believes that intent and spirit of the 73rd Constitutional Amendments can only be achieved with a strong political will towards empowering Panchayat and not just treating them as mere agents for implementing various programs and schemes in a top-down manner. Autonomy and community need to be prioritized and top-down planning, delayed decisions on fund disbursement and red-tapism need to be changed. She acknowledges that there are some efforts for decentralizing by way of shifting of funds and responsibility to the Panchayat. Smt. Savita Choudhary struggles, issues, and challenges as an outcome of this case study could be further leveraged by concerned trainers, stakeholders, and policy makers in this domain to strengthen leadership and build efficiency in the institutions of Panchayati Raj in India.

Following are the results of the objectives:

i. Smt. Savita Choudhary strongly believes that reservation for women has provided her an opportunity for initial entry into the system of PRIs(Panchayat Raj Institutions). Being an elected representative has increased her circle of influence and action to become more visible and recognized as a leader and changemaker in development issues and action than as a member of a women's group. She describes her journey from a 'Gharelu Aurat' (a woman confined to the household and its chores) to an empowered women leader of her community through positive support of her husband. As an elected representative in the PRI(Panchayat Raj Institution)she has said - "With family support and community support women can empower and actively participate in Panchayati Raj function and deliver better result for making a society better for living. She possess some inherent quality of helping other which makes her popular in village. She does not discriminate anyone basis on caste, religion. Despite belonging to extremely backward class, her reputation in upper caste is quite impressive. As far as caste dynamics is concern, her Panchayat has high caste dominance about 70 percent population is Rajput. Despite this caste combination, extremely backward women getting importance shows her ability.

ii.Smt.Savita Choudhary outdoor mobility has been gained from exposure visits including networking group meeting. She is active member of District Development Coordination committee and attend regular meeting held in district town Madhubani. This DISHA meeting makes her aware of recent updates regarding act and rules of Panchayat.It shows how network of women and Panchayat capacity building body help elected women representative to perform duties assigned to her in Bihar Panchayati Raj Act,2006.

iii. Smt.Savita Choudhary participation in PRI (Panchayat Raj Institution)as EWR (Elected Women Representative) has not only influenced her participation in economic decisions but enhanced control over economic resources at home.

iv. At household level too, not only does Smt. Savita Choudhary receive the support of her husband and children but her neighbors too have recognized her leadership and boost her self-confidence with continuous endorsement and support.

v. Smt. Savita Chouhary participation as EWR(Elected Women Representative) in Panchayat has increased her influence and participation in social, community and political activities. For example, she has also earned respect and recognition of the Up-Pradhan (Vice President) of the Panchayat, who is male and whose political affiliation is different from her. Not does he recognize her capability but endorses her in all decisions as a supporter and co-partner. She is now highly motivated and aspiring to contest the Zilla Parishad/MLA election to benefit many more people with her leadership.Her story is an excellent example of women's empowerment and leadership in PRIs (Panchayat Raj Institutions) and community development. She has significantly contributed to the development of her Panchayat. Both intrinsic and extrinsic factors led to her success . These factors include her own drive for educating and training herself, experimenting with different types of sources of livelihood and an inherent desire to do something for herself and others through network with agencies like DISHA and Government. As Pradhan, she built upon the knowledge, skills, and networks she established as member and leader of the women's group to build positive relationships with all stakeholders within and outside the Panchayat including with local MLAs, ministers, corporate agencies and so on. She made sure that her activities and policies didn't alienate those who opposed her. By displaying maturity in her interactions and using a direct and focused approach in problem solving, she is an example of a woman from a poor family and marginalized community who has been able to bring people together and demonstrate positive changes in the community and local-self-governance. She highlights some challenges in the system of governance by stating that a strong political will is essential for enabling PRI (Panchayat Raj Institution) to become effective institutions of Local Self Government .She sometimes feels that Pradhan's of Panchayats are becoming mere agents of implementation of government schemes and programs. Autonomy of the PRI (Panchayat Raj Institution)and community needs are compromised due to overpowering and top-down planning instructions of government, delay in release of funds, attitude enforcing common activities to all PRIs(Panchayat Raj Institutions) not as per need of specific Panchayat. A bottom-up approach in PRI(Panchayat Raj Institution) remains challenging. She states that in a democratic ecosystem, political party ideology,affiliation,tagging sometimes affects development of Panchayat and should be avoided to give priority to development of Panchayat. She acknowledges that there are some positive efforts for decentralizing in terms of greater space being given to Panchayats for deciding use of funds. However, due to poor infrastructure and lower capacities of some members of the Panchayat, leaders and functionaries of the Panchayat are not able to leverage it. She shares that Pradhan as an elected representative has several social, physical, moral and development responsibilities towards the Panchayat but do not receive appropriate remuneration and recognition. Pradhan are expected to do wonders and benefit the needy persons in their Panchayat, but the systems of governance remain unchanged,

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rigid, and operationally sluggish since the time of Independence. The Pradhan's role is very demanding, but their compensation does not match even the wage rates of the State and is nowhere close to the compensations, privileges, salary, and honorariums provided to elected representatives at higher levels such as the Members of Parliament (MPs) and Members of Legislative Assemblies (MLAs). Pradhan's are expected to work around the clock as volunteers (Lok-seva).

Smt.Savita Choudhary also highlighted major constraint while performing duties which include: -

a) Panchayat is not able to set agenda for development as per felt need in Gram Sabha meetings.
b) Felt need of the common people go into back burner since new GPDP (Gram Panchayat Development Plan) started in Panchayat.
c) Pradhan receive set target from center to implement central sector scheme.
d) Gram Panchayat become mere an implementing agency.
e) Housing scheme does not benefit the beneficiaries due to technicalities (sometimes geo tagging app does not work that's leads to beneficiary's name not uploaded)
f) More than fifty percent beneficiaries are not included in housing scheme.
g) Maximum dependency on Block Office due to heavy bureaucratic intervention in Panchayat work.
h) Contractor for installing solar street light , drainage facility and other technical work decided by the State Government, which further undermine the authority of the Pradhan.

From Smt. Savita Choudhary case study one can say that she has gained self-confidence and self-initiative, she has been able to perform her duties by conducting meetings with Gram Sabha, dealing with administration, she is empowered at home as well with regard to decision making and also has been able to get cooperation of multiple stakeholders and beneficiaries including co-partners. These factors motivating EWRs (Elected Women Representatives) to participate in Panchayat.

CONCLUSION

Although Bihar is the first state to implement 50 percent reservation for women, situation of women is still under the circumference of feudal character. Elected women representative are still facing challenges to perform duties just because of male dominated society and lack of women education. EWR (Elected Women Representative) who have better family background, better education and back up perform better in their duties. This case study shows if women have will for community service, they can perform better and become a role model for other elected women representative who faces challenges in performing role as an EWRs(Elected Women Representatives). Case study also shows the value of networking through which EWR can perform her duties by knowing recent updates of act and rule/policies and better practices.

Currently ,29 Panchayat Development activity are divided into 9 themes as per Gram Panchayat Development Plan and it is oriented towards achievement of Sustainable Development Goal. For the fulfillment of these 9 themes which include poverty free and enhance livelihood village, healthy village, child friendly village, water sufficient village, clean and green village, self-sufficient infrastructure in village, socially just and socially secured village, village with good governance, women friendly village, required large scale women participation and well trained and highly motivated elected women representative to perform in Panchayat. If more and more women leader are engage as Pradhan in Panchayat through institutional help and cooperation, achievement of Sustainable Development Goal become simple and easy.

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SPRINKLER IRRIGATION SYSTEM MAINTENANCE FOR IMPROVED UNIFORMITY AND APPLICATION EFFICIENCY IN BARREN LAND

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ABSTRACT

An irrigation sprinkler is used to water agricultural crops, lawns, landscapes, golf courses, and other areas, also aiding in cooling and dust control. Sprinkler irrigation mimics rainfall and is promoted over surface methods, especially in regions like Coimbatore, where annual rainfall ranges from 550 to 900 mm. This paper examines the efficiency of sprinkler irrigation at RVS Technical Campus, aiming to optimize water use and reduce human intervention. The study focuses on an impact sprinkler system, monitoring soil moisture to determine water needs and using a rotating system to ensure accurate water scheduling and minimize runoff.

KEYWORDS: *Sprinkler irrigation, Soil Moisture, Water efficiency, Installation, Design.*

INTRODUCTION

An irrigation sprinkler, also called a water sprinkler, is a device used to water agricultural crops, lawns, landscapes, and other areas. It also helps with cooling and controlling airborne dust. Sprinkler irrigation distributes water in a controlled manner, similar to rainfall, through a network of pumps, valves, pipes, and sprinklers. It is suitable for residential, industrial, and agricultural use, especially on uneven land or sandy soil where water is scarce. Perpendicular pipes with rotating nozzles are attached to the main pipeline at regular intervals for efficient distribution (Padhye.A.H,1990).

COMPONENTS

Major Components of Sprinkler Irrigation System

1. Pumping station or Header Assembly
2. By-pass valve
3. Fertilizer Tank
4. Filtration system
5. Pressure Gauges
6. Control valves
7. HDPE/PVC Pipes
8. QRC Pump connector
9. Sprinkler Nozzles
10. Service Saddle

BASIC DESIGN PRINCIPLES

✓ Sprinkler Heads

Impact and gear-drive sprinklers, commonly used in lawns, gardens, and pastures, produce moving water streams and can be set for full or part-circle patterns. They cover large areas (around 12 m spacing) and are ideal for larger spaces. These systems can be configured as solid set, where sprinklers remain fixed and draw water from surface or buried lines, or set-move, where lateral lines are moved every 12 to 24 hours. Solid set systems are costlier to install but require less labor and can be automated, while set-move systems are cheaper but need more manual operation (Patel.I.S. et al, 1993).

✓ Centre Pivot

The self-propelled sprinkler system, which rotates around a pivot point, requires minimal labor compared to other systems. It consists of pipes connected to movable towers, with water application controlled by the rotation speed. Center pivots can be adjusted for various crop heights and work well on lighter soils. A computerized control system allows operators to program multiple irrigation features. Additionally, a corner attachment system, or "end-gun," can be installed to irrigate corner areas that traditional center pivots may miss.

✓ Linear Move

The linear move (also called lateral move) irrigation system is built the same way as a center pivot; that is moving towers and pipes interconnecting the towers. The main difference is that all the towers move at the same speed and in the same direction. Water is pumped into one of the ends or into the center. Due to the high capital investment, linear

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moves are used on high- value crops such as potatoes, vegetables and turf (McCauley. G. N, 1990)

METHODOLOGY

SITE PLANNING & PREPARATION

a. Works shall be carried out under the supervision of the Site Engineer, Safety Officer, and QA/QC Engineer.
b. Work to be carried out in line with approved Site layout drawing relevant to the area and the required trial pit related to the excavation must be inspected, verified by the consultant prior to trench excavation.
c. Traffic will be managed by the Site Engineer/ Site Supervisor and the Safety Officer for any re-routing as well as the monitoring of equipment movements on site, transporting foundations, and lifting area.
d. Working area will be protected with plastic jersey barriers, safety signage, and safety tapes. Existing Structures, Utilities, Sidewalks, Pavements should also be protected.
e. Any MEP or any other underground utilities required clearance shall be obtained prior to
f. starting the activity.
g. Ensure that enough tools, materials, and manpower are available before commencing the work.
h. All relevant documentation (approved shop drawings, checklists, method statement irrigation system, material sample for pipes, fittings, and solvent cement/adhesives, etc.,) and materials applicable for the section of work will be checked by the Site Engineer/Supervisor prior to commencement of work.
i. The Site Engineer/Supervisor will give necessary instructions to the tradesman and provide the necessary approved shop drawings.
j. Materials shall be delivered in their original, tightly sealed containers or unopened packages, all clearly labelled with manufacturers name, brand name, number, and batch member of the material where appropriate.
k. The material shall be delivered to the site in ample time to avoid delay in the job progress and at such times as to permit proper coordination of various parts (Westcott.M.P and Vines. K.W,1986),

CHECKS FOR INSTALLATION

- Find out if the design or sketch of the designated plot is ready.
- Also, see if the physical conditions of a site meet the dimensions mentioned in the plan.
- Check if all tools, material and fittings required for the installation are available.
- Find out if the trenching is ready as per design and pipe specifications(Suryawanshi.S.N. and Pampattiwar.P.S,1985)

TOOLS AND EQUIPMENT REQUIRED FOR INSTALLATION

The following tools and equipment are required for the installation of a microirrigation system.

- Pipe wrench (18″, 24″or 36″)
- Spanner set (preferably adjusting sly wrench)
- Drill machine with drill bits of different sizes
- Drill guide
- Screwdriver and pliers
- Hacksaw blade with frame and one spare blade
- Measuring tape and scale
- Straight or ejecto punch
- Hand punch
- S-hose pump
- Plier punch
- Take-off tool
- Solvent cement
- Teflon tape
- Jute
- GI threaded joint's synthetic compound
- Pencil or marker
- Pressure gauge with adopter and nozzle

INSTALLATION OF SPRINKLER IRRIGATION SYSTEM

The components of the sprinkler irrigation system are tested before being installed. The entire system is tested once the installation is complete. The installation work must be carried out as per the installation guidelines. Guidelines to maintain the system and few precautions starting from the installation will ensure trouble-free operation. (Muazu dantala.et al,2012).

Installation of head control unit

The installation of head control unit requires a cemented platform. The size of the platform depends on the various components to be installed, such as pump, bypass mechanism, non- return valve, hydro cyclone filter, fertigation unit, media filter, screen or disc filter and air release valve. A layer of paint on these fittings is used to avoid rusting. Pressure gauges are installed wherever needed to check pressure readings.

Installation of pipes

PVC pipes must be installed according to the specified size and class. Exercise caution on hot days, as temperature drops can loosen the pipes. Before joining, remove burrs and clean the surfaces with sandpaper and a cloth. Apply solvent cement evenly around the spigot end and push it into the socket to the marked depth. Store solvent cement in a cool, dry place away from fire and children. Use Teflon tape to prevent leakage at threaded ends, avoiding over-tightening with a pipe wrench. Immediately support or fill trenches after joining pipes and fittings, and backfill only after testing, ensuring materials are free of stones to prevent damage.

Installation of valves

Air valves on the mainline must always be installed at the highest point of the pipeline or at a point of change in the slope. Control valves must be installed minimum one feet above the ground level and need to be straight, both vertically and horizontally. Use Teflon tape to wrap the

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threaded parts of adopters for fitting it into the valves in order to avoid leakage. Avoid over tightening by pipe wrench.

Installation of main, sub-mains and laterals

Main line - Rigid Poly Vinyl Chloride (PVC) and High-Density Polyethylene (HDPE) pipes are used as main lines in irrigation systems to minimize corrosion and clogging, with recommended diameters of 63 mm and above, rated for 4–10 kg/cm². The main line serves as the primary artery of a sprinkler irrigation system, conveying water to the sub-mains at the required pressure. Typically buried about 30 cm below the soil surface, it supplies water efficiently to the sub-mains.

Sub-mains - Light PVC, HDPE, or Linear Low-Density Polyethylene (LLDPE) pipes are used as sub-mains, typically with an outer diameter of 32–75 mm and a pressure rating of 2.5-4.0 kg/cm². The sizes of main and sub-mains are based on crop water requirements and field size, with both featuring flush valves for sediment removal and flow control (ball) valves at the start of each sub-main. Flush valves should be installed horizontally with an elbow to prevent spillage, while sub-mains connect to the main line using fittings like tees and elbows, secured with solvent cement.

Laterals - Laterals are tubes located between the shut-off valve and sprinkler heads. The laterals are, usually, made of LDPE, Linear Low-Density Polyethylene (LLDPE) or HDPE pipes of 10 to 20 mm in diameter and with a wall thickness of 1–3 mm with a pressure rating of 2.5 kg/ cm2. Lateral pipes are, usually, flexible, non-corrodible, resistive to radiation and to the effects of temperature fluctuation. They are easy to install. Laterals are, usually, black in colour. The laterals supply water to a field through sprinklers. To install laterals, the following need to be done.

(i) To connect the laterals (poly-tubes) to the submains, holes are drilled on the PVC sub-main pipes using a drilling machine. The holes are drilled at a distance equal to the row spacing of the crop. The size of the holes depends on the size of the laterals and the grommet take off (GTO).

(ii) Grommets are fixed in the holes and take-offs are fixed on the grommets. The laterals are then connected to the take-offs.

Sprinkler riser and head

Sprinkler risers connect the sprinkler heads to the lateral pipes or tubes. Sprinkler heads distribute water uniformly over the field without run-off or excessive. The characteristics that need to be considered for sprinkler selection are jet trajectory, operating pressure and sprinkler body design. The sprinkler operating conditions to be considered in sprinkler selection are soil infiltration characteristics, desired irrigation depth, desired or appropriate irrigation cycle, crop characteristics, wind conditions and plant spacing.

The uniformity of water distribution from sprinklers depends on the pressure of water, wind velocity, rotation of sprinklers, spacing and nozzle diameter. The spacing of sprinklers in a lateral, and lateral spacing are adjusted considering all these parameters.

RESULT AND DISCUSSION

EFFICIENCY OF SPRINKLER IRRIGATION

Efficient irrigation systems are cost-effective, yet many are inefficient, leading to water wastage, increased energy use, and reduced profits. A well-designed sprinkler system applies water uniformly without exceeding soil infiltration capacity, considering factors such as pressure, nozzle size, weather conditions, and crop water use. Leakage losses should be minimized for optimal efficiency; in this evaluation, a Distribution Uniformity (CU) of 86% and a Deep Percolation Rate (DPR) of 87% were deemed satisfactory. Performance assessment involves measuring water depth in cans placed between sprinklers to ensure uniform distribution. Results show that reduced uniformity leads to decreased water productivity, particularly at higher adequacy levels, highlighting that the uniformity coefficient alone is insufficient for evaluation. Thus, irrigation strategies must consider both irrigation adequacy and uniformity to prevent discrepancies in crop growth and yield across the field, making lower adequacy levels more justified in systems with lower uniformity.

FORMULA FOR IRRIGATION EFFICIENCY

The scheme irrigation efficiency (e in %) is that part of the water pumped or diverted through the scheme inlet which is used effectively by the plants. The scheme irrigation efficiency can be sub-divided into:the conveyance efficiency (ec) which represents the efficiency of water transport in canals, and the field application efficiency (ea) which represents the efficiency of water application in the field.

The conveyance efficiency (ec) mainly depends on the length of the canals, the soil type or permeability of the canal banks and the condition of the canals. the scheme irrigation efficiency (e) can be calculated, using the following formula: with

$$e = \frac{ec \times ea}{100}$$

e = scheme irrigation efficiency (%)
ec = conveyance efficiency (%)
ea = field application efficiency (%)

A scheme irrigation efficiency of 50-60% is good; 40% is reasonable, while a scheme Irrigation efficiency of 20-30% is poor.

It should be kept in mind that the values mentioned above are only indicative values. Unit cost of sprinkler irrigation setup shown in table 1.

CONCLUSION

Expert knowledge is crucial for effective irrigation management, including the maintenance of motors, water supply pipes, and mechanical components to avoid damage and costly repairs. Sprinklers work best in sandy soils with high infiltration rates and should have an application rate lower than the soil's basic infiltration rate to prevent surface ponding and runoff. They are unsuitable for soils prone to crusting or salinization and can easily clog due to sediment. Sprinkler irrigation mimics rainfall, distributing water efficiently over various crops and soil

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types. However, these systems can incur high capital costs and may require careful management to prevent clogs. Advancements in mathematical and numerical modeling have led to better design and management tools for sprinkler systems, with several applications awaiting adoption by farmers. Effective irrigation relies on governing equipment using accessible meteorological, water resource, and crop data online. The development of collective irrigation schedulers will enhance simulation models and decision-making routines, increasing the importance of applied mathematics in irrigation management.



Figure 1: Components of sprinkler irrigation system

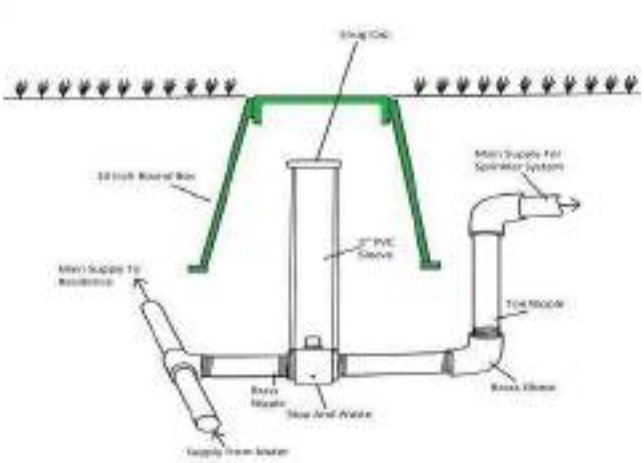


Figure 2: Final setup of sprinkler irrigation

Table 1: Unit cost of sprinkler irrigation setup

Key: HDPE=High Density Poly Ethylene, PVC= Poly Vinyl Chloride

S. No.	Components	Nos.	Price (INR)
1	Sprinkler heads (brass)	6	3600
2	Sprinkler riser	6	600
3	HDPE sprinkler elbow	1	100
4	HDPE Male and Female Reducer - Increaser	6	800
5	HDPE Sprinkler Tee	1	200
6	PVC Sprinkler pipe adapter with lock system	6	4100
7	HDPE sprinkler pipes	15	10,500
8	HDPE black sprinkler end caps	2	100
TOTAL			**20000**

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QUALITY EVALUATION OF BIOCHAR FROM DIFFERENT AGRICULTURAL BIOMASS

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ABSTRACT

Biochar, one of the co products of pyrolysis unit , is a potential soil amendment that sequestrates large amount of carbon which helps in increasing the soil fertility. And also application of biochar to t he soil reduces compaction, increase water holding capacity, nutrient availability, enhance biological activity, increase crop yields and reduce nitrous oxide emissions. In this research, bhendi and brinjal stalks are used to produce biochar by using pyrolysis. The nutritive content in biochar is analysed by proximate and ultimate analysis. As the result of proximate analysis, the nutritive contents such as moisture content, ash content, fixed carbon and volatile matter has recorded higher in bhendi stalks whereas in ultimate analysis such as carbon, nitrogen, hydrogen and sulfur, brinjal stalks has recorded a higher value. As the result, applications of biochars of bhendi stalks and brinjal stalks will improves the soil nutritive content than the biomass application

KEYWORDS: *Biochar, bhendi, brinjal, proximate analysis, ultimate analysis, soil fertility.*

I.INTRODUCTION

The world's population is expected to reach 9 billion by 2050 which will require an increase of >50% in agricultural food supply to meet the growing demand. Over the same period, climate change, water scarcity and land degradation are expected to negatively impact agricultural productivity, which may severely challenge our ability to meet this required demand of food production. People that are already poor and vulnerable may be the worst affected, despite having contributed least to climate change. Since the global challenges of hunger, nutrition and climate justice are strongly connected it is critical to minimize further land use change, land degradation and greenhouse gas (GHG) emissions.

The complex interrelationship of agricultural production, water availability, and soil health will underpin the possibilities for achieving the Sustainable Development Goals of the United Nations Sustainable Development Solutions Network (Sustainable Development Solutions Network 2015). Managing land degradation is a central challenge that simultaneously addresses environmental and development objectives. The literature often reports that the majority of land degradation is caused by human activity (e.g., overgrazing, deforestation, agricultural mismanagement or mining) that stimulates the loss of organic matter due to erosion, physical and chemical soil deterioration of the soil. This in turn reduces soil productivity and the provision of crucial ecosystem services. Moreover, agriculture is one of the major GHG emitters (i.e. CO2, CH4, N2O) accelerating global warming (IPCC 2013, 2000), which almost certainly will negatively impact agriculture. This contribution will even be enhanced with future climate change by positive feedback effects of elevated CO2 on non-CO2 GHG formation, rising temperatures and more extreme weather events, such as droughts and flooding. Thus, agricultural management requires adaptation and mitigation strategies to reduce GHG emissions while simultaneously increasing crop productivity. One adaptation strategy is to apply organic matter to agricultural lands.

Application of organic matter has shown to improve the properties of soils and agricultural productivity. However, soil organic matter can decompose quickly, necessitating repeated applications. Thus, the usage of stable compounds such as biochar as soil amendments, or as part of organic amendments such as compost or manure, may be a cost-effective and low-risk alternative to improve agricultural productivity and to mitigate climate change over the long-term (Khalid Mehmood *et al.*, 2017). Biochar, the solid product of biomass pyrolysis, has been produced and utilized for several thousand years and is best known as charcoal (when produced from woody biomass). The applications of biochar are very diverse, ranging from heat and power production, flue gas cleaning, metallurgical applications, use in agriculture and animal husbandry, building material, to medical use.

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Effect of biochar composite and organic sources on soil properties and yield of bhendi attributed to increased nutrient availability, cation exchange capacity and water holding capacity of soil by the addition of biochar. In India, prosopis was introduced in the late 1900‘s to meet the fuel requirement of the rural poor. It is a phreatotype plant widely distributed in India and has survived where other tree species fail to grow and become a nuisance to the environment. It inhibits the germination of other species seeds that present in its vicinity. It has a negative impact on native vegetation and interferes with water supply, hydrological functioning and herbivores grazing potential. Complete eradication was inevitable but we can reduce the menace of prosopis by converting them into agriculturally important carbon rich biochar. Therefore, in this study prosopis based biochar was prepared and biochar composite was prepared to study the effect of biochar and inorganic fertilizers on soil nutrient availability, carbon status and yield of bhendi crop.

With this, the study focused on the Quality evalution of bichar from different agricultural biomasses. The main is to analyze the nutrient contant of biochar.here is important to select a biomass which is rich in carbon and porous constant. It is very much important to analyse this kind nutrient because the biochar used as a fertilizer and also act as substitute for soil which promote the growth of plants and high in water holding capacity.

II.METHODOLOGY

The preparation of biochar carried out in many other ways. Here, we used pyrolysis method to produce the biochar.pyrolysis is the best way to produce high quality of biochar through slow pyrolysis,which is combustion of selected biomass at 300ºC and below the requirement of time is much longer and also maintain in same temperature the biochar get ready after the temperature is completely reduced upto room temperature. The selection of raw material is based 0n nutrient. Here, we select agriculture waste that is after cultivation, the harvesting of Bhendi,brinjal,coconut petiole collected from the village and after that the selected samples are dried for 3 days after the samples are completely dried weighed each 10kg. The processed raw material procured from the village to our institution and the samples are directly converted into biochar by our pyrolysis unit.The pyrolysis unit was 1kg each top and bottom layer, the separation of this champers is to carry top as sample and bottom as charcoal. Here, the pyrolysis unit carried out by slow pyrolysis method for production of biochar. First the selected samples weighed for 1kg each and keep it apart.

The main principle of pyrolysis is to combustion of biomass without oxygen, Here, the charcoal is selected as a combustion material, the charcoal also weighed 0.75kg and pre-heated until it turns to 300ºC nearly and immediately put it in to the lower champer of the pyrolysis unit after that without any delay the weighed sample filled in upper chamber and then the upper was closed using chimney with the help of chimney, the pre-heated charcoal turns to initial the combustion process it is only for initial action of biochar preparation. Here, we took nearly 30mins for the required capacity. After 30mins the chimney was removed and immediately the air tight lid was closed both top and bottom of the chamber. Here, or at this stage the process of pyrolysis starts. The slow combustion of stalks were initiate to turns as biochar, the required 1kg of sample tooks 3hrs to complete the process and it is important that the lid opened after the complete set up turns to room temperature because a little amount of oxygen turns the material as ash.After 3hrs the processed biochar collected from the pyrolysis unit and repeat the same process for another two sample. Once the process was over the collected biochar were powered to easy the quality analysis.



FIGURE 1 REPRESENTS THE PREPARATION OF BIOCHAR

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III. DISCUSSION

The Moisture content, ash content, fixed carbon and volatile matter are measured by the proximate analysis method. The carbon, hydrogen, nitrogen, sulphur are measured by the ultimate analysis method**.**

TABLE 1
Proximate Analysis of Biochar

Parameters	Biochar (wt %) dry basis	
	Bhendi Stalks	Brinjal Stalks
Moisture	3.6	3.1
Ash	4.75	4.28
Fixed Carbon	61	42
Volatile Matter	6.5	5.8

The fixed carbon is more in Bhendi stalks. The Brinjal stalks have the lower all four required contents. The proximate analysis of biochar derived from bhendi (okra) stalks and brinjal (eggplant) stalks reveals distinct characteristics that can influence its application and effectiveness as a soil amendment or carbon sequestration material.The moisture content of both biochars is relatively low, with bhendi stalks showing 3.6% and brinjal stalks at 3.1%. Low moisture content is favorable as it indicates higher stability and durability of the biochar during storage and application. This characteristic enhances its potential for long-term carbon storage in soil.The ash content for bhendi stalks is 4.75%, slightly higher than that of brinjal stalks at 4.28%. Ash content is an important factor as it reflects the mineral composition of the biochar, which can influence soil fertility. The presence of minerals can improve soil nutrient levels, while the slight difference in ash content suggests that biochar from bhendi stalks might provide a marginally higher mineral supply compared to brinjal stalks.Fixed carbon content is crucial as it represents the stable carbon fraction of biochar. Bhendi stalks exhibit significantly higher fixed carbon content at 61%, compared to 42% for brinjal stalks. This difference suggests that biochar from bhendi stalks may be more effective for carbon sequestration and may contribute to improved soil structure and stability over time.The volatile matter content for bhendi stalks is 6.5%, while brinjal stalks have a slightly lower value of 5.8%. Higher volatile matter can indicate a greater potential for gas emissions during the application or degradation of biochar. However, the overall low levels of volatile matter in both samples suggest that they are stable and less likely to emit harmful gases post-application.

TABLE 2
Ultimate Analysis of Biochar

Parameters	Biochar (wt %) dry basis	
	Bhendi Stalks	Brinjal Stalks
Nitrogen	1.81	1.82
Carbon	59.06	71.40
Sulfur	0.71	0.05
Hydrogen	0.93	1.22

The nitrogen and carbon content are higher in brinjal stalks. The sulphur content is higher in bhendi stalks. The elemental analysis of biochar derived from bhendi (okra) stalks and brinjal (eggplant) stalks highlights significant differences in their chemical composition, which can influence their utility in agricultural practices.The nitrogen content is comparable in both biochars, with bhendi stalks at 1.81% and brinjal stalks at 1.82%. Nitrogen is an essential nutrient for plant growth, and both biochars can provide a moderate source of nitrogen. The similar levels suggest that both types of biochar can contribute to soil fertility, although further studies on the bioavailability of this nitrogen are needed.The carbon content reveals a notable difference: bhendi stalks contain 59.06% carbon, while brinjal stalks have a significantly higher carbon content of 71.40%. This higher carbon level in brinjal biochar indicates a greater potential for carbon sequestration. The increased carbon can also enhance soil structure, improve moisture retention, and provide a long-term energy source for soil microorganisms.Sulfur content is another area of difference. Bhendi stalks have a sulfur content of 0.71%, which is substantially higher than the 0.05% found in brinjal stalks. Sulfur is critical for plant metabolism and can influence the synthesis of amino acids and proteins. The higher sulfur content in bhendi biochar may provide an added nutritional benefit for crops grown in soils amended with it.The hydrogen content is higher in brinjal stalks (1.22%) compared to bhendi stalks (0.93%). Hydrogen, while not a primary nutrient, is important in forming organic compounds in the soil. The higher hydrogen content in brinjal biochar could suggest a greater potential for enhancing microbial activity, which relies on organic matter breakdown and nutrient cycling.

IV.CONCLUSION

Biochar from bhendi stalks, brinjal stalks and coconut petiole are produced by pyrolysis method. By using the dry biomass of bhendi stalks, brinjal stalks and coconut petiole directly to the soil will improve the soil nutritive content. Whereas using biochars of bhendi stalks brinjal stalks and coconut petiole to the soil also helps more and improves the soil nutritive content. But the improvement of nutritive content of biochar application is more than the biomass application. The proximate analysis indicates that biochar derived from bhendi stalks has superior characteristics compared to that from brinjal stalks, particularly in terms of fixed carbon content. These properties suggest that

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bhendi biochar could be more beneficial for applications aimed at enhancing soil fertility and promoting carbon sequestration. Further studies could focus on the long-term effects of these biochars on soil health and crop yield to validate their practical applications in agriculture. This is because of the nutritive content present in biomass increased when it is converted into biochar. Thus the nutritive content in biochar is analysed by proximate and ultimate analysis.As the result of proximate analysis, the nutritive contents such as moisture content, ash content, fixed carbon and volatile matter has recorded higher in bhendi stalks whereas in ultimate analysis such as carbon, nitrogen, hydrogen and sulfur, brinjal stalks has recorded a higher value. As the result, applications of biochars of bhendi stalks and brinjal stalks will improves the soil nutritive content than the biomass application. The elemental analysis indicates that while both bhendi and brinjal biochars can enhance soil fertility, they possess distinct characteristics that may cater to different agricultural needs. The higher carbon content in brinjal biochar positions it favorably for carbon sequestration, while the increased sulfur in bhendi biochar could enhance its role in providing essential nutrients. Further research should explore the specific impacts of these biochars on plant growth and soil health to optimize their application in sustainable agricultural practices.

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DESIGN OF ROAD PAVEMENT USING PIEZOELECTRIC HARVESTER - A REVIEW

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ABSTRACT
In the era in which the need for sustainability in terms of harvesting energy (electricity) using elements which are present for free and upgrading the traditional method of energy harvesting by using piezoelectric materials for harvesting electricity by the pressure exerted by vehicle on the pavement. In this project the pressure energy which is being wasted can be used as source for producing electricity .The future of transportation focuses on smart and green technologies, with energy harvesting. Piezoelectric systems, known for their ability to capture pressure energy without external power, have gained interest for producing electricity.

INTRODUCTION
Today electricity has become a source of living one cannot even imagine living a day without electricity. Electricity is basic need for everyone. Due to increase in population the demand for supply of electricity is also increasing. The urges to generate electricity for growing population in a very eco-friendly way without causing any harm to the environment as the traditional way of producing electricity uses lots of burning of fuels to run thermal power plants, this plants are known to pump out a lots of greenhouse gases into the environment. So for this a study for generating electricity from some eco-friendly sources like piezoelectric materials which exhibit a fascinating property known as piezoelectricity, which enables them to convert mechanical energy (pressure energy) into electrical energy. By using this piezoelectric materials into road pavements we can produce electricity by the pressure exerted by the traffic on the road pavements. A large amount of pressure energy is wasted during the movement of traffic, so why not use this traffic as a source for generating energy.

SCOPE OF WORK
- Piezoelectric roads can generate clean, renewable electricity by pressure exerted by movement of vehicles on road.
- Piezoelectric roads can help develop sustainable, environmentally friendly infrastructure.
- Piezoelectric roads can integrate with smart cities by powering sensors, smart lighting systems.
- Piezoelectric roads can optimize the use of energy resources.

MATERIAL
- Bitumen-
  A black, sticky, viscous petroleum by-product that acts as a binder to hold aggregates together.

The most common types used in India are VG-10, VG-20, VG-30, VG-40, and VG-50.

- Aggregates-
  These include sand, gravel, or crushed stone.
- Crushed stone-
  An angular rock that's used as a base material for roads. Crushed stone is durable and solid, making it suitable for heavy traffic loads.
- Pavers: Spread hot mix asphalt evenly across the road surface.
- Roller equipment: Compact the asphalt for the road base.
- Customized piezoelectric sensors.
- Copper wire of 2.5mm
- Rechargeable battery.
- Rectifier circuit (AC/DC).
- Wire conduit (Flexible And Rigid).
- Junction box.

METHODOLOGY
Construction of Piezoelectric roads

Step 1- Preparation of Sub base course
The first layer of the road , usually made of riverbed aggregates, rocks, or alluvial fans.

Step 2- Preparation of Base course
Made of coarse aggregates like gravel, crushed stone, or sand, mixed with a bituminous binder. This layer provides a stable foundation for the road and helps distribute the weight of traffic.

Step3-To create a strong base for placing the generator, a thin layer of asphalt is laid.

Step 4- Fixing the piezoelectric generators on asphalt layer as per design.

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Step 5-Connecting the generators in parallel series for getting collective output.

Step 6- Preparation of Hot mix
A hot mix of bitumen and aggregate is prepared and placed using a paver.

Step7- Compaction of layer.
Step 8- Finishing

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ATROPINE FOR MYOPIA CONTROL: EFFICACY, CHALLENGES AND FUTURE DIRECTIONS

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ABSTRACT

Myopia, or near-sightedness, is rapidly emerging as a major global health issue, with projections indicating that by 2050, it will affect nearly 50% of the world's population. This condition arises from excessive elongation of the eyeball, leading to blurred vision at a distance and increasing the risk of severe ocular complications, such as retinal detachment and glaucoma. Effective management strategies are critical to mitigating the public health impact of this growing epidemic.

Atropine, a muscarinic antagonist, has gained attention for its potential in myopia control. By inhibiting muscarinic acetylcholine receptors (mAChRs) in the eye, atropine slows down axial elongation, the anatomical hallmark of myopia. Low-dose atropine (0.01%) has demonstrated efficacy in clinical trials, such as the ATOM2 study, which showed a 50% reduction in myopia progression with minimal side effects, including photophobia and blurred vision. Meanwhile, the LAMP study indicates that slightly higher concentrations (0.05%) may further balance efficacy and tolerability, especially in children at high risk of severe myopia.

Despite these promising results, critical knowledge gaps persist, particularly concerning atropine's long-term safety, optimal dosing, and the rebound effect, where myopia progression may accelerate after stopping treatment. Ethnic and genetic variability also calls for a more diverse research focus. Future studies should explore combining atropine with other interventions, such as orthokeratology or multifocal lenses, to optimize outcomes. As leading pharmacological option for myopia management, atropine holds potential for integration into multifaceted treatment strategies to address this pressing public health concern.

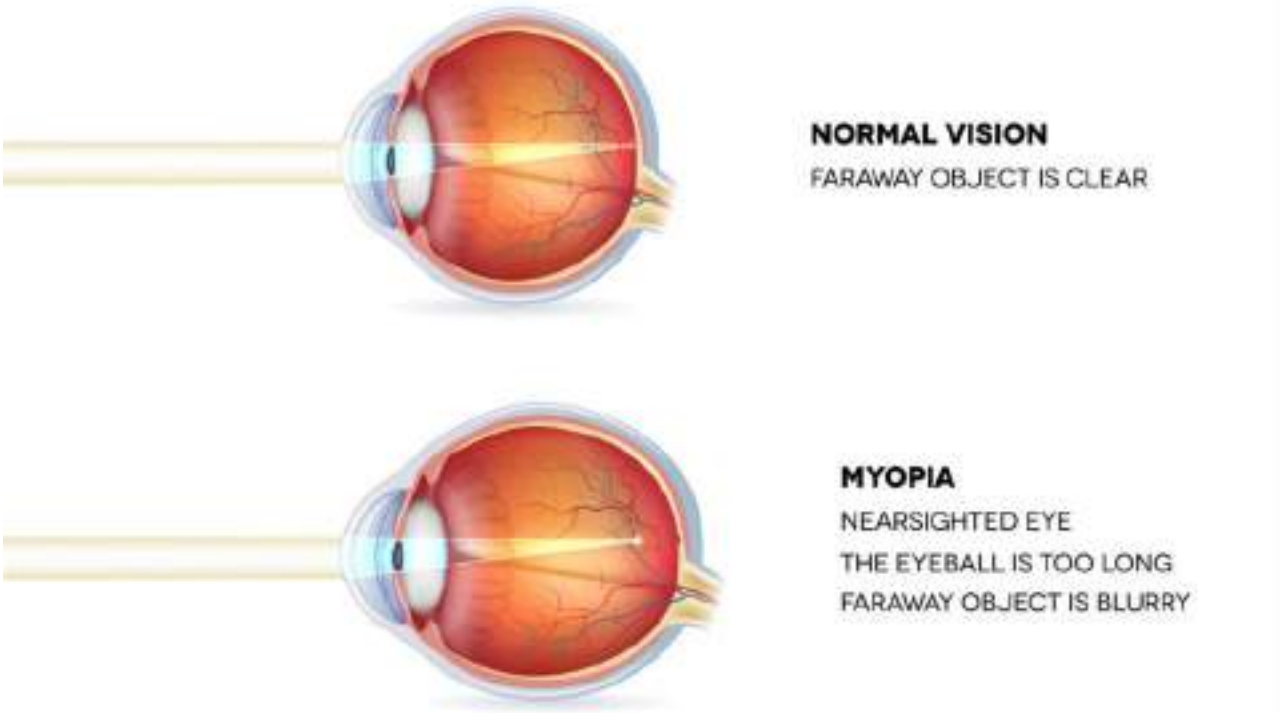
KEYWORDS: *Atropine, Myopia, Pediatric Populations, Muscarinic Acetylcholine Receptors, LAMP.*

INTRODUCTION

Myopia or near-sightedness has become a significant global public health concern, particularly among children and adolescents [1]. Recent estimates suggest that approximately 5 billion people (approximately 50% of the world's population) will be affected by myopia by 2050[2]. As its prevalence continues to rise, effective interventions for its control are urgently needed The impact that myopia possesses is not just limited to ocular health but has a long-term burden on the health-care system, impact on the global economy, and quality of life [1, 3-6] .Among the various treatment modalities, atropine, a muscarinic antagonist, has garnered attention for its potential in myopia management [7]. Many strategies have been implemented to achieve this goal, including the use of beautiful bifocal lenses [8-12], peripheral defocus lenses [13-15], protective lenses [16], orthokeratology [17-20], multifocal contact lenses [21], ophthalmic, outdoor activities [22-25] and drug interactions [26-30] .The evidence from good research is changing the way myopia is managed, especially in children, where myopia is a common eye care problem. This review delves into the mechanisms underlying atropine's effects in myopia control, assessing its efficacy, safety, and the implications for future research and clinical practice.

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Fig.1:- Comparison of Normal Vision and Myopia (Nearsightedness)



Atropine

Atropine's primary mechanism involves its action on the muscarinic acetylcholine receptors (mAChRs) found within the eye. Research indicates that the modulation of these receptors influences the elongation of the eyeball, a hallmark of myopia progression [31]. Atropine functions as a competitive antagonist to muscarinic receptors, inhibiting their activation by the neurotransmitter acetylcholine [32]. One notable characteristic of atropine is that it is non-selective, meaning it blocks multiple types of muscarinic receptors (M1, M2, and M3), rather than targeting any specific one. After absorption, primarily in the gastrointestinal tract, it is distributed widely throughout the body, metabolized in the liver, and excreted in the urine. Atropine has various physiological effects, including the inhibition of secretions, relaxation of smooth muscles, an increase in heart rate, and heightened respiratory depth and rate.

Ocular Applications

In ophthalmology, atropine is commonly used to induce mydriasis (pupil dilation) and Cycloplegia (paralysis of the ciliary muscles). Atropine achieves mydriasis by blocking the contraction of the circular pupillary sphincter muscle, which is usually triggered by acetylcholine. This inhibition allows the radial iris dilator muscle to contract, leading to pupil dilation [39]. Cycloplegia occurs as atropine paralyzes the ciliary muscles, preventing accommodation, which is the eye's ability to focus on near objects. This is particularly helpful in refracting young children and treating conditions like Iridocyclitis and ciliary block glaucoma. However, for the purposes of myopia control, both pupil dilation and Cycloplegia are considered undesirable side effects with no therapeutic benefit.

Mechanisms of Action

Atropine's primary mechanism involves its action on the muscarinic acetylcholine receptors (mAChRs) found within the eye [39]. Research indicates that the modulation of these receptors influences the elongation of the eyeball, a hallmark of myopia progression. The precise pathways remain an area of active investigation, but several hypotheses offer insights into how atropine may exert its protective effects against myopia:

1. **Ciliary Muscle Relaxation**: Atropine's ability to paralyze the ciliary muscle may reduce the eye's effort during accommodation, thereby decreasing the stimulus for axial elongation. By inhibiting the reflex associated with prolonged near work, atropine mitigates a significant risk factor for myopia progression.
2. **Choroidal Thickening**: Studies suggest that atropine may promote choroidal thickening, which can, in turn, lead to a reduced rate of elongation of the eyeball. This effect appears to be dose-dependent, with lower concentrations demonstrating a more pronounced benefit in controlling the progression of myopia compared to higher concentrations.
3. **Influence on Retinal Dopamine Release**: Recent findings propose a potential role for retinal dopamine in the pathogenesis of myopia. By modulating dopaminergic activity through muscarinic receptor interactions, atropine may help regulate the biochemical processes that govern eye growth and development.

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TABLE:-1. SIDE EFFECTS OF ATROPINE

CATEGORY	SIDE EFFECT
OCULAR SIDE EFFECTS	
1. Blurred near vision	Difficulty focusing on close objects (temporary).
2. Photophobia	Increased sensitivity to light due to pupil dilation.
3. Pupil dilation (mydriasis)	Prolonged dilation of pupils, causing vision issues
4. Eye irritation	Redness, discomfort, or itching of the eyes.
5. Allergic conjunctivitis	Rare occurrence of eye inflammation or irritation.
6. Decreased accommodation	Difficulty adjusting focuses between near and far objects.
SYSTEMIC SIDE EFFECTS	
1. Dry mouth (xerostomia)	Reduced salivary secretion due to anticholinergic effects.
2. Urinary retention	Difficulty in urination, especially in predisposed individuals.
3. Headache	Mild to moderate headaches.
4. Increased body temperature	Elevated temperature, particularly in young children (rare).
5. Drowsiness/fatigue	Feeling tired or sleepy, though rare at low doses.

Efficacy and Safety

Clinical trials have established that topical atropine, particularly at low concentrations (e.g., 0.01%), is effective in slowing myopia progression with a favourable safety profile. Common side effects, such as photophobia and blurred vision, tend to be mild and manageable. The long-term implications of atropine use, particularly on visual acuity and potential rebound effects upon cessation, require further scrutiny. Nevertheless, current evidence supports its use as a first-line therapy for managing myopia in children.

Atropine in Myopia Control

The use of atropine as a pharmacological intervention for myopia control has gained significant attention over the past several decades. Unlike traditional optical and surgical approaches, which primarily aim to correct visual acuity without addressing the underlying progression of myopia, atropine has emerged as a promising agent that directly targets the mechanisms involved in the development and worsening of myopia. Research into the use of atropine for myopia management has spanned over half a century, with varying levels of success and refinement in understanding its role and effectiveness.

Early Research and Limitations

The exploration of atropine for myopia control began in the mid-20th century, with early studies led by researchers like Bedrossian in the 1960s and 1970s [34, 35]. Bedrossian's work suggested that atropine could reduce the progression of myopia, but his research was limited by an inability to clearly differentiate between the effects of long-term.

Cycloplegia (the paralysis of the ciliary muscle, which prevents the eye from focusing on near objects) and reductions in axial elongation (the lengthening of the eyeball, which is a key factor in the progression of myopia). Although some reductions in myopia progression were observed, the studies lacked the precision necessary to draw definitive conclusions about atropine's long-term efficacy in preventing the pathological consequences of high myopia, such as retinal detachment, maculopathy, and glaucoma.

Subsequent studies, such as those conducted by Kelly et al., [36] sought to improve upon this early research. Kelly's retrospective study compared different groups of individuals treated with atropine, but the study design was not randomized, and treatment regimens varied widely between the groups. This lack of consistency made it difficult to generalize the findings or establish atropine as a reliable treatment for myopia control.

Gimbel was the first to suggest that atropine's effectiveness in controlling myopia might be time-limited, [37] indicating that its beneficial effects could diminish over time. However, like previous studies, Gimbel's research was flawed by the lack of control groups and the combination of atropine treatment with other interventions, such as spectacle use. These limitations hindered the practical utility of his findings.

The First Randomized Controlled Trials

The breakthrough in atropine research for myopia control came in 1989 when Yen et al. [33] conducted the first randomized, placebo-controlled trial using 1% atropine. This study was a significant step forward, as it introduced a more rigorous scientific approach to evaluating atropine's efficacy. By randomly assigning participants to either an atropine treatment group or a placebo group, Yen et al. were able to control for variables that had plagued earlier studies, such as differing treatment regimens and unblinded study designs.

Their findings demonstrated that atropine significantly slowed the progression of myopia compared to the placebo group [38]. This pivotal study marked the beginning of a new era in myopia research, firmly establishing atropine as a potential therapeutic agent for myopia control. It also opened the door to further research aimed at optimizing atropine's dosage, minimizing its side effects, and understanding its long-term implications.

Mechanism of Action in Myopia Control

The exact mechanism by which atropine controls myopia is still not fully understood, but several theories have been proposed. One prevailing hypothesis is that atropine's antimuscarinic properties interfere with the signaling pathways involved in eye growth. Specifically, atropine blocks muscarinic receptors in the retina and sclera, the outer layer of the eye, which are thought to play a role in regulating axial elongation [40, 41]. By inhibiting these receptors, atropine may slow or halt the elongation of the eye, thereby preventing myopia from worsening.

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Additionally, atropine's ability to induce Cycloplegia might also contribute to its effectiveness in myopia control. Cycloplegia reduces the eye's ability to focus on near objects, which could alleviate the visual stress that has been linked to myopia progression [42], particularly in children who engage in prolonged near-work activities such as reading and using digital devices.

Evolving Research and Dosage Optimization

While 1% atropine was initially used in early studies, this concentration was associated with significant side effects, such as pupil dilation (mydriasis) and difficulty focusing on near objects (Cycloplegia). These side effects, although not dangerous, were inconvenient and could discourage long-term adherence to treatment, especially among children. As a result, researchers began exploring the use of lower concentrations of atropine to strike a balance between efficacy and tolerability.

The landmark *Atropine for the Treatment of Myopia (ATOM)* studies, conducted in Singapore, was among the first to systematically evaluate different concentrations of atropine. The ATOM1 study, which used 1% atropine, confirmed its effectiveness but also highlighted its side effects.6This led to the ATOM2 study, which investigated lower concentrations (0.5%, 0.1%, and 0.01%) of atropine.5The results of ATOM2 were ground-breaking, showing that even very low doses of atropine, particularly 0.01%, could significantly slow myopia progression with minimal side effects [43], This low-dose atropine did not cause significant pupil dilation or affect near vision, making it a much more practical option for long-term use in children.

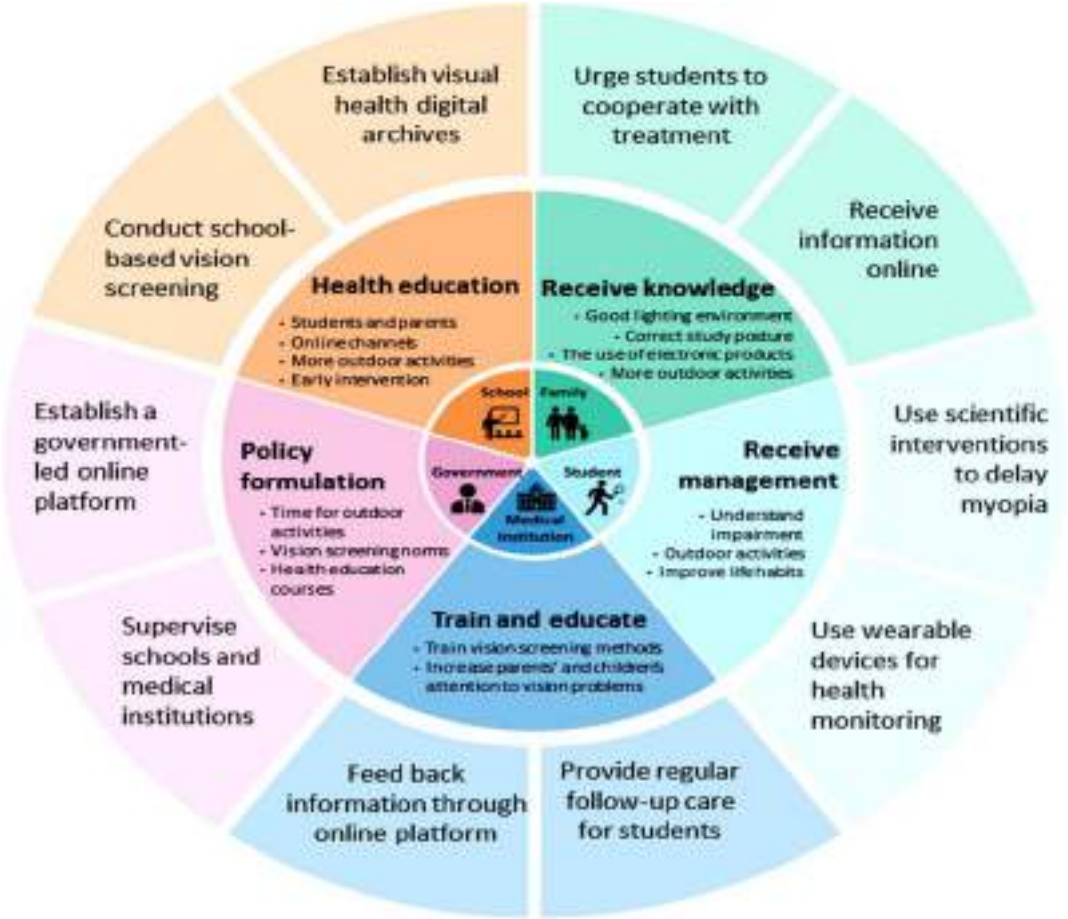
Long-Term Efficacy and Rebound Effects

Another critical area of research has been the long-term efficacy of atropine and the potential for rebound effects, where myopia progression accelerates once treatment is stopped. Studies have shown that while higher concentrations of atropine (1%) are effective in the short term, they are also more likely to lead to rebound myopia when treatment is discontinued [44]. In contrast, low-dose atropine (0.01%) not only slows myopia progression effectively but also minimizes rebound effects, making it a more sustainable option for prolonged use.

Atropine in Routine Clinical Practice

Today, atropine, particularly in low doses, has become an integral part of routine clinical practice for myopia management. It is widely used in many countries, particularly in Asia, where the prevalence of myopia is highest. Ophthalmologists and optometrists are increasingly incorporating atropine into their treatment plans for children who are at high risk of developing high myopia. Ongoing research continues to refine our understanding of atropine's long-term safety and effectiveness, as well as its potential to be combined with other myopia control strategies, such as multifocal contact lenses or increased outdoor activity.

Fig.2:-A comprehensive myopia strategy requires cooperation across schools, families, and health sectors to integrate vision care into education.



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Dose of Atropine for Myopia Control

The exploration of atropine as a treatment for myopia control has evolved significantly over the years, especially regarding the optimal dosing that balances efficacy and minimal side effects. The concentration of atropine administered plays a crucial role in both its effectiveness and the likelihood of side effects such as pupil dilation, light sensitivity, and difficulty with near vision. As a result, the choice of dosage has been a primary focus in both clinical research and real-world application of atropine for myopia management.

High-Dose Atropine (1%)

Initially, studies on atropine for myopia control focused on using a high concentration of 1%, as this was the standard dosage used for other ocular applications, such as inducing pupil dilation (mydriasis) and cycloplegia for diagnostic purposes.[45] Early studies, including those by Bedrossian and Yen et al., confirmed the efficacy of 1% atropine in significantly slowing myopia progression.

In these early trials, 1% atropine was found to be highly effective in reducing the axial elongation of the eye, which is the primary cause of myopia progression. For example, the ATOM1 (*Atropine for the Treatment of Myopia*) study conducted in Singapore in the early 2000s showed that 1% atropine could reduce myopia progression by as much as 77%. However, despite its efficacy, this high concentration was associated with notable side effects, such as blurred near vision due to cycloplegia (the paralysis of the eye's focusing ability), severe light sensitivity due to pupil dilation, and dry eyes. These side effects were significant enough to limit the practical use of 1% atropine, especially in children, who are the primary candidates for myopia control. [46]

Medium-Dose Atropine (0.5% - 0.1%)

As concerns about the side effects of high-dose atropine grew, researchers began exploring lower concentrations to find a balance between effectiveness and tolerability. Studies investigating medium-dose atropine (concentrations ranging from 0.5% to 0.1%) found that these doses still provided considerable myopia control, though the effectiveness was somewhat reduced compared to the 1% concentration.

The ATOM2 study, which followed the ATOM1 trial, evaluated the use of 0.5%, 0.1%, and 0.01% atropine.[47] The results showed that both 0.5% and 0.1% concentrations continued to provide strong control over myopia progression, with reductions of 65-70% in myopia progression compared to placebo. However, while the side effects of medium-dose atropine were less severe than those seen with 1% atropine, issues such as pupil dilation, light sensitivity, and near vision difficulties persisted to some degree. This raised questions about whether even lower doses might offer a better therapeutic balance, especially for long-term use in children.

Low-Dose Atropine (0.01%)

The most significant breakthrough in atropine dosing came with the investigation of ultra-low-dose atropine (0.01%). The ATOM2 study revealed that 0.01% atropine, although less effective in absolute terms than the higher concentrations, still slowed myopia progression by around 50% compared to placebo. Importantly, this low concentration was associated with minimal side effects, making it much more tolerable for children over long periods.

Low-dose atropine (0.01%) does not induce significant pupil dilation or cycloplegia, meaning children retain their ability to focus on near objects, and they experience little to no light sensitivity. This dramatically improves patient comfort and compliance, which is crucial in long-term myopia management. In fact, 0.01% atropine has become the preferred dose in many clinical settings due to its strong balance between reducing myopia progression and minimizing side effects. Moreover, studies have shown that low-dose atropine significantly reduces the risk of a "rebound effect" after treatment cessation, a common issue with higher doses where myopia progression accelerates after stopping treatment.[50]

Rebound Effects and Long-Term Efficacy

An important consideration in atropine treatment is the rebound effect, where myopia progression worsens once the treatment is stopped. High concentrations of atropine (1%) are more likely to result in a pronounced rebound effect, meaning that while the treatment is initially effective; its discontinuation often leads to a rapid increase in myopia. In contrast, studies have shown that 0.01% atropine is much less likely to cause this rebound effect, making it a safer option for long-term use. Children treated with low-dose atropine are less likely to experience a rapid worsening of myopia once the medication is stopped, which is an essential factor in developing sustainable treatment plans.

Personalization of Atropine Dosing

Recent trends in myopia management emphasize personalized treatment approaches, including the dosing of atropine. Not every patient responds the same way to atropine, and while 0.01% is the standard recommendation for many children, some cases may benefit from slightly higher concentrations, such as 0.05% or 0.025%, depending on the severity of their myopia and their tolerance to the drug.[57] Some studies suggest that a personalized dosing approach, in which treatment begins with a low concentration and is adjusted as needed, could optimize both the effectiveness and comfort of atropine therapy.

Ongoing Research and Future Directions

The success of low-dose atropine has sparked continued research into further optimizing the concentration and application of atropine for myopia control. Trials are underway to determine whether concentrations between 0.01% and 0.05% could offer an even better balance between efficacy and minimal side effects.[52] Moreover, combination therapies that include atropine alongside other myopia control interventions, such as orthokeratology (Ortho- k) lenses or outdoor activity recommendations, are being explored to enhance overall treatment outcomes.

Clinical Myopia Control Studies

Over the past several decades, numerous clinical studies have explored the effectiveness of various interventions for controlling myopia progression[53,54].These studies have provided critical insights into both pharmacological and non-pharmacological strategies for managing myopia, with a particular focus on reducing axial elongation, which is the key driver of myopia progression. Among these interventions,

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atropine and other optical devices have emerged as central components of myopia management. This section elaborates on key clinical trials and studies, with a particular focus on the use of atropine, lenses, and lifestyle modifications.[55]

Here is a table-2:- summarizing key studies on clinical myopia control. This covers various treatment strategies such as orthokeratology, atropine eye drops, multifocal contact lenses, and specialized spectacle lenses.

Study	Treatment	Participants	Duration	Key Results	Reference
ATOM Study (2006)	Atropine 1% eye drops	400 children	2 years	77% reduction in myopia progression in the atropine group compared to placebo	Chia et al., 2006
ATOM2 Study (2012	Atropine 0.5%, 0.1%, 0.01% drops	400 children	5 years	Atropine 0.01% most effective with fewer side effects, reduced	Chia et al., 2012
LAMP Study (2019)	Atropine 0.05%, 0.025%, 0.01%	438 children	2 years	Atropine 0.05% most effective, showing a 67% reduction in progression	Yam et al., 2019
COMET Study (2003)	Progressive addition lenses (PAL)	469 children	3 years	PAL slowed myopia progression by 0.20D compared to single-vision lenses	Gwiazda et al., 2003
BLINK Study (2019)	Multifocal contact lenses	287 children	3 years	High add power lenses reduced myopia progression by 43%	Walline et al., 2019
CHAMP Study (2020)	Hoya MiYOSMART spectacle lenses	160 children	2 years	59% reduction in myopia progression compared to single-vision lenses	Lam et al., 2020
SMART Study (2014)	Orthokeratology (Ortho-K)	50 children	2 years	43% reduction in axial length growth in the Ortho-K group	Cho et al., 2014

This table provides a concise overview of different myopia control strategies and their clinical outcomes.

The ATOM Studies (Atropine for the Treatment of Myopia)
The most significant studies on atropine for myopia control are the *Atropine for the Treatment of Myopia* (ATOM) studies, which took place in Singapore and were conducted in two major phases: ATOM1 and ATOM2.

ATOM1 Study
The *ATOM1* study, conducted in the early 2000s, was a randomized, placebo-controlled trial that evaluated the efficacy of 1% atropine in reducing myopia progression among children aged 6-12 years. The trial included 400 children who were randomly assigned to receive either 1% atropine eye drops or a placebo, administered nightly in one eye. The primary outcome measure was the progression of myopia, assessed by changes in spherical equivalent refraction and axial length.[56]

The results of the ATOM1 study were ground-breaking. After two years, children in the atropine group had a mean myopia progression of only 0.28 dioptres (D), compared to 1.20 D in the placebo group. Additionally, axial elongation was significantly less in the atropine group, with an average increase of 0.02 mm compared to 0.38 mm in the placebo group. These findings demonstrated that 1% atropine was highly effective in slowing both the refractive error and axial elongation associated with myopia progression.

However, the study also highlighted the drawbacks of 1% atropine, most notably significant side effects such as pupil dilation (mydriasis), light sensitivity, and blurred near vision due to cyclopaedia. These side effects limited the practicality of long-term use, particularly in children, and led researchers to investigate lower doses of atropine.

ATOM2 Study
In response to the side effects observed in ATOM1, the ATOM2 study, conducted between 2006 and 2010, evaluated the efficacy of lower doses of atropine: 0.5%, 0.1%, and 0.01%. Like ATOM1, the study included children aged 6-12 years and followed them for two years to measure changes in myopia progression and axial elongation. The primary aim was to

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determine whether lower concentrations of atropine could provide comparable myopia control with fewer side effects.

The findings of ATOM2 were pivotal. After two years, myopia progression in the 0.5% group was 0.30 D, in the 0.1% group was 0.38 D, and in the 0.01% group was 0.49 D, all significantly less than the untreated rates typically observed in myopia progression. Axial elongation was also reduced in all three groups, though to a lesser degree at the 0.01% concentration. Most importantly, the 0.01% atropine group experienced minimal side effects, with little to no impact on pupil size or near vision.

The ATOM2 study established 0.01% atropine as a viable, low-risk option for long-term myopia management. While it was slightly less effective than higher concentrations, its minimal side effect profile made it a preferable option for many patients, particularly children requiring long-term treatment.

LAMP Study (Low-Concentration Atropine for Myopia Progression)

Building on the findings of the ATOM studies, the *LAMP* (Low-concentration Atropine for Myopia Progression) study, initiated in Hong Kong, explored even more precise dosing regimens of low-concentration atropine. The LAMP study evaluated three concentrations: 0.05%, 0.025%, and 0.01%, in a large cohort of children aged 4-12 years, aiming to determine the optimal concentration for long-term use in myopia control.[57, 58]

Over the course of one year, the LAMP study demonstrated that all three concentrations of atropine slowed myopia progression significantly compared to baseline rates. However, the 0.05% concentration showed the greatest effect, reducing myopia progression by 0.27 D per year and axial elongation by 0.20 mm per year. The 0.025% and 0.01% concentrations were also effective, but to a lesser extent, with myopia progression reductions of 0.34 D and 0.59 D, respectively. Importantly, even at the 0.05% concentration, side effects were minimal, with most children tolerating the treatment well without experiencing significant pupil dilation or loss of near vision.

The LAMP study findings suggest that 0.05% atropine may provide an ideal balance between efficacy and tolerability, particularly for children at higher risk of severe myopia progression.

Optical Interventions: Multifocal Lenses and Orthokeratology

While atropine remains one of the most effective pharmacological interventions for myopia control, several optical approaches have also shown promise in clinical studies. These include multifocal soft contact lenses, peripheral defocus spectacle lenses, and orthokeratology (Ortho-k).

Multifocal Contact Lenses

Multifocal contact lenses are designed to reduce the hyperopic defocus that occurs on the peripheral retina, which is thought to contribute to myopia progression. Clinical trials have shown that these lenses can slow myopia progression by 25-50%. One of the landmark studies in this area is the *BLINK* (Bifocal Lenses in Near-sighted Kids) study, which found that children wearing high-addition multifocal lenses experienced 43% less myopia progression over three years compared to those wearing single-vision lenses.

Orthokeratology (Ortho-K)

Ortho-k is another non-pharmacological method that has gained popularity for myopia control. It involves wearing specially designed rigid gas-permeable contact lenses overnight, which temporarily reshape the cornea to reduce refractive error. Studies have shown that Ortho-k can slow axial elongation by up to 45% compared to single-vision lenses. However, Ortho-k is not without risks, including the potential for corneal infections, making proper hygiene and follow-up essential.

Outdoor Activity and Myopia Progression

Increasing outdoor activity is another non-pharmacological intervention that has been extensively studied in the context of myopia control. Several large-scale studies have demonstrated that increased time spent outdoors can significantly reduce the risk of developing myopia in children and may also slow the progression of existing myopia. The exact mechanism behind this protective effect is not fully understood, but it is thought that exposure to natural light and reduced near work may play important roles.

The *Sydney Myopia Study* and other population-based studies have found that children who spend at least two hours per day outdoors are significantly less likely to develop myopia than those who spend less time outside. As a result, many eye health professionals now recommend increased outdoor activity as part of a comprehensive myopia management strategy.

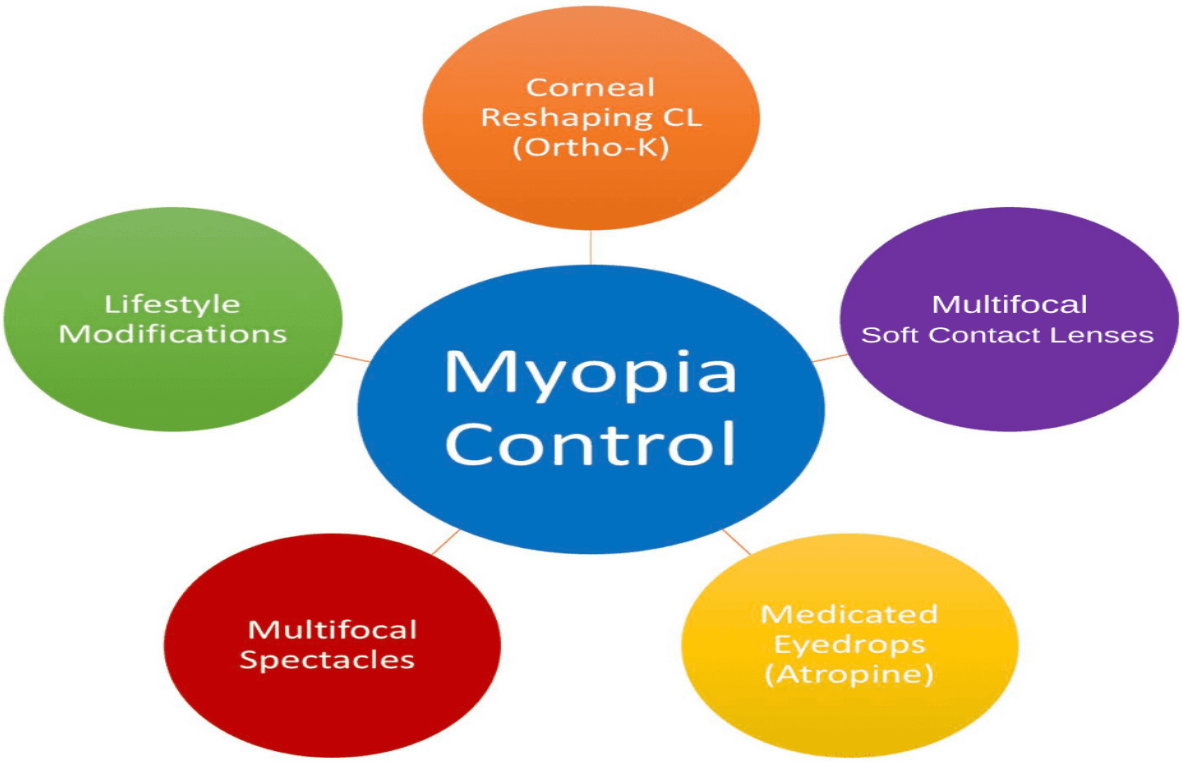
Clinical studies on myopia control have greatly advanced our understanding of effective interventions, from pharmacological treatments like atropine to optical devices and lifestyle modifications. The ATOM and LAMP studies have been instrumental in establishing low-dose atropine as a mainstay of myopia control, while trials on multifocal lenses, Ortho-k, and outdoor activity have broadened the range of options available for managing this increasingly prevalent condition. Ongoing research continues to refine these strategies, with the goal of improving outcomes and minimizing long-term complications associated with progressive myopia.

Research Gap

Myopia, or near-sightedness, is an increasingly prevalent condition globally, particularly among children. Uncontrolled progression of myopia can lead to severe vision problems later in life, including retinal detachment, macular degeneration, and glaucoma. Over the years, atropine eye drops have emerged as one of the most studied pharmacological interventions for controlling the progression of myopia in children. However, several research gaps exist that need to be addressed for a more comprehensive understanding of atropine's role, mechanisms, and long-term efficacy in controlling myopia progression.

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Fig.3:- Methods for Myopia Control



Understanding the Existing Research

1. **Mechanism of Action Uncertainty**: Atropine, primarily used to dilate pupils and inhibit accommodation, has been found effective in slowing down the elongation of the eye (axial length growth), a key factor in myopia progression. However, the exact molecular or biochemical mechanism by which atropine exerts this effect on myopia control is not fully understood. Although it has been hypothesized that atropine may act on muscarinic receptors in the retina or sclera, direct evidence is lacking.
2. **Dose-Response Relationship**: Studies have demonstrated that low-dose atropine (0.01%) is effective in controlling myopia with fewer side effects compared to higher doses (0.5% or 1%). However, the optimal dosage that provides a balance between efficacy and side effects remains debatable. Some studies suggest that even lower doses (e.g., 0.005%) may be sufficient, but long-term data on their efficacy and safety is still sparse.
3. **Long-Term Effects and Rebound Phenomenon**: One of the major challenges in atropine therapy is the so-called "rebound effect" that occurs when the treatment is stopped. Studies have shown that myopia progression may accelerate once atropine therapy is discontinued, particularly in higher concentrations. Research gaps exist in understanding how to mitigate this rebound effect, whether through gradual dose reduction, intermittent use, or combination therapy.
4. **Ethnic and Genetic Variations**: Most of the research on atropine for myopia control has been conducted in East Asian populations, where the prevalence of myopia is exceptionally high. Less is known about the efficacy of atropine in other ethnic groups, and whether genetic factors may influence the treatment outcomes. Studies investigating these variations are limited, creating a gap in generalizing the results across diverse populations.
5. **Combination Therapies and Synergistic Effects**: While atropine monotherapy has been widely researched, its potential in combination with other interventions, such as orthokeratology (Ortho-K) lenses, bifocal or multifocal glasses, and outdoor activity regimens, is not well understood. There is a need for more studies exploring how atropine may be integrated into multi-faceted myopia control strategies, and whether such combinations can provide superior outcomes with fewer side effects.
6. **Age-Related Effectiveness**: Research is primarily focused on children aged 6–12, but there is a gap in understanding the role of atropine in myopia control for younger children (under 6 years) or older adolescents. It remains unclear whether starting atropine therapy earlier or continuing it into the later teen years can result in more significant long-term benefits in slowing myopia progression.
7. **Safety and Side Effects**: While low-dose atropine is considered safe, there are still some concerns about potential long-term effects on ocular health, particularly in terms of retinal health, photophobia, and the impact on accommodation. More comprehensive studies on the safety profile over extended treatment periods are needed, particularly in

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younger patients who may require treatment for several years.

CONCLUSION

In conclusion, myopia represents a growing global health concern, particularly among younger populations, with projections suggesting that half of the world's population may be affected by 2050. This alarming trend underscores the urgency of developing effective management strategies to slow myopia progression and mitigate the associated risks of long-term vision problems, such as retinal detachment and glaucoma. Atropine eye drops, particularly in low concentrations, have emerged as a leading pharmacological intervention, demonstrating efficacy in slowing myopia progression by inhibiting muscarinic acetylcholine receptors, which play a role in controlling axial elongation of the eye. The success of clinical trials like the ATOM and LAMP studies in confirming the safety and effectiveness of low-dose atropine (0.01%) has positioned it as a first-line treatment for children at risk of high myopia.

However, despite its promising benefits, there remain important gaps in the research that need to be addressed. The precise mechanism of action by which atropine slows myopia progression is still not fully understood, and this limits the ability to optimize treatment further. In addition, long-term safety data, particularly regarding potential side effects on ocular health after prolonged use, remains incomplete, necessitating ongoing monitoring. Another key challenge is the rebound effect observed in some patients after discontinuing atropine treatment, where myopia progression accelerates. Research exploring how to mitigate this rebound effect, whether through gradual tapering of dosage or alternative treatment strategies, is still needed.

Ethnic and genetic variations in treatment response also represent a critical area for further exploration, as most studies have been conducted in East Asian populations, where myopia prevalence is particularly high. Understanding how atropine performs in different ethnic groups could lead to more personalized and effective treatment protocols. Additionally, combining atropine with other therapies, such as orthokeratology or multifocal lenses, and incorporating lifestyle changes like increased outdoor activities, may offer synergistic effects that enhance treatment outcomes.

Finally, while most research has focused on children between the ages of 6 and 12, it remains unclear how effective atropine may be in younger children or older adolescents. Determining the optimal age range for treatment initiation and duration is crucial for maximizing long-term benefits. Addressing these knowledge gaps through further research will be essential to refining atropine's role in myopia management, ensuring that it is not only effective but also safe for widespread, long-term use in children across diverse populations. In sum, atropine holds significant potential as a cornerstone in the global effort to control myopia, but continued research is imperative to unlocking its full therapeutic potential.

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UTILIZATION OF CLASSROOM ENVIRONMENT AND ITS EFFECTS ON ACADEMIC PERFORMANCE IN SUB COUNTY LEVEL SECONDARY SCHOOLS IN UASIN GISHU COUNTY, KENYA

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ABSTRACT

School infrastructure is a key pillar for effective learning process in any educational institution. The purpose of this study was to utilization of classroom environment affect academic performance in Sub County level secondary schools in Uasin Gishu County. This study was guided by Production theory. The study was guided by pragmatism philosophy and adopts descriptive survey research design. The study area was carried out in Uasin Gishu County. The target population of the study was 18960 respondents. Stratified simple random and purposive sampling was employed to select the respondents. The sample size was 530 respondents comprising of 48 principals, 97 teachers, 384 students and a Quality Assurance and Standards Officer The data collection instruments were questionnaire, interview schedules and observation check list. A pilot study was carried out in five public schools in the neighboring Trans Nzoia County to check on the consistence of the instruments. The researcher yielded both quantitative and qualitative data. Quantitative data was analyzed using descriptive statistics that resulted in percentages and frequencies that were represented in tables, pie charts and bar graphs and inferential statistics. Qualitative data was analyzed thematically. Therefore, from the research findings based on the multiple regression models, the coefficient of determination (R squared) of 0.441 showed that 44.1% of the variation in student performance was explained by the utilization of selected school infrastructure. The study found out that the classroom environment influenced academic performance. The study concluded that the more conducive the classroom environment the higher the academic performance. The research recommended that sub county level secondary schools management in Uasin Gishu County should develop infrastructural development initiatives to solve the inadequacy of these facilities and enhance their utilization in the schools. There should be consistent routine supervision of quality of facilities in schools done by the government to ensure that schools are operating with good facilities that would help the learners.

KEY WORDS: *School infrastructure utilization of classroom environment, academic performance*

INTRODUCTION

Countries are constantly facing the ever-changing economic challenges and social transformations due to globalization and technological development. Education helps the countries overcome these challenges by developing knowledge and high skills, allowing better opportunities and faster economic progression (OECD, 2019). In both developed and developing countries, education is a very crucial process through which an individual's life chances are determined (Makori and Onderi, 2013; Sarker et al., 2019a). Educational institutions are mandated to use education as a tool for social transformation and the quality of a school is measured by the quality of grades students produce through academic performance (Biama, 2014). The social and economic development of a country is directly linked to student academic performance. Academic performance is a threshold assessment used to measure a student's ability to meet performance criteria. Grades are used to measure learning or knowledge and attainment of learning objectives and acquisition of skills and competencies (York et al., 2015). They noted that academic failure is not only frustrating to pupils and parents; its effects are equally grave on the society in terms of death of manpower in all spheres of the economy and politics. Farombi (2018) opined that the wealth of a nation or society could determine the quality of education, emphasizing that a society that is wealthy would establish good schools with quality teachers, learning infrastructures, where such students may learn with ease thus bringing about good academic achievement.

Arif (2017) argues that in the US educational system, student advancement is predicated on graded performance in a series of classes. Failing to achieve passing grades has numerous additional implications during secondary school and beyond the school level. Students' academic failure is a major determinant of status attainment and adult well-being. Low-performing students are less likely to graduate from high school and less likely to go to college. This increases high school dropouts, and substantially lower adulthood wages. Globally, in the U.K., research has shown that the physical environment can impact a student's academic progress by 25%. Alternatively, crowded classrooms result in

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lower student achievement with a poorer disposition. Even if educational policy makers focus on the quality of education and the school learning environments, many countries adopted a fragmented or piecemeal approach to investing in their educational infrastructure. In California Queiroz, Sampaio, & Sampaio (2020) reported that classes and comfortable classroom temperature contribute to good opportunities for students to participate fully in discussions.

Further, Ikegbusi, Eziamaka and Iheanacho (2021) asserted that school facilities are needed to develop cognitive areas of knowledge, abilities and skills that are necessary for academic achievement. This problem of poor performance is more pronounced in ill-equipped schools (Ikegbusi, Onwuasoanya & Chigbo-Okeke, 2016). They also pointed out that for effective teaching and learning situation, school facilities and educational goals, should be viewed as being interwoven. School facilities such as buildings are very essential to the academic development of the students. Apart from protecting the pupils from the sun, rain, heat and cold, school building represents learning environment which has great impact on the comfort, safety and performance of the children (Okechukwu & Oboshi, 2021). From the fore going, school facilities play a crucial role in academic achievement of students.

In Tanzania, Yusuph (2019) stated that the student's enrolment has challenged school's infrastructure on implementation of free secondary education policy, as schools require adequate learning infrastructure, including classrooms, desks, tables, toilets, staff houses, and offices. In Tanzania, poor physical infrastructure is a common feature in many public educational institutions. Saga (2014) researched on access and quality challenges facing community secondary schools in Kilolo District Iringa Region in Tanzania. The findings revealed that the challenges facing the heads of schools in community schools include inadequate teaching and learning materials as well as school infrastructure. High academic performance of secondary schools was influenced by the availability of learning resources including teacher and students' ratio.

Similarly, Simiyu (2013), who did a study to determine the factors affecting the academic performance of learners in public secondary institutions of learning in Trans Nzoia West Sub County confirmed that physical resources that influence most good academic performance of students in learning institutions were the existence of a library with the right types and number of books, pertinent textbooks, teachers resources who have had the relevant training, classrooms which are adequate, as the elements that play the most important part in leading to very satisfactory academic performance of students. Mwangi & Obiero (2019) study on factors influencing Academic Performance of learners with physical Handicaps in primary schools in Kapseret Sub County in Uasin Gishu found out that availability of physical facilities and educational resources influence learner's performance highly followed by teachers support and school learning environment.

In Kenya, the Kenya Certificate of Secondary Education (KCSE) examination administered by the Kenya National Examinations Council (KNEC) measures student performance. It is used as the main basis for judging a student's ability and also as a means of selection for educational advancement and employment (Kieti, 2017). The education system in Kenya places a minimum grade C+ which students must obtain before they are admitted to public and private universities (Kigotho, 2012). In the Kenyan context, education is considered a basic need and academic performance is positioned quite high on the national agenda with educators and policy makers putting effort in testing, accountability and other related concerns (Kaimenyi, 2013). From the K.C.S.E 2021 results, released by C.S of education on 23/4/2022 indicate that 831,026 candidates sat for this year examination up from 2020 which was 743,299. The 2021 KCSE results are shown in the table below.

Table 1: Analysis on how the KCSE 2021 Candidates performed nationally

Number of Candidates	Grade attained
1138	A
5973	A-
13463	B+
25045	B
39683	B-
59843	C+
81345	C
99406	C-
116355	D+
145916	D
187264	D-
46151	E

Source: KNEC News (2022)

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From the results the cabinet secretary made the following remarks in Citizen T.V Station

> *"A large number of candidates representing over 50% of students have scored below grade C+ (plus) and thus have not gotten a university entry. A total of 441 candidates saw their exam results withheld because of irregularities''.*
> *(Magoha, 23/04/2022)*

The students' declining performance in KCSE Examination has been a major headache to all stakeholders in the education sector including parents and teachers who are directly involved in the learning process and outcomes. A significant proportion of learners nationally tend to score very low marks and fail to progress to institutions of higher learning hence discontinue from learning. The national development can only be realized in a country if students are able to complete the education cycle from Primary, Secondary to institutions of higher learning.

Chepkonga (2017), who asserts that there is scarcity of school infrastructure in secondary schools in Kenya and found that most secondary schools lack school infrastructure and that schools were running out of adequate learning facilities which influenced the quality of education. Also, Gichu, Kabaara and Njagi (2017) research on challenges faced by head teachers in public schools in Kenya and found out that heads of schools with poor and unsatisfactory infrastructure affected the implementation and improvement of academic performance in their schools. Students from marginalized and deprived backgrounds and socio-economically marginalised sections of the society may not even afford books and required reference materials. Such facilities in a school give them a chance to perform better in examinations (Maina, 2017).

STATEMENT OF THE PROBLEM

The Government of Kenya introduced Free Primary Education policy in 2003 and many pupils were enrolled in primary schools; in 2003 about 1.3 million pupils were enrolled in the program me. Further in 2008 the introduction of Free Day Secondary Education led to increased enrolment in public secondary schools in Kenya. Despite this most of the sub county level schools have not increased the development of physical infrastructure needed to cope with increased enrolment to enhance quality of education and academic performance in National Examinations. The government introduced 100% transition policy in 2018 in a joint effort that involved the ministry of Education and interior and has sustained it amid some hitches. This policy has registered an impressive progress so far, with a reported rate to secondary schools standing at 98% after a recent mop out. Education cabinet secretary added that parents' attitudes and poverty has been a major hindrance to the remaining uptake of 20% but emphasized that the government has accounted for all students in its bid to ensure 100% transition and he was quoted making the following remarks in Citizen digital news.

> *''Out of the 1,179,192 Candidates that sat the 2020 KCPE Examination, 1,171,265 have been placed in Secondary Schools, this is after excluding inmates, overage and candidates from refugee Camps. We have therefore placed all Candidates in Secondary Schools in keeping with our 100% transition policy from primary to secondary Education''.*
> (*George Magoha, 15/6/2021)*

FPE, FDSE and 100% transition policies has increased enrolment in secondary schools constraining the physical infrastructure such as; classroom, laboratories, utilities, boarding facilities among other. This has led to poor utilization of physical facilities which in turn affect academic performance of students in National Examination K.C.P.E and K.C.S.E especially those in sub county level secondary schools in the country. Sub County Schools in Kenya form the lowest cadre of secondary schools; these schools come after National, Extra County and County schools respectively. From studies done in primary and secondary schools to establish how infrastructure affects overall performance of students, it was clear that performance is influenced by many factors which include; home and school based factors, parental level of education and income and physical facilities among others. One of the assumptions of this study was that schools in Uasin Gishu County had adequate infrastructure, but the problem was the poor academic performance, hence the researcher conceived utilization of the selected infrastructure on academic performance. Therefore, this study was to investigate the utilization of selected infrastructure and its effects on academic performance in Sub County level secondary schools in Kenya. A case of Uasin Gishu County.

PURPOSE OF THE STUDY

The purpose of this study was to investigate how utilization of classroom environment and how it affects academic performance in Sub County level secondary schools in Uasin Gishu County, Kenya.

METHODS

This study adopted descriptive survey research design. The study was conducted in Uasin Gishu County. The study targeted sub county schools in Uasin Gishu County. The researcher used purposive sampling to select Quality Assurance and Standard Officers. Uasin Gishu County was stratified into six sub counties with each of them forming a stratum. From each stratum, simple random sampling was used to select Sub County level secondary schools and principals, while teachers and students were selected as respondents using purposive sampling. From each stratum, simple random sampling was used to select 48 Sub County level secondary schools and 48 principals, as respondents. From the target population of 162 Sub County level secondary schools, 30% was used to select 48 principals and 10% was used select 97 teachers from a target population of 972 TSC teachers. According to Pandey and Pandey (2021), 10% to 30% of the target population forms a representative sample for descriptive study; hence, the researcher took 30% as the upper limit. From the target

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population of 17820 students, the following formula is recommended in social science to determine the sample size (Mgenda & Mgenda 2003).

$$n = \frac{Z^2pq}{d^2}$$

Where n=the desired sample size (if the target population is greater than 10,000)

Z= standard normal deviate at required confidence level.

P=the proportion in the target population estimated to have characteristics being measured

Q=1-p

D= the level of statistical significance set.

Therefore, if no estimate available of the proportion in the target population with the characteristics of interest,50% should be used. Z- statistic is 1.96, accuracy at the.05 level hence sample size is;

N= (1.96)"(.50)(.50)/(.50)=384

Therefore, the sample size for students is 384 and table below shows the sample sizes of principals, teachers, students and SCQASO.

Table 2: Sample Size

Description	Population	%	Sample size
Principals	162	30	48
Teachers	972	10	97
Students	17820	-	384
SCQASO	6	30	1
Total	**18960**		**530**

Source: (Author, 2022)

Questionnaire was the major tools of collecting data from the principals, teachers and students. The interview schedules were used to collect data from Board of Management (BOM) Secretary and QASOs on policy guiding establishment and development of school infrastructure, adequacy and challenges of establishing school facilities. The researcher observed classroom environment. The study yielded both qualitative and quantitative data, and was analyzed using thematic analysis and descriptive and inferential statistics respectively. The quantitative data gave percentages and frequencies that were represented in statistical tables, pie charts and bar graphs. Inferential statistics showed whether there was any relationship between dependent and independent variables in the study.

REVIEW OF THE RELATED LITERATURE

Classroom environment has a positive impact on students' academic achievement, as by provision of physical facilities like furniture, electric supply, painted walls, drinking water, models, charts, overhead projector and other ICT related instructional material, students take much interest in classroom activities which help them to get high marks in examinations (Kausar, Kiyani & Suleman, 2017). Provision of physical facilities to schools like well-equipped library, clean drinking water, well-furnished classroom, laboratory with related appliances are the main factors which play vital role for better teaching and uplifting students' learning (Omae, et al., 2017).

Classroom environment contained on proper lighting system, bright atmosphere, use of ICT instructional technologies, cupboards and shelves, electric power supply, air coolers or ceiling fans, audio-visual aids in classrooms play active role in improving students' achievement. Whereas, un-conducive classroom environment consists on small classroom size, in-appropriate ventilations, high classroom temperature, lack of ICT instructional teaching aids, in-appropriate desks, improper seating arrangements, lack of fresh air and overcrowded classrooms prove negative impact on students' performance (Umar, 2017).

The literature review results revealed that the classroom environment is a significant determinant for students' academic performance and also their musculoskeletal discomfort. While we consider educational activities or environments, ergonomics is a key science not only to remove undesired design features from the environment or equipment but also to enhance the educational experience (Zunjic et al., 2015). For evaluating the physical environment of the classroom, several studies have analysed students' physical environment, such as lighting, classroom size, and technology (Ramli, Ahmad, and Masri, 2013; Yang, Becerik-Gerber, and Mino, 2013; Widiastuti, Susilo, and Nurfinaputri, 2020). Widiastuti et al., (2020) stated that the greatest influence on the learning comfort of students comes from the physical conditions in the classroom. The number of green buildings and their implementation in school environments as an alternative to conventional buildings is growing rapidly (Liu and Wang, 2022).

In the global arena, in the United Kingdom (UK) Halder and Argyropoulous (2019) did a study that investigated the impact of school physical environment in the provision of quality secondary school education in the United Kingdom. The study revealed that most classrooms in the UK schools lacked decency. The schools also lacked adequate space, ventilations and heat insulation. This study also reported that urinals and incinerators were inconveniently located, making the schools' plant be in poor conditions. These numerous shortcomings created significant gaps in the consistency of the learning environments, resulting in non-attainment of goals and expectations of public secondary schools. The study had highlighted many adverse effects of physical environment in the provision of quality education in the UK. Therefore, the shortcomings had translated to secondary students' underachievement. This study revealed the status of public schools' physical learning environment in the UK to be in dilapidated situations. In other words, majority of the schools

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were inadequately equipped to provide quality education to the UK secondary school students. Although UK is a developed world, the study findings have revealed that the public-school physical learning environment was in bad state and required stakeholder attention.

Queiroz, Sampaio, & Sampaio's (2020) research, as supported by Akoto-Baako (2018), reported that smaller classes and comfortable classroom temperature contribute to good opportunities for students to participate fully in discussions, thus reducing indiscipline cases and thereby enhancing better performance. It is opposite to schools which have sub-standard buildings. Although this initiative is similar to the done study, the researcher aimed to find out the influence of classroom environment among other facilities, on students' academic performance in public sub county schools in Uasin Gishu County.

In the East African region, Namusisi, (2015), in Uganda conducted a research study whose findings showed that well-designed classrooms increased learning progress in reading, writing and Math by 16%. The learning environment is an arena that exerts greater influence on learner performance. This happens more especially when co-curricular activities, teaching techniques and appropriate relationships were provided, developed, maintained and are well-coordinated. Lyimo, Too and Kipng'etich (2017), in Tanzania investigated the Perception of teachers on availability of instructional materials and physical facilities in secondary schools of Arusha District, Tanzania. This study investigated on teachers' perception on availability of instructional materials and physical facilities in secondary schools of Arusha district, Tanzania, and the study concludes that there was inadequate number of textbooks, reference books, maps and globes in schools under investigation due to increase of students in Community Schools. Further, schools have inadequate physical facilities such as classrooms, desks, chairs and the available classrooms are poorly constructed with inadequate spacing. Researchers recommend that Curriculum developers at Tanzania Institute of Education together with policy makers should come up with a policy guideline that would enhance provision of instructional materials and physical facilities.

In Kenya Osundwa (2016) explained that the school learning environment was a composition of physical, social, academic and cultural environments that have greater influences on students' learning and academic achievements. In Makueni County, Kitonyi (2013) investigated the Influence of Learning Environment on Pupil Academic Performance in Kenya Certificate of Primary Education in Kaiti Division, Makueni County. The study revealed that different learning environments contributed to poor performance in the schools in the area and necessitated the need to investigate on the school and home environment affecting the academic results in KCPE.

RESULTS AND DISCUSSIONS

The objective of the study was to determine how classroom environment affect students' performance in Sub County public secondary schools in Uasin Gishu County. This was achieved by obtaining the views of the teachers, students and principals on the status of classroom environment.

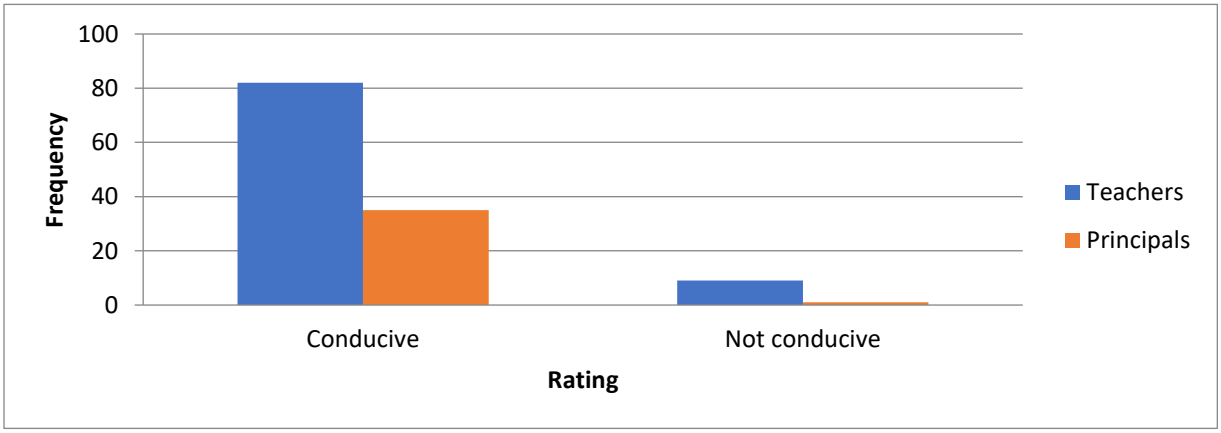


Figure 1 Classrooms located in a conducive environment

Majority 82 (91%) of the teachers and 35(97.2%) agreed that the classrooms were located in a conducive environment. However, 8 (9%) of the teachers and 1 (2.8%) principal disagreed that they were not located in a conducive environment as shown in Figure 1. This showed that majority of the schools had classrooms located in a conducive environment. This agrees with Suleman & Hussain (2014) that conducive classroom environment comprises various components like room size, lighting, temperature, walls, ventilation, whiteboards, mats, seats, floor, PCs and other material prove fruitful effects on students' learning. Further agrees with Umar (2017) that, un-conducive classroom environment consists on small classroom size, in-appropriate ventilations, high classroom temperature, lack of ICT instructional teaching aids, in-appropriate desks, improper seating arrangements, lack of fresh air and overcrowded classrooms prove negative impact on students' performance.

Physical layout of learning facilities

The students were requested to rate the various aspects of physical layout of learning facilities in their school and the responses are summarized in Table 3.

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Table 3: Physical layout of learning facilities

	Fairly placed		Not placed well		Fairly placed		Not sure	
	F	%	F	%	F	%	F	%
Classroom	21	13.5	23	14.8	94	60.6	17	11.0
Library	9	5.8	46	29.7	64	41.3	36	23.2
Computer facilities	6	3.9	38	24.5	27	17.4	84	54.2
Playground	14	9.0	42	27.1	68	43.9	31	20.0

Most of the students 43.9% rated the playground to be fairly placed, as well as classroom 60.6% and library at 41.3%. The students were not sure on the computer facilities at 54.2%. This implies that the physical layouts of learning facilities in sub county level secondary schools were fairly placed except computers. This agrees with Koroye (2016), that the school physical environment consists of physical infrastructures and facilities which include school building, classrooms, furniture, equipment, instructional materials, laboratories, libraries, playground, among others.

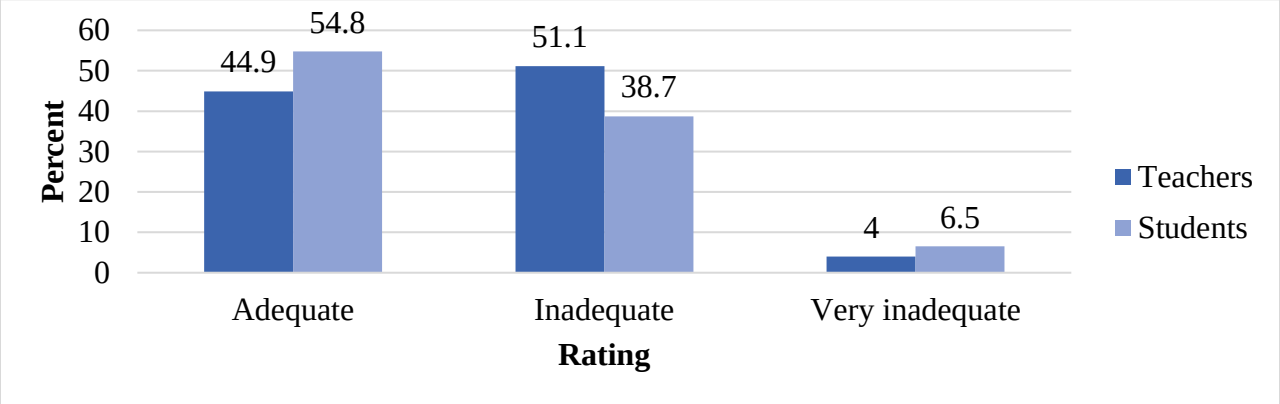


Figure 2: Rating the spacing of learners' lockers and chairs

Majority of the teachers (61.1%) and 45.2% students rated the spacing of lockers to be inadequate, with 44.9% teachers and 54.8% rating them to be adequate as shown in Figure 2. Most of the students rated the spacing of learners' lockers to be adequate. This implies that the spacing of learners' lockers and chairs in class or school in public sub county schools in Uasin Gishu County was adequate. In consideration of the crucial role that school infrastructure plays in achieving the desired learning outcomes, the increase in number of student results in the need for additional resources: materials, informational resources, physical resources, and total textbooks per student. This agrees with the World Bank (2016) that the enrolment of secondary schools increases from year to year. This increase, which is not proportionate to improvement of school infrastructure to accommodate the increasing numbers, leads to overcrowding in the classrooms where one class has more than 74 students.

Frequency of repairs and maintenance

The principals were requested to rate how frequent do they carry out repair and maintenance of classrooms, Library, Computer/ICT, and Playground facilities in their school.

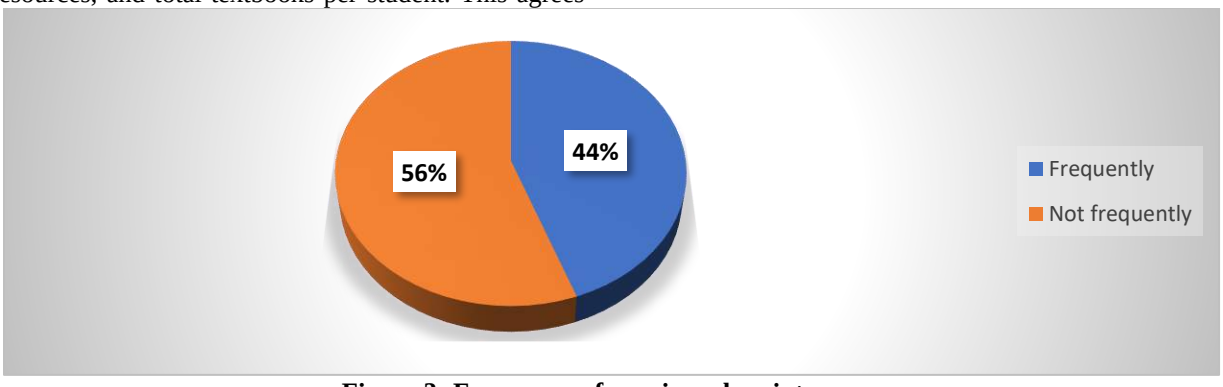


Figure 3: Frequency of repair and maintenance

Results show that most of the principals 56% do not frequently repair the infrastructure facilities and only 44% do repair as shown in Figure 3. This implies that the repair and maintenance of classrooms, Library, Computer/ICT, and Playground facilities in Sub County public secondary schools in Uasin Gishu County was not done frequently. The Ministry of Education in Kenya has

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come up with Safety Standards Manual for Schools in Kenya (MoEST, 2015). Classroom should be properly lit and ventilated, floor should be level and clean always and for cemented floors any cracks should be repaired in good time. The researcher's observation was different because some of the classrooms had cracks,' pot-holes' and the overall paint cannot be distinguished since it has never been repainted since construction in most Sub County level secondary schools in Uasin Gishu County.

Rating Learning facilities in relation to students' academic performance

The principals were requested to rate the various learning facilities in relation to students' academic performance and the responses are summarized in Table 4.

Table 4: Learning facilities in relation to students' academic performance

	Strongly disagree		Disagree		Neutral		Agree		Strongly agree	
	F	%	F	%	F	%	F	%	F	%
Classroom	1	2.8	-	-	6	16.7	15	41.7	14	38.9
Library	6	16.7	2	5.6	3	8.3	9	25.0	16	44.4
Computer/ICT	6	16.7	2	5.6	7	19.4	8	22.2	13	36.1
Playground	4	11.1	2	5.6	7	19.4	14	38.9	9	25.0

Most of the principals agreed that class room environment (80.6%, library services (69.4%), computer/ICT (58.3%) and playground (63.9%) affect students' academic performance as shown in Table 4. This implies that all the infrastructure facilities in public sub county schools affected students' academic performance. This finding agrees with Awan (2018) that school facilities like school buildings, electricity, natural/artificial lighting and ventilation in classrooms, drinking water, wash rooms and playground were the main attributes to improve students' learning.

Descriptive Results on Classroom Environment

The study sought to determine how classroom environment affect students' performance in sub-county level secondary Schools in Uasin Gishu County. A total of 7 statements were used to establish the teacher's views on status of classroom environment and their responses elicited on a 5-point likert scale, shown in Table 5.

Table 5: Descriptive Results on Classroom environment

	Strongly disagree		*Disagree*		*Undecided*		*Agree*		*Strongly agree*		*Mean*	*SD*
	F	%	F	%	F	%	F	%	F	%		
The shape and size of classrooms and availability of educational materials, change the way through which students participate in school instruction.	3	3.3	2	2.2	14	15.6	44	48.9	27	30.0	4.00	0.92
The state of the classroom when in good condition will support the continuity of learning.	2	2.2	1	1.1	8	8.9	45	50.0	34	37.8	4.20	0.82
The arrangement of classroom environment plays a significant role in enabling instructional process	2	2.2	2	2.2	7	7.8	44	48.9	35	38.9	4.20	0.85
The classrooms have sufficient space and have the convenience for students to move and work.	3	3.3	10	11.1	21	23.3	37	41.1	19	21.1	3.66	1.04
The classrooms have convenient seating arrangements suitable for activity-based learning	3	3.3	2	2.2	14	15.6	45	50.0	26	28.9	3.99	0.92
The classrooms have sufficient light and ventilation	1	1.1	2	2.2	15	16.7	52	57.8	20	22.2	3.98	0.76
Size of the class is according to ministry of education recommendations	4	4.4	3	3.3	16	17.8	43	47.8	24	26.7	3.89	0.99
Mean											3.99	0.58

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On the shape and size of classrooms and availability of educational materials, change the way through which students participate in school instruction. Majority of the teachers 48.9% agreed and 30% strongly agreed with 15.6% undecided and 5.5% disagreed as indicated by a mean of (M=4.0; SD=0.92). Most of the teachers 50% agreed and 37.8% strongly agreed with 8.9% undecided and 3.3% disagreed that the state of the classroom when in good condition would support the continuity of learning as indicated by a mean of (M=4.20; SD=0.82). On the arrangement of classroom environment playing a significant role in enabling instructional process, majority of the teachers 48.9% agreed and 38.9% strongly agreed with 7.8% undecided and 4.4% disagreed as indicated by a mean of (M=4.20; SD=0.85).

On the statement that the classrooms have convenient seating arrangements suitable for activity-based learning majority of the teachers 50% agreed and 28.9% strongly agreed with 15.6% undecided and 5.5% disagreed as indicated by a mean of (M=3.99; SD=0.92). Most of the teachers 41.1% agreed and 21.1% strongly agreed with 23.3% undecided and 14.4% disagreed that the classrooms have sufficient space and have the convenience for students to move and work as indicated by a mean of (M=3.66; SD=1.04). On the size of the class was according to ministry of education recommendations, majority of the teachers 47.8% agreed and 26.7% strongly agreed with 17.8% undecided and 7.7% disagreed as indicated by a mean of (M=3.89; SD=0.99). Most of the teachers 57.8% agreed and 22.2% strongly agreed with 16.7% undecided and 3.3% disagreed that the state of the classrooms have sufficient light and ventilation as indicated by a mean of (M=3.98; SD=0.76).

From the findings of the study, the 7 statements used to explain the classroom environment had an overall mean of 3.99 and a standard deviation of 0.58. These shows that majority of the teachers agreed on the statements explaining classroom environment. On the status of classroom environment teachers agreed that the shape and size of classrooms and availability of educational materials, change the way through which students participate in school instruction. The state of the classroom when in good condition supported the continuity of learning. The arrangement of classroom environment played a significant role in enabling instructional process. The classrooms had convenient seating arrangements suitable for activity-based learning and sufficient space, convenience for students to move and work. The size of the class built was according to Ministry of Education recommendations. The state of the classrooms had sufficient light and ventilation.

The findings of the study revealed that the teachers from sub-county level secondary schools agreed that: adequate furniture (chairs, desks, boards) in classrooms makes the students feel comfortable for learning, observing considerable class size ratio enhances students focus and attention in learning activities, availability of spacious and well-ventilated classrooms keeps the environment conducive for effective learning among others have influence on students' academic performance. The findings of this agrees with Namusis (2015), whose study showed that well-designed classrooms increased learning progress in reading and writing Maths by 16%.

Students' performance in Sub County public secondary schools in Uasin Gishu County

The study sought to determine students' performance in Sub County public secondary schools in Uasin Gishu County. A total of 10 statements were used to establish the teacher's views on students' performance and their responses elicited on a 5-point likert scale, shown in Table 4.

Table 4: Students' performance

	Strongly disagree		*Disagree*		*Undecided*		*Agree*		*Strongly Agree*		*Mean*	*SD*
	F	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**		
Classroom arrangement, seating positions and space management, in general, has a more significant impact on the students' level of understanding, and consequently, their academic performance,	3	3.3	4	4.4	16	17.8	39	43.3	28	31.1	3.94	0.99
Classroom arrangement affects the core of teaching and learning – communication			6	6.7	15	16.7	50	55.6	19	21.1	3.91	0.80
Students grades improve when they are involved in extracurricular activities.	2	2.2	5	5.6	13	14.4	42	46.7	28	31.1	3.99	0.94
Participation in extracurricular activities has a positive effect on academic performance among students	2	2.2	5	5.6	13	14.4	40	44.4	30	33.3	4.01	0.95

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Participation in athletics improve academic performance,	3	3.3	12	13.3	24	26.7	34	37.8	17	18.9	3.56	1.05
Participation in musical performance improve academic performance among the student	4	4.4	12	13.3	29	32.2	34	37.8	11	12.2	3.40	1.01
There were improved grades by students	3	3.3	10	11.1	24	26.7	38	42.2	15	16.7	3.58	1.01
There is improved students' termly scores	3	3.3	10	11.1	27	30.0	36	40.0	14	15.6	3.53	1.00
There is improved class participation	1	1.1	7	7.8	20	22.2	49	54.4	13	14.4	3.73	0.85
There is improved scores in class assignments by students	2	2.2	8	8.9	19	21.1	47	52.2	14	15.6	3.70	0.92
Mean											**3.74**	**0.65**

On the statement that classroom arrangement, seating positions and space management, in general, has a more significant impact on the students' level of understanding, and consequently, their academic performance as shown in the Table 4.9 below. 74.4% agreed, with 17.8% undecided and 7.7% disagreed as indicated by a mean of (M=3.94; SD=.99). Most of the teachers 76.7% agreed, with 16.7% undecided and 6.7% disagreed that classroom arrangement affects the core of teaching and learning – communication as indicated by a mean of (M=3.91; SD=.80). The student's grades improve when they are involved in extracurricular activities, majority of the teachers 77.8% agreed, with 14.4% undecided and 7.8% disagreed as indicated by a mean of (M=3.99; SD=.94). Most of the teachers 77.7% agreed, with 14.4% undecided and 7.8% disagreed that participation in extracurricular activities has a positive effect on academic performance among students as indicated by a mean of (M=4.01; SD=0.95).

On the statement that participation in athletics improve academic performance, majority of the teachers 56.7% agreed, with 26.7% undecided and 16.6% disagreed as indicated by a mean of (M=3.56; SD=1.05). On participation in musical performance improve academic performance among the student, majority of the teachers 50% agreed, with 32.2% undecided and 17.7% disagreed as indicated by a mean of (M=3.40; SD=1.01). On the statement that there were improved grades by student's majority 58.9% agreed, with 26.7% undecided and 14.4% disagreed as indicated by a mean of (M=3.58; SD=1.01).

Most of the teachers 55.6% agreed, with 30% undecided and 14.4% disagreed that there was improved students' termly scores as indicated by a mean of (M=3.53; SD=1.00). There was improved class participation, since majority of the teachers 68.8% agreed, with 22.2% undecided and 8.9% disagreed as indicated by a mean of (M=3.73; SD=.85). Most of the teachers 67.8% agreed, with 21.1% undecided and 11.1% disagreed that participation in extracurricular activities has a positive effect on academic performance among students as indicated by a mean of (M=3.7; SD=0.92). From the findings of the study, the 10 statements used to explain the students' performance had an overall mean of 3.74 and a standard deviation of 0.65. These shows that majority of the teachers agreed on the statements explaining students' performance in Sub County public secondary schools. The classroom arrangement, seating positions and space management, had significant impact on the students' level of understanding, and consequently, their academic performance. The classroom arrangement affected the core of teaching and learning – communication.

The student's grades had improved due to involved in extracurricular activities. The participation in extracurricular activities had a positive effect on academic performance among students. The participation in athletics improves academic performance. There were improved grades and students' termly scores and class participation. This finding agrees with Qamar et al., (2018) that conducive classroom environment helps both teachers to teach effectively and students to learn with ease and perform better academically. Use of proper available teaching and learning resources in classrooms enhances learning outcomes of students.

Overall influence of infrastructure facilities on student academic performance

The students were requested to rate the overall influence of infrastructure facilities on their academic performance of the school and the responses are summarized in Table 5.

Table 5: Overall influence of infrastructure facilities on student academic performance

	Low		Very low		Average		High		Very high	
Facilities	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
Learning facilities (classroom)	20	12.9	17	11.0	70	45.2	38	24.5	10	6.5
Library facilities	60	38.7	41	26.5	35	22.5	13	8.4	6	3.9
Computer facilities	100	64.5	18	11.6	23	14.8	6	3.9	8	5.2
Playground infrastructure	44	28.4	40	25.8	59	38.1	10	6.5	2	1.3

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Most of the students 45.2% rated the learning facilities (classroom) to averagely influence the school academic performance, with 31% having high and 23.9% low effect. The library facilities (66.2%), computer facilities (76.1%) and playground (54.2%) were rated to have low effect on academic performance. This implies that the library facilities, computer facilities and playground in public secondary sub county schools had low overall influence on academic performance. Suleman & Hussain, (2014) found that various components like room size, lighting, temperature, walls, ventilation, whiteboards, mats, seats, floor, PCs and other material prove fruitful effects on students' learning. It has positive impacts on improving students' learning. Ikegbusi, Eziamaka and Iheanacho (2021) in support of the study, explained that a good school building structure, location, safety, accommodation, classrooms and furniture affect learning and have influence on pupils' academic achievement.

Correlation Analysis between classroom environment and academic performance

The correlation analysis was conducted to determine the relationship between variables. Correlation results of the study showed that there was a significant positive and average relationship between classroom environment and student performance (r= 0.426, p =0.000).

Table 6: Correlation Analysis between classroom environment and academic performance

		Student Performance	Classroom environment
Student Performance	Pearson Correlation	1	.426**
	Sig. (2-tailed)		.000
Classroom environment	Pearson Correlation	.426**	1
	Sig. (2-tailed)	.000	

**. Correlation is significant at the 0.01 level (2-tailed).

b. Listwise N=90

The adequate/good infrastructure or facilities and good school management contributed to good performance in these secondary schools. This result had also been established by Duruji (2014) and Madiba (2016) whose studies revealed that physical structure in a learning environment influence pupils' and students' academic achievement in such school. These findings resonate with conclusion by Olufemi and Olufemi (2018) that student's related factors, parental background, school factors as well as teachers' factors have serious influence on students' academic performance.

Regression analysis on classroom environment and student performance

A linear regression model explored the effect of classroom environment on student performance. The R^2 represented the measure of variability in student performance that classroom environment accounted for. From the model, $R^2 = 0.182$ shows that classroom environment accounted for 18.2% variation in student performance. The classroom environment predictor used in the model captured the variation in the student performance. The adjusted R square of 0.172 depicts that the classroom environment explained the variation in student performance by 17.2%.

Table 7: Model Summary on classroom environment and Student performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.426[a]	.182	.172	.58801

a. Predictors: (Constant), classroom environment

Analysis of Variance on classroom environment and Student performance

The study used Analysis of variance to check whether the model could forecast the result better than the mean. The regression model that used classroom environment as a predictor was important (F=19.55, p value =0.000), indicating that classroom environment has a substantial impact on student performance.

Table 8: Classroom environment and Student Performance Analysis of Variance

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	6.760	1	6.760	19.551	.000[b]
	Residual	30.426	88	.346		
	Total	37.186	89			

a. Dependent Variable: Student Performance

b. Predictors: (Constant), classroom environment

Classroom environment and Student Performance Coefficients

In addition, the study generated β coefficients in order to test the hypothesis under study. The β-value for classroom environment had a positive coefficient, depicting positive influence on student performance as summarized in the model as:

$Y = 1.873+0.465X_1 + \varepsilon$ …… Equation 4.1

Where: Y = Student performance, X = classroom environment, ε = error term.

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Table 9: Classroom environment and Student Performance Coefficients

Model		*Unstandardized Coefficients*		*Standardized Coefficients*	*T*	*Sig.*
		B	Std. Error	Beta		
1	(Constant)	1.873	.426		4.399	.000
	Classroom environment	.465	.105	.426	4.422	.000

a. Dependent Variable: Student Performance

The study had hypothesized that there was no significant relationship between classroom environments on student performance. From the findings classroom environment had significant influence on student performance (β=0.465 and p =0.000). Therefore, an increase in classroom environment leads to an increase in student performance. The study therefore rejected the null hypothesis. The findings showed that an improvement in classroom environment led to an increase in student performance. The study was in agreement with the earlier findings of Okechukwu and Oboshi (2021) who explained that overcrowded classrooms have negative impact on pupils' academic achievement and negatively affects the delivery of instruction as teachers find it difficult to measure pupils' level of achievement in overcrowded classrooms.

Conclusion

The study found out that for students' efficient and effective academic performance in a school learning environment to be realized, there should be the proper provision of quality infrastructure. The researcher found classrooms had a significant influence on academic performance in Sub- County level secondary schools in Uasin Gishu County. However, from the linear regression model, $R^2 = 0.182$, indicating that classroom environment accounted for 18.2% variation in student performance. From the finding's classroom environment had significant influence on student performance (β=0.465 and p =0.000). An increase in classroom environment leads to an increase in student performance.

Recommendations

The research recommended that sub county level secondary school management in Uasin Gishu County should develop infrastructural development initiatives to solve the inadequacy of the facilities in their schools. There should be consistent routine supervision of quality of facilities in schools done by the government to ensure that schools are operating with good facilities that would help them better results. The school board of management together with Public works department should ensure that classrooms are spacious enough to enable teachers and students to move freely during lessons and other learning activities.

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WIRELESS ECG MONITORING SYSTEM

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ABSTRACT
ECG is typically used by doctors to make decisions on heart health. An electrocardiogram (ECG) evaluates heart rate regularity and detects cardiac device malfunctions. It is quite helpful for keeping an eye on those who have heart activity limitations. In India nowadays, heart attacks account for almost 25% of all fatalities. The primary factor contributing to heart attack fatalities is delayed or incorrect diagnosis. A heavy device that plots the patient's ECG must be carried by the doctor making the diagnosis on the spot. The suggested effort assists in resolving this issue. It is now possible to create a portable ECG gadget that records a patient's ECG and allows them to view it on a mobile platform because to advancements in Arduino and mobile technology. In order to couple ECG via mobile board, this paper discusses low power Lilypad, mobile platform Panda board, and zigbee technology.

KEYWORDS-*ECG, Arduino, Zigbee*

I.INTRODUCTION
For many years, hospitals and other healthcare facilities have employed electrocardiograms (ECGs) to diagnose cardiac conditions and do heart disease screenings. The electrocardiogram (ECG) measures the heart rate and regularity of heartbeats, as well as the size and location of the heart's chambers, any cardiac injury, impairments in cardiac function, and the effects of medications or heart-regulating devices, such as pacemakers [1].

Many attempts have been made over the years to create clinical information systems that are dependable, reasonably priced, and available to the entire institution. Today's scenario is made possible by advancements in international standards, strong personal computer technology, and wireless technologies. The aforementioned elements have facilitated the integration of data from various medical devices, including electronic stethoscopes and ECG machines, into a unified information system setting.

The electrocardiogram (ECG) is one of the most reliable and widely used techniques for determining cardiac regularity. Since the ECG is a costly instrument, using it alone to measure heart rate is not cost-effective. There are additional heart rate measuring devices available in the shape of wrist watches. Although these instruments are capable of providing precise measurements, their price typically exceeds several hundred dollars [4,5, 6].

This work aims to provide an overview of the development of a compact wireless sensor system that can increase patient mobility without compromising the ECG sensor's dependability. The next step in the advancement of wireless patient monitoring technology is to create an ECG system that is adaptable and dependable, helping to reduce the need for cables in clinical and physiotherapy settings. The primary goal is to develop a low-cost, dependable tiny wireless ECG sensor system [9].

The goal of the proposed study is to build a portable ECG monitoring device that can communicate ECG data wirelessly. The development of mobile and Arduino technology has made it feasible to create a low-power, portable ECG monitoring device that records patient ECG data and displays it on a mobile device. The suggested method employs the mobile platform Panda board and the inexpensive, low-power Lilypad to monitor ECG.

II.ABOUT ECG WAVEFORM
Figure 1 depicts the different waves and vectors produced in the heart muscles during each heartbeat. The electrical activity linked to the depolarization of atria is represented by the "P" wave. As a result, a depolarization wave moving from the Sinoatrial node to the atrioventricular node is represented by the "P" wave vector. The region next to the sinoatrial node becomes negatively charged as the wave moves, while the area surrounding the atrioventricular becomes electrically positive. The lower body becomes positive during this process, whereas the upper body becomes negative. 'P' waves that are positive are the consequence. Arithmegaly occurs during the beginning of the 'P' wave.

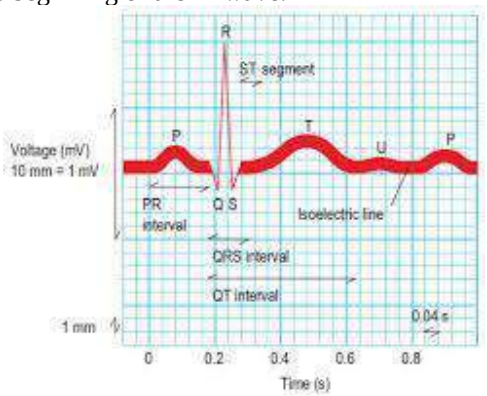


Fig.1.ECG Waveforme

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They then polarize again. There is one basic direction that atrial depolarization proceeds in. There are three routes whereby ventricles can depolarize.The ventricle depolarizes as soon as the delay period ends, starting in the septal region directly below the atrioventricular node and moving towards the right side. This is a result of the right ventricle's thinner walls than those of the left ventricle. In this instance, the depolarization wave moves from the left to the right. As a result, the body's left side turns negative and its right side becomes positive. The 'Q' wave is the recorded movement or vector.

The depolarization of the majority of the surviving ventricular muscles is represented by the 'R' Vector. The 'R' wave vector has a large amplitude or length because the ventricular muscles are larger than the atrial muscles. It appears to be moving in a positive direction, akin to the 'P' wave. The most noticeable element in the ECGs is the 'R' wave.

When measured at the body's surface, the usual amplitude of a "R" wave is roughly 1 mV, and when recorded inside the heart, it is about 40 mV.

The depolarization of the remaining ventricles is represented by the 'S' Wave vector. A 'S' wave causes the atrioventricular node area to become positive and the heart's apex region to become negative. The recorded 'S' wave hence appears negative. There is a difference in the amplitude of the 'S' and 'Q' waves. The combined effect of the ventricles' depolarization is the "QRS" complex. Prior to this period, the atrial repolarization wave has a relatively tiny amplitude and the atrium is in a state of repolarization.

As a result, the ECG waveform's base line typically turns flat between the beginning of the QRS complex and the conclusion of the "P" wave. The ventricles contract as they start to depolarize and then repolarize. The 'T' wave symbolizes ventricular repolarization. If the 'U' wave is seen, it is commonly thought to be the result of ventricular muscle after potentials. In the QT interval, the ventricles are inactive.

III.METHODOLOGY

Figures 2 and 3 present an overview of the proposed system. The ECG electrode is attached to a circuit that uses a Lilypad Arduino and delivers data via a Zigbee device. Pandaboard attached at the receiving end.

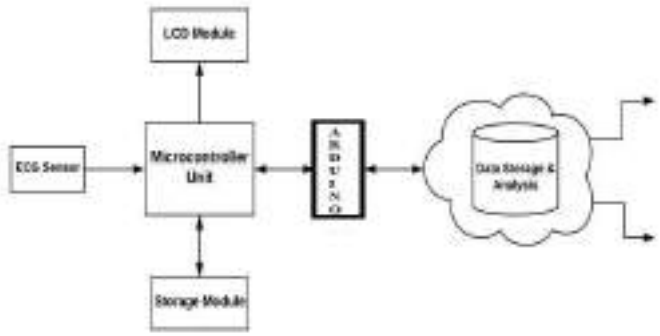


Fig.2.Sending End

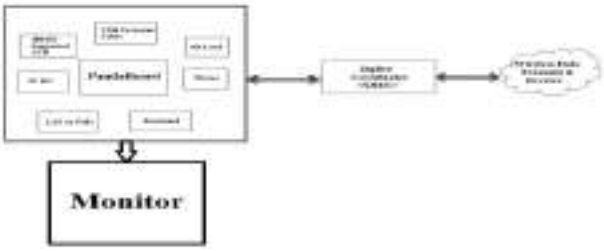


Fig.3.Reciving End

The monitoring system's data collecting component is focused on creating an ECG sensor board, which includes signal amplifier circuits and ECG electrodes. The weak electric signal produced by the heartbeat will be picked up by sensor leads. Microvolt impulses are converted to millivolts using an amplifier. The objective of this work is to obtain the human body's data and then process, filter, and amplify the signal before sending it to Lilypad Arduino. A reset switch, a 10-bit analog-to-digital converter, and an ATmega328V microcontroller are all part of the main board, which operates between 2.7 and 5.5 V.

The data is handled by the Lilypad Arduino circuit before being sent to the data monitoring component. The Zigbee breakout RX port is linked to the LilyPad TX port. The zigbee breakout operates a zigbee module and is fueled by the same power source as the LilyPad.

In Figure 2, the receiver function is displayed.The ECG is shown on the receiver's screen once it gets the data sent by the circuit via zigbee. The Zigbee has a voltage rating of 3.3V.However, the UART port's output voltage is 5 V. Therefore, a level shifter is required to lower the voltage from 5V to 3.3V. With its unique cheap cost and open nature, the Pandaboard is an open source mobile software development platform that makes development quick, simple, and extremely expandable.

Fig.4.shows the hardware prototype

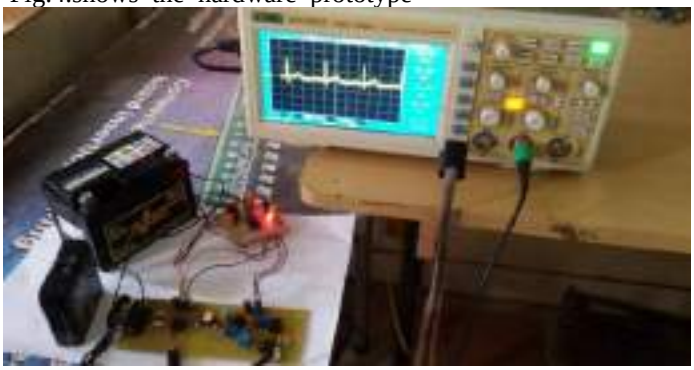


Fig.4.Hardware prototype of Proposed system

IV.COMPARISON

a.Limitations of Current Systems

1. Monitoring the reports for abnormalities is time-consuming work on the part of someone.

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2. A portion of them only read when it's heart attack by the flip of a switch that won't be very beneficial for identifying a person's cardiac action.
3. A computer should be used to upload the report for moving it to the medical facility.
4. The automatically detecting ECG monitor the algorithm is expensive and large.

b. Advantages of Proposed system

The suggested prototype is a mobile platform device called Pandaboard that serves as the basis for a portable ECG monitor. The patient will wear a portable ECG monitor that wirelessly transfers heart rhythm data from Lilypad Arduino to Pandaboard for storage and monitoring. The Pandaboard's Linux foundation makes it simple to convert to other Linux-based systems, such as a PC or PDA.

1. Keeping track of a patient's heart rate and circulation
2. Lilypad Arduino is utilized to offer inexpensive a portable gadget and a solution.
3. The Zigbee protocol is utilized for transceivers. This is an improvement above Bluetooth technology.
4. The PandaBoard mobile platform is utilized to offer access to the instrument with mobility.

V.CONCLUSION

A heavy ECG device must be carried by the doctor in order to diagnose a patient on the spot. The development of Arduino and mobile technology has made it feasible to create a low-power, portable ECG monitoring device that records patient ECG data and displays it on a mobile device. This paper provides a brief introduction of a portable ECG system that employs the mobile platform Panda board and the low-cost, low-power Lilypad for ECG monitoring.

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INDIA AND COLD WAR POLITICS: A REVIEW

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ABSTRACT

This review explores the intricate relationship between India and Cold War politics, highlighting how geopolitical dynamics shaped the country's foreign policy and strategic positioning. During the Cold War, India navigated a complex international landscape characterized by ideological rivalries between the United States and the Soviet Union. This paper examines India's strategic non-alignment policy, its role in the Non-Aligned Movement (NAM), and its interactions with major global powers and neighboring states. The review synthesizes existing literature and historical analyses to elucidate India's balancing act between superpower influences and its pursuit of national interests. By analysing key events, diplomatic strategies, and policy shifts, this review offers insights into how Cold War politics influenced India's domestic and international trajectories and continues to impact its current foreign policy orientation.

KEYWORDS: *India, Cold War, Non-Aligned Movement, geopolitics, foreign policy, superpower relations, strategic non-alignment, diplomatic history, international relations, Cold War politics.*

INTRODUCTION

The Cold War, spanning from 1947 to 1991, was a period of intense geopolitical rivalry between the United States and the Soviet Union, shaping global politics and international relations in unprecedented ways. Emerging from the shadows of colonialism and seeking to establish its position on the world stage, India, under the leadership of Jawaharlal Nehru, navigated this complex landscape with a distinct strategic approach. As a newly independent nation with diverse challenges and aspirations, India's foreign policy during the Cold War era was marked by its pursuit of non-alignment a stance aimed at avoiding entanglement in the superpower rivalry while promoting an independent and autonomous global role. India's non-alignment policy, which was initially conceived as a means to assert its independence from the clutches of Cold War bipolarity, evolved into a significant diplomatic strategy. By advocating for a third path, India sought to balance its relations between the two superpowers while championing the cause of newly decolonized nations and striving for global peace and development. This policy was not just a diplomatic stance but a comprehensive strategy that influenced India's international alignments, economic policies, and defense posture throughout the Cold War. This paper aims to provide a nuanced review of India's engagement with Cold War politics, focusing on how its non-alignment policy shaped its foreign relations and internal strategies. It will examine the key aspects of India's diplomacy, including its interactions with the United States and the Soviet Union, its role in the Non-Aligned Movement (NAM), and the impact of global tensions on its domestic policies. Through a critical analysis of historical events and strategic decisions, this review seeks to offer insights into the effectiveness and limitations of India's Cold War strategies and their lasting implications for its contemporary foreign policy. The significance of studying India's Cold War politics extends beyond mere historical interest; it provides valuable lessons on how emerging powers can navigate global rivalries and assert their interests in a complex international environment. By exploring the intricate interplay between India's diplomatic maneuvers and global power dynamics, this paper will contribute to a deeper understanding of the Cold War era and the strategic evolution of one of the world's most populous and influential democracies.

OBJECTIVE OF THE PAPER

- To evaluate the origins, principles, and evolution of India's non-alignment policy during the Cold War.
- To understand how this policy influenced India's diplomatic and strategic decisions, and its interactions with major global powers.
- To evaluate the effectiveness of India's Cold War strategies, identifying both successes and limitations.
- To analyse how these strategies contributed to or hindered India's goals in the international arena.

1. The Cold War era (1947-1991) was marked by ideological and geopolitical rivalry between the United States and the Soviet Union. As a newly independent nation, India, led by Jawaharlal Nehru, navigated this global tension with a unique foreign policy approach known as non-alignment. This paper explores India's strategies and interactions during this period, emphasizing its diplomatic maneuvers, role in the Non-Aligned Movement, and the implications for its domestic and international policies.

2. India's Foreign Policy Framework

2.1. Non-Alignment Movement (NAM) The Non-Aligned Movement emerged as a response to the Cold War's binary structure, advocating for a third path that avoided alignment with either superpower bloc. Nehru's vision for NAM emphasized:

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- **Independence from Major Powers:** NAM sought to protect the sovereignty of newly independent nations by avoiding entanglements with either the U.S. or Soviet Union.
- **Promotion of Peace and Development:** NAM aimed to foster economic and social development among developing countries while advocating for disarmament and global peace.

2.2. Strategic Autonomy India's strategy involved:

- **Balancing Relations:** Maintaining a delicate balance between the U.S. and Soviet Union while pursuing an independent foreign policy.
- **Economic Development:** Emphasizing state-led industrialization and self-reliance as key components of its domestic policy.

3. Key Relationships and Diplomacy

3.1. Relations with the United States

- **Early Interactions:** Initial support from the U.S. in terms of economic aid and developmental assistance.
- **Growing Tensions:** Divergent interests, such as India's position on the Vietnam War and its stance on Soviet relations, led to strains. The U.S.'s support for Pakistan during the Indo-Pakistani conflicts further complicated relations.

3.2. Relations with the Soviet Union

- **Strategic Partnership:** India and the Soviet Union developed a close partnership, characterized by military and economic support.
- **Impact of the 1971 Indo-Pakistani War:** Soviet support during the war strengthened Indo-Soviet ties and led to a strategic alliance formalized by the Indo-Soviet Treaty of Peace, Friendship, and Cooperation.

4. India's Role in the Non-Aligned Movement (NAM)

4.1. Leadership and Influence India played a pivotal role in NAM, contributing to its policy direction and international influence. Key contributions include:

- **Major Summits:** Hosting and participating in key NAM summits, where India advocated for the rights of newly decolonized nations and global disarmament.
-
- **Diplomatic Efforts:** Leading initiatives to address global issues like colonialism, apartheid, and economic inequality.

4.2. NAM's Global Impact NAM's advocacy for economic development and peace influenced global diplomacy and provided a platform for developing nations to assert their interests.

5. Impact of the Cold War on Domestic Policies

5.1. Economic Policies

- **Industrialization and Self-Reliance:** India pursued a policy of state-led industrialization and economic self-reliance, influenced by Cold War dynamics and the desire to avoid dependence on superpowers.
- **Economic Challenges:** The Cold War context influenced India's economic policies, including trade and aid dependency, and internal development strategies.

5.2. Defence and Security

- **Military Modernization:** The need to counter regional threats, such as those from Pakistan and China, influenced India's military strategy and defence procurement.
- **Nuclear Policy:** India's nuclear program, which began in the 1960s, was partly driven by Cold War considerations and regional security concerns.

6. Case Studies and Specific Events

6.1. Sino-Indian War (1962)

- **Cold War Context:** The war with China highlighted the complexities of Cold War alignments and the limitations of India's non-alignment policy.
- **Strategic Repercussions:** The conflict influenced India's subsequent defense policies and its strategic relationships with superpowers.

6.2. Indo-Pakistani Wars (1965 and 1971)

- **Cold War Influences:** Superpower alignments played a role in the dynamics of these conflicts. The U.S.'s support for Pakistan and Soviet backing for India were crucial factors.
- **Outcome and Alliances:** The 1971 war led to the creation of Bangladesh and reinforced India's strategic partnership with the Soviet Union.

6.3. Nuclear Policy and the Peaceful Nuclear Explosion (1974)

- **Development and Justification:** India's nuclear tests were influenced by Cold War rivalries and regional security concerns. The 1974 test was a demonstration of India's growing technological capabilities and strategic autonomy.

7. Analysis and Interpretation

7.1. Strategic Successes and Failures

- **Effective Diplomacy:** India's non-alignment strategy allowed it to navigate Cold War tensions and maintain its independence in foreign policy.
- **Limitations:** Despite its non-alignment stance, India faced challenges and limitations in balancing relations with major powers and addressing regional security concerns.

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7.2. Long-Term Implications

- **Post-Cold War Transition:** India's Cold War experiences influenced its post-Cold War foreign policy, including its approach to global alliances, economic reforms, and security strategies.
- **Contemporary Relevance:** The legacy of Cold War politics continues to impact India's international relations and strategic decisions in the 21st century.

8. CONCLUSION

The Cold War era was a defining period for India's foreign policy, characterized by its commitment to non-alignment and strategic autonomy. India's interactions with the U.S. and Soviet Union, its leadership in NAM, and its domestic policies during this period shaped its current international position. The lessons learned from this era continue to influence India's approach to global challenges and its role in the international system.

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2. ***"The Impact of Cold War Rivalries on India's Regional Policy"*** *by Priya Sharma (Master's Thesis, University of Delhi, 2018) Focuses on how Cold War rivalries influenced India's policies in its regional context.*

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SOCIO-ECONOMIC CONDITIONS AND OCCUPATIONAL HEALTH CHALLENGES OF WOMEN CONSTRUCTION WORKERS: A CASE STUDY IN MADURAI DISTRICT, TAMIL NADU

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ABSTRACT
The construction sector plays an important role in the livelihoods of rural poor populations, contributing significantly to their economic sustenance. This study focuses on the status and significance of women construction workers in the Madurai district of Tamil Nadu. More than 3 lakh construction workers are employed in Tamil Nadu facing various challenges on a daily basis. Women in this sector encounter numerous issues including socio-economic hardships, environmental risks and health problems at the worksite. The present study investigates the socio-economic conditions and occupational health problems faced by women in Madurai's construction industry. The construction sector a key employer in developing countries like India predominantly hires unskilled and semi-skilled labour. Women workers in construction industry endure long working hours, wage discrimination and adverse working conditions often with limited access to social security or healthcare. Data collected from 60 respondents through purposive sampling reveals that most of the women workers are between 30 and 50 years old and have only a primary level of education. Despite their significant contributions these women face a multitude of challenges such as health issues like neck and shoulder pain, anaemia and asthma with minimal awareness of medical insurance. The study highlights the urgent need for targeted interventions aimed at improving economic security, health awareness, and working conditions for women in the construction sector.
KEYWORDS: *construction women workers, marginalized, health problems, wage discrimination, livelihood.*

INTRODUCTION
In developing countries, the construction industry plays a significant role in driving economic growth. It provides a large number of employment opportunities for both skilled and unskilled labourers. Housing is a fundamental need for every individual and the construction sector is a key contributor in fulfilling this demand. A large portion of India's workforce is engaged in the unorganized sector which is supported by various economic resources. India has a workforce of 501 million people, making it the second-largest labour force globally. Of these 17.1 million workers are part of the unorganized sector (Business Standard, 2016).

The term "unorganized worker" is defined under the Unorganized Workers' Social Security Act, 2008. It refers to home-based workers, self-employed workers or wage workers in the unorganized sector as well as workers in the organized sector who are not covered under any of the acts listed in Schedule II of the Act. A significant portion of this workforce is composed of semi-skilled and unskilled labour. Workers in the unorganized sector are primarily found in industries such as housing, handicrafts, tailoring, fishing, leatherwork, agriculture, landless labour, small and marginal farming, salt production and oil mills (UWSSA, 2008).

Employment in the unorganized sector is typically characterized by contract work, casual labour, migrant workers and agricultural labourers. Women workers especially in the construction sector often hold low-level positions. Many migrant women workers acquire new skills and become financially independent with their income gradually increasing. They often lack awareness about workplace safety, accidents and hygiene. In many developing countries there is minimal knowledge about safety regulations in the construction industry and labourers typically lack access to insurance coverage.

Women Workers in the Construction Industry
In India, women workers in the construction industry are predominantly semi-skilled or unskilled. They are mainly involved in tasks such as carrying sand, stone, bricks and cement at construction sites. These workers commonly referred to as "chittal," typically work for more than eight hours a day. While agriculture remains the first choice of employment for women workers construction comes second due to the relative ease of securing jobs in this unorganized sector. Most of the women in the unorganized sector have only completed primary education limiting their opportunities for advancement.

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REVIEW OF LITERATURE

Anjali et.al (2016) found the temporary nature of activity started and happiness to poor socio-economic standing reduces their priority to activity health and safety. The occupations involve varied work connected hazards. These activity hazards are a unit the resultant risk to health. The study aimed to work out activity health situation within the India informal sector. One thousand eleven hundred and 22 women workers from five totally different occupations specifically weaving, construction, transportation, tobacco process and fish process were assessed by scientist administrated health form. Women worker suffered from contractile organ complaints, eye issues and skin connected complaints. There was high prevalence of self – reported activity health issues within the choose sectors. The study finds that women worker has activity exposures to multiple hazards. The absence of protecting guards aggregates their health conditions.

Monika Yadav (2015) despite the mountain of funds on the market, one keeps seeing women worker carrying babies at their waist while they struggle to hold basins of mud on their head thanks to the shortage of day- care centres for his or her youngsters at the most work-sites. Worse, one reads regarding workers' children falling fatally into open sumps or into construction pits. The women worker wasn't aware of the schemes' that are a unit on the market for the developing women worker. Neither their contractor nor the supervisor mentions them regarding their right from government. Their skills don't seem to be upgrade as they're allowed to perform just some varieties of work and typically, they back of the male workforce. India is one amongst the quickest growing economies of the globe.

Ravi kumar (2013) findings of the study show that a lot of women construction worker are a unit illiterate, widows, solely earning members of the family, from depressed category and from low financial reception and work place and that they are a unit discriminated in wage and promotion. The vital reasons why women don't seem to be promoted as masons is that the gender bias that men and women have, and women workers in construction industry don't seem to be trained informally like men within the housing industry. Most of the women are a unit willing to become masons, and men particularly the contractors, area unit willing to just accept them train and provides them placement within the housing industry.

OBJECTIVES OF THE STUDY

1. To examine the socio-economic condition of the construction women workers.
2. To investigate the work-related health issues and health awareness of the construction women workers.

METHODOLOGY

Research Design

This study examines the socioeconomic conditions and occupational health issues of women construction workers in the Madurai district of Tamil Nadu. It adopts an empirical approach by using both primary and secondary data sources.

Sampling Technique

A sample of 60 women construction workers from the Madurai district was selected through a simple random sampling technique. It is needed on how randomization was implemented to ensure the sample's representativeness given the small size. It is important to consider whether this sample accurately reflects the broader population of women construction workers in the region.

Data Collection

Primary data were collected through face-to-face interviews conducted in Tamil the local language. An interview schedule was used to guide the interviews and record specific details. Secondary data were gathered from various sources including magazines, journals, publications, books, articles, research papers, websites, government reports and brochures.

Qualitative Data

Qualitative data were obtained through detailed interviews, allowing the participants to share their personal experiences and perspectives. This qualitative approach provided deeper insights into the socio-economic conditions and occupational health challenges faced by women construction workers.

Data analysis

Basic statistical tools such as percentages and figures were used for data analysis. Providing a clear understanding of the socio-economic and occupational health issues among the women construction workers.

RESULT AND DISCUSSION

Table 1: Age of the Respondents

Sl. No	Age Composition	No. of respondents	Percentage
1	25-30	8	13.3
2	30-40	22	36.7
3	40-50	19	31.7
4	Above 50	11	18.3
Total		**60**	**100**

Source: Primary Data.

The table (1) it is inferred that 36.7 per cent of the respondents are within the people of 30-40 followed by 31.7 per cent are in 40-50 and regarding eighteen per cent are in above 50 and remaining thirteen per cent are in 25-30. It's clear that the foremost of women worker are engaged construction sector in their time of life.

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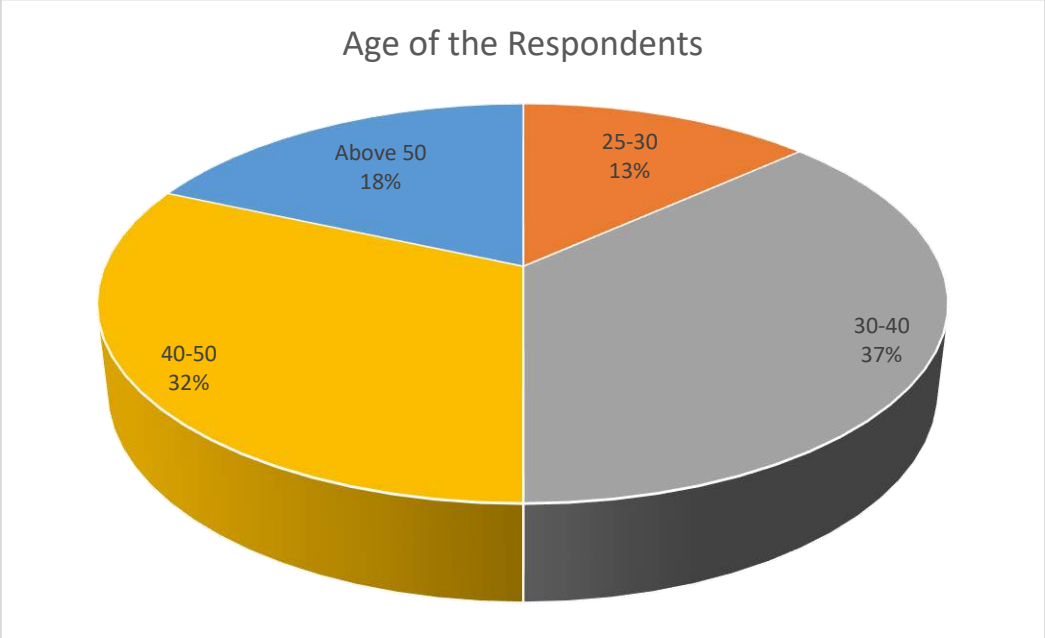


Table 2: Educational Level of the Respondents

Sl. No	Educational Level	No. of respondents	Percentage
1	Illiterate	17	28.3
2	Primary	43	71.7
	Total	**60**	**100**

Source: Primary Data.

This table 71.7 per cent of the respondents studied school solely. None of the respondents have seemed not even crossed school.

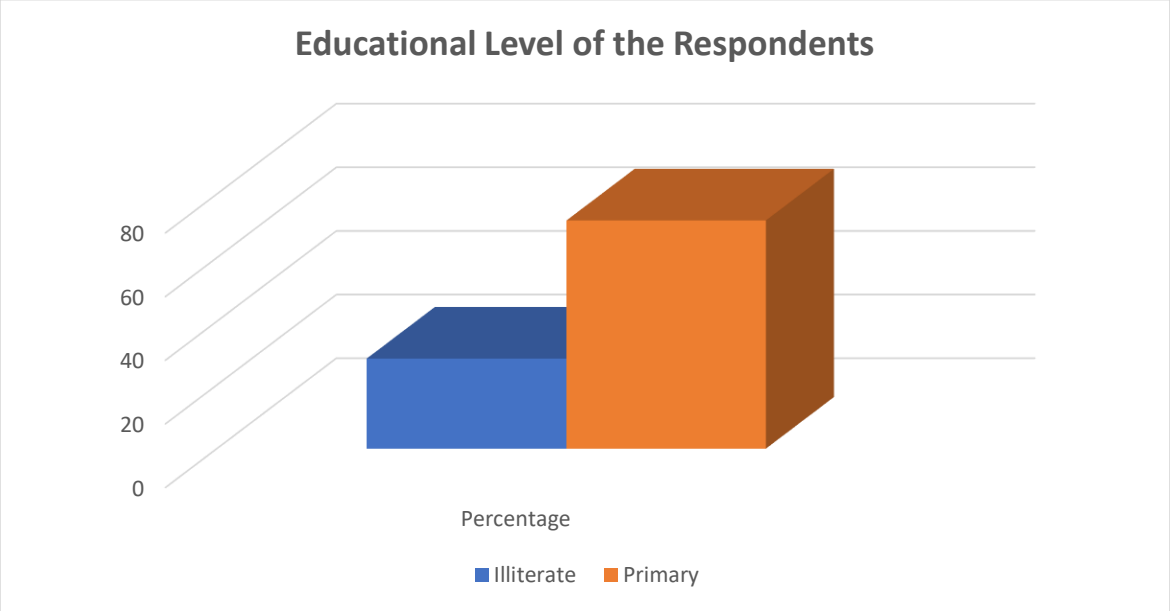


Table 3: Monthly Income of the Respondents

Sl. No	Monthly Income	No. of respondents	Percentage
1	Below 10,000	10	16. 7
2	10,000-12,000	23	38.3
3	12,000-13,000	15	25
4	13,000-15,000	12	20
Total		**60**	**100**

Source: Primary Data.

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Table (3) indicates that 38 per cent of the respondents are earning 10,000-12,000 per month followed by 25 per cent of the respondents are earning 12,000-13,000 and 16 per cent are below 10,000 and 20 per cent of the respondents gain around 15,000 per month

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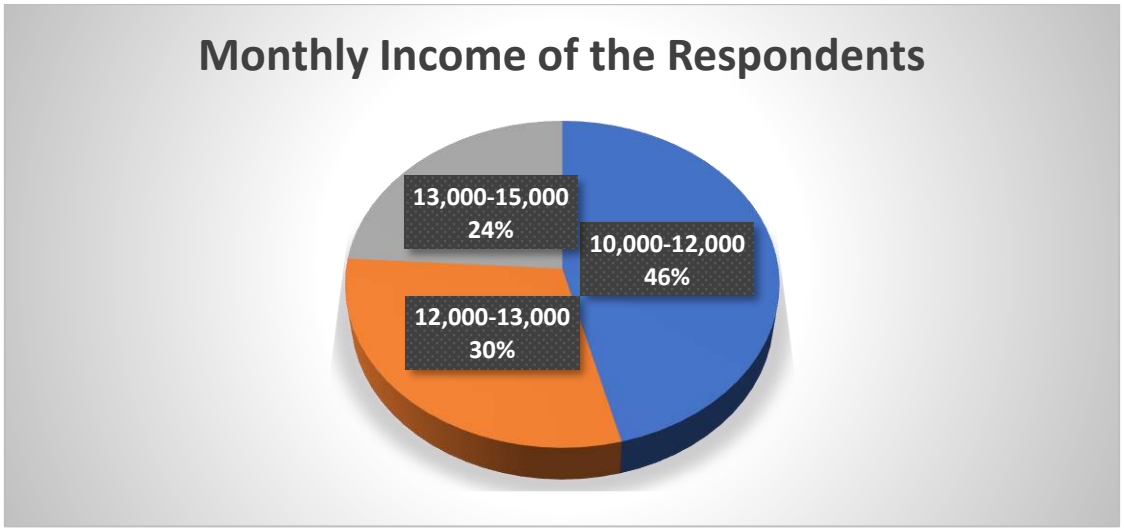


Table 4: Expenditure of the Respondents

Sl. No	Monthly Expenditure	No. of respondents	Percentage
1	Below 3000	12	20
2	3000-5000	21	35
3	Above 5000	27	45
Total		**60**	**100**

Source: Primary Data.

This table (4) shows the expenditure of respondents per month. It's clearly perceived that half of respondents that is 45 per cent are spending their earning more than 5000 followed by 35 per cent are 3000-5000 and remaining 20 per cent respondents spend below 3000.

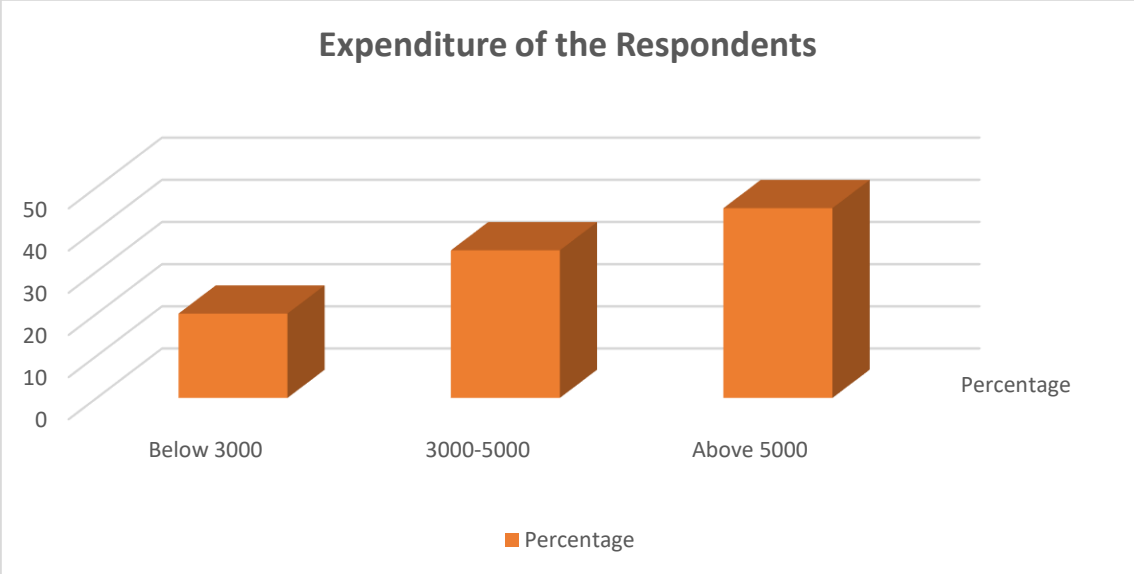


Table 5: Saving of the Respondents

Sl. No	Monthly Saving	No. of respondents	Percentage
1	Nil saving	14	23. 3
2	Below 3000	24	40
3	3000-5000	15	25
4	Above 5000	7	11. 7
Total		**60**	**100**

Source: Primary Data.

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The table (5) shows the saving ability of the respondents 40 per cent of the respondents save below 3000 per month followed by 25 per cent save 3000-5000 and 11 per cent save more than 5000 and remaining 23 per cent respondents don't seem to save. This table it's perceivable that the majority of the respondents have the habit of saving.

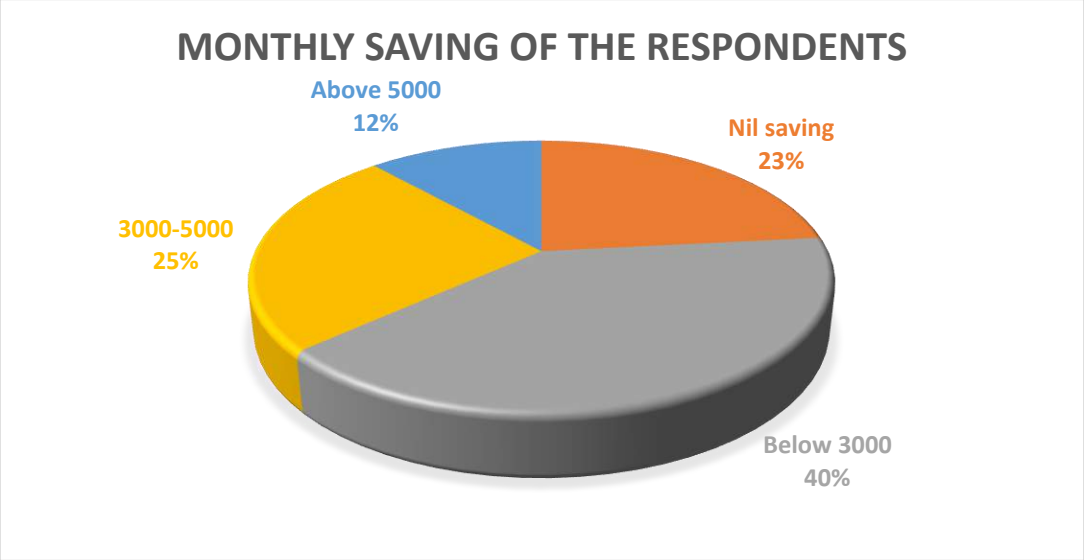


Table 6: Debt of the Respondents

Sl. No	Debt	No. of respondents	Percentage
1	Health problem	22	36. 7
2	Construction	11	18. 3
3	Marriage	17	28. 3
4	Education	10	16. 7
Total		**60**	**100**

Source: Primary Data.

The table (6) reveals that all respondents have debts for her family needs likes medical expenditure, education of their youngsters, construct a home and their youngster's marriage, etc., virtually half the respondents 36 borrow cash for his or her health problem, 16 per cent for youngster education followed by 28 per cent for wedding and 18 per cent for construct a home and 14 per cent of the respondents borrow cash to fulfill medical expenditure.

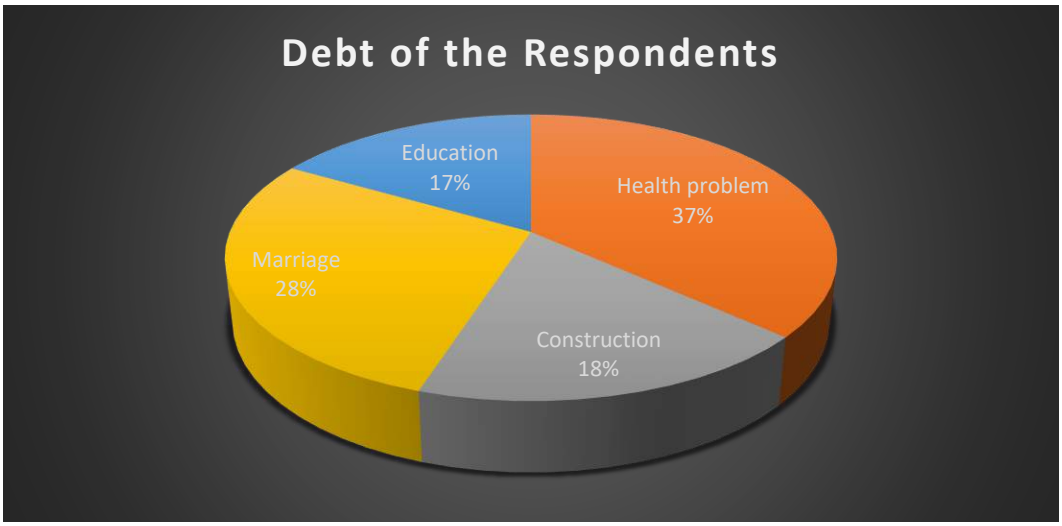


Table 7: Time and Work of the Respondents

Sl. No	Time and Work	No. of respondents	Percentage
1	Below 8 hours	8	13.3
2	8 hours	29	48.3
3	Above 8 hours	23	38.4
Total		**60**	**100**

Source: Primary Data.

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This table (7) shows the working hours of the respondents 48 per cent of the respondent workers worked for eight hours sometimes followed by 38 per cent of the respondents worked more than 8 hour and 13 per cent of the women worker was engaged but 8 hours.

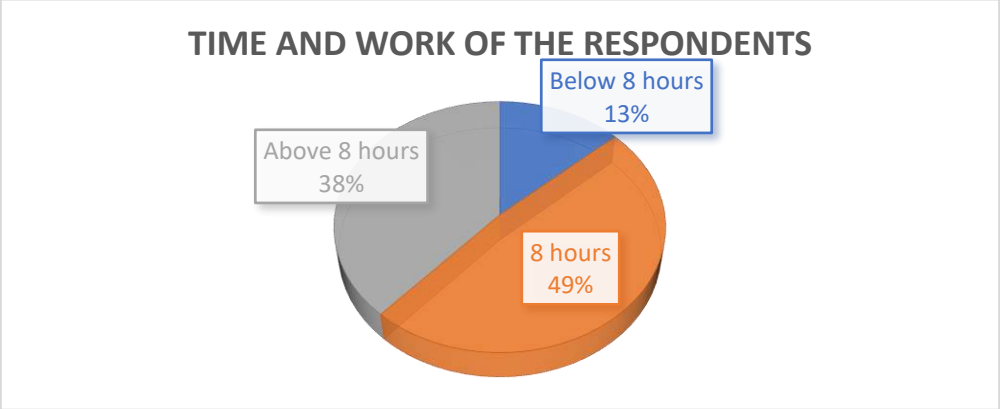


Table 8: Health Problems of the Respondents

Sl. No	Health problem	No. of respondents	Percentage
1	Anemia	11	18.3
2	Asthma	9	15
3	Back ache and headache	15	25
4	Neck pain and shoulder pain	18	30
5	Hypertension	7	11.7
Total		**60**	**100**

Source: Primary Data.

This table (8) shows the number of the health problems with the construction women workers. Most of respondents are 30 per cent have neck and shoulder pain followed by 25 per cent have headache and back ache and about 18 per cent were stricken by anemia and 15 per cent of the respondents have bronchial asthma and 11 per cent of them feel hypertension at the work place.

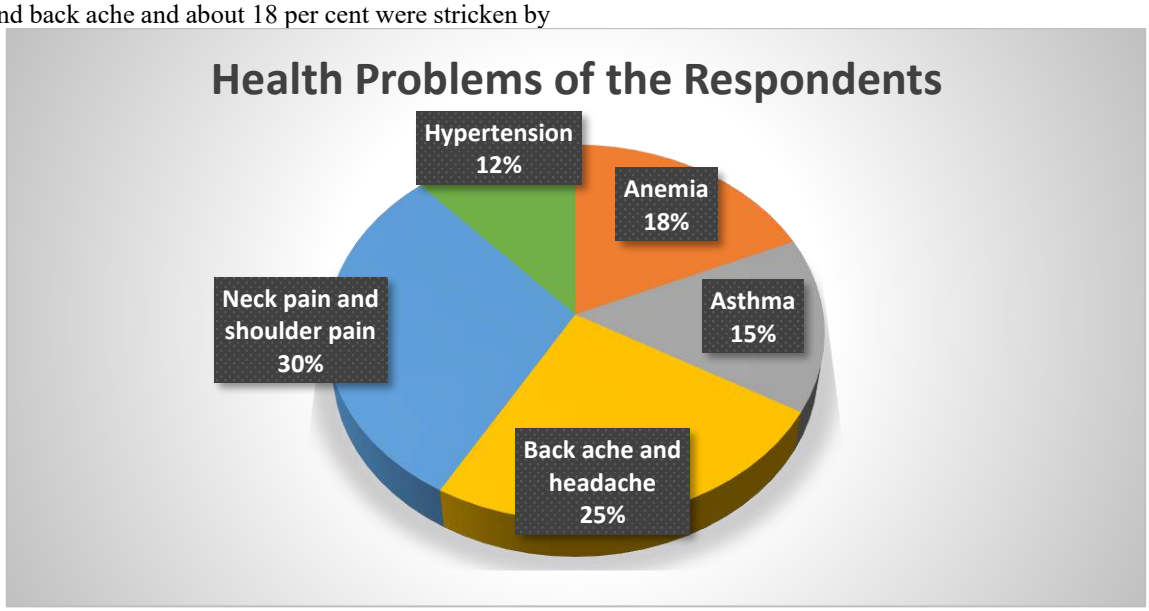


Table 9: Medical Insurance of the Respondents

Sl. No	Medical Insurance	No. of respondents	Percentage
1	Yes	21	35
2	No	39	65
Total		**60**	**100**

Source: Primary Data.

This table (9) clearly displays the notice of the respondents close to holding medical insurance. 65 per cent of the respondents haven't insured. 35 per cent women worker have medical insurance. It's clear from the table most of the respondents have poor awareness about medical insurance.

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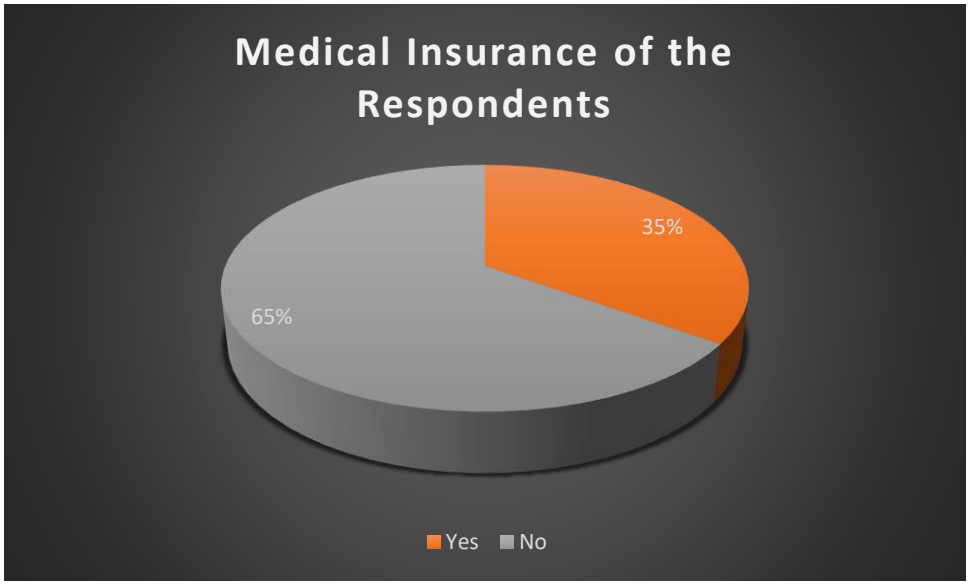


Table 10: Wage Discrimination

Sl. No	Wage Discrimination	No. of respondents	Percentage
1	Yes	60	100
2	No	0	0
Total		**60**	**100**

Source: Primary Data.

It is terribly clear from the more than table that women worker in construction have round face in the matter of wage discrimination within the construction field.

DISCUSSION AND IMPLICATIONS

The findings align with existing literature which similarly identifies wage discrimination, poor working conditions and a lack of health awareness among unorganized sector workers. The analysis adds specificity by linking particular health conditions like anemia and musculoskeletal issues to the physically demanding and hazardous conditions these women face. Long working hours, combined with poor ergonomics and lack of safety measures, exacerbate these health challenges.

Socio-economic factors also play a major role. Limited education combined with the informal nature of employment constrains these women's opportunities for upward mobility. The systemic factors contributing to these conditions include inadequate enforcement of labour laws, lack of access to social security and insufficient healthcare infrastructure both at local and national levels. Existing government schemes such as medical insurance are either not well-publicized or difficult to access due to bureaucratic inefficiencies.

CONCLUSION AND RECOMMENDATIONS

The study underscores the urgent need for targeted interventions to address the issues faced by women construction workers in Madurai. Stricter enforcement of wage parity laws would help combat wage discrimination. Providing mandatory health and safety training and regular medical check-ups would mitigate many occupational health risks. Improving access to affordable healthcare through government-sponsored medical insurance programs is essential to alleviate the financial burden caused by health problems.

Expanding skill development programs can empower women workers by providing them with opportunities for higher paying jobs. The introduction of daycare facilities at construction sites would reduce the dual burden of work and childcare increasing productivity and improving work life balance. Raising awareness about existing government schemes and ensuring that these programs are easily accessible through simplified procedures would greatly enhance the socio-economic security of women construction workers.

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A BRIEF ANALYSIS OF THE BANKING INDUSTRY IN INDIA

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ABSTRACT

This research paper explores the evolution and current dynamics of the Indian banking sector, focusing on the role of digital transformation and the performance of public, private, and foreign banks. Focusing mainly on the decadal data from 2013 to 2023, the study analyzes the growth of bank assets, the Credit-Deposit (C-D) ratio, and the penetration rate of online banking. The findings demonstrate that the banking sector in India has undergone significant changes, with technological advancements driving increased efficiency and customer reach. Public sector banks faced challenges due to non-performing assets (NPAs), while private sector banks showed robust asset growth, recovering quickly from the economic impact of the COVID-19 pandemic. Foreign banks also displayed resilience, with steady growth in assets. The research highlights the critical role of digital banking in modern banking services, contributing to financial inclusion and economic growth.

KEY WORDS: *public, private, foreign, assets, Credit-Deposit ratio, online banking,*

JEL classification: G21

INTRODUCTION

A bank is a financial institution that is involved in the borrowing and lending of money. They not only keep deposits but use them to lend and thereby making profits but also finance businesses and enable economic growth (Bhandari, K., & Soni, H., 2016). India has quite a long history in terms of banking which began with the establishment of the Bank of Hindustan in 1770 while the earliest attempt at setting up a Central bank being in the year 1773. At the time of independence, in 1951, India had 566 private commercial banks with 4151 branches which were mainly confined to towns and cities (Saini, R., & Lodha, S., 2014). The Indian banking sector has transformed incredibly from a stage of stagnancy of the license raj to the dynamic and liberalised and technology oriented white elephant of India which has gradually emerged as the backbone of the Indian economy. It outperformed the majority of the banking indices of the world and even overcame the global financial crisis unscathed by its spillovers. This was mainly due to the ability of the banking sector to protect the asset health by means of prudent lending (Gauba, R., 2012). The Indian banking sector has been marked by nationalisation, liberalisation and technology advancement in the past decades also accompanied by the financial sector reforms (Bhandari, K., & Soni, H., 2016). The banking industry in India is thus making commitments to the improvement of the economy and has assisted to accomplish economic growth (Srishylam, N., 2021).

The banking sector in India has undergone major changes mainly as a consequence of economic reforms. The economic reforms have also led to the creation of an influential middle class and has also led to a heterogeneity of the banking sector with a new mix of players emerging viz., public sector banks, private banks, foreign banks etc. This has created new financial products and generated competition as well as new expectations from the existing as well as the potential customers (Purbey, D.U., 2020).

RESEARCH METHODOLOGY

This study employs a quantitative approach, using secondary data collected from sources such as Statista and financial reports. The data includes bank asset values, C-D ratios, market share distributions, and online banking penetration rates. The analysis spans from 2013 to 2024, focusing on public, private, and foreign banks in India. Key metrics such as the growth of total assets, C-D ratios, and market capitalization were used to analyze the financial performance of banks. Trend analysis and comparisons across different bank categories were used to interpret the data and draw meaningful conclusions. Additionally, a focus on digital banking metrics such as penetration rates is helpful in assessing the impact of technological adoption in the sector.

OBJECTIVES

- To evaluate the growth trends and financial performance of Indian banks
- To assess the impact of digital transformation on Indian banking sector

Table 1: Distribution of the banking market in India:

Sl. No	Type of bank	Market share (In Percentage)
1	Foreign banks	37.7
2	Regional Rural Banks	35.2
3	Private banks	17.21
4	Public banks	9.83

Source: Statista

This above data showcases the diverse structure of India's banking industry, highlighting the key roles played by foreign, rural, private, and public banks in catering to various market segments.

The distribution of the banking market in India reveals an interesting composition, with foreign banks holding the largest

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share at 37.7%. Regional Rural Banks (RRBs) come next with a substantial 35.2% market share, underscoring their critical role in rural financing and supporting agricultural and small-scale sectors.

Private banks, holding a 17.21% share, reflect their growing prominence, driven by innovation, customer-centric services, and digital banking initiatives. Finally, public banks account for 9.83% of the market, a smaller share relative to foreign and rural banks, possibly indicating increased competition from private and foreign players, as well as a shift towards more modern banking services.

Table 2: Number of Banks Across India

Sl.no	Type of bank	Number of Banks
1	Rural co-operative banks	96,508
2	Urban co-operative banks	1,534
3	Foreign banks	46
4	Regional Rural banks (RRBs)	43
5	Private sector banks	21
6	Public sector banks	12

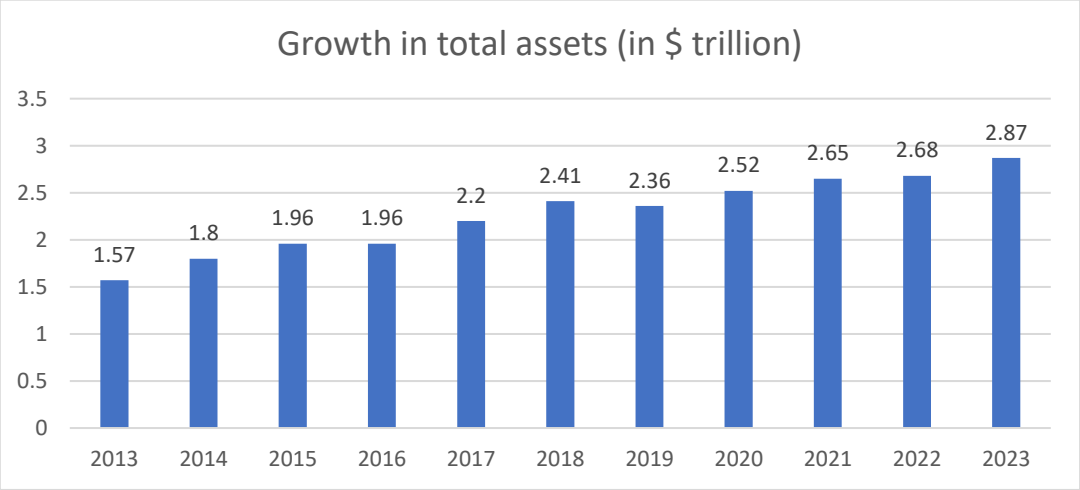
Source: Statista

India has 33 licensed banks in total as of November 2023, comprising 12 public sector banks and 21 private sector banks. 43 Regional Rural Banks (RRBs) and 46 foreign banks are also located in the nation. With 96,508 rural cooperative banks and 1,534 urban cooperative banks operating nationwide, the cooperative banking industry is large. In India, approximately 100,000 cooperative banks provide a range of financial services to both rural and urban populations.

Growth of the bank assets in Indian banks

The assets in the Indian banks amounted to nearly 2.9 trillion dollars as per the financial year 2023. The public sector banks accounted for the highest share in the assets in comparison private sector banks, during the period (Banking in India, Statista)SBI is the largest public sector bank with assets valuing worth Rs. 6,179,693 crores. Bank of Baroda and Punjab National Bank follow up with assets worth Rs. 1,585,797 and Rs. 1,561,835 respectively. With regards to the private sector, HDFC emerged as the bank with highest assets which were of the worth of Rs. 3,617,623 crores while ICICI Bank and Axis Bank followed with assets worth of Rs. 1,871,514 crores and 1,477,208 crores respectively.[1]

Graph 1: Growth of total assets in banks in India from financial year 2013 to 2023



Source: Statista

The total assets held by Indian banks increased steadily from $1.57 trillion in 2013 to $2.87 trillion in 2023, as shown in the above graph that charts this growth. Consistent growth was observed between 2013 and 2017, propelled by rising investments, increased lending, and economic expansion. But in 2016, the growth somewhat stalled at $1.96 trillion, most likely as a result of economic difficulties and an increase in non-performing assets (NPAs). Despite a slight decline in 2019, growth resumed in 2017 thanks to advances in digital banking, enhanced asset quality, and regulatory reforms. The total assets reached $2.87 trillion by 2023, demonstrating the banking sector's strong recovery and continued growth in India.

Table no.3: Assets of the public sector banks in India:

Financial year	Assets (In Trillion Dollars)
2013	1.14
2014	1.31
2015	1.42
2016	1.35
2017	1.52
2018	1.56
2019	1.45
2020	1.35
2021	1.47
2022	1.59
2023	1.69

Source: Statista

[1] *https://ddnews.gov.in/en/indian-banks-a-snapshot-of-market-capitalization-and-assets/#:~:text=TOTAL%20ASSETS%20OF%20BANKS%3A%20SBI,crore%20and%20Rs%201%2C391%2C957%20crore.*

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The above table shows the asset sizes of Indian public sector banks from 2013 to 2023. It also shows the financial trends of the banks during that time. PSB assets, which were valued at $1.14 trillion in 2013, grew steadily to $1.42 trillion by the year 2015, driven by increased lending and expansion initiatives. However, there was a decline to $1.35 trillion in 2016, most likely as a result of growing non-performing assets (NPAs) and economic challenges having an effect on the asset base. In the years that followed, assets varied, peaking at $1.52 trillion in 2017 and then marginally falling to $1.45 trillion in 2019. During this time, the government worked to recapitalise banks and address the NPA crisis.

In 2020, the assets dropped to $1.35 trillion due to the COVID-19 pandemic's economic effects and the ensuing strain on the banking sector. However, a revitalisation started in 2021, and by 2023, assets had risen to $1.69 trillion. Thanks to continued reforms in the public sector banking industry, improved asset quality, and improved financial performance, PSBs' increased asset base in India has stabilised and grown.

Table No.4: Value of the assets of Private sector banks in India (in billion dollars)

Sl.no	Financial Year	Assets (In Billion Dollars)
1	2013	325.9
2	2014	369.9
3	2015	415.1
4	2016	488.1
5	2017	558.92
6	2018	721.34
7	2019	758.04
8	2020	731.85
9	2021	805.84
10	2022	925.05
11	2023	1,016.93

Source: Statista

The data on the value of assets of private sector banks in India from 2013 to 2023 reflects a consistent upward trajectory, indicating the sector's robust growth. Beginning at $325.9 billion in 2013, the assets grew steadily, reaching $558.92 billion by 2017, which signifies strong banking sector expansion over this period. A significant jump occurred in 2018, with assets soaring to $721.34 billion, followed by a peak of $758.04 billion in 2019.

A slight dip was observed in 2020, possibly due to the economic impacts of the COVID-19 pandemic, bringing the asset value down to $731.85 billion. However, the recovery was swift, with asset values rebounding to $805.84 billion in 2021 and continuing to rise to $1,016.93 billion by 2023.

This trend suggests the growing importance of private sector banks in India's financial system, driven by technological advancements, enhanced customer outreach, and a recovering post-pandemic economy.

Table no.5: Assets of the Foreign banks in India:

Sl.no	Financial year	Assets (In Billion Dollars)
1	2013	104.5
2	2014	122.6
3	2015	123.5
4	2016	121.1
5	2017	125.52
6	2018	135.3
7	2019	151.2
8	2020	132.61
9	2021	158.75
10	2022	158.65
11	2023	164.78

Source: Statista

The assets of foreign banks in India from 2013 to 2023 show a fluctuating but overall upward trend. In 2013, the total assets stood at $104.5 billion and saw a steady increase over the next few years, reaching $135.3 billion by 2018. There was a notable peak in 2019 at $151.2 billion, followed by a slight decline to $132.61 billion in 2020, likely impacted by global economic disruptions such as the COVID-19 pandemic. However, foreign banks quickly rebounded, with assets growing to $158.75 billion in 2021 and stabilizing around $158.65 billion in 2022. By 2023, the assets had risen to $164.78 billion.

This data reflects the resilience and adaptability of foreign banks in India, despite short-term volatility, and highlights their strong recovery post-pandemic

Credit to deposit ratio (CDR) of Indian banks

The Credit-Deposit ratio acts as an indicator of the progress for any financial institution. It indicates the proportion of credit deployment of banks in relation to the amount of deposits maintained by them (Nayan, K., 2020). Since it indicates the proportion of a bank's core funds that are being used for lending, the credit to deposit ratio is a crucial initial indicator of the health of the bank. It serves as a liquidity indicator for banks. A very low ratio may suggest that the bank is not making the best use of its resources, while a very high ratio may point to pressure on resources as well as capital adequacy concerns.

Table no. 6: C-D Ratio of Public sector banks

Sl.no	Financial year	C-D ratio
1	2012	75.14
2	2013	77.85
3	2014	77.42
4	2015	76.12
5	2016	74.63
6	2017	68.78
7	2018	68.96
8	2019	69.43
9	2020	68.06
10	2021	64.11
11	2022	65.72
12	2023	70.74

Source: Statista

The relationship between bank loans and deposits is depicted in the above table, which shows the Indian public sector banks' (PSBs') Credit to Deposit (CD) ratio from 2012 to 2023. From

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2012 to 2015, the CD ratio fluctuated between the mid-70% and a high of 77.85% in 2013, indicating that a significant portion of the deposits were being used to provide credit and that lending activity was active during that time.

Nevertheless, the CD ratio started to drop in 2016, dropping to 68.78% in 2017 and then to 64.11% by 2021 as a result of factors like an increase in non-performing assets (NPAs), which caused PSBs to become more cautious when making loans. The reasons for the lower CD ratios were stringent regulations, a slowdown in economic growth, and a rise in deposit inflows without a corresponding increase in credit demand. The trend started to change in 2022, though, and by 2023 the CD ratio had risen from 65.72% to 70.74%. The recovery suggests a rise in credit demand, which was most likely fuelled by better asset quality, a more robust banking system, and the post-pandemic economic recovery.

Table no.7: Credit-Deposit Ratio of Private sector banks in India:

Sl.no	Financial year	C-D ratio
1	2017	86.54
2	2018	86.91
3	2019	88.26
4	2020	87.16
5	2021	82.01
6	2022	83.5
7	2023	85.19

Source: Statista

The above data indicates the C-D ratio of the Private sector banks in India. From 2017 to 2023, the Credit-Deposit (C-D) ratio of India's private sector banks demonstrates a generally stable trend with sporadic fluctuations. It reached its highest point in 2019 at 88.26, indicating robust lending activity. However, because of cautious lending during the COVID-19 pandemic, it fell to 87.16 in 2020 and then to 82.01 in 2021. As economic conditions improved, the ratio gradually returned to normal lending operations, reaching 83.5 and 85.19 in 2022 and 2023.

Graph no.2: Market Capitalization of leading Public Sector banks in India



Source: http://www.bsepsu.com/mkt_capt.asp

The above graph displays the market capitalisation of India's largest public sector banks. State Bank of India (SBI) tops the list by a wide margin with ₹51,784.27 crores, indicating its dominance in the country's banking industry. The market capitalisation of Indian Bank, which comes in second with ₹24,419.53 crores, reinforces SBI's position. At the middle with market capitalisations of ₹9,112.13 crores, ₹6,864.63 crores, and ₹6,186.57 crores, are Bank of Baroda, IDBI Bank Ltd, and Bank of India respectively. Canara Bank and Union Bank of India, two other prominent banks, have comparable market values of ₹4,571.5 crores and ₹6,139.71 crores, respectively. With a market valuation of ₹3,671.7 crores, Punjab National Bank (PNB), a prominent participant in the banking industry, is relatively smaller than its peers. With smaller market capitalisations of ₹3,317.29 crores and ₹2,802.84 crores, respectively, Indian Overseas Bank and UCO Bank round out the list, representing their comparatively smaller size and market presence.

Online banking in India

Online banking, also synonymously referred to as E-banking, virtual banking, or internet banking, is a system that uses the internet to facilitate virtual cash deposits and withdrawals, loan and EMI payments, and fund transfers. A key component of modern banking functionality is e-banking (Smriti, M.A., et al., 2021).

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Table no.8: Penetration rate of Online banking in India

Sl.no	Financial year	Penetration rate (In Percentage)
1	2014	5.27
2	2015	6.91
3	2016	8.52
4	2017	11.37
5	2018	14.34
6	2019	19.84
7	2020	24.96
8	2021	30
9	2022	35.08
10	2023	40.1
11	2024	45.02

Source: Statista

India's online banking penetration rate increased steadily from 5.27% in 2014 to a predicted 45.02% in 2024. This steady increase is a result of the nation's quick adoption of digital banking services. Important benchmarks include rising above 19.84% in 2019 due to technology developments and the growing acceptance of online and mobile banking, as well as the spike in demand during the COVID-19 pandemic, which will cause the rate to reach 30% by 2021. The penetration rate increased to 40.1% by 2023, indicating a major advancement in the digital transformation of the Indian banking industry.

FINDINGS

The major findings of the study highlight several important trends in the Indian banking sector:

- Growth in Bank Assets: The total assets of Indian banks grew steadily from $1.57 trillion in 2013 to $2.87 trillion in 2023, with public sector banks accounting for the highest share, although private banks showed the fastest growth.
- Private Sector Banks: Private banks demonstrated resilience, with assets growing from $325.9 billion in 2013 to $1.016 trillion in 2023, indicating their expanding role in India's financial system.
- Foreign Banks: Foreign banks experienced fluctuations, but overall, their assets grew from $104.5 billion in 2013 to $164.78 billion in 2023, showing recovery post-pandemic.
- Credit-Deposit Ratio: The C-D ratio of public sector banks showed a declining trend from 77.85% in 2013 to a low of 64.11% in 2021, reflecting cautious lending practices due to rising NPAs. However, a recovery to 70.74% was observed in 2023. Private banks maintained a higher C-D ratio, peaking at 88.26% in 2019, despite a drop during the pandemic.
- Digital Banking Penetration: The penetration rate of online banking grew steadily, from 5.27% in 2014 to a projected 45.02% in 2024. This reflects the rapid adoption of digital banking services, accelerated by technological advancements and the COVID-19 pandemic.

CONCLUSION

The Indian banking sector has shown considerable growth and transformation over the past decade, with technology playing a key role in its modernization. Public sector banks, while challenged by NPAs and slower asset growth, remain integral to the economy. Private sector banks have emerged as key players, leveraging digital technologies to drive customer engagement and asset growth. Foreign banks, despite external economic shocks, have maintained a steady presence in the market. The rise in the online banking penetration rate underscores the sector's shift towards digitalization, improving accessibility and financial inclusion. The study concludes that continued digital innovation and reforms will be essential for sustaining the growth and stability of the Indian banking sector in the coming years.

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DENTAL MANAGEMENT IN PATIENTS WITH SYNDROMIC CRANIOSYNOSTOSIS; CASE REPORT

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ABSTRACT

Introduction: *Apert syndrome is a challenging syndromic condition for health care specialists because it affects the patient's overall physical, oral and behavioral health. Knowledge of the protocols to be followed and dental management by the operator of patients with AS are of great importance in the dental field, allowing for adequate and guided craniofacial and behavioral control of the patient.*

Objective: *The objective of this article is to present a clinical case that shows an adequate treatment plan for a patient with Apert syndrome.*

Methodology: *an objective description of the clinical case is made with analysis of a total of articles, including review and original articles, as well as clinical cases, of which 12 bibliographies were used because the other articles were not relevant for this study. The sources of information were indexed journals, as well as search engines such as PubMed, Google Scholar and Cochrane; the terms used for the information search were: Apert syndrome, acrocephalosyndactyly, craniosynostosis, dental care.*

Results: *We report a 15-year-old female patient who presented the characteristic triad of Apert syndrome: craniosynostosis, facial malformations and symmetrical syndactyly.*

Conclusions: *Knowledge of the disease by health professionals will be of vital importance in order to develop appropriate strategies and efficient care protocols for patients with Apert syndrome, resulting in a better quality of life for the patient in the short and long term.*

KEY WORDS: *acrocephalosyndactyly, craniosynostosis, dental care.*

INTRODUCTION

Patients with some type of syndromic condition are more likely to have a high morbidity and mortality rate, so the care needs and knowledge of proper management in the medical or dental office are of vital importance. For the initial clinical evaluation of patients with special needs, three important steps are required:

a. General health evaluation: in this section, the cooperation of the person in charge of their care is important, in order to know about any extra anomalies that may be of interest, since the following should be made known: medications used, diseases and eating habits(1).

b. Evaluation of oral health: the patient's current oral condition will be assessed and previous treatments will be analyzed. This includes taking X-rays, which will be useful for the diagnosis of the jaws and teeth(2).

c. Evaluation of the behavior: it is considered for the management of syndromic patients, so the behavior is analyzed by means of some scales, among them the most used is the modified Frank scale to predict the cooperation and motor skills.

After completing this first phase of clinical evaluation of the patient, preventive treatment should be started: prophylaxis, fluoride application and sealant placement. Conservative therapy includes restorative treatment in both deciduous and permanent dentition. In case there are habits or some type of malocclusion, it is when you should intervene with orthopedic treatment and orofacial exercises. In the craniofacial surgery center the analysis, diagnosis, treatment and rehabilitation of the patient are established depending on the pathology that is present, whether congenital, hereditary or genetic origin. Surgical therapy includes dental extractions, gingivectomies, biopsies, oral or maxillofacial surgery(1,2).

Apert syndrome (AS), also known as acrocephalosyndactyly, is one of the rarest and most severe craniosynostosis syndromes, accounting for approximately 4.5% of all cases of

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craniosynostosis. It is a rare congenital autosomal dominant disorder characterized by severe craniosynostosis (premature closure/fusion of multiple cranial sutures, specifically the coronal suture) and is associated with craniofacial anomalies, including symmetrical syndactyly of the 2nd to 4th fingers and toes (partial or complete); fusion of the skin and bones of the fingers/toes, with a common fingernail(2,3).

In severe cases, synostosis of the radius/humerus and shoulder and elbow joints may occur, with ocular (superficial orbits, exophthalmia, strabismus, hypertelorism and downward slanting palpebral fissures), ear (chronic otitis media, hearing loss), (obstructive sleep apnea, mouth breathing), skin (acne, excessive sweating), brain (ventriculomegaly, hydrocephalus) and malformations of the corpus callosum and/or limbic structures; in addition, some children may have mild mental/intellectual deficits, with an average intelligence quotient (IQ) of 74, pharyngeal (short stature) and internal organ (gastrointestinal, cardiovascular, genitourinary) abnormalities(3,4).

Craniosynostosis leads to a restriction of the anteroposterior growth of the facial skeleton, from the glabella to the posterior fontanelle, resulting in the characteristic conical head of AS in its variable acrobrachycephaly or turribrachycephaly. Craniofacial findings include midfacial/maxillary hypoplasia with class III malocclusion, premature fusion of the fifth and sixth cervical vertebrae, flat forehead and occiput, depressed broad nose with bulbous tip, and deviated septum(5).

The prevalence of the syndrome has been estimated to be between 1 / 65,000 and 1 / 200,000 newborns, with no gender predilection. AS has an autosomal dominant pattern of inheritance, associated with advanced paternal age, maternal infections, maternal drug use and cranial inflammatory processes. More than 98% of cases are caused by specific mutations in the fibroblast growth factor R (FGFR2) gene on chromosome 10q25-10q26, which are exclusively paternal in nature. FGFR is a family of mitogenic signaling molecules that play an important role in the control of cell proliferation and survival; thus, in AS, fibroblasts are unable to produce the essential fibrous material in various craniofacial tissues, including bone sutures and cartilage, and during tooth formation and regeneration; therefore, the mutated FGFR2 gene may influence the dental abnormalities observed in AS (2,6,7). Molecular genetic mapping of specific FGFR gene mutations or prenatal ultrasonographic detection of structural abnormalities is recommended to confirm the diagnosis(2,7).

Therefore, the present study aims to expose and identify the treatment protocol aimed at children with AS in order to establish in an orderly manner the procedures to be followed to achieve the proposed results.

PRESENTATION OF THE CASE

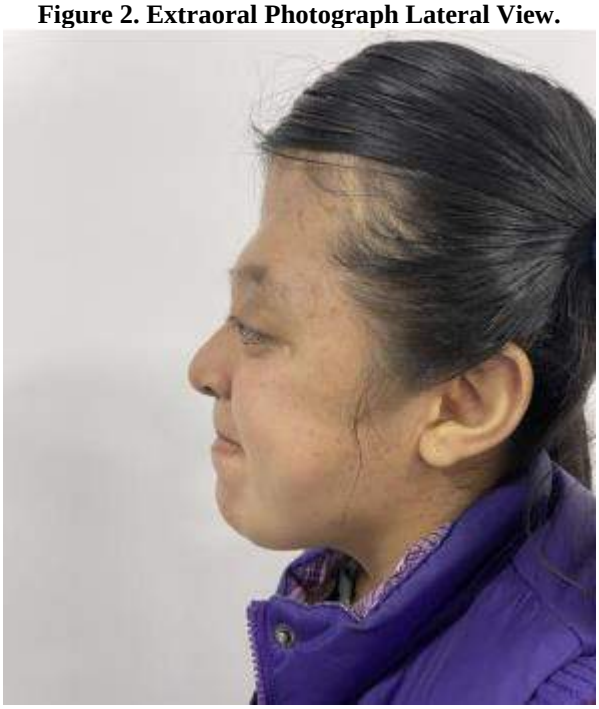
A 14-year-old female patient attended the Cleft Lip and Palate Clinic of the Catholic University of Cuenca. Physical examination shows that the patient presents craniosynostosis, macrocephaly and facial asymmetry. In the upper facial third we can see scars at frontal level caused by previous surgeries, low ocular implantation, hypertelorism, hypoplasia of the upper third, turri-brachycephaly, low capillary insertion. In the middle third of the face there is evidence of short nasal pyramid, low auricular implantation and middle third hypoplasia. In the lower third there is a transverse and anteroposterior deficiency of maxillomandibular growth (Figure 1 and 2). (Figure 1 and 2) At the level of the upper and lower limbs there are mitten-shaped hands and feet.

Figure 1. Extraoral Photograph Frontal View.



Source: The Authors.

Figure 2. Extraoral Photograph Lateral View.



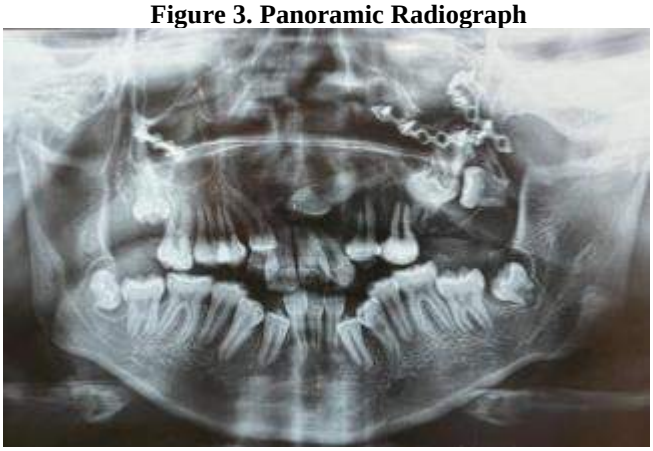
Source: The Authors.

On intraoral examination we can observe that the patient presents ogival palate with presence of cleft palate, velopharyngeal insufficiency, Angle class III, macroglossia, dental defects such as enamel hypoplasia, dental crowding, caries, generalized gingival hyperplasia, absence of dental pieces. In the radiograph multiple dental inclusions of the dental

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organs can be observed (17, 23, 26, 27, 38 and 48) (Figure 3, 4 and 5).

Figure 3. Panoramic Radiograph



Source: The Authors

Figure 4. Lateral Cephalic Radiograph



Source: The Authors

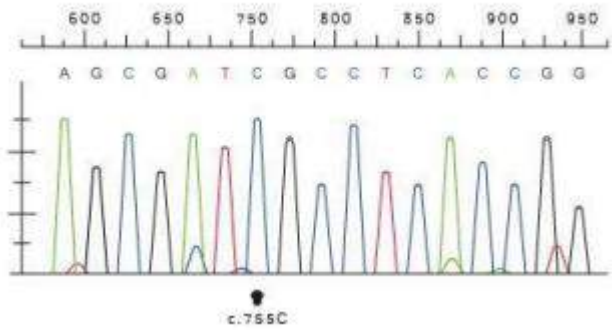
Figure 5. This image shows dental crowding, poor dental position and occlusion, dental caries, gingival hyperplasia with a change in the color of the gingiva, enamel hypoplasia type 2 classified by the International Dental Federation, where the tooth can be seen with white, opaque, yellow and brown tones.



Source: The Authors.

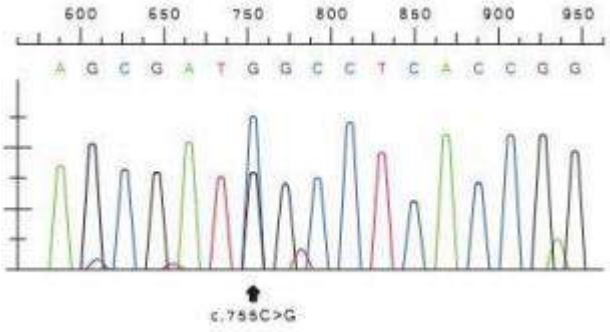
To certify the diagnosis, genetic tests were performed to prove Apert syndrome (Figure 6 and 7).

Figure 6. Electropherogram with normal FGFR2 gene sequence, the presence of homozygous cytosine at position 755 of c.DNA was observed.



Source: The Authors.

Figure 7. Electropherogram determines a heterozygous variant at position 755 of the c.DNA, a variant in the above mentioned Cytosine by a Guanine is observed. A change is detected at the level of the FGFR2 protein (p.Ser252Trp).

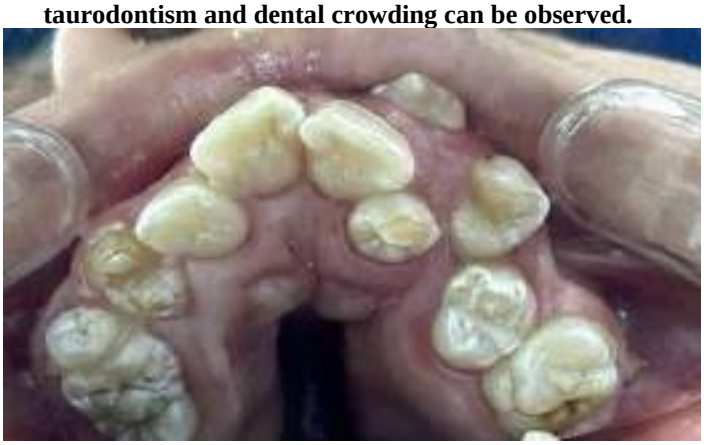


Source: The Authors.

In the management of this case we started with the pediatric dentistry area performing a prophylaxis, then we proceeded to seal completely with a luminoactivation resin sealant the affected pieces 36 and 46 classified 03 by the International Caries Detection and Diagnosis System (ICDAS) where the localized enamel rupture due to caries without visible dentin is located. In these cases the use of materials such as glass ionomer, which releases fluoride and is useful as a preventive and therapeutic approach, is also indicated. The preventive part of pediatric dentistry begins, which includes the placement of sealants in pits and fissures in teeth 35, 24 and 26. 5% fluoride varnish is placed for caries prevention and enamel renewal. The maintenance will be done every 3 months since the patient presents a high risk of dental caries. When the preventive phase is completed, the patient is referred to the periodontics area (Figure 8 and 9).

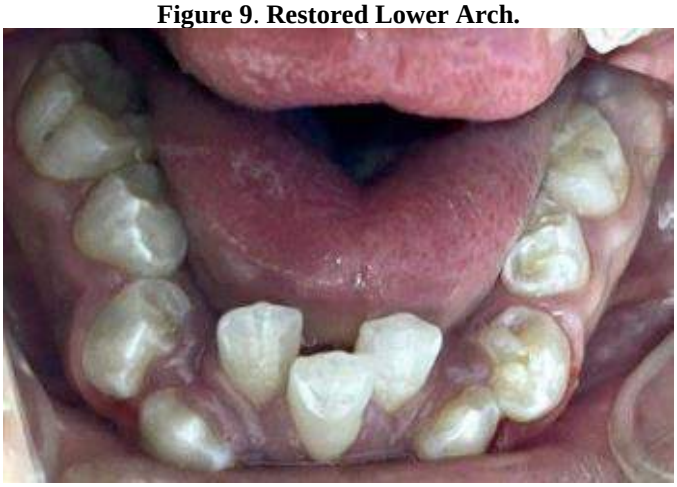
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Figure 8. Upper arch. Palatal fissure, teeth with taurodontism and dental crowding can be observed.



Source: The Authors.

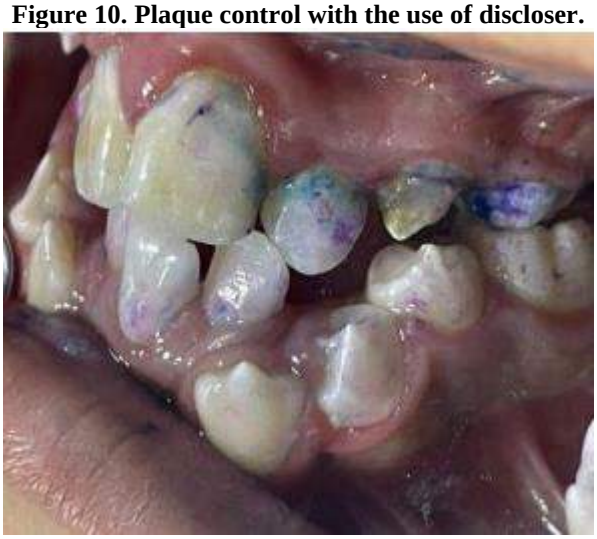
Figure 9. Restored Lower Arch.



Source: the authors.

In the periodontics area, the first step was to motivate the patient to take care of his oral health on his own. Then a prophylaxis was performed to reduce the infectious focus of the teeth. The appropriate brushing technique was taught to the patient and periodic controls were performed to evaluate the improvement of the patient.

Figure 10. Plaque control with the use of discloser.



Source: The Authors.

Figure 11. Periodontal control after 1 month.



Source: The Authors.

PROPOSED SURGICAL TREATMENT

In order to achieve an adequate intermaxillary relationship and an acceptable occlusion, the following is proposed:
1.Maxillary and mandibular transverse distraction
2. Anteroposterior distraction of the middle third.
3. Surgical-orthodontic repositioning of included teeth .
4. Orthognathic and aesthetic facial surgeries.

DISCUSSION

Apert syndrome, being a congenital pathology with no cure and with a very low prevalence of 15.5 per 100,000 live births, becomes a challenge for professionals according to Torres and Lattanzi, since there is no standardized care protocol for these patients(8,9).

According to Shin, the main objective of care for patients with AS is to improve the quality of life and their optimal development(10).

According to Torre and Shin, the prenatal diagnosis of these pathologies can be determined mostly at the 19th week of gestation and thus important decisions can be made at the time of the child's birth, where the comprehensive treatment should begin with a team of professionals such as pediatricians, maxillofacial surgeons, neurologists, plastic surgeons, anesthesiologists, dentists, geneticists, otolaryngologists, who should work together to achieve a multidisciplinary team of care throughout the patient's life(8,10).

Wilkie reports that patients with AS can present upper and lower extremities of three types: type I (spade), type II (mitten) and type III (rosebud)(7).

The present case presented type II. Specialists should keep in mind that patients with syndromic craniosynostosis are more susceptible to oral diseases, so starting always with preventive treatments will be the best protocol of care for these patients. Similarly, multiple studies by Mathews and Calandrelli indicate the importance of evaluation and management of respiratory pathologies. Transverse deficient jaws will cause the patient to develop as a mouth breather, which is associated with a risk

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factor for developing gingival and periodontal diseases (10,11,12).

The patient in the case study presented a triad that is characteristic of AS where we can observe: craniosynostosis, facial malformations and symmetrical syndactyly. It was also determined that she is a mouth breather and has an atypical swallowing, so these pathologies at the beginning of her treatment were reflected in her oral cavity. In order to maintain adequate oral health, the patient was instructed in oral hygiene techniques and the use of a conventional toothbrush combined with an electric toothbrush was recommended to obtain better results. Likewise, depending on the case, fluoridation sessions could be performed. In the maintenance phase, the progress of the patient's periodontal health, how he/she has managed the techniques taught, and the results of the same will be analyzed.

CONCLUSION

The lack of knowledge or experience on the part of the operator when starting treatment of a syndromic patient can lead to late or incorrect treatment, so it is important that the operator follows a management protocol and thus provide the best quality of life for these patients. In the management of patients with Apert syndrome, a multidisciplinary treatment is necessary, where the medical and dental areas (pediatric dentistry, periodontics, orthodontics and surgery) should work together to detect the disease at an early age and provide the appropriate treatment plan in the short and long term, thus achieving a total and stable rehabilitation of the patient.

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Conflict of Interest Statement

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AWARENESS AND VIOLATION OF BROWN LAWS AMONG CRIMINOLOGY STUDENTS IN CABANATUAN CITY

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ABSTRACT

The purpose of this study was to assess the level of awareness among first year criminology students in Nueva Ecija regarding brown laws, identify instances of non-compliance, understand the underlying reasons and motivations for violation and develop an action plan grounded in the research findings. The participants in this study were the 1st year students of selected Criminology institutions in Cabanatuan City namely: Manuel V. Gallego Foundation (MVGFC), Nueva Ecija University of Science and Technology (NEUST); PHINMA- Araullo University (Main Campus); and Wesleyan University-Philippines (WU-P). The study concludes that Criminology students are generally aware of various Brown Laws, including RA 9275, RA 9003, RA 8749, and RA 6969. However, despite this awareness, there is a notable tendency for some students to commit environmental violations, particularly under RA 6969, which has the lowest level of awareness and is linked to frequent violations such as storing hazardous wastes and knowingly using prohibited chemical substances. The primary reasons for these violations include the laws' lack of popularity, insufficient media dissemination, lenient enforcement, and a shortage of dedicated enforcement personnel. These factors create an environment where environmental laws, despite being known, are often disregarded. Hence, it is recommended to enhance education and awareness, improve media campaigns and strengthen enforcement to secure compliance and deter potential violators.

KEYWORDS: *Awareness, Violations, Reasons, Brown Laws, Criminology Students*

I. INTRODUCTION

The study of crime, its causes, and societal reactions to criminal activity are the cornerstones of the science of criminology. In this regard, it is crucial for anyone pursuing a bachelor's degree in criminology to have a thorough understanding of the legal principles and ethical issues that support the criminal justice system. Being knowledgeable of the "Brown Laws," which are a collection of statutes and rules governing the behavior of law enforcement officials and criminal justice professionals, is an essential component of this understanding. These rules are crucial in ensuring that people are treated fairly and justly within the criminal justice system because they establish expectations for behavior and responsibility among those in charge of upholding law and order.

The Philippines' Nueva Ecija region provides a distinctive and fascinating setting for examining Brown Law understanding and potential infractions among BS Criminology students. A thorough knowledge of Brown Laws is essential for prospective criminologists who will work in law enforcement, corrections, or similar professions, as the Philippines' criminal justice system has undergone various changes and revisions in recent years. It is crucial to determine how well-informed BS Criminology students are about these regulations and to find out if this information affects how they see ethical conduct in the criminal justice system.

Every Filipino has a right to a sustainable and healthy environment. However, there is a commensurate responsibility to uphold that right. This study aims to provide light on the readiness of aspiring criminologists to traverse the intricacies of their future professions by investigating the level of their knowledge and understanding of these laws, as well as their attitudes toward ethical conduct within the criminal justice system. Additionally, it will investigate the perceived reasons for violating such laws among Criminology students.

The results of this study will assist in the creation of targeted interventions and curriculum improvements by identifying potential knowledge and ethical understanding gaps, better preparing upcoming criminologists with the skills and principles required for a fair and just criminal justice system. The ultimate objective of this research is to reinforce the fundamental principles that support the fairness, accountability, and respect for the rule of law of the criminal justice system in Cabanatuan City as well as nationwide.

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II. METHODOLOGY

The participants of this study were the 1st year students of selected Criminology institutions in Cabanatuan City namely: Manuel V. Gallego Foundation (MVGFC), Nueva Ecija University of Science and Technology (NEUST); PHINMA-Araullo University (Main Campus); and Wesleyan University-Philippines (WU-P). A questionnaire-checklist was designed using Google forms platform. Part I of the questionnaire-checklist was the level of awareness on brown laws, Part II was the assessment on the extent of the commission of environmental crimes and Part III was the perceived reasons of violating brown laws.

III. RESULTS AND DISCUSSIONS

Table 1. Level of Awareness of the 1st Year Criminology Students on Brown Laws

Brown Laws	WM	Verbal Interpretation
RA 6969 otherwise known as Toxic Substances and Hazardous Wastes Control Act of 1990	2.98	Aware
RA 9275 otherwise known as the Philippine Clean Water Act of 2004	3.11	Aware
RA 8749 otherwise known as the Philippine Clean Air Act of 1999	3.01	Aware
RA 9003 otherwise known as Ecological Solid Waste Management Act of 2002	3.11	Aware
Total	**3.05**	**Aware**

Table 1 presents the level of awareness of the 1st year criminology students on brown laws obtained an overall weighted mean of 3.05 which was verbally interpreted as "aware". The highest weighted mean of 3.11 are: RA 9275 "Philippine Clean Water Act of 2004" and RA 9003 "Ecological Solid Waste Management Act of 2002" followed by: RA 8749 "Philippine Clean Air Act of 1999" with a weighted mean of 3.01 while the lowest weighted mean of 2.98 was RA 6969 "Toxic Substances and Hazardous Wastes Control Act of 1990" with the verbal interpretation of aware.

The findings are consistent with the study of Singh (2015) which concluded that the undergraduate students possessed a good average level of environmental awareness.

Table 2. Assessment on the Extent of Commission of Environmental Crimes

Environmental Crimes under Brown Laws	WM	Verbal Interpretation
1. Cause, aid, facilitate directly or indirectly, in the storage, importation, or bringing into Philippine territory, including its maritime economic zones, even in transit, either by means of land, air or sea transportation or otherwise keeping in storage any amount of hazardous wastes in any part of the Philippines.	2.86	Sometimes
2. Knowingly use a chemical substance or mixture which is imported, manufactured, processed or distributed in violation of RA 6969 or its implementing rules and regulations.	2.80	Sometimes
3. Discharging, depositing, or causing to be deposited material of any kind directly or indirectly into the water bodies along the margins of any surface water, where the same shall be liable to be washed into the surface water either by tide action, or by storm, floods, or otherwise, which could cause water pollution or impede natural flow of water in the water body.	2.73	Sometimes
4. Unauthorized transport or dumping into sea waters of sewage sludge or solid waste.	2.64	Sometimes
5. Transport, dumping or discharge of prohibited chemicals, substances or pollutants.	2.64	Sometimes
6. Littering, throwing, and dumping of waste matters in public places.	2.73	Sometimes
7. Open burning of solid waste	2.75	Sometimes
8. Causing or permitting collection of non-segregated or unsorted solid waste.	2.74	Sometimes
9. Open dumping, and burying of biodegradable and non-biodegradable materials in flood-prone areas.	2.70	Sometimes
10. Unauthorized removal of recyclable material intended for collection by authorized persons.	2.74	Sometimes
Total	**2.73**	**Sometimes**

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Table 2 presents the assessment on the extent of commission of environmental crimes. It can be noted that the indicator relating to environmental crimes under brown laws that obtained the highest weighted mean of 2.86 with the verbal interpretation of "sometimes" is: Cause, aid, facilitate directly or indirectly, in the storage, importation, or bringing into Philippine territory, including its maritime economic zones, even in transit, either by means of land, air or sea transportation or otherwise keeping in storage any amount of hazardous wastes in any part of the Philippines followed by: Knowingly use a chemical substance or mixture which is imported, manufactured, processed or distributed in violation of RA 6969 or its implementing rules and regulations; and Open burning of solid waste with a weighted mean of 2.80 and 2.75 respectively with a verbal interpretation of sometimes.

This result indicates that despite their awareness of the laws, they still violate its provisions. The study supports the findings of Sivamoorthy, Nalini, and Kumar (2013) that college students have a high awareness level but a moderate practice level.

Table 3. Perceived Reasons of Violating Brown Laws

Brown Laws	WM	Verbal Interpretation
Leniency (failure of the government to strictly and consistently enforce the law.	2.93	Significant Reason
Unpopular Law (students are unaware of the existing law)	3.0	Significant Reason
Lack of Personnel (There is no sufficient law enforcer who will enforce the law)	2.93	Significant Reason
Lack of Media Campaign (The brown law is not well-disseminated in all media outlet)	2.94	Significant Reason
Total	**2.95**	**Significant Reason**

It can be elicited from Table 3 that the perceived reasons of violating brown laws which obtained the highest weighted mean of 3.0 with the verbal interpretation of "'significant reason" is: Unpopular Law followed by: Lack of Media Campaign with a weighted mean of 2.94. Article 3 of the Philippine Civil Code highlights the principle "Ignorance of the law excuses no one from compliance therewith". Thus, it is essential that students should know the different environmental laws. This further implies the need to conduct activities and other programs to further educate our learners on different environmental laws. Further, it was revealed in the study that the respondents perceived Leniency and Lack of Personnel as significant reasons for violating brown laws with a mean of 2.93. Justice Oswaldo D. Agcaoili (2011) noted that while there are laws in place to define and punish environmental offenses, enforcement is hindered by the leniency of the agencies responsible for implementation. Hence, this implies that though students are aware of the laws, they still violate it because they believe that nothing will happen to them because of the failure of the government to strictly and consistently enforce the law.

IV. CONCLUSION

As can be concluded from the study, Criminology students were generally aware of the various Brown Laws discussed, including RA 9275, RA 9003, RA 8749, and RA 6969, but despite this awareness, there is a notable tendency for some students to commit environmental violations, particularly under RA 6969, which has the lowest level of awareness and is linked to the highest incidences of violations such as storing hazardous wastes and knowingly using prohibited chemical substances.

Moreover, the perceived reasons for violating Brown Laws include their lack of popularity and insufficient dissemination through media campaigns, resulting in low public awareness and engagement. Additionally, leniency in the enforcement of these laws reduces their deterrent effect, as violators do not face significant consequences. The shortage of personnel dedicated to enforcing environmental regulations further aggravate the problem, allowing violations to occur with little oversight or accountability. These factors collectively contribute to a climate where environmental laws, despite being known, are frequently disregarded.

V. RECOMMENDATION

It is recommended to enhance education and awareness by providing detailed information about the specific fines and penalties associated with each violation, thereby emphasizing the serious consequences of non-compliance. Improving media campaigns is also essential; utilizing various platforms, including official Facebook pages and other social media channels, can effectively disseminate information about Brown Laws and engage a wider audience. Furthermore, strengthening enforcement by implementing strict monitoring and ensuring rigorous enforcement of these laws is necessary to secure compliance and deter potential violators.

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MANAGEMENT OF GRIDHRASI THROUGH AYURVEDA: CASE SERIES

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ABSTRACT

Gridhrasi (sciatica) is a condition characterized by radiating pain along the sciatic nerve, often due to lumbar disc herniation, spinal stenosis, or trauma. In Ayurveda, Gridhrasi is considered a disorder caused by an imbalance of Vata dosha. This case series examines the efficacy of Ayurveda therapies in managing Gridhrasi. Five patients presenting with symptoms of radiating pain, stiffness, and heaviness were treated using Panchakarma therapies including Snehana (oleation), Swedana (sudation), and Basti (medicated enema), along with internal medications such as Maharasnadi Kashaya, Sahacharadi Kashaya, and Manjishtadi Kashaya, all known for their anti-inflammatory and Vatahara properties. The patients underwent personalized treatment protocols combining Bahya chikitsa like Katibasti, Patra Pinda Sweda, and abhyanga (massage) with Abhyantara chikitsa. Yoga Basti, incorporating Anuvasana and Niruha Basti, was central in pacifying Vata and nourishing the dhatu. Outcomes were assessed based on both subjective and objective criteria, including pain scores, toda, stamba, gourava, and Straight Leg Raise (SLR) test results. Post-treatment assessments revealed significant reductions in symptoms, and improved mobility across all cases, demonstrating the effectiveness of this Ayurveda treatment protocol. These findings suggest that Ayurveda treatment offers a promising-term management of Gridhrasi by addressing both the root cause and symptoms. Further research with larger sample sizes and clinical trials is warranted to establish the broader applicability of these findings.

KEYWORDS: *Gridhrasi, Sciatica, Vata dosha, Basti.*

INTRODUCTION

Sciatica is a common clinical condition characterized by radiating pain along the sciatic nerve, typically caused by compression of the lumbar nerve roots, most often due to lumbar disc herniation. Other causes include spinal stenosis, spondylolisthesis, and trauma. Risk factors include age, obesity, a sedentary lifestyle, and occupations involving prolonged sitting. Patients often present with sharp or burning pain radiating from the lower back through the leg, along with numbness, muscle weakness, and diminished reflexes.[1] Diagnosis is primarily clinical, supported by imaging like MRI to confirm nerve root compression. Conservative treatment, including NSAIDs, physical therapy, and, in some cases, epidural steroid injections, is the first-line management. In cases of persistent pain or significant neurological deficits, surgical interventions such as discectomy may be necessary. Long-term prognosis is generally favorable with proper management, although chronic sciatica may require ongoing treatment.

Gridhrasi commonly equated with sciatica, is a Vyadhi primarily caused by Dooshana of Vata dosha, as per classical Ayurveda texts[2]. it manifests as severe radiating pain from the lower back to the leg, often accompanied by stiffness, numbness, and restricted movement. (Charaka Samhita emphasizes the use of Snehana, Swedana, and Basti for Shamana of Vata[3], while Sushruta Samhita additionally highlights Rakthamokshana for Shodhana of Rakta[4]. Ayurveda treatment also incorporate medicines like Guggulu and Dashamoola for their anti-inflammatory and Vatahara properties. External therapies, such as Agnikarma, Pizhichil and Kati Basti, are also used. A scientific case series presented here could explore the efficacy of these treatments, focusing on analysis across acute and chronic cases and integrating outcomes. This unified perspective offers a comprehensive view of Gridhrasi management, through Ayurveda.

CASE REPORT

This case series includes participants who visited the Kayachikitsa OPD of Ashwini Ayurvedic Medical College and Research Center, Tumkur, Karnataka with a primary history of the low back ache and radiating pain to extremities. Pre and post-assessment was done on the basis of both subjective and objective criteria. All demographic data that include age, gender, occupation, affected site of face, and durations of all patients are described in Table 1.

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Table 1: Demographic data of all patients					
	CASE 1	**CASE 2**	**CASE 3**	**CASE 4**	**CASE 5**
Age in years	45	17	21	34	59
Gender	Female	Male	Male	Male	Male
Occupation	Housewife	Student	Student	Business	Retired Teacher
Religion	Hindu	Hindu	Hindu	Hindu	Hindu
Marital status	Married	Unmarried	Unmarried	Married	Married
Socio - Economic status	Upper middle	Lower middle	Upper middle	Lower middle	Upper Middle
Locality	Urban	Rural	Urban	Rural	Rural
Duration since onset of symptoms	6 months	1 month	6 months	1 year	1 year

Case Presentation

Case 1: A 45-year-old female patient reported with complaints of stiffness and pain in lower back radiating to left lower limb associated with heaviness of left lower limb and was not able to do her occupational work for 1 month. Patient took allopathic treatment for 1-2 months but got temporary relief. No significant previous illness history and family history found. Patient is having good appetite, proper micturition and bowel but disturbed sleep due to pain. With dashavidha pareeksha revealing vata-kapha prakruthi, with madhyama sara, samhanana, satva, satmya, ahara shakthi, vyayama shakti, vaya and Pramana. With the exception of the musculoskeletal system, no abnormalities in the respiratory, CNS, GI, or CVS systems were found. MRI reports revealed L2-L3, L4-L5 diffuse disc bulge causing neural foraminal narrowing and possible impingement over bilateral traversing nerve roots.

Case 2: A 17-year-old male patient reported with complaints of low backache radiating to right lower limb since 1month with no associated complaints. With h/o heavy weight lifting 1 month back. Patient took analgesic medications for 1-2 weeks but got temporary relief. No significant previous illness history and family history found. Patient is having good appetite, proper micturition and bowel but disturbed sleep due to pain. With dashavidha pareeksha revealing vata-kapha prakruthi, with madhyama sara, samhanana, satva, satmya, ahara shakthi, vyayama shakti, vaya and Pramana. No abnormalities in the respiratory, CNS, GI, or CVS systems were found.

Case 3: A 21 -year-old male patient came with the complaints of pain in lower back region radiating to left lower limb for 6 months associated with pricking type pain in thigh and calf region. Patient took allopathic treatment for 6 months but got temporary relief. Pain increased from 15 days. No significant previous illness history and family history found. Patient is having good appetite, proper micturition and bowel but disturbed sleep due to pain. With dashavidha pareeksha revealing vata-kapha prakruthi, with madhyama sara, samhanana, satva, satmya, ahara shakthi, vyayama shakti, vaya and Pramana. No abnormalities were detected in respiratory, CNS, GI and CVS systems. L5-S1diffuse posterior disc bulge, left paracentral and subarticular disc protrusion causing anterior thecal sac indentation and narrowing of left lateral recess severely impinging on left traversing nerve root.

Case 4: A 34-year-old male patient came with the complaints of pain and stiffness of low back associated with radiating pain to left leg for 1 year. H/o self-fall in his home 1 year back since then he developed above said symptoms. MRI reports revealed mild disc bulge at L3-L4 level with mild degenerative changes. Patient is having good appetite, proper micturition, bowel and sleep. With dashavidha pareeksha revealing vata-kapha prakruthi, with madhyama sara, samhanana, satva, satmya, ahara shakthi, vyayama shakti, vaya and Pramana. No abnormalities were detected in respiratory, CNS, GI and CVS systems.

Case 5: A 59-year-old male patient came with complaints of pain and stiffness in low back region with pain radiating to right thigh, calf region down to the foot, difficulty while walking and since 6 months. Patient underwent for several allopathy treatments but got only temporarily relief. Patient is having good appetite, proper micturition and bowel but disturbed sleep due to pain. With dashavidha pareeksha revealing vata-kapha prakruthi, with madhyama sara, samhanana, satva, satmya, ahara shakthi, vyayama shakti, vaya and Pramana. No abnormalities were detected in respiratory, CNS, GI and CVS systems.

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CHIKITSA GIVEN TO ALL PATIENTS

PANCHAKARMA

Day 1: Sindhuvara eranda taila – 25ml on empty stomach at 8.a.m
Followed by Day 2- Day 9

1) Katibasti by Mahamasha taila – 8 days
2) Sthanika abyanga by Prabhanjana Vimardana Taila (over kati and both lower limbs)- 8 days
3) Sthanika patra pinda sweda – 8 days
4) Yoga basti:
   Anuvasana basti by Sahacharadi taila Dose:100 ml
   Niruha basti by Dashamoola Kashaya Dose: 400 ml
   Niruha basti preparation: Honey – 30ml, saindhava lavana: 3 gm, Shatapushpa churna Kalka: 25 gm, Sahachardi taila: 80 ml, Dashamoola Kashaya- 400ml

Shamana Aushadi	Dose	Time	No of days
1) Maharasnadi Kashaya	3tsp-0-0 mixed with 6tsp lukewarm water	30 min before food	14 days
2)Sahacharadi Kashaya	0-3tsp-0 mixed with 6tsp lukewarm water	30 min before food	14 days
3)Manjishtadi Kashaya	0-0-3tsp mixed with 6 tsp lukewarm water	30 min before food	14 days
4)Nuro XT caps	1-0-1	30 min before food	20 days
5)Spiner tab	1-0-1	30 min before food	20 days

Following the scoring pattern is applied for the subjective and objective parameters

Ruk (Pain)	**Score**
No Pain	**0**
Slight pain in only on hard work	**1**
Pain on movement but do not disturb routine work	**2**
Pain on movement which disturb routine work	**3**
Severe pain compelling patient to be bed ridden	**4**
Toda (Pricking Sensation)	
No pricking sensation	**0**
Occasionally pricking sensation	**1**
Mild pricking sensation, once in a day	**2**
Moderate pricking sensation, frequently	**3**
Severe pricking sensation, persistent	**4**
Stambha (Stiffness)	
No stiffness	**0**
Sometimes for 5 – 10 minutes	**1**
Daily for 10 – 30 minutes	**2**
Daily for 30 – 60 minutes	**3**
Daily more than 1 hour	**4**
Gaurava	
No heaviness	**0**
Heaviness of leg for sometimes	**1**
Heaviness of leg throughout the day	**2**
S.L.R. Test	
More than 90°	**0**
71° – 90°	**1**
51° – 70°	**2**
31° – 50°	**3**
Up to 30°	**4**

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Assessment Between Before and After Treatment

Parameters	CASE 1		CASE 2		CASE 3		CASE 4		CASE 5	
	BT	AT	BT	AT	BT	AT	BT	AT	BT	AT
RUK	4	2	3	1	3	1	2	0	3	2
TODA	3	0	2	0	2	0	1	0	0	0
STAMBHA	4	2	4	1	3	2	3	1	3	1
GAURAVA	2	0	0	0	1	0	0	0	0	0
S.L.R Test	4	2	3	1	3	1	2	1	2	0

DISCUSSION: PROBABLE MODE OF ACTION

The treatment approach for Gridhrasi described in the case series integrates various Ayurvedic therapies targeting the root cause—imbalance of Vata dosha. The protocol focuses on relieving symptoms like Shoola, Stambha, and Guruta.

Sadyovirechana given with Sneha - Sindhuvara eranda taila to pacify Vata dosha, which is responsible for the pain and stiffness experienced in sciatica. Following Snehana, Swedana is performed using Patra Pinda Sweda and Katibasti with this promotes muscle relaxation and improves circulation. Swedana helps in sroto shodhana, which allows better movement of Vata and reduces symptoms like toda and gaurava.

Gridhrasi has its origin in pakwashaya, as it is a vata disorder, Basti is considered to be the effective treatment for disorders caused by Vata dosha. The Yoga basti regimen, which includes alternating Anuvasana basti with Sahacharadi taila which is mentioned in Ashtanga Hrudaya[5]. It has Ushna Virya and it act as Vata and Kapha Dosha hara. It is very effective in Adha Kaya Vatarogas and Niruha basti with Dashamoola Kashaya, is key in pacifying Vata. Dashamoola kashaya consists of laghu and brihat panchamula has the properties like ama pachana and kapha pitta anila hara and jwarahara. It is also mentioned under shvayathu hara dashemani gana. Dashamoola kashaya acts on rasa, mamsa and asthi dhatu. It can also be given in avruta vata conditions. Dashamoola kashaya has ushna veerya, tikta kashaya madhura rasa, laghu guna tridosha shamana mainly vata kapha hara, vatanulomana, shoola prashamana, anaha hara and mutrala. Dashamoola kashaya also enhances digestion and providing relief from acidity These Basti helps in shodhana of pakwashaya, does nourishment of the nervous system, and alleviate inflammation. They improve both local symptoms and systemic imbalances, offering long-term relief from the condition. Basti should not be given without proper agni and koshta Shuddhi.

Internal Medications Alongside external treatments, internal medications are administered to address inflammation and promote nerve healing. The protocol includes: Maharasnadi Kashaya which is anti-inflammatory, pain-relieving, and Vatahara properties[7], Sahacharadi Kashaya indicated in adhakayavata vikara known for its benefits vata-kapahara [8]action and Manjishtadi Kashaya used for its Rakta Shodhaka and anti-inflammatory effects[9]. These Kashayas are taken before meals to enhance digestion and absorption. Cap Nuro XT contains ekangaveera ras, vata gajankusha rasa, maha vata vidhwamsana rasa useful in intercoastal neuropathy[10]. Spiner tablet is formulated guggulu tiktaka Kashaya, shallaki and many more to tackle spondylitis[11].

The assessment of symptoms such as pain, pricking sensation, stiffness, heaviness, and Straight Leg Raise (SLR) angle is carried out both before and after treatment. A significant reduction in pain and improvement in movement, as well as reduced pricking sensations and heaviness, were observed post-treatment, showing the effectiveness of the integrative approach.

CONCLUSION

The management of Gridhrasi (sciatica) through Ayurveda treatment, as demonstrated in this case series, presents a promising approach to a condition that often poses challenges to long-term relief with conventional treatments alone. The approach also involved external therapies such as Katibasti, Patra Pinda Sweda, and abhyanga (massage), which not only provided symptomatic relief but also improved circulation and promoted muscle relaxation. The incorporation of Yoga Basti, a combination of Anuvasana and Niruha basti, significantly contributed to the management of the condition by nourishing the Dhatus and aiding in the elimination of Ama from the body.

The internal medications such as Maharasnadi Kashaya, Sahacharadi Kashaya, and Manjishtadi Kashaya, with their known anti-inflammatory and Vatahara properties, played a crucial role in addressing both systemic and localized issues associated with the condition. These medicines, traditionally used to treat Vata-related disorders, also helped to enhance digestion and absorption, thereby improving the overall therapeutic outcomes.

The subjective and objective assessments, including the reduction in pain scores, improvement in Straight Leg Raise (SLR) test outcomes, and the overall decrease in stamba and gourava, underscore the effectiveness of the Ayurvedic approach. The marked improvement in all five cases presented in this series, including patients with varied durations of symptoms, occupations, and demographic backgrounds, demonstrates the versatility and adaptability of Ayurveda in managing chronic conditions like Gridhrasi.

Overall, this case series highlights the potential of Ayurveda to offer sustainable and long-term solutions for sciatica. While the results are encouraging, larger-scale studies and clinical trials are necessary to further validate the findings and establish standardized protocols for wider clinical application. The comprehensive nature of Ayurvedic treatments with both

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antahparimarjana and bahiparimarjana chikitsa, focusing on the root cause of disease while providing symptomatic relief, makes it a valuable component in the management of Gridhrasi.

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HISTORY OF TRADITIONAL TOWN OF BANGLE MAKERS: FIROZABAD, UTTAR PRADESH

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[1]*Conservation Architect,*
[2]*Assistant professor, MBS School of Planning and Architecture, Delhi*

ABSTRACT
Firozabad is a district situated near Agra. It is known as the Glass City of India for its large manufacturing of glass-related products. For more than 200 years the Firozabad industry has been indulging in making glass bangles and now has become the world's largest producer. Bangle-making skills have been transferred from generation to generation passing on the traditional technique. Now the business of the glass industry has grown in various fields like glassware like beakers, flasks, containers for laboratories, and other products like light bulbs, battery bulbs and other lighting and spotting equipment, glass art items are also made like toys, candle stands, fruits, birds and animal figurines and images of gods and goddesses and domestic glass goods like drinking glasses. It has now become a culture of small households in the city to indulge in making glass-related items. Most of the population is connected to the business. To produce all these products, one requires skill, craft and knowledge which cannot be gained without proper practice and knowledge. This paper focuses on the history of the town which is lesser explored and studied. It has various aspects of culture which has been studied upon.

KEYWORDS: *Glass, bangle, craft, traditional knowledge*

HISTORY OF FIROZABAD

Firozabad before the 16th century

Firozabad was a combined land of 7 villages which were Rasoolpur, Mohammad Gazamalpur, Sukhmalpur, Datauji, Akbarabad, Pempur and Jahanpur. The glass was then produced by locally available sand called 'reh'. They first dig a pit of approx 3 feet and fill it with water then the water is left for evaporation which gives matter in a crystallised form which is then melted in locally made Bhatti called 'bhainsa bhatti'[1]. The glass obtained from that was used to make bangles called *kadechhal ki chudi*[2]. These bangles were made by fixing the axe drawing wires and making spirals on the handle of the axe after cooling down the spirals they were cut and joined on the burners. The major manufacturer of glass involves bangles.

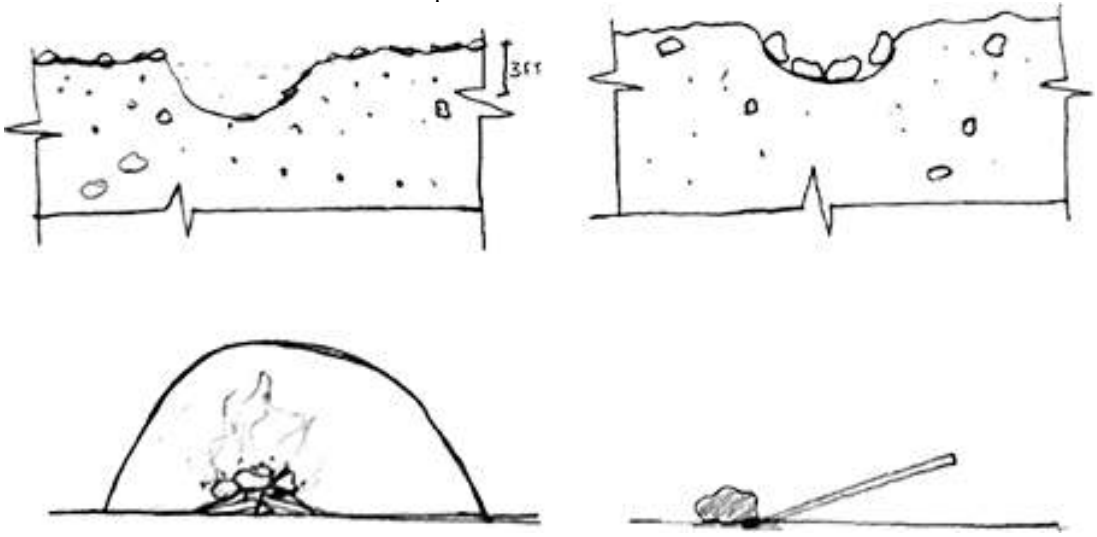


Figure 1: Process of Making Glass

[1] *Bhainsa Bhatti: homemade kiln to mix and milt glass components*

[2] kadechhal ki chudi: bangle made of mixed components (raw material)

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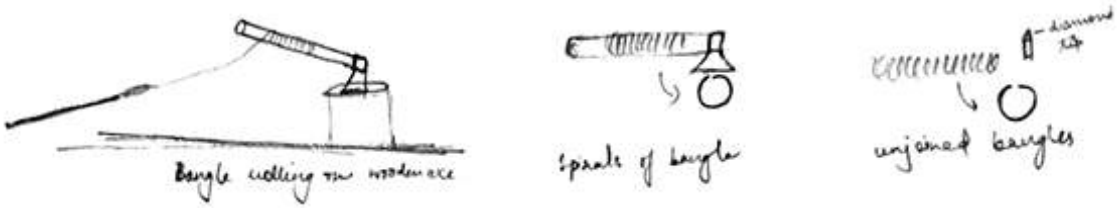


Figure 2: Process of Making Bangles

Firozabad in 16th and 17th century

Firozabad was a barren land until Akbar's reign. Akbar started to rule Agra from year 1556 to 1605.3 He was a Muslim ruler whose ruling territory involved Fatehpur Sikri, Edmatpur, Firozabad, Farah, Jalalabad, Fareednagar, Talihar, Akbarpur, Jalalpur, Kisanpur, Mughalsarai and Islamabad Nagar.

It was when Raja Todarmal in 1566 who was a minister in Akbar's court travelled to Gaya for religious purpose and while returning he was clean shaved and stayed in Asifabad (a small village) where he was looted by residents of the place as they could not recognize him. When he returned to Agra he informed same to King Akbar he then sent one of his trusted servants (mansabdar) Firoz Shah who destroyed Asifabad. Later some villagers gathered and pleaded to Firoz and explain their state of living with no food or homes he then decided to develop Firozabad on barren land. This land was part of villages whose evidence could not be found today. Those villages were then known as Rasoolpur, Md. Gajmalpur, Mizamabad, Datauji, Akbarabad and Raipura. Firozabad is mentioned in Akbar's boundary of rule in Agra. Before Akbar Babur had visited the area but the name of Chandwar could be found in his autobiography "Tujka Babri" not Firozabad so this became more evident that Firozabad only existed after Babur. The mark of Firoz Shah being in Firozabad is Tomb of Firoz Shah where his remains are grounded. The agriculture could flourish in the region easily because of the availability of water from the river Yamuna. The development of small residences was done with a major economical source of agriculture. After the demise of Firoz Shah in the 17th century his tomb was made in memory of all the work he had done and the name Firozabad was marked as the permanent name of the place.

Sher Shah Suri rebuilt the Grand Trunk Road in the 16th century, which went from Sonargaon in Bengal to Lahore in Punjab, and then on to Multan. It was constructed to allow for simple trade between cities. Agra was connected to Sonargaon in the east and Multan in the north and west via Lahore and Delhi, while another road connected the capital to Borhanpur in the south and Jodhpur in the southwest. These roads eased communication, aided trade and commerce, and allowed armies to be dispatched quickly from one location to another. The road also aided the Sultan in keeping a robust spy apparatus in place and establishing efficiency postal department. During the colonial period, the road was upgraded and extended up to Peshawar, and it was dubbed Grand Trunk Road. This road, presently known as National Highway 2, runs through Firozabad. Uttarapatha was the name given to the Grand Trunk Road in ancient India (means northern route).



Figure 3: Grand trunk road from Kabul to Kolkata (Firozabad Marked With Circle)

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Firozabad in 18th century

In 1737 when Firozabad had been developed enough, a part of it was looted and burnt by a part of Bajirao Peshwa's army who were crossing the region. During Scindia's reign in Gwalior in 18th century his trusted fellow D Vayan came to city and started Neel (flower use to colour clothes) farming which had been in region for quite a long time.

Firozabad in 19th century

During the rule of Britishers a resident of Firozabad Chaubeyji helped British army and East India Company in many ways for which he got rewarded 10acre of land in East of Firozabad signed by Sd. R. Canyngham (then collector). In 1833 Firozabad was taken into the territorial boundary of Agra.

Railway was introduced in India in 1853 when first train travelled for 34kms from Bori Bunder (Bombay) and Thane. Firozabad was industrial hub since a long time and after a time water transportation became very difficult that's when in year 1862 railway introduced in Firozabad and very first train travelled between stations of Tundla and Shikohabad. In year 1863 it expand to Tundla to Aligarh and growing since. The station also had a massive store area where imported items use to store before it came into market. In year 1868 firozabad had its first Nagar palika.



Figure 4: Railway storage from 19th century

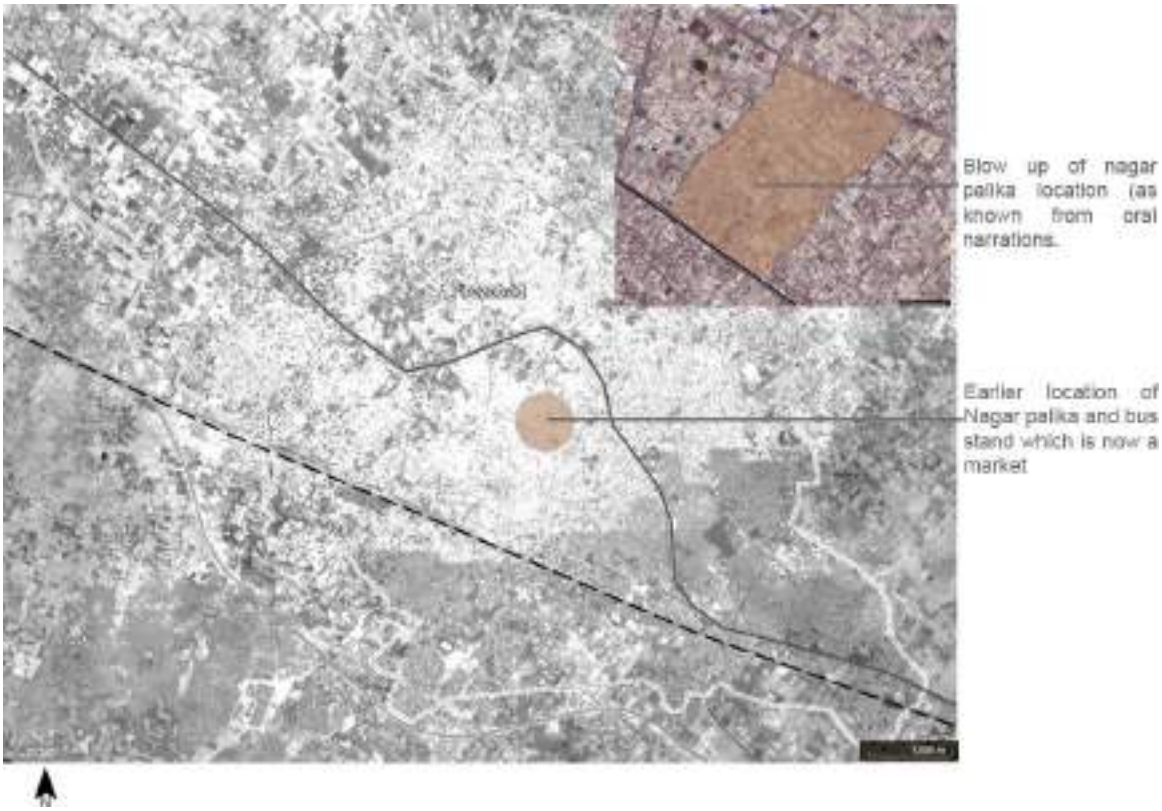


Figure 5: Nagar Palika Earlier Location

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Firozabad in 20th Century

Before year 1920 Firozabad was into the farming, import and export of bamboo and neel. After 1920 glass came to Firozabad. Firstly final products were imported later some labor class clan started collecting broken glass and started melting it into their homes and made bangles out of it which was easiest to cast and later it gave shape to town and started to be known as Suhag Nagari and its connection to Agra which is a tourist hub made these items flourish and grow till now. Firozabad was counted as tehsil under the district of Agra until 5th Feb 1989 when it is announced a separate district with Firozabad, Jasrana, Shikohabad, Tundla and Sirsaganj tehsil Agra.

There had been some known writers from Firozabad which gain popularity nationally and internationally. Those writers are Shree Brahm Gulal ji, Bodha Kavi, Kavi Tikaram, Shreethar Pathak, Shree Satyanatayan Kaviratha, Pd. Banarasidas Chaturvedi, Shree Brijmohan Bhatnagar, Shree Ratan Lal Bansal, Shree Phool Singh Sharma, Shree Umesh Joshi, Pranav (pen name), Shree Ram Prakash Jain, Mir Akbar Ali, Munshi Jagan Kishor, Hazrat Mirza, Hakeen Nausa, Shree Anjum Ansari and Shree Mathura Prasad.

INFERENCE

The city's craft work has received little attention in literature. When it comes to the glass industry, a global description of the bangle production process, child labor, pollution, and health hazards have all been discussed. Nothing supports the story of a craftsman and an artisan, or how industries and artisans are interdependent on one another. Almost all the articles mention artisans or craftsmen as labourers. The art behind curating the products is not touched any literature.

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INTEGRATION OF INDIAN KNOWLEDGE SYSTEM IN HIGHER EDUCATION: ISSUES AND CHALLENGES

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ABSTRACT
The Indian Knowledge System (IKS) has a rich and diverse heritage that encompasses a vast range of knowledge traditions, from Vedic studies to various regional and linguistic literatures. The integration of the Indian Knowledge System (IKS) into higher education has gained momentum in recent years, aiming to bridge traditional wisdom with contemporary education. This article explores the significance of IKS, discusses the potential benefits of integrating it into higher education, and addresses the various challenges involved. The study highlights issues related to curriculum design, pedagogy, and the acceptance of traditional knowledge in the academic community, while suggesting strategies for overcoming these challenges.
KEY WORDS: *Integration, IKS, Higher Education, Issues, Challenges*

1. INTRODUCTION

The Indian Knowledge System encompasses the vast traditional knowledge base that has evolved in India over millennia. It includes various disciplines like Ayurveda, yoga, Vedic mathematics, astronomy, philosophy, architecture (Vastu Shastra), and spiritual practices. With the advent of globalization, there is a renewed interest in harnessing the insights from IKS to address contemporary societal needs. Integrating IKS into higher education provides an opportunity to connect students with India's rich cultural heritage while enriching modern scientific inquiry and holistic learning.

2. IMPORTANCE OF INTEGRATING IKS IN HIGHER EDUCATION

Integrating IKS into higher education is essential for several reasons:

- **Cultural Awareness and Identity:** It fosters a sense of cultural pride and national identity, making students aware of India's intellectual heritage.
- **Holistic Education:** Traditional Indian education emphasized the overall development of an individual, addressing physical, mental, and spiritual aspects, aligning with the principles of modern holistic education.
- **Alternative Approaches:** It offers alternative perspectives on various disciplines, such as health sciences, ecology, and ethics, which are highly relevant in the current context.
- **Sustainable Development:** The sustainable practices embedded in IKS can contribute to solving global environmental issues.

3. OBJECTIVES OF THE STUDY

The objectives of this research are:

1. To explore the significance of integrating IKS in higher education.
2. To identify the issues and challenges associated with this integration.
3. To suggest strategies for effective incorporation of IKS in academic curricula.
4. To analyze the impact of IKS on contemporary education practices.
5. To identify Key Features of IKS Integration under NEP 2020.

4. ISSUES IN INTEGRATING IKS IN HIGHER EDUCATION

Despite the benefits, there are numerous issues associated with integrating IKS into higher education:

4.1. Lack of Standardized Curriculum

One of the significant challenges is the absence of a standardized curriculum for IKS. The diverse and fragmented nature of traditional knowledge systems makes it difficult to design a uniform syllabus that can be adopted across different universities. There is a need for an organized framework to categorize and present IKS in a structured manner.

4.2. Resistance from Academic Community

The academic community often views traditional knowledge as outdated or unscientific. This skepticism creates a barrier to integrating IKS into mainstream education. The perception that modern education and scientific methods are superior to traditional knowledge limits the acceptance of IKS within academia.

4.3. Inadequate Teacher Training

Teachers and educators are not always adequately trained to teach IKS subjects. Most contemporary teachers are familiar with modern education methodologies, and there is a lack of training

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programs to equip them with the skills needed to effectively integrate IKS in their teaching.

4.4. Lack of Research and Documentation

Many aspects of IKS are still in oral form or documented in ancient texts that are not widely accessible. The lack of systematic research and documentation poses a challenge in integrating IKS into structured educational programs. Efforts are needed to compile, translate, and interpret these traditional texts in a way that is compatible with modern academic requirements.

4.5. Curriculum Overload

Introducing IKS into an already packed curriculum can lead to curriculum overload, where students and teachers may feel overwhelmed. Balancing traditional subjects with modern disciplines without overburdening the students is a key challenge.

5. CHALLENGES IN THE INTEGRATION OF IKS

5.1. Epistemological Challenges

IKS is based on a different epistemological foundation compared to Western knowledge systems. Traditional Indian knowledge often integrates spirituality and metaphysics, which may not always align with the empirical approach dominant in modern academia. Reconciling these different worldviews is a fundamental challenge.

5.2. Language Barriers

A significant portion of IKS is available in ancient languages such as Sanskrit, Pali, and Prakrit. Translating these texts into modern languages while preserving their essence poses a challenge. Additionally, the lack of proficiency in these ancient languages among students and teachers further complicates the integration process.

5.3. Policy and Regulatory Issues

The inclusion of IKS in higher education requires policy support from educational authorities. However, the absence of clear policies, guidelines, and accreditation standards for IKS courses affects its implementation at the university level.

5.4. Interdisciplinary Approach

IKS is inherently interdisciplinary, blending philosophy, science, art, and ethics. Integrating such a system into a compartmentalized academic structure poses a challenge, as universities often operate within rigid disciplinary boundaries.

6. STRATEGIES FOR OVERCOMING THE ISSUES AND CHALLENGES

To successfully integrate IKS in higher education, the following strategies can be implemented:

6.1. Developing a Standardized Curriculum Framework

A standardized curriculum framework should be developed in collaboration with experts in IKS, modern education, and policymakers. This framework should outline the core subjects, elective options, and interdisciplinary courses that can be offered across universities.

6.2. Promoting Research in IKS

Encouraging research in IKS can help bridge the gap between traditional knowledge and modern science. Funding initiatives and research programs aimed at studying, documenting, and validating traditional practices can foster greater academic acceptance.

6.3. Teacher Training Programs

Implementing teacher training programs to familiarize educators with IKS and its pedagogical approaches is crucial. Such programs should emphasize the philosophical underpinnings, practical applications, and interdisciplinary nature of IKS.

6.4. Translating and Publishing IKS Texts

Efforts should be made to translate important IKS texts into regional and international languages, making them accessible to a broader audience. Digital platforms can also be used for disseminating these texts and creating open-access resources.

6.5. Curriculum Integration through Electives

Instead of overloading the existing curriculum, IKS subjects can be introduced as electives. This would allow students to explore traditional knowledge without compromising their core academic requirements.

7. KEY FEATURES OF IKS INTEGRATION UNDER NEP 2020

7.1 Interdisciplinary Approach: The NEP encourages an interdisciplinary learning model, similar to the ancient Gurukul system, allowing students to study subjects such as Yoga, Indian philosophy, Ayurveda, and traditional arts alongside modern science and technology.

7.2 Research and Development: The policy promotes research in IKS, encouraging institutions to set up centers dedicated to studying traditional knowledge and linking it with contemporary science.

7.3 Inclusion of Languages: Efforts are being made to offer courses in classical languages such as Sanskrit, Pali, and Prakrit, along with modern Indian languages, to preserve and study ancient texts.

7.4 Vocational Training: The policy emphasizes skill development and vocational education in traditional crafts, music, dance, and other arts, thereby supporting the cultural heritage and artisanal communities.

8. CONCLUSION

Integrating the Indian Knowledge System in higher education presents a unique opportunity to enrich the academic landscape with traditional wisdom while fostering holistic development.

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Although there are numerous issues and challenges, a systematic approach involving curriculum standardization, research promotion, teacher training, and policy support can facilitate the successful incorporation of IKS in higher education. Bridging the gap between traditional knowledge and modern education will not only enhance learning experiences but also contribute to sustainable development, cultural preservation, and societal well-being.

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SIMPLE REARER AND YOUNG REVOLUTIONER

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ABSTRACT

Insects are known as one of the most successful class of animals on earth, being a major player in the ecosystem. The economic importance of insects encompasses both their negative and positive importance. Often found on leaves, flowers and stems of crop plants, insects cause both direct (eat the leaves, fruits or vegetables of crop plants and many times too, do destroy the crops prior to fruiting) and indirect damage (transmit infections; viral, bacterial and fungal) to crops. Some insects are predaceous, they feed upon and destroy a large number of injurious insects. Stagomantis, a mantis is voracious, it feeds on flies, grasshoppers and caterpillars, some of which are injurious to crops. The larvae and adults of Chilomenes, a lady-bird beetle, feed on aphids which infect cotton plants. Novius, a lady-bird bettle, destroys scale worms which are pests of orange and lemon trees. Epicauta is a blister beetle, it deposits eggs where locusts occur, the larvae on hatching enter egg capsules of locusts and eat up masses of eggs. Calasoma, a ground beetle preys upon many kinds of lepidopterous larvae which destroy cereals and cotton.

KEY WORDS: *Honey bees, honey products, venom, royal jelly, pollen, propolis*

INTRODUCTION

Honey hunting, or plundering the nests of wild honeybees to obtain honey and beeswax, is practiced throughout the world wherever colonies of wild nesting honeybees are abundant. However, obtaining honey is easier and more convenient if bees are encouraged to nest inside a hive. This housing of bees in a container is true "beekeeping", but the term is used loosely to describe all the techniques involving bees and the harvesting and processing of their products. Honeybees belong to the family Apidae subfamily Apinae and genus Apis. They are social insects living in colonies **(**Ryazan, R. et.al.,1999). A colony consists of a queen, several thousand workers and a few hundred drones. There is division of labour and specialization in the performance of various functions. They build nests (combs) with wax, which is secreted from the wax glands of worker bees. The bees use their cells to rear thin brood and store food. Honey is stored in the upper part of the comb; beneath it are rows of pollen storage cells, worker brood cells and drone brood cells in that order. Some Apis species build single comb in open, while others build multiple combs on dark cavities **(**JENTER, K.2002**).** There are many ways to utilize honeybees for their pollination services or to obtain products from them. The methods used depend upon the types of bees available, and the skills and resources available. The concept of a "Simple Rearer" and "Young Revolutioner" reflects the evolving roles in agriculture and innovation, particularly in the context of animal husbandry and youth-driven change. A Simple Rearer refers to individuals or small-scale farmers focused on raising livestock through traditional, often low-cost methods. They emphasize practical, hands-on approaches to managing animals and producing food for their local communities. On the other hand, the Young Revolutioner represents a new generation of innovators and entrepreneurs, eager to transform agricultural practices with fresh ideas and modern technologies (Caparica-Santos, C et.al., 2007**).** These young change-makers are introducing sustainable, efficient, and technologically advanced solutions, bridging the gap between traditional farming and future-oriented agricultural methods. Together, both play crucial roles in shaping the agricultural landscape, ensuring a balance between preserving traditional practices and embracing innovation for better productivity and sustainability. of hydroponics fodder production and its challenges. The economic importance of insects encompasses both their negative and positive importance. Often found on leaves, flowers and stems of crop plants, insects cause both direct (eat the leaves, fruits or vegetables of crop plants and many times too, do destroy the crops prior to fruiting) and indirect damage (transmit infections; viral, bacterial and fungal) to crops. These rearers prioritize hands-on experience,

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simplicity, and cost-effective techniques to meet the needs of their livestock and communities. In contrast, the Young Revolutioner signifies a new generation of innovators who bring fresh perspectives, embracing modern technologies and sustainable practices to revolutionize the industry (Bogdanov, S. 2011). By introducing automation, data-driven solutions, and eco-friendly innovations, these young pioneers are transforming how agriculture and animal husbandry are approached. Together, they represent the balance between tradition and progress, working toward a more efficient and sustainable future in farming and livestock rearing (Hocking, B. et.al., 1960).

METHODOLOGY

This study focuses on comparing the traditional methods used by Simple Rearers and the innovative techniques introduced by Young Revolutioners in honey bee management and pollen extraction. A detailed review of academic papers, industry reports, and manuals on honey bee management and pollen extraction will be conducted. This will provide insights into both traditional and modern practices, highlighting the differences in techniques, tools, and efficiency between Simple Rearers and Young Revolutioners Observations will be carried out on beekeepers who use traditional methods for managing hives and extracting honey and pollen. Key factors like hive maintenance, extraction processes (manual or low-tech methods), and environmental factors influencing bee health will be documented. Data will be collected from beekeepers using modern tools, such as automated hive monitoring systems, advanced pollen extraction methods, and AI-based techniques to track hive health and productivity.

Pollen Extraction Efficiency: Volume and quality of pollen extracted.

Bee Health and Productivity: Impact of the techniques on colony health and honey production.

Environmental Sustainability: Assessment of how each method affects the surrounding environment and biodiversity.

Technology Adoption: The degree to which modern technologies such as IoT sensors and automated extractors are used. The gathered data will be analyzed to determine the strengths and limitations of both traditional and modern approaches, focusing on efficiency, sustainability, and impact on bee health. Statistical tools will be used to quantify differences in pollen yield and hive productivity.

This methodology aims to provide a balanced understanding of how both groups contribute to sustainable beekeeping and effective pollen extraction practices.

RESULT AND DISCUSSION

The results of this study reveal distinct differences in the methods and outcomes of honey bee management and pollen extraction between the Simple Rearers and Young Revolutioners. These findings highlight how both traditional and modern techniques contribute to beekeeping, each with its own advantages and challenges The analysis shows that Young Revolutioners who use modern tools and automated systems tend to have a higher efficiency in pollen extraction. The use of advanced technologies, such as pollen traps and automated extractors, results in a more consistent and higher yield of pollen per hive. These methods reduce labor intensity and allow for a more precise collection process. In contrast, Simple Rearers, who rely on manual extraction techniques, often experience lower pollen yields due to the less controlled nature of their methods. However, they emphasize a more hands-on, natural approach that respects the natural behavior of the bees, which can sometimes result in lower disruption to the hive.Bee health emerged as a critical factor in this study. The Young Revolutioners showed a higher reliance on technological interventions for monitoring hive health. Devices such as hive sensors and IoT-based systems provide real-time data on factors such as temperature, humidity, and bee activity. This allows for immediate interventions if problems such as hive diseases or unfavorable conditions arise. As a result, Young Revolutioners often report better colony health and productivity, including more significant honey and pollen yields. On the other hand, Simple Rearers rely on their deep knowledge of bee behavior, observing the hives manually to detect potential issues. While this traditional approach may lack the precision of modern technology, experienced rearers often develop an intuitive understanding of their bees, enabling them to respond to potential problems before they escalate. However, due to the lack of precise monitoring tools, there may be delays in identifying issues such as pests or diseases, leading to reduced hive productivity.In terms of bee productivity, both groups have strengths. While technology enables Young Revolutioners to maintain more controlled environments that boost bee productivity, Simple Rearers benefit from their low-intervention methods, which are believed to reduce stress on the bees, potentially improving long-term health and productivity. This suggests that while automation increases pollen output, traditional methods may offer benefits in terms of colony stability and resilience lower uniformity.

The results indicate that both approaches offer valuable insights into honey bee management and pollen extraction. Young Revolutioners excel in optimizing productivity and efficiency through the use of cutting-edge technology, making their methods particularly suited for large-scale, commercial operations. Their ability to closely monitor hive conditions and respond to challenges in real-time positions them well for future innovations in sustainable beekeeping.However, the Simple Rearers provide important lessons in sustainability and low-impact beekeeping. Their reliance on traditional methods fosters a closer relationship with nature and emphasizes bee welfare and environmental harmony over sheer productivity. While these methods may yield less in terms of pollen extraction and honey production, they prioritize the long-term health of the colonies and the environment.

CONCLUSION

The findings suggest that a hybrid approach, integrating the best aspects of both the Simple Rearers and Young Revolutioners, could be the key to sustainable and productive beekeeping. By combining the technological advancements embraced by the

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younger generation with the time-tested, eco-friendly practices of traditional beekeepers, beekeeping can become more efficient while still prioritizing the welfare of bees and the environment. This approach would allow for a more balanced method of pollen extraction, ensuring both productivity and sustainability for the future of beekeeping.. In developed countries where there is no dearth of quality feed and fodder, the hydroponic production of fodder is less competitive than traditional fodder production when compared on per kg dry matter basis. On the other hand, Simple Rearers emphasize traditional, low-tech approaches that prioritize harmony with nature and bee welfare. Their practices, while less efficient in terms of yield, foster long-term colony health and environmental sustainability. Their deep, intuitive understanding of bees offers valuable insights into maintaining balance in natural ecosystems, even though they may not always have the precision of technology.The study suggests that combining the strengths of both groups could lead to a more sustainable future for beekeeping. Integrating advanced technology with traditional methods would ensure high productivity while also protecting bee welfare and the environment. This hybrid approach could address the need for increased efficiency without compromising on sustainability, offering a balanced solution for future beekeeping practices.

Figure 1: Collection of Royal Jellies





Figure 2: Propolis

Table 1: Composition of Royal Jelly

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Ingredients	Fresh	Lyophilized
Water %	60 – 70	< 5
Lipids %	3 – 8	8 – 19
10-hydroxy-2- decenoic acid %	> 1,4	> 3,5
Protein %	9 – 18	> 3,5
Fructose+glucose+ sucrose %	7 – 18	-
Fructose %	3 – 13	-
Glucose %	4 – 8	-
Sucrose %	0,5 – 2,0	-
Ash %	0,8 – 3,0	2 – 5
Ph	3,4 – 4,5	3,4 – 4,5
Acidity(ml0.1NNaOH/g)	3,0 – 6,0	-

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DESIGN AND FABRICATION OF AUTOMATED HYDROPONIC SYSTEM FOR FODDER CROPS

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ABSTRACT

The proposed system was developed for small and medium agriculture explorationsenabling fodder production in six days. Within the six days production timeline, the system in completely autonomous, i.e., controls the desired agronomic conditions for production. Moreover, the system controls the fodder flow, i.e., since its entrance (seeds) to the final production stage, through vertical and horizontal displacement ofthe fodder trays. The system was designed to produce the fodder in height, to diminish the occupied area in the greenhouse, due to the space the later solution occupies, and also to diminish the volume of air to acclimate, if needed. From the requirements above, is present in the paper the automatic solution that comprises: the mechanical structure, the mechanical and hydraulic components, and also the control system to automate the Hydroponic Automatic System (HAS).

KEY WORDS: *Hydroponics, Fodder production, Tray farming, Automatedsystem, Soil less farming.*

INTRODUCTION

Hydroponics is the method of soil less farming. In this setup both Irrigation and Nutrient supply are done by water supply through the spraying nozzles. These nozzles are fixed at the top of each tray in which plants are cultivated. In this method irrigation systems are managed by a sensor which auto runs in precise timing and runs the water flow. It involves calculated flow of nutrients and water in a five layered mixing tank. The solution is pumped into the gullies where plantsare grown with suitable supporting cups. The roots of the plants directly absorb water and minerals. Overflowing solution is collected in recycle tank and is pumped back to mixing tank for refuse. The automation enables easy graphical user interface based programmable timing control and other monitoring of system. Background The human population will grow to an estimated 8 billion people by 2025 and 9 billion by 2050, and it is widely recognized that global agricultural productivity must increase to feed the world population (sekhon, 2014). The increase in livestock production demands nutrient requirement to feed animals. Productive and reproductive performance of animals can be increased through feeding of green fodder. Now a days scarcity of land has been shown as a great constraint of forage production for ruminant animals. Having these and other problems in mind, alternative technologies like the hydroponics found critical (Naik et al., 2015). It is a technique of growing crops like barley without use of chemicals and artificial growth agents(soil). It is characterized by short growth period with around 7-10 days and need of a small piece of land for production (Mooney J, 2005). And has extraordinary protein, vitamins, fibers and mineral contents with their healthy beneficial effects on animals. Therefore, this technology is an important agricultural technique currently used in many countries (Tudor G. et al., 2005).

Automated hydroponics for fodder crop cultivation represents an innovative approach to modern agriculture, where plants are grown without soil, using nutrient-rich water solutions. This method offers a highly efficient, sustainable way to produce high-quality fodder, especially for livestock. Traditional soil-based agriculture faces challenges such as unpredictable weather, soil degradation, and water scarcity, all of which affect the consistent supply of fodder crops.

In contrast, automated hydroponic systems enable controlled, year-round production by precisely managing variables such as light, temperature, and nutrient levels. This technology optimizes resource use, reduces labor costs, and increases yields, making it particularly beneficial for regions with limited arable land or adverse climate conditions. By automating the cultivation process, farmers can improve both the quantity and quality of fodder, ensuring a reliable feed supply for animals and contributing to more sustainable agricultural practices. In this research the main objective is to

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cultivate fodder crop in Chemical free manner. To irrigate and manage Nutrient of the crop accurately to review the Hydroponic feed value to livestock production and to review principles of hydroponic fodder production and method of hydroponics fodder production.

METHODOLOGY

Hydroponic fodder production involves supplying cereal grain with necessary moisture and nutrients, to enable germination and plant growth in the absence of a solid growing medium. There are a range of chemical and structural changes that take place within the cereal grain through the hydroponic growing process. The number of sprouts produced (yield) and quality of the fodder is influenced by a number of factors including Grain, environment, Managementof the system etc.

Hydroponic fodder production system. To grow green fodder at wider temperature (15º - 32ºC) and humidity (70 -80 %) range without fungal growth. Environmentally friendly. Contamination free fodder. Saves water and labor. Fodder grown is highly palatable and nutritious. Fodder improves animal health and reproductive efficiency. Hydroponic maize fodder-Soaking for 24 hr. Maize seed is best choice for fodder production. Procure good quality maize seeds with at least 85% germination rate. Seed should be pesticide free. Separate impurities from seeds by impurities-separator. Weight 1.5 kg. seeds and allow to soak in water for 24 hr. in soakingtray.

HYDROPONIC FODDER GROWTH STAGE

Hydroponic fodder Growth.Stage-2nd Day: Transfer-soaked seed to tray and spread uniformly through it. Load trays on 1st two rows of racks.
Hydroponic fodder Growth.Stage-2nd Day: 1st day tray shift in 3rd & 4th rows of trays.

Hydroponic fodder Growth Stage-3rd Day: Respective below two rows of racks till they reach bottom two rows which coincides on 7th day.

Hydroponic fodder Growth Stage-4th Day: The environmental factors that influence in the forage production. The duration of daylight influences vegetative development. The ideal temperature is 21º C, and it should be as constant as possible.

Hydroponic fodder Growth Stage-5th Day: The watering system is electronically controlled and delivers water at the optimum rate. Hydroponic fodder Growth Stage-6th Day Adjusting nutrient flows: - Nutrient flows are adjusted across each stack, along with water.

Hydroponic fodder Growth Stage-7th Day: Mould is actively managed within sheds through pretreatment of the seed. Additives to the water are used for pre-soaking the grain to minimize therisk of mould. Shed hygiene is also important and thus considerable attention is paid. One tray containing 1.5 kg maize seeds produces 7-9 kg green fodderwith fodder height of 20-25 cm. Here irrigation system in Hydroponics is done using a sprinkler mist at regular intervals. water is sprayed to the crops every 2 hours for 1 minute in order to maintain the water availability for their growth. This is to ensure the water usage efficiently for irrigation purpose and precisive growth of the crop. Using A 100L drum the submersible water pump inserted in the drum. Water pump pushes the water by the implementation of dripper pipe with mist sprayer water sprays in the seed places trays.

RESULT AND DISCUSSION

EFFICIENCY OF AUTOMATED HYDROPONICS

Natural green fodder is the key to decreasing feeding cost during milk production. Due to non-availability and higher land costs, minimum Utilization of fodder producing areas to feed livestock. This system also eliminates additional pressure on already over worked irrigation system. It is the demand of the dairy owners in the states, were there is low land holdings, scarcity of water, saline water, higher labor and land cost. The hydroponics green fodder was looking like a mat consisting of roots, seeds and plants. There are differences in the nutrients content of hydroponics fodder maize during different stages of growth and maize grown in conventional practices. The increase in protein content may be attributed to the loss in dry weight, particularly carbohydrates, through respiration during germination and thus longer sprouting time was responsible for the greater losses in dry weight and increasing trend in protein content.

Lower Uniformity.
The absorption of nitrates facilitates the metabolism of nitrogenous compounds from carbohydrates reserves, thus increasing levels of CP. The CP content of conventional green fodder maize harvested at about 60 days was similar to the earlier findings.
The lower CF content and higher NFE content of the hydroponics green fodder than the conventional green fodder indicated the high leafy and succulent nature of the hydroponics green fodder which may be more palatable to livestock, particularly the dairy animals. There was an increasing trend in the TA content of the hydroponics fodder maize with the advancement of the period. However, the AIA values of the hydroponics fodder maize were similar and lower than the AIA content (1.40%) of the fodder maize harvested at about 60 days under conventional practices.

CONCLUSION

The production of livestock needs a healthy supply of fodder for better production. But during the dry season there seems to be a lean supply. There must therefore be an alternative like that of the production of hydroponic fodder. Hydroponics is a smart alternative technology against scarcity of land and impeding climate changes. The hydroponic system requires a fraction of conventional agriculture's water use while still offering high quality stock feed. Generally, this technology has a solution to avoid scarcity of green feeds especially in dry seasons and urban areas having a shortage of land and water for forage production. Having a characteristic of high intake palatable and digestible properties, this technology is best chosen than cereal grains and other concentrate feeding. In developed countries where there is no dearth of quality feed and fodder, the hydroponic production of fodder is less competitive than

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traditional fodder production when compared on per kg dry matter basis. High initial investment on fully automated commercial hydroponic systems and high labor and energy costs in maintaining the desired environment in the system adds substantially to the net cost of hydroponic fodder production. Such systems are not successful in developing countries. Conversely, low-cost hydroponic systems have been developed by utilizing locally available infrastructure where there is an acute shortage of fodder and water; local irrigation systems are not well established. Transportation and fuel costs are high; and seasonal variations of fodder prices are extreme.



Figure 1: Pictorial representation of Hydroponics

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THE ROLE OF MEDIA IN GLOBALIZATION AND GENDER DISCRIMINATION: A CRITICAL ANALYSIS

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ABSTRACT

In the context of globalization, mass media has become an essential tool for disseminating information, shaping public consciousness, and connecting diverse cultures. However, this power comes with significant responsibility, as the media often perpetuates harmful stereotypes and gender discrimination. This article explores how media not only influences but distorts gender identities, reinforcing patriarchal norms and outdated ideologies. It examines the portrayal of gender in various media forms, highlighting the implications of stereotyping and the regression of women's roles in society. Additionally, the article argues for the media's potential to promote democracy, gender literacy, and pluralism, advocating for a more balanced representation of gender that reflects contemporary realities. Ultimately, it calls for responsible media practices that prioritize equality and challenge hegemonic narratives to foster a more inclusive society.

INTRODUCTION

In the age of globalization, mass media has become a vital tool for disseminating information across borders. Through Television, Radio, the Internet, Magazines, Newspapers, and other mediums, people are constantly informed about the happenings around the world. However, the power of media comes with significant responsibility (Berger, John, 1972). While it plays an essential role in connecting people and cultures, it can also propagate harmful stereotypes, gender discrimination, and flawed ideologies. This article aims to shed light on how media not only shapes but also distorts gender identities, and why it needs to prioritize democracy, gender literacy, and pluralism.

Media as a Wheel for Globalization

Media has evolved into a critical mechanism driving globalization. It connects diverse regions, transmits ideas, and facilitates communication across different cultures. Yet, along with this positive influence comes the hegemony of particular ideologies. Media is no longer a neutral communicator; it frequently propagates ideologies of patriarchy, capitalism, and orthodoxy. These ideas work to dominate feminine perspectives and promote autocratic economic principles, which often align with the interests of capitalist, patriarchal structures. For instance, the glorification of consumerism and patriarchal norms frequently appears in corporate advertising and entertainment.

Stereotyping and Gender Discrimination in Media

Gender is a social construct deeply tied to culture, behaviour, and identity. The media frequently reinforces gender stereotypes by associating specific characteristics with masculinity and femininity (Butler, 1990). Boys are portrayed as strong and unemotional, while girls are depicted as emotionally and physically weaker. Such representations are pervasive in various media, from advertisements to movies, TV shows, and even children's programs. For example, the notion that boys prefer blue and girls prefer pink is a product of media-driven cultural conditioning. These seemingly trivial colour associations cement a rigid understanding of gender roles.

Moreover, the media often presents women as dependent on men for protection, which fosters a culture of domination and dependence. Such narratives can be seen in Bollywood item songs, popular TV serials, and movies, which objectify women and present them as weak or as tools for male pleasure. Bollywood songs like *"Munni Badnaam Hui"* and *"Chikni Chameli"* reduce women to objects. At the same time, advertisements for products such as cars or clothing often exploit feminine sexuality to promote consumerism (Wolf, 1991). These representations are not only problematic but contribute to the perpetuation of gender discrimination in society.

Orthodox Thinking and Media's Role in Gender Construction

The media, instead of challenging regressive ideas, often reinforces them. Orthodox notions of gender roles and identities are repeatedly presented, limiting the public's understanding of gender as a fluid concept (Gill, 2007). Media content reflects outdated values, which not only deny the evolution of societal roles but also impede the progress of gender equality. Advertisements, family dramas, and films often emphasize patriarchal ideals, pushing back against feminist concepts and contributing to the marginalization of women's voices.

Historically, women held positions of power and respect in society, as warriors, leaders, and spiritual figures. But today's media tends to portray women primarily as objects of desire or subordinate to male figures. This regression undermines the progress made in gender equality over centuries and leads to

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psychological harm, as these media portrayals create a skewed image of femininity and masculinity.

Media's Responsibility: Promoting Democracy and Gender Literacy

The media holds the power to shape public consciousness (Said, 1993). Rather than promoting patriarchal or capitalistic ideas, it should work to support democratic values, gender studies, and secularism. The portrayal of gender should be more balanced and reflective of contemporary realities. Media can play a crucial role in dismantling stereotypes and promoting gender equality by providing a platform for meaningful and fact-based discussions. Reliable and sustainable news, coupled with responsible advertising, can help foster a society that is more aware of corporate social responsibility and ethical practices.

Challenges Posed by Neo-media Culture

In today's world, neo-media culture—a blend of traditional and modern media—plays a critical role in shaping public opinion. However, it often threatens the stability of localized cultures by imposing external, often Westernized, norms. This import-export of cultural values through media can result in the dilution of indigenous practices, and when combined with the propagation of gender biases, it poses a significant threat to societal balance.

While the print media of the past maintained a degree of objectivity and neutrality, today's fast-paced digital media landscape often blurs the line between facts and fiction. We must remain vigilant in maintaining a balance, ensuring that media content respects the diversity of gender identities and promotes equality.

CONCLUSION

Media has the potential to be a force for positive change, especially in terms of fostering gender equality. However, in its current form, it often perpetuates patriarchal norms, gender discrimination, and hegemonic ideologies. The need of the hour is for the media to focus on promoting democracy, gender literacy, and pluralism rather than reinforcing stereotypes and outdated ideas. By providing reliable, fact-based information, media can help create a more conscious and inclusive society. Gender sensitivity and awareness of gender-based violations are fundamental needs for our ongoing societal development. Only through conscious media practices can we hope to build a world free from gender bias and inequality.

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ASSESSING ENVIRONMENTAL AND HEALTH IMPACTS OF THE DYEING AND BLEACHING INDUSTRY IN TIRUPUR, TAMIL NADU

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ABSTRACT
There are serious environmental and health issues as a result of Tamil Nadu's Tirupur district's fast industrialization, especially in the bleaching and dyeing sector. In both contaminated and non-polluted communities, this project intends to explore the intricate connections between industrial pollution, agricultural productivity, land degradation, and health effects. Using a mixed-method approach, the study examined data from 223 people who were chosen by systematic random sampling processes and represented 20% of the overall population. The study's main emphasis is on important government initiatives, such as Individual Effluent Treatment Plants (IETPs) and Common Effluent Treatment Plants (CETPs). The study evaluates how well these actions work to lower pollution levels and their effects on the ecosystem. Furthermore, the study investigates how industrial pollution has led to the expansion of healthcare infrastructure, looking at the incidence of incurable diseases, disparities in life expectancy, and medical costs between the two types of villages. Strong links between industrial operations, land degradation, and health effects are found in the study using regression and correlation analysis. Preliminary results show that in contaminated communities, agricultural productivity has significantly decreased and land degradation has significantly increased. In addition, healthcare expenses are significantly greater in these regions, which is associated with a reduced life expectancy and a rise in chronic illnesses such skin disorders and respiratory ailments. In order to address the negative effects of industrial pollution on Tirupur's environment and public health and ensure a healthier future for its citizens, these findings highlight the urgent need for strengthened regulatory measures and sustainable practices.

KEYWORDS: *Dying and bleaching industry in Tirupur district: Health impacts: CETPs: IETPs: Medical expenses: Polluted and Non-polluted villages: Economic consequences.*

1. INTRODUCTION

Tamil Nadu's Tirupur District, dubbed the textile capital of India, is essential to the nation's apparel production sector. It makes a substantial contribution to the state's economic growth and national revenues with more than 6,250 industrial units. With 200,000 migrant labor and 600,000 local employees, the business exports goods valued at Rs. 120 billion a year. The dyeing and bleaching facilities, however, have seriously harmed the environment by contaminating water sources and destroying agricultural land. Although increased industrial activity has unquestionably had positive economic effects, there have also been significant environmental costs, especially in the agricultural sector. The dyeing and bleaching industry's effluents have significantly contaminated soil and water bodies, reducing agricultural productivity and causing long-term land degradation in the area (Kumar & Chakraborty, 2019).

Greater agricultural productivity has been maintained in non-polluted villages farthest from the industrial area. These two sets of villages differ greatly from one another, underscoring the dire environmental effects of uncontrolled industrial pollution. As an illustration of the significance of clean water and good soil for sustainable agriculture, farmers in non-polluted areas continue to report consistent crop yields (Krishnan & Meenakshi, 2022). According to studies, a range of hazardous chemicals found in textile effluents, such as dyes, bleaching agents, and heavy metals, infiltrate into the groundwater and soil, rendering the area unusable for farming (Sivakumar, 2021). Farmers have reported a significant drop in agricultural yields, low soil fertility, and decreased irrigation capacity in polluted communities close to the industrial clusters. These issues are clearly related to the contaminated farming water (Ramanathan et al., 2020).

Farmers in polluted villages spend up to 30% more on agricultural inputs like fertilizers and pesticides in an effort to make up for the harm caused by pollution, which puts further burden on their finances, according to a study by Rajan and Sudha (2021). Many of these rural villages are already in debt as a result of the economic difficulties they have already encountered.

India's knitwear exports are dominated by Tirupur, which produces 55% of all knitwear exports and 90% of the nation's cotton knitwear. The region's exports increased by 14% in 2023–2024, from $294 million in April 2024 to $360 million in May 2024, despite obstacles like rising cotton costs and uncertainty in the global economy. Because of its tenacity, Tirupur will always be significant to India's textile sector.

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2. OBJECTIVES

1. To examine the effects of industrial pollution on the health of the local populace, paying particular attention to life expectancy and incurable diseases.
2. To assess the success of government initiatives to mitigate the effects on the environment and human health, such as CETPs and IETPs.

3. REVIEW OF LITERATURE

Mohamed A. Hassan and Ahmad El Nemr., (2017): This essay discusses the problem of water contamination brought on by textile industry untreated wastewater and how it directly affects human health. Serious health difficulties like bleeding, skin sores, nausea, respiratory problems, permanent blindness, and other conditions are brought on by the contaminated water. Complex compounds that are challenging to manage, such azo dyes and diaminobenzene, are the main contaminants. In order to lower toxicity and permit water reuse in industrial operations, the study recommends the use of Advanced Oxidation operations (AOPs) in wastewater treatment. These actions are essential for reducing the health hazards that tainted water poses.

Govindarajalu K., (2003): The study focuses on industrial pollutants that pollute the Noyyal River, degrading the soil, air, and water in the process. Both the environment and human health are harmed by this pollution. The wellbeing of the settlements in the Noyyal River Basin is examined, emphasizing the negative impacts of river pollution on human health, both naturally occurring and as a result of human activity. The study demonstrates that severe health issues such skin allergies, respiratory infections, gastritis, and ulcers have been brought on by water pollution.

4. RESEARCH METHODOLOGY

The effects of the dyeing and bleaching business in Tirupur District on the environment and human health are investigated in this study using a quantitative research methodology. A systematic questionnaire was used to gather information about the demography of two villages, Karaipudur (non-polluted) and Andipalayam (polluted), which are five kilometers apart. A sample size of 223 respondents, or 20% of the total population, was chosen from among the 1,114 people living in these settlements.

Percentage analysis was used to examine demographic factors, and correlation and regression approaches were used to assess the links between pollution and health outcomes. This research seeks to shed light on how industrial pollution affects agricultural productivity and nearby populations.

5. RESULTS AND DISCUSSION

Significant gender differences in hospital and overall treatment costs are highlighted in the study. Low hospital expenses were noted by a noteworthy 91.5% of respondents, of whom 89.4% were men.

Table: 5.1: Respondent Family expenditure and Treatment Cost for Gender Classification:

Gender	Respondent Family - Hospital Expenses				Total Treatment Cost T + T + M = TC			
	Low	Medium	High	Total	Low	Medium	High	Total
Male	160 (89.4) [78.4]	14 (7.8) [100]	5 (2.8) [100]	179 (100) [80.3]	109 (60.9) [82.6]	23 (12.8) [63.9]	47 (26.3) [85.5]	179 (100) [80.3]
Female	44 (100) [21.6]	0 (0.0) [0.0]	0 (0.0) [0.0]	44 (100) [19.7]	23 (52.3) [17.4]	13 (29.5) [36.1]	8 (18.2) [14.5]	44 (100) [19.7]
Total	204 (91.5) [100]	14 (6.3) [100]	5 (2.2) [100]	223 (100) [100]	132 (59.2) [100]	36 (16.1) [100]	55 (24.7) [100]	223 (100) [100]
Chi-Square	$\chi^2 = 078$				$\chi^2 = 024$			

Source: Primary Date

The female respondents reported low hospital costs, which may indicate variations in reporting practices, treatment options, or access to healthcare. With 59.2% of the overall treatment expenditures falling into the low-cost group, men likewise made up the majority of the data. In the medium and high-cost groups, however, the distribution of males and females was more evenly distributed. There was a somewhat wider range of treatment prices for females, with 52.3% falling into the low-cost category and 29.5% into the medium-cost category.

The distribution of hospital expenses and treatment costs showed weak correlations with gender, according to the Chi-Square analysis (`$\chi^2 = 0.78$ for hospital expenses and $\chi^2 = 0.24$ for total treatment costs). This implies that although there are discernible

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variations between men's and women's financial experiences, these variations are not statistically significant in this particular sample. The results highlight the need for more investigation into potential contributing reasons to the observed gender-based trends in hospital and treatment expenditures, such as socioeconomic status, access to healthcare, or treatment preferences.

Table: 5.2: Respondent Family expenditure and Treatment Cost for Village Classification:

Village Type	Respondent Family - Hospital Expenses				Descriptive Statistics	Total Treatment Cost T + T + M = TC			
	Low	Medium	High	Total		Low	Medium	High	Total
Polluted	28 (87.5) [13.7]	3 (9.4) [21.4]	1 (3.1) [20.0]	32 (100) [14.3]	**Mean SUM N**	19 (59.4) [14.4]	2 (6.3) [5.6]	11 (34.4) [20.0]	32 (100) [14.3]
Non -Polluted	176 (92.1) [86.3]	11 (5.8) [78.6]	4 (2.1) [80.0]	191 (100) [85.7]	**Mean SUM N**	113 (59.2) [85.6]	34 (17.8) [94.4]	44 (23.0) [80.0]	191 (100) [85.7]
Total	204 (91.5) [100]	14 (6.3) [100]	5 (2.2) [100]	223 (100) [100]	**Mean SUM N**	132 (59.2) [100]	36 (16.1) [100]	55 (24.7) [100]	223 (100) [100]
Chi-Square	**$\chi 2 = 3.694^{NS}$**				**ANOVA**	**1.853^{NS}**			

Source: Primary Date

According to the survey, a sizable majority of participants—87.5% in polluted villages and 92.1% in non-polluted areas—reported having minimal healthcare costs. There is a general trend toward decreased healthcare expenditures in both areas, since only a tiny percentage reported medium or high expenses. Both types of villages mainly fell into the low category when looking at overall treatment expenses, with 59.4% in contaminated villages and 59.2% in non-polluted ones. The percentage of responders in the medium category, however, was larger in non-contaminated villages (17.8%) than in polluted villages (6.3%).

Statistical tests revealed no statistically significant variations in hospital expenses or overall treatment costs based on village type, with a Chi-Square value of $\chi^2 = 3.694$ and an ANOVA result of F = 1.853. According to the data, both types of villages have low hospital and treatment costs, and although there are minor variations in the distribution of costs, they are not statistically significant. This implies that respondents must deal with comparable healthcare costs whether they reside in polluted or non-polluted locations. Other variables affecting these trends, such socioeconomic circumstances or access to healthcare, might be examined in future studies.

Table: 5.3: Correlation Determinants of Various Cost of Medical Expenditure

Independent Variables		Total Treatment Cost T + T + M = TC	Affected Persons - Travel Cost	Affected Persons - Transaction Cost	Affected Persons - Treatment Cost
Total Treatment Cost T + T + M = TC	Pearson Correlation	1	.884**	.888**	.674**
	Sig. (2-tailed)		.000	.000	.000
	N	223	223	223	223
Affected Persons - Travel Cost	Pearson Correlation	.884**	1	.882**	.614**
	Sig. (2-tailed)	.000		.000	.000
	N	223	223	223	223
Affected Persons - Transaction Cost	Pearson Correlation	.888**	.882**	1	.633**
	Sig. (2-tailed)	.000	.000		.000
	N	223	223	223	223
Affected Persons - Treatment Cost	Pearson Correlation	.674**	.614**	.633**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	223	223	223	223

. Correlation is significant at the **0.01 level (2-tailed).

Source: Primary Date

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With correlation coefficients (r) ranging from 0.884 to 0.888, the study finds extremely high relationships between the overall costs of treatment and related expenses for impacted persons, particularly travel and transaction costs. This suggests that travel and transaction expenses climb sharply in tandem with overall treatment costs. Total treatment costs and treatment expenses for affected individuals have a moderately significant correlation (r = 0.674), indicating a positive but weaker link. Additionally, there is a considerable link (r = 0.882) between transaction and trip prices, suggesting that people who spend more on travel also tend to spend more on transactions. Additionally, there is a strong association (r = 0.633) between transaction costs and treatment costs. The reliability of these interactions is confirmed by the statistical significance of all correlations ($p < 0.001$).

The study reveals a correlation between treatment, travel, and transaction costs, suggesting that increased costs are linked to other expenses, potentially influencing healthcare policies and support systems

Table: 5.4: Multiple Regression Model Determinants of Various Cost of Medical Expenditure:

S. No	Independent Variables	B	Std. Error	t	Sig
1.	Constant	-1.068	.113	-9.475	.000
2.	Affected Persons - Travel Cost	.114	.088	1.297	.196
3.	Affected Persons - Transaction Cost	.178	.087	2.057	.041
4.	Affected Persons - Treatment Cost	1.701	.120	14.131	.000
	R and R Square	.848[a]		.719	
	Adjusted R Square			.715	
	F	186.774			.000[b]

Source: Primary Date Significance at one percent and ten percent level

A statistical method for determining an asset, good, or service's value by examining each of its unique attributes is called hedonic regression. Both positive and negative externalities are taken into account as the approach allocates values and weights to these attributes. This method shows how modifications to particular attributes impact total pricing and aids in establishing correlations between independent and dependent variables.

The statistical significance of the model is demonstrated by the p-value and F-statistic, which attest to the independent variables' high predictive ability with respect to the dependent variable. Affected Persons-Treatment Cost stands out as the most important of these factors, with a coefficient of 1.701 and a very significant p-value, highlighting its crucial importance in figuring out the total expenses for affected individuals. The outcome is similarly highly impacted by Affected Persons - Transaction Cost, while Affected Persons - Travel Cost does not exhibit a statistically significant effect, indicating that it is less important in this situation.

Travel expenses have little bearing on the dependent variable, according to the analysis, which shows that treatment costs are the main driver, followed by transaction costs. The necessity of controlling treatment expenses to lessen people's financial burdens is one way that these findings can influence healthcare policy. Future studies could look into more factors or interactions to further understand these connections.

6. ADVANTAGE OF CETPS AND IETPS

Tirupur has more than 750 bleaching and dyeing units, of which 252 use Individual Effluent Treatment Plants (IETPs) and 502 are connected to 20 Common Effluent Treatment Plants (CETPs). A number of facilities were ordered to close by the Tamil Nadu Pollution Control Board (TNPCB) due to environmental infractions. The Noyyal River and groundwater were severely contaminated as a result of the effluents from both CETPs and IETPs failing to fulfill Total Dissolved Solids (TDS) and chloride regulations, despite the installation of treatment systems, including facilities for recycling residential sewage. In order to prevent discharge into the river, the Madras High Court ordered the installation of Zero Liquid Discharge (ZLD) systems in 2006. These systems included Reverse Osmosis (RO) facilities. ZLD systems are now run by 17 CETPs, and evaporators are used to handle RO rejects. Despite advancements, pollution and wastewater management continue to present difficulties.

7. CONCLUSION

The study examines water contamination in the Noyyal River bed, highlighting its negative effects on groundwater, river water, and community health. The textile industry, particularly in Tirupur District, releases high levels of TDS and chlorides, causing medical expenses. The study calls for stronger environmental laws and advanced technologies, community involvement, sustainable investment, and legislative reform.

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CLINICAL AND PARACLINICAL MANIFESTATIONS IN SUPRAVENTRICULAR ARRYTHMIA IN CHILDREN

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ABSTRACT

Background: *Supraventricular arrythmias (SVAs) are a prominent class of cardiac rhythm problems in children defined by an irregular heartbeat that begins above the ventricles.*
Objective: *To provide a summary of the clinical and paraclinical manifestations of SVA.*
Methods: *The study included a review of prior studies on paediatric supraventricular arrhythmias.*
Results: *SVAs are a prevalent form of arrhythmia in young people, with an estimated incidence of 1% to 2%. Children's supraventricular arrhythmias may possess a complicated aetiology that includes genetic predispositions and anatomical cardiac problems. The symptoms might be as mild as palpitations, lightheadedness, dyspnoea, or even more severe lke syncope. Most symptoms occur before the age of four months during the first six months of life. Various manoeuvres have been implicated in the diagnosis of SVA to include obtaining a thorough history about the onset and recurrence of palpitations, syncope, chest pain, dyspnea, heart failure, and drug use, and physical examination. Some 20% of asymptomatic SVT infants are incidentally diagnosed. The mainstay of paraclinical diagnosis of SVA is provided by the ECG, which uncovers typical patterns of irregularly irregular rhythms in AF and sawtooth patterns in atrial flutter. Intermittent arrhythmias may be captured with Holter monitoring and event recorders. Echocardiography also plays an important role in assessing the underlying structural heart disease, whereas blood tests may be required for detecting electrolyte imbalances or thyroid disorders that may precipitate the arrhythmias.*
Conclusion: *In conclusion, to avoid potential problems in the aetiology and treatment of supraventricular arrhythmias in children, a complete approach that considers individual circumstances is required.*
KEYWORDS: *supraventricular arrythmia, children*

INTRODUCTION

A common type of arrhythmia that affects people of all ages is supraventricular arrhythmias. [1]Depending on the rhythm, frequency, and severity of any organic heart malfunction or other noncardiac disorders, SVTs can occur with a wide range of conditions and exhibit a wide range of clinical symptoms, from asymptomatic to collapse.

A narrow complex tachycardia is typically the result of supraventricular tachycardias, barring rate-dependent aberration or basal bundle branch obstruction. Atrioventricular reentry tachycardia and atrioventricular nodal reentry tachycardia are the most prevalent types of supraventricular tachycardia in newborns and infants, while 10%–15% of supraventricular tachycardias in all age groups are focal atrial tachycardias.[2]

Usually identified by mistake in children, supraventricular arrhythmias are generally asymptomatic and well treated. Heart palpitations, dyspnoea, chest discomfort, lightheadedness, dizziness, syncope, and presyncope are common symptoms, however they are not always present.[3]

Arrhythmias are caused by three mechanisms: triggered, automated, and reentrant. The continuous, repeating propagation of electrical activity in a circular motion is known as reentrant or reciprocating tachycardia. The aberrant spontaneous impulse beginning in a tissue is the source of automatic tachycardias. Impulsive behaviour is referred to as triggered activity.[4]

The most prevalent kind of AVNRT causes the atria and ventricles to contract virtually simultaneously, making it difficult to observe P-waves on the surface ECG during tachycardia. [5]When they are seen, they might be faint, appearing as a pseudo-S' deflection in the inferior leads or a pseudo-r' wave in lead V1.[5]

Premature atrial contractions can appear with an abnormally shaped premature P wave.
Pre-excited atrial fibrillation, which is rare and marked by a wide, irregular QRS of variable duration and shape, can occur in patients with antegrade route conduction because the condition can conduct at various rates down both the AV node and the pathway.[5]

Within the atrium, there are two processes that give rise to atrial tachycardia (AT): focal and re-entrant. The most common kind of AT observed in clinical practice is classic atrial flutter.
Atrial flutter is responsible for 8% of supraventricular tachyarrhythmias in children older than a year, 11% to 18% of neonatal tachyarrhythmias, and 30% of foetal tachyarrhythmias.[6]

In the acute diagnosis and treatment of SVT, current guidelines from the European Society of Cardiology still support the use of adenosine and vagal manoeuvres as first-line treatments. [2] SVT cessation rates for the Valsalva technique range significantly from 19% to 54%. [7]Another option is to provide an adenosine challenge through a large peripheral or central

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vein right after a rapid saline flush. In the event that the patient exhibits signs of haemodynamic compromise, direct current cardioversion should be performed right away. Catheter ablation can also be used. The main treatments for AT include medications, electrical cardioversion, catheter ablation, and transoesophageal atrial pacing (TEAP). [6]

OBJECTIVE

To provide a broad summary of the clinical and paraclinical manifestations of childhood supraventricular arrhythmias.

METHODOLOGY

A thorough analysis of the literature was carried out, with an emphasis on the clinical presentation, and paraclinical manifestations of SVAs in children from article databases between 2020 and 2024

RESULTS

Clinically, SVAs may present in children with palpitations, fatigue, dizziness, exercise intolerance, or symptoms of heart failure in extreme cases, especially in infants. Whereas older children might complain of a feeling of racing or irregular heartbeat, younger children and infants may also present nonspecifically with irritability, poor feeding, or failure to thrive. The paraclinical manifestations that help in diagnosis include electrocardiography, used to detect the characteristic rhythm abnormalities; Holter monitoring in the case of intermittency or asymptomatic instances; and echocardiography, helpful to rule out structural heart diseases. Electrophysiological studies are put to use in pinpointing the exact mechanisms of arrhythmias and in the support of targeted interventions like catheter ablation in cases that may be complicated..

SUGGESTIONS

Early detection of the arrythmia helps in timely diagnosis and treatment of the disease. Compliance to the advised treatment measures is very important.

CONCLUSION

Supraventricular tachycardias (SVTs) are a common cause of presentation to primary and secondary care services. Understanding the clinical and paraclinical manifestations is required for timely diagnosis and treatment of supraventricular arrythmia. The underlying cause, symptom frequency, and patient preference all affect long-term treatment.

FIGURES

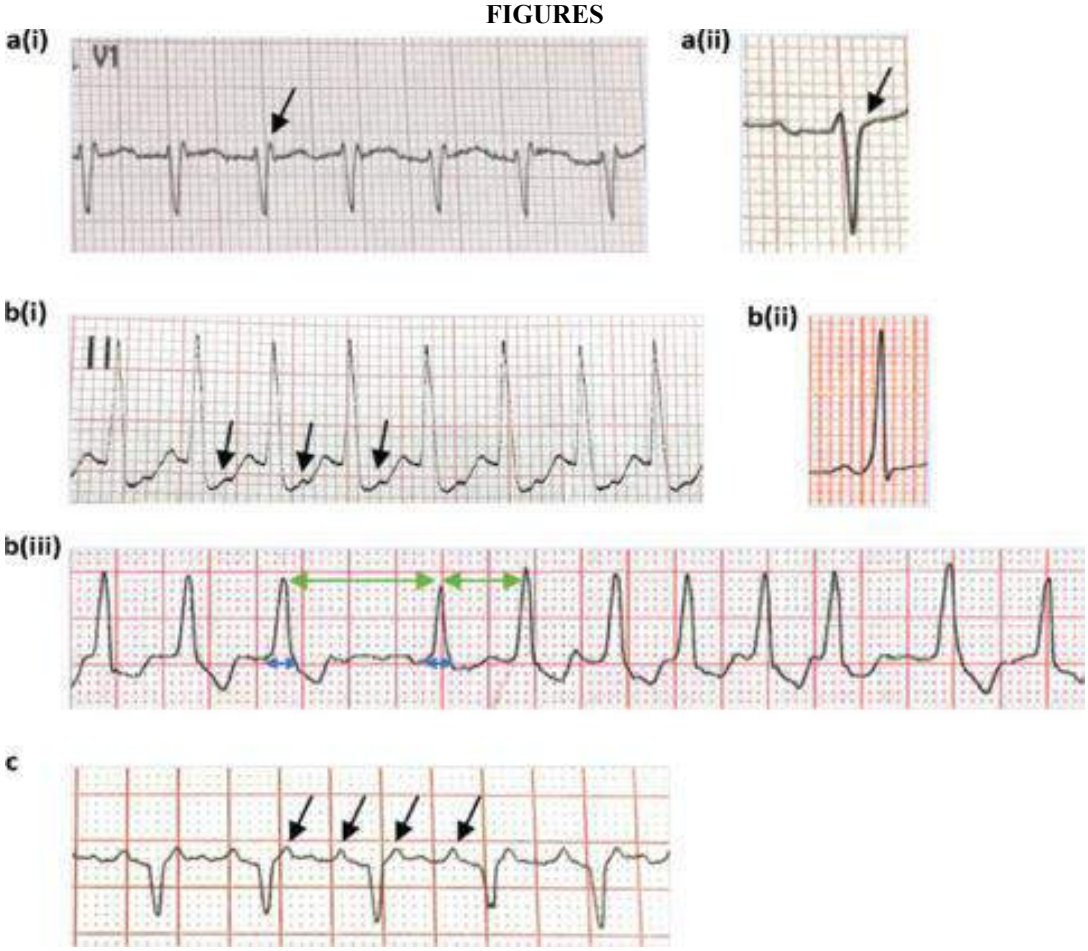


Figure 1 [5]

a. Pseudo r'wave and sinus rhythm for comparison
b. Narrow complex tachycardia with visible retrograde P-waves that appear separate to the QRS and sinus rhythm and pre excited atrial fibrillation
c. Atrial tachycardi

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THE IMPACT OF LANGUAGE IDEOLOGY ON ACADEMIC ACHIEVEMENT CONSIDERING BENGALI LANGUAGE CLASSROOM USERS, AND OTHERS USING THE ENGLISH LANGUAGE IN SOUTHEAST ASIA, WHICH IS A BARRIER TO LEARNING

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ABSTRACT

This paper determines and analyses the problems faced by Bengali Medium students, and how Bengali medium students are treated negatively and thus affect their outcomes, at university. This research paper has been made based on secondary and primary data which the researcher analyzes and graphical representation. The researcher structured a survey questionnaire on a sample size 30. The researcher focused on the actual problems that are being faced by Bengali medium students at university. Also, the researcher tried to find out why Bengali medium students were treated negatively by many faculty members and tried to find out whether these problems are affecting the student's achievement or not; the researcher also tried to take some suggestions from the students about how can we reduce the problems. A mixed-method approach was considered in writing this paper. With the use of a Likert scale for collecting the primary data from the students was collected. After analyzing these data, the researcher focused on collecting secondary data. Secondary data were collected from different sources i.e. online journals, online articles, and some web pages.

KEYWORDS: *pedagogical practices, language proficiency, multilingualism, linguistic identity, language barriers*

The curriculum of most universities is fully English medium based that is why faculties are bound to take all the academic things in English for that Bengali medium students face different types of problems when they come to university. First one or two semesters they don't cope with the system. Questions of the exam, everything is written in English. The class lectures are also conducted in the language English. It can be tough for newly admitted students to catch all the lectures which are given by instructors. "Even Bengali medium students are not able to communicate with faculties, even when faculties ask them questions, they are not able to answer them, and that impacts their results. And it affects students' learning and achievements" (Rahman, et al., 2020). This research will find out the actual problems of the students and also, its solution.

In our country, all well-known private universities are fully conducted in the English language. Their curriculums are also English-based, and NSU is the best university in Bangladesh and this university follows the North American curriculum. To maintain all these things, NSU maintains language issues. "In private universities, English is not only a language it is also a modern style as well, if someone knows then the person will be considered a smart one otherwise the person will be treated negatively" (Rahman, & Pandian, 2018). At the SSC and HSC levels, there were only 2 basic books "English for Today" and "English 2nd Paper with Basic Grammar" Thus it is enough for a student to learn English? Our Bengali medium student has basic English ideas and it is not enough for higher education. "This deficiency makes them nervous and leads to their whole university life guilt" (Lambert & Penney, 2020). This makes them treated negatively; therefore, Bengali medium students are not only treated negatively at NSU but also in all well-known universities as well.

Many researchers show there is a communication gap between students and faculty, I mean those students from Bengali medium backgrounds. "This communication gap leads a bad impact on their career and affects them negatively and this research will give a solution to this matter and how they can cope up with faculty" (Saha, 2023). In this research, there will be several questions with absolute rules. This research will give an idea about how Bengali medium students face problems, how Bengali medium pupils are treated negatively, and how this affects their learning and their solutions. "In most of the cases, researchers found that Bengali medium-background students are somewhere confused" (Lee et al., 2022). They also remain less confident in comparison to

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English-medium students. "For this reason, Bengali medium students cannot interact with faculties, and faculties take them negatively, along with faculties thinking they are less attentive in class; that's why teachers don't give focus to them" (Rahman et al., 2019). Even if a Bengali-medium student doesn't understand a topic, they can't even ask their faculty to help them because of their language barrier. Between Bengali-medium students and their teachers, this issue causes a communication gap. Bengali-speaking students often find themselves unable to respond confidently and despite knowing the answer when a teacher poses a question to them in class due to language barriers. "The lack of enough good friends, poor relationships with faculty, and a general lack of good relations with anyone in varsity cause Bengali medium students to suffocate during their time in college" (Canagarajah & Ashraf, 2013). They are unable to express their feelings to both friends and teachers. For this reason, Bengali-medium students are overlooked and treated poorly, which has an impact on their time in college, their academic career, and their academic life outside of it. Additionally, Bengali-medium students have a detrimental effect on their extracurricular activities. "Since all academic and nonacademic work is completed in English at the majority of private universities" (De Jong et al., 2016). Bengali-medium pupils would need to be confident or have English communication skills to join a club for that purpose. "They are treated unfairly in every aspect of university life, which has an impact on their brain and mental health" (Haque, 1989).

This research has also found that there are some common problems for Bengali medium students. One of the major problems is coping with the university's educational environment. Most of the universities follow the American curriculum, that is why all the academics are conducted in English. "In university, all the classes, presentations, exams, quizzes, assignments, and all the activities are conducted in English" (Hamid & Ali, 2022). But when non-English medium students join university and face this curriculum and medium of studying, they become hopeless and shocked. They face huge problems in coping with the environment. A Bengali medium student comes from a Bangla background. From the start of education life until joining the university, they study everything in Bangla. All the academics are done in the Bangla language. They only have a single subject that is called English for today, and that does not cover anything that helps a student to cope with the university academic system. "A Bengali medium student studies for 11 years in Bangla and just has a simple idea about the English language then how can Bengali medium students cope with the English medium curriculum? That is why when Bengali medium students join in university, they face troubles in adapting to that culture as well as their system"(Rahman, 2022). Even Bengali medium students can get anything in the classroom when their faculty takes class, Bengali medium students can't even understand what their faculty is teaching. Additionally, they can't make good friends then so they can't get any help from their teachers as well as their friends. Thus affect their whole outcomes of that semester.

Another one is using English continuously in speaking and writing. The most common problem is giving presentations in English. When a Bengali-medium student notices most of his friends give good presentations and can interact with teachers, then the student feels a lack of confidence to cope with that university culture as we as the student start feeling shy to talk with others. A Bengali-medium student doesn't even have many friends because of their communication skills, which leads to a negative role in their academic life. "Even most of the Bengali-medium students are not satisfied with the study materials, which are in English, and I am also not used to using the English language continuously in my studies" (David et al., 2009). Bengali medium students don't understand class lectures properly, which are conducted in English. For all of these, Bengali-medium students are having trouble with their studies; even they are not able to take proper preparation for their exams. These problems influence their abilities for the rest of their lives.

Another major problem that faces Bengali-medium students is adaptation. The adaptation of English-medium students's culture. "Bengali medium students have their own culture and traditional style of dressing, but English medium students wear different cultured dresses that also separate them. Even both backgrounds have different gestures and behaviors" (Shende, 2023). Most of the faculties, like the gesture of an English medium student, that's why they get concentration; on the other hand, a Bengali medium student gets avoidance, which is also a reason for not doing well in the result. "Bengali-medium students try to adopt the culture that has English-medium students, but they can't adopt the culture because they don't have that ability, and they don't get support from their friends and their faculties" (Curran, 2023). Even sometimes faculties ignore them when they understand that the student is from a non-English background. They can't interact with them. These problems make a Bengali medium student's mind tiny; they can't even think broadly. "Except for enjoying the varsity life, they take it as a pain and burden. They try to find a solution on how to get rid of this life" (Ferreyra, 2023).

This can be hypothesized that Bengali medium students face problems in university because there is a communication gap between Bengali medium students and faculties, which affects their study and learning outcomes negatively, Bengali medium students face are treated negatively by many faculty members of NSU, and thus it affects the students learning and achievement.

In this research, the researcher plans to investigate all the factors. This research will address the following questions:

a) Why the Bengali-medium students miss-treated and how does it affect their studies, as well as other activities?
b) How Bangla medium students can face the problems of educational environments.
c) What is the underlying problem of Bengali medium students at NSU and how does the communication gap with faculty exacerbate these problems?

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LITERATURE REVIEW

Bengali Medium student faces different types of problems in terms of English listening, writing, reading, and speaking. For a language, these 4 parts are very important, if one of the four in missing then it will create problems in learning that language. "Writing is the most used skill in evaluating students' performance in almost all levels of education" (Yang & Jang, 2022). Bengali medium student faces numerous problems in English. "The proficiency level of English among students is very low due to their educational background" (Lee, 2019). Because of our passion for Bangla, English was never recognized as the second language though it is widely used, side by side, with our mother tongue. "But the problem was terming English as a subject, not a language, and for this reason, the nation has not yet an English-speaking generation" (Altavilla, et al., 2023). For taking English as a 'subject', the students of SSC and HSC do not have to face listening and speaking tests, though these are language skills. Every language has 4 skills: Listening, Speaking, Reading, and Writing. Our English education tests only Reading and Writing skills. For this reason, "the learners do not pay heed to Speaking. We know that speaking skills are a crying need for working at home and abroad" (Carvajal Regidor, 2020). That is why Bengali medium students suffer a lot in English in their whole life.

Because of a lack of skills in English, Bengali medium background has to suffer a lot from the communication gap with teachers and other students. Especially when we are talking about NSU this scene is very common here. This is the reason to not understand class properly. And simply this reason leads to bad results. And bad result leads to depression. And the stresses and depression that a student faces during exam time. "Depression and stress lead to behavioral problems and this is the cause of getting bad results (Ricker)" (Chang, 2022). "A report published by the *Centre for Enterprise and Society (CES)* has revealed that 62% of undergraduate students in Bangladesh are under extreme stress. 3 in 5 undergraduates 'stressed out'" (Ilieva & Waterstone, 2013). The research findings conclude that undergraduate students are stressed with their student life despite being satisfied with the overall university experience. In our country Bengali medium students are really dominated, sometimes they are dominated by English medium mates, and sometimes they are dominated by faculty. "The peer pressures from the English medium students who seem to be more advanced make the Bengali medium students less confident" (Çakmak et al., 2023).

MATERIALS & METHODS

For my primary research quantitative, the researcher conducted a survey of a representative sampling of the students in North South University Dhaka from Bengali medium. This was an online survey via Google Forms. The questionnaire consists of different type of questions to get a range of useful data which will help me to answer my research question. Total thirty students responded to this survey.

As for the secondary research qualitative approach, the researcher used an online research paper, book, and documentary. Mostly considered the fifteen peer-reviewed journals and other sources relevant to this topic. The whole paper is cited in compliance with the APA 7 professional paper format. Also, two interviews from the specialists in this field.

DATA PRESENTATION AND ANALYSIS

Quantitative Research Findings

The survey conducted for my research had some presentable data that added significant insights and value to the research. The researcher collected a sample of 30 students and put all the information correctly to make the analysis perfect. The researcher explained the results that the analysis brought me. The researcher also explained all questions with their results. In my survey, there were ten close-ended questions and two open-ended ones and all of the questions were closed questions that were related to my hypothesis.

When the question asked why Bengali medium students do not get class lectures properly. And 56.7% agreed with the option weak in English. So, 17 students out of 30 claim that weakness in English is the main factor in not understanding class properly which is conducted in English. And 20% of students agreed that faculty makes classes harder, according to these 6 students, faculty makes class harder which is why Bengali medium students do not understand class properly which is conduct in English. 17.7% did not agree with the statement. 5 of 30 think Bengali medium students understand class properly. And 2 students 6.7% out of 100 thinks that because of concentration Bengali medium students do not understand class properly which in conducted in English. Weakness in English was the main reason why Bengali medium students do not understand class properly which is in English.

Then researcher proceeded to second question researcher have to ask to the interviewees, do they think Bengali medium students facing problems coping with the environment of the NSU campus, 19 students 63.3% went with the option in the first few semesters, that's meant to cope with English medium institute Bengali medium students takes few semesters. This affects their CGPA, and that leads to feeling down. While 30% of students which means 9 students out of 30 said sometimes Bengali medium students face problems coping. And 6.7% claim that Bengali medium students never face problems coping with the environment. The good news is that not a single student out of 30 said that Bengali medium students always face problems coping with the environment. Then it means that after some semesters they can cope with the environment. So 63.3% of students claim Bengali medium student faces problems in the first few semesters.

When the question asked about the main factors, why Bengali medium students are facing problems with their faculty in terms of communication which purpose was to find factors creating problems between Bengali medium students and faculties in

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terms of communication. The data in the pie chart illustrates that 50% of people agree that less proficiency in the English language is the main factor. 33.3% of students said Bengali medium students were afraid to communicate with faculty. 10% claim because of shyness. And 6.7 % state that Bengali medium students don't get the proper environment to communicate with faculty. This survey proved that less proficiency in the English language is the main factor to why Bengali medium students are facing problems with their faculty in terms of communication. When a student has less knowledge about a language then the student would not have the confidence to communicate with faculties. When they have less confidence, they will feel shy as well as afraid to talk then there will grow a communication gap between students and teachers. This survey question answer states the same concept.

When the question asked whether Bengali medium students are satisfied with the study material which is in English the main purpose of putting the question in this survey is to know are Bengali medium students satisfied or not with their study material which is in English. From this question 56.7% of students go with neutral, they are not satisfied and dissatisfied. 26.7% were satisfied with this study material. 13.3% of people are dissatisfied.3.3% people are satisfied. So Bengali medium students don't have that much problem with their study material and find that around 57% of them are neutral, they have no problem with this material. Even 8 out of 30 are satisfied with the material, and 1 student out of 30 is very satisfied with the materials. But 4 of 30 were not satisfied with the material that's a lesser amount than the satisfaction rate. This question gives the idea that most Bengali medium students have neutral opinions in terms of study material that is in English, and then most of them are satisfied with the smaller number of students who are not.

When the question asked do you think Bengali medium students are neglected by English medium students. The reason for choosing this statement as a part of this research is that the researcher wanted to bring up the fact that, Bengali medium students are also neglected by English medium students. 36.7% of people state that sometimes Bengali medium students neglected by English medium students. 23.3% of people say always neglected. 20% people said yes they neglected and 20% not really. This question it's proves that Bengali medium students are neglected by English medium student because most of the students claim that they are dominated by English medium students. 80% of students go with the Bengali medium students treated negatively while only 20% students oppose of this statement. This question states that most of the Bengali medium students around 80% are negatively treated by their friends those who are from English medium backgrounds and few students don't agree with the statement.

When the question asked do English Medium students get favors from teachers. This question was to find out do English medium students get a favor. And this survey gives the proper idea and answer to it. 46.4% of students agree with this statement they said often English medium students get a favor. 25% of people directly agree with this statement. They said yes, English medium students get favors from the faculty. 21.4% said not really, like that can happen or not. 7.1% of people are against this statement. Most of the students think English medium students get favor from faculty, around 71% of students accept that English medium students get favor from faculty whereas only about 29% of students claim not really.

When this question is asked do, they think Bengali medium students get bad grades in English courses? The purpose of putting the question in this survey is to know do Bengali medium students get a bad grades in English courses. In this question 50% of people mean 15 people out of 30 go with sometimes, they said sometimes Bengali medium students get a bad grade in English courses. 23.3% means 7 out of 30 said often, they directly agree with this statement. 23.3% means 7 people said no. and 1 of them directly disagreed with this statement. 15 students say that sometimes but 14 of 30 agree with the statement that Bengali medium students get bad grades in English courses on the other hand only 1 student doesn't agree with this statement.

When asked to opinion on Bengali medium students get confused about the meaning of some words during lectures. This sole purpose is to find out do Bengali medium students get confused about the meaning of some words during lectures. 66.7% of people agree with this statement and 16.7% of people strongly agree with this statement. 13.3% of people state not really. And 3.3% said directly did not agree; therefore, during class 66.7% got confused about the meaning of some words during the lecture. That refers to the weakness of the understanding of Bengali medium students. About 83% of students agree that they don't understand or get confused about the meaning of some words during lectures whereas only 17% of them say that they don't get confused to understand any meaning of a word during classes.

When the opinion is asked in Bengali medium students are treated negatively by many faculty members of NSU. The purpose of this question was to acknowledge the fact of whether Bengali medium students were treated negatively or not. 50% of people agree with this statement. 33.3% of people do not agree or even not with disagree. 13.3% of people do not with this statement. 3.3% said always Bengali medium students are treated negatively by many faculty members of NSU. So, it is proved, that Bengali medium students are treated negatively by many faculty members of NSU. 16 students out of 30 agree that Bengali medium students are treated negatively by many faculty members of NSU, opposite of it 14 students out of 30 don't agree that Bengali medium students are treated negatively by many faculty members of NSU. So, it is proved that Bengali medium students are treated negatively by many faculty members of NSU, while English medium students get favor from the faculty.

When the question asked should Faculty members need to use easy words during their lecture**?** This question is to find out, do faculty members need to use easy words during their lectures,

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60% of people said always faculty need to use easy words during class. 36.7% said sometimes need to use it. 3.3% said no need to use easy words. The researcher asked this question to find the solution, here 29 students asked for a simple word or easy word while only 1 student opposed it. It also hints that faculties use tough words and Bengali medium students don't get them properly they need easy words to get the topic.

Qualitative Analysis

There were two open-ended questions. One is, do you think that Bengali medium students struggle in interacting with their faculty members and why?

Most of the interviewees said yes, they think Bengali medium students struggle in interacting with their faculty members. Some suggestions are:

Yes, because they are scared most of the time by thinking that what if the faculty is mean or won't pay attention to the student. Because they are not efficient in English...so they want to interact. They have a constant fear of getting mocked by students of English medium background. That's why they hesitate, and cannot make the right choice of words when they try to interact with their faculty members. They sometimes utter something negative that they don't even mean or fail to make their faculty members understand what they want to say. In this case, faculty members sometimes may misinterpret their words. Some students know English well, but during the time of speaking their passive vocabularies do not work.

They should speak Bangla to their faculty members. For their class lectures and slide creation, professors ought to use simpler synonyms. For a group discussion in English, their faculties should allot them ten to twenty-five minutes. Finally, they believe that by practicing their English with friends, they can become better people and that their faculties will be able to assist them in solving this difficulty.

2nd open-ended question: How Bengali medium students can cope with NSU and faculty members, in your opinion? First, the students have to practice speaking English and the faculties also have to have simple English language so that the students can understand**.**

Students should try to improve their proficiency in English and a friendly attitude from faculty members can be helpful in this regard. To make good relations with faculties, they need English skills. Make good friends with English medium background students. Who can guide you well to overcome this problem? So, these were the suggestions most important suggestions or short answers from the researcher's interviewee.

There were two interviews in this research. Two teachers of the English department who took the introductory level courses give their valuable input on this issue. In the first question researcher asked, do you believe the communication in the English language between you and your students matters a lot while you grade their script? In this response, two teachers agreed with this part. Senior lecturer claimed that without communicating in English, he did not allow his students to raise anything in the class, and students who were fully in the English language got more edge in terms of grading as they marked themself positive vibes in the classroom. Another instructor said that he also does not allow his students to speak in other languages in the classroom in terms of communication. He also added that during his offer hours, he also maintained this. In addition, while grading he also takes it as a factor. In the second question, teachers are prioritizing the communication medium rather than the context of the lesson. In this part, both teachers said that it is part of the learning. Even if the students are falling and demotivation; they will not change any form of teaching method because this has a connection with their grading system. After that, the researcher asked the teacher whether they do anything when they find students are struggling to following this lecture. They said they did not bother about it. It's the student's responsibility to deal with it. Further, the researcher also interested to know if they have any suggestion to solve this problem. Both of them said it varies from students to students. They suggest that students should spend more time on language and communication skills, this will help them to achieve proficiency in the language. After conducting the interviews, it is a clear indication that students are struggling and they are not treated negatively.

DISCUSSION & RECOMMENDATION

After analyzing the data, the researcher can surely say that Bengali medium student faces problems in university, and they are negatively treated by some faculty and English medium students as well. And it affects their learning. This research helps me to find out some of the problems of Bengali medium background students at NSU. Most of the students are not that much fluent in using English. So, they are having problems with speaking, writing, listening and reading. Some of the students are having problems understanding the class lectures, some of the students are having problems with their exam scripts, some of the students are having problems with their study materials and most of them are having problems with giving presentations. The Bengali medium background students are facing more problems in speaking and presenting. In NSU every student needs to present every semester no matter from which department the student is. Most of the Bengali medium students are having trouble. Bengali medium faces problems in choosing major courses. "They choose those courses where they have to participate in fewer presentations" (Seargeant & Erling, 2011). Bengali medium student faces all of these problems in their varsity life and for this reason; their studies and outcomes are getting affected.

After collecting the survey data, the researcher thinks the students are seeking help from the faculties. If the faculties help them they will overcome this fear of English. In most of the cases, the researcher found that students avoid asking questions because of the fear of using English while talking to the faculties. Even when they do not understand any topic properly they never asked that to that faculty. For this, they are having problems with almost

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every topic. Their results are also hampering for this reason. They cannot answer the questions properly in class or even in exams. It is a very common problem. The viewpoint of the researcher is to use easy synonyms during the class lecture and sometimes using Bengali words is necessary for the faculties. If the faculty uses Bengali words, then the students won't be afraid to ask questions or to communicate with the faculties. It will be really helpful and beneficial for Bengali medium students of NSU. The researcher believes that varsity faculties will be concerned about this problem and take the proper easy steps to reduce the fear. Besides these, the students should also take some steps such as, increasing vocabulary, trying to use English for a whole conversation with their friends, and practicing more writing and reading. Additionally, every university ought to start a group like this where students who speak Bengali and English can join together and support one another. Additionally, a teaching member ought to be able to mentor them in effective communication and coping mechanisms. A student can quickly adapt to the surroundings and culture if there is this kind of group. Anyone is welcome to join the club and discuss anything there. If this kind of environment persists, Bengali-medium students will feel comfortable speaking out, expressing themselves, and interacting with peers and teachers. Every university also should take steps to reduce the problem. In the academic curriculum, they can add some free courses that are based on English. Where they can teach a non-English-medium background student English. They can conduct this course before the main academic journey starts. It will boost a Bengali-medium student lot. They can get the confidence to do well in academic life. By doing all these things, the researcher thinks Bengali medium students can be good in English which is the main problem they are facing at university. Secondary data were gathered from a variety of websites, online journals, and papers, among other sources. However, because there isn't much research in this area, gathering secondary data was challenging. On this subject, no books existed. The researcher therefore devoted all of my attention to reading articles on the internet, which was also extremely uncommon.

CONCLUSION

After conducting this research, the researcher can conclude that the researcher's hypothesis has been proven correct that most of the time Bengali medium students are treated negatively by faculty members and English medium students as well and thus affecting their results. Throughout the whole research researchers have found lots of problems that Bengali medium student faces among them most important thing is that they are less confident of using English while speaking or writing. Because they did not get much option to practice English or they did not. If they properly practice English then they might be able to get the confidence of using English in every sector. "Researcher does not get much secondary data to access my entire paper is based on the primary data" (Seargeant et al., 2017). The researcher collected the data from the students who are having trouble at NSU. According to the students, practicing English and their faculty might be a great option to help them. Faculties have a lot of options to help those students. Those students are helpless at some point especially those students who are newly admitted to NSU. Faculties should be more careful towards them. Also, the students should hard be working at the same time. "Students should be able to overcome this issue with the support of extracurricular activities and a language club and other extracurricular activities" (Goldshtein et al., 2024, June). Additionally, there is a counseling session for all students. Students from English-medium backgrounds can learn how to accept those from non-English-medium backgrounds, as well as how to act and support them. Faculty members can also teach Bengali-medium students coping mechanisms. "Pupils can communicate with professors and all pupils will benefit from that" (Çakmak, et al., 2023). Then the students will be able to cope with all the problems. Throughout the paper, researchers found the problems Bengali-medium students face problems in an English-medium university, and also the researcher suggested some ideas on how to get rid of this problem. If the non-English medium students work hard with the support of faculties and English medium students, Bengali medium students can overcome this issue.

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EXPLORING THE PRICING STRATEGIES OF VEGETABLES VENDORS

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ABSTRACT
Pricing is one of the determining factors in assessing gross sales and profit, especially in vegetable vendors. Pricing techniques shall be assessed to reach long-term profitability. This study examines how vegetable vendors of Bongao Public Market decide on prices. Five standard pricing methods were explored, including adding a markup to costs, pricing based on competitors, setting prices according to perceived value, setting high prices then lowering them over time, and adjusting with low prices to gain market share. Fifty respondents were chosen to participate in this study through simple random sampling. This study used surveys, interviews, and market observations.

The findings show that vendors are aware of pricing techniques. They use different strategies depending on factors like production costs, competition, and customer preferences. This study aimed to help vendors and others in the vegetable business make better decisions by understanding these pricing methods and their effects.

KEYWORDS: *Pricing, Pricing Strategies, Vendors, Vegetables Vendors*
JEL Classification: A12, M39, Q11

INTRODUCTION
Vegetable vendors have encountered various rudimentary problems with their business, such as a marketing system constrained by unfair product pricing by brokers (Bekele et al., 2016), no permanent place for selling (Choudhary & Raghuwanshi, 2021), and the challenge of bargaining to reduce the price and collect the credit payment from customers (Amballoor, 2023), which leads to low profit for the vendors (Chandralekha, 2021). In addition, vendors have also experienced tight market competition and unpredicted consumer preferences (Buhion, 2023).

Product pricing is part of the marketing system that can affect low sales and income for the vendors. Vendors shall create strategic pricing to satisfy the customer by delivering the best value and underpricing satisfying products (Nagle & Müller, 2018). Due to the inflation rate, customers are more price-sensitive when they allocate a budget for their daily expenses. It is challenging for market vendors to create strategic pricing so that customers still purchase these basic commodities. With stiff market competition and sudden changes in customer preferences, marketers have additional positive encounters to remain playing in the market. In the end, the decision of the vendors must agree with their sales objectives for long-term profitability.

In the Philippines, vegetable vendors shared their frustration with dropping earnings. They experienced slow sales (Usigan & Primero, 2024). In addition, their capital was borrowed from banks, cooperatives, or other financial institutions. They expected to earn more profit; however, they experienced breakeven, and some were losing their income. Some were due to competition and price fluctuations (Mercado, 2018).

The price changes of some basic commodities and gasoline might affect consumer purchasing behavior. Consumers might increase their price sensitivity when purchasing basic commodities. These changes also affect price competition, which leads to either decreasing or increasing prices. Vendors shall create a calculated pricing strategy to earn revenue.

OBJECTIVES
This study aims to delve into the intricate pricing strategies used by vendors in Bongao Public Market, with a specific focus on the vegetable sector. The primary objective of this research is to identify the prevailing pricing strategies utilized by vendors and to examine the factors driving their adoption and implementation (Tetiana, 2023). By gaining insights into the pricing behaviors and underlying motivations of vendors, this research seeks to elucidate the intricacies of pricing dynamics in agricultural markets and offer actionable insights for academics,

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policymakers, industry stakeholders, and a broader audience interested in agricultural economics or market dynamics.

In addition, the result of this study provides information that vendors' decision in creating strategic pricing management might anchored from this study. This is an opportunity for the academe to create sustainable programs for this industry.

LITERATURE REVIEW

Vegetable Vendors

Importance and Impact of Market Vendors

Market vendors and traders play an essential role to the urban economies where they offer easy access to affordable retail and wholesale goods and services. Vendors are usually selling vegetables, garments, electronics and gardening tools (WIEGO, n.d.). They sell located at public spaces, including booths or built market (Vanek et al., 2015).

Market trading provide another substitute of source of income for their families and school expenses for children. It gives informal jobs and generate taxes, including permits, licenses, fees and fines. Despite the impact of this trading, they also faced various challenges that are overlooked by economic agent, where supposed to be help by the municipal policies and practices (Roever, 2014).

In Ghana, there were 29 per cent of total urban employed in street vendors and market traders. However, 39 percent and 10 per cent of women and men, respectively, were engaged in market trading in 2015 (Baah-Boateng & Vanek, 2020). In eight major South African metro areas, market traders are composed of one per cent women and men, wherein five per cent of total urban employment in 2018 (Rogan, 2019). Moreover, market traders and street vendors were comprised of eight per cent of total urban employment (Raveendran & Vandek, 2020).

Motivation of Vegetable Vendors

Poverty is one of the major predicaments in the world. Country to country find major ways to solve and fight this problem. The data relies on each country's national household surveys, which have differences across various countries (Hasell et al., 2022). According to the World Bank Group (2024), around 700 million individuals live on the extreme poverty line, with an income of less than $2.15 per day. Because of poverty and lack of educational attainment, Indians invested in and indulged in the vegetable vending business (Jaishankar & Sujatha, 2016). An estimated workforce of over 25 percent is in the vending business (Manikandan & Ramamurthy, 2019). In addition, the Tanzanian locals believe engaging in vegetable vending can address poverty by generating revenue (Mkwizu, 2023).

In the Philippines, the poverty incidence in 2023 was 10.9 percent, meaning Filipino families did not have enough income to meet their basic food and non-food needs (PSA, 2024). Small enterprises such as vegetable selling can mitigate poverty (Vandenberg, 2006). The business provides money for daily needs, lessening the poverty incidence in the country.

Vegetable vendors play a significant role in the informal economy (Orlale et al., 2022) and help develop the urban economy through taxes, licenses and permits, fees, and fines (WIEGO, n.d.). It also provides money for their family members, especially their children's education, and increases living conditions (Tigari & Anushree, 2020; Kumar et al., 2023). It gives informal jobs for low levels of education and skills and solves livelihood problems (Jaishankar & Sujatha, 2016). It also provides lower valuable prices for the urban poor (Neary, 2018). The country's high unemployment rate can help this business through additional income for their family members.

The study explores vegetable vendors' pricing strategies and awareness in Bongao, Tawi-Tawi. It helps the informal sector make their businesses sustainable, which creates opportunities for a sustainable community on SDG No. 11 and reduces poverty on SDG No. 1.

Conceptual Framework

Pricing strategies are fundamental to the functioning of markets (Anderson et al., 2022) and profoundly influence consumer behavior. Pricing is an essential aspect of marketing. Effective pricing creates significance in the market, resulting in financial success (Nagle & Müller, 2018).

This framework encompasses various models, including the awareness of pricing strategies and their use by vegetable vendors (Figure 1). This study started by investigating the level of awareness of pricing strategies. The pricing strategies include cost-plus, competitive, value-based, pricing skimming, and penetration pricing, analyzing their applicability and effectiveness within public market contexts (Aman, 2022).

In cost-plus pricing, vendors set prices by adding a markup to the cost of producing or acquiring the product. The markup covers the production costs and allows for a desired profit margin (Hanson, 1992; Kaplan & Anderson, 2007). This strategy ensures that vendors cover their expenses and generate a profit.

Competitive pricing refers to adjusting prices based on competitors' prices (Nagle & Müller, 2018). Vendors examine the prices of competitor's similar products and then set their prices accordingly to remain competitive. This strategy aims to attract customers by offering prices comparable to those of competitors.

Value-based pricing is determined by customers' perceptions of the product. Vendors set prices based on the benefits and value that customers attribute to the product rather than solely considering production costs (Kienzler, 2018). This strategy allows vendors to capture the maximum value that customers are willing to pay for the product.

Pricing skimming involves setting high initial prices for new or innovative products and gradually lowering them over time

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(Spann et al, 2015). This strategy targets early adopters and customers willing to pay a premium for new features or technology. As demand stabilizes, prices are lowered to attract more price-sensitive customers.

Penetration pricing involves setting low initial prices for products to quickly gain market share and penetrate the market (Ali & Anwar, 2021). This strategy aims to attract price-sensitive customers and discourage competitors from entering the market. Once a foothold is established, prices may be gradually increased to reflect the product's value (Spann et al., 2015).

Each strategy has advantages and challenges, requiring vendors to carefully evaluate market dynamics and consumer behavior to determine the most effective approach for driving sales and maximizing profits in Bongao's vibrant marketplace.

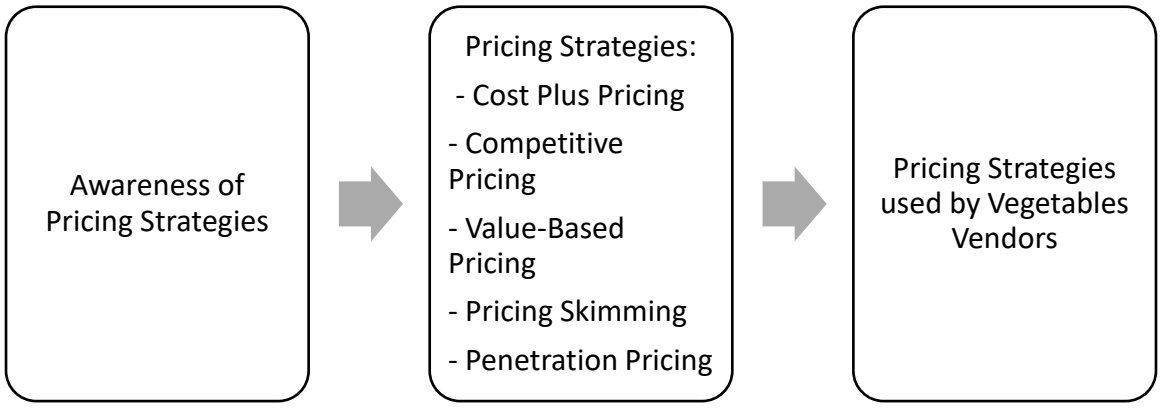


Figure 1. Conceptual Framework of Exploring Pricing Strategies

Public Markets

Public markets, whether ordinary or located in distant places such as Bongao Public Market on secluded islands, play vital roles as centers for trade, socializing, and sharing cultural experiences (Morales, 2009). While both share roles in local economies and cultural preservation, they differ in accessibility and market dynamics (Balsas, 2020). Urban markets, renowned for their easy access and wide variety of goods, cultivate lively economic and social settings (Morales, 2009). In contrast, Bongao Public Market faces challenges due to its isolated location, impacting accessibility and infrastructure. Market dynamics vary, with typical markets experiencing higher competition and turnover compared to Bongao Public Market's potentially limited customer base. Understanding these distinctions is crucial for policymakers and stakeholders to tailor strategies supporting both types of public markets in their unique contexts (Evanschitzky et al., 2020). While typical markets may boast bustling activity and diverse goods, Bongao Public Market serves as a testament to resilience, overcoming geographic barriers to sustain local commerce and community life. The comparison between regular public markets and Bongao Public Market highlights the varied factors influencing these important community areas. Market dynamics, pricing strategies, and factors influencing pricing decisions vary significantly, influenced by geographic location and local context. Understanding these intricacies is crucial for vendors to navigate market competition and make strategic pricing decisions effectively. By synthesizing existing literature on pricing strategies and their determinants in public markets, we gain valuable insights for enhancing market efficiency and competitiveness in Bongao Public Market.

MATERIALS AND METHODOLOGY

The study was conducted at the local Public Markets of the Municipality of Bongao, Tawi-Tawi, in the Southernmost tip of the Philippines. It is a cornerstone of economic activity, particularly in the trade of fresh produce, notably vegetables. There is one primary and one little public market in the municipality. Within this market ecosystem, the pricing decisions made by vendors hold significant sway over market dynamics, vendor profitability, and consumer access to essential goods (Elmaghraby et al., 2015). This study aims to explore the awareness of vegetable vendors in Bongao, Tawi-Tawi

The municipality's licensing office registers 90 registered vegetable vendors. This study used simple random sampling to obtain a sample size of 50 vendors.

A structured questionnaire was used to gather information and insights from the respondents. Vendors will answer a structured questionnaire, responding to closed-ended inquiries concerning pricing techniques, strategies, and factors influencing their pricing decisions. Additionally, a limited number of open-ended questions will allow vendors to provide qualitative insights into their pricing practices.

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The survey questionnaire has three parts that serve as a guide for inquiry. These include the personal profile, business profile, and pricing strategies used by the respondents. Common inquiries include awareness of pricing strategies and vendors' standard pricing strategies and practices. By addressing these questions, we aim to contribute to a deeper understanding of pricing mechanisms in agricultural markets and provide practical recommendations for enhancing market efficiency and competitiveness.

Descriptive and inferential statistics were used to analyze and present the data. A descriptive statistic summarizes the data using frequencies, percentages, means, and standard deviations.

RESULTS AND DISCUSSION

This study explored the respondents' awareness of pricing strategies and identified their strategies. The 50 respondents provided relevant information on the questionnaire queries.

Personal & Business Profiles

Age, sex, and civil status are essential to assessing the economic opportunities for poverty and unemployment reduction in every sector of the vegetable vending business. In Bongao Public Market, the average age of vegetable vendors—respondents—is 38.96. Table 1 highlights the basic demographic profile of the respondents. Most of the participants are married. More than half of the respondents are female, 54%, compared to male, 45%.

Table 1. Demographic Distribution in terms of Civil Status & Sex

Civil Status	F	%
Single	1	2%
Married	48	96%
Widow	1	2%
TOTAL	**50**	**100%**
Sex		
Male	23	46%
Female	27	54%
TOTAL	**50**	**100%**

The educational level is essential for adopting effective pricing strategies for their business. Table 2 shows the educational level distribution. 28% of the respondents graduated from college, and 30% have reached the college level. Some vendors still need education, with 6%

Table 2. Educational Attainment Distribution

Educational Attainment	F	%
No Degree	3	6%
Elementary Level	5	10%
Elementary Graduate	4	8%
High School Level	3	6%
High School Graduate	6	12%
College Level	15	30%
College Graduate	14	28%
Master's Level	0	0%
Master's Graduate	0	0%
TOTAL	**50**	**100%**

This study also assesses the primary source of income among vegetable vendors. The respondents' primary source of income is the vegetable vending business (Table 3). The average years of business operation is 12 years, with an average initial investment of PhP 27,756.00. Their average daily income is PhP 4,924.00.

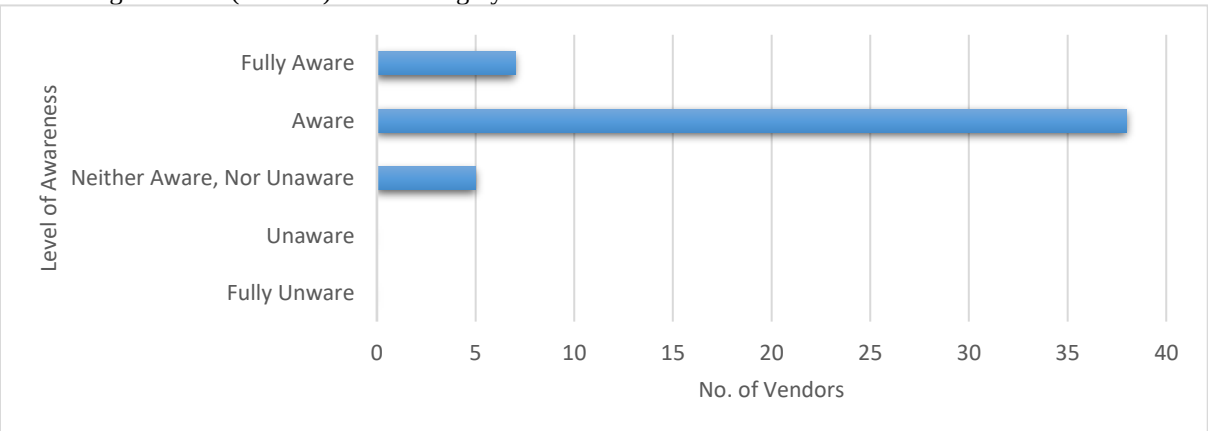


Figure 2. Pricing Strategy Awareness of Vendors

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Table 3. Primary Source of Livelihood

Primary Source	F	%
Yes	49	98%
No	1	2%
TOTAL	**50**	**100%**

Pricing Strategies Awareness

Awareness of the pricing strategies is essential to understanding the vendors and how they attract and retain customers. Figure 2, the respondents' awareness of the pricing strategies: 14% of the respondents were fully aware of analyzing various pricing strategies in the business. While 76% were aware, and 10% were neither aware nor unaware. Most vendors are either aware or fully aware of pricing techniques, with only a small percentage being neither aware nor unaware. It suggests a relatively high awareness among the vendors regarding various pricing strategies.

Pricing Strategies

All vendors reported using cost-plus pricing. 49% of the respondents used competitive pricing strategies for their products. Additionally, a notable proportion employed value-based pricing (54%), while fewer utilized pricing skimming (32%) and penetration pricing (36%) strategies. Cost-plus pricing and competitive pricing are commonly used by all vendors, indicating that these are the most common strategies. Value-based pricing, pricing skimming, and penetration pricing are also used, but to a lesser extent.



Figure 3. Pricing Strategies Implemented by Vendors in Bongao Public Market

CONCLUSION

Pricing is essential for vendors to achieve long-term profitability. To achieve this goal, vendors must have a solid pricing strategy to retain customers and maintain long-term engagement. This study helps vendors become aware of solid pricing strategies despite external and internal factors. Moreover, it explores the pricing strategies employed by vendors in Bongao Public Market.

A detailed survey of the respondents found that most are aware of various pricing strategies and predominantly use cost-plus and competitive pricing. The respondents are aware of the pricing techniques but need more relevant information to understand how to develop pricing strategies.

All female respondents use cost-based pricing, while male respondents use cost-based and competitive pricing. Females calculate their cost of goods sold as the determining factor for markup, while males ask other stores for pricing.

Recommendations

Based on the findings of this study, the following recommendations can be made:

Enhance Vendor Awareness and Training. Given the high awareness of pricing strategies, continuous training programs can help vendors refine their skills and adapt to changing market conditions. Training should focus on advanced pricing strategies and market analysis techniques.

Strengthen Market Information Systems. Providing vendors with up-to-date information on commodity prices, market trends, and consumer preferences can help them make more informed pricing decisions. Implementing a market information system within the public market could facilitate this.

Encourage Collaboration Among Vendors. Encouraging vendors to collaborate can help them negotiate better prices for their inputs, share market information, and collectively respond to competition. Forming vendor associations or cooperatives could be beneficial.

Policy Support and Regulation. Local government units should consider providing support through subsidies, tax incentives, and rgulations that stabilize market conditions. Policies to reduce the cost of commodities and support sustainable business goals can positively impact pricing strategies.

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THE SECOND WORLD WAR IN THE EASTERN INDIAN FRINGES: THE CASE OF TRIPURA

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ABSTRACT

From the dawn of human civilization, the history of mankind has recorded multiple events of conflicts, battles & wars. But it has never witnessed something destructive & devasting like World War II (1939 -1945). This global conflict between Allied & Axis powers lasted for 2191 days, involving as many as 110 million armed soldiers from 72 nations. At least 50 million people lost their lives in this great war among them 28 million were innocent civilians. Major cities across Europe and Asia, including Berlin, London, Warsaw, Tokyo, and Hiroshima, were extensively bombed and reduced to rubble. In the initial stage, the war was only confined to European nations though their colonies in Asia & Africa were indirectly affected severely. But with time, the African colonies caught fire from this war and in later stages, it spread all over Asia. India, being a British colony at that time was pushed into the war by its colonial masters who looked over the will of Indian masses. The British Government exploited India's valuable resources and labour force for the War preparations. The heat of the war also reached Tripura, a small princely state under the British Suzerainty. The involvement of Japan in the Second World War and its hasty advancement on the eastern front changed the whole scenario of the war from the Indian perspective. The fall of Burma at the hands of the Japanese brought the war to the very door of India. As a result, Tripura and the northeastern region fell under the direct threat of the Japanese offensive. In this paper, I have attempted to sketch a picture of Princely Tripura of that time concerning the Second World War. Here I have discussed extensively about the threat of Japanese invasion, economic strains, military organizations, war preparations, and other administrative activities in the state, all centred around the Second World War. In the middle of the war, the Congress-led 'Augst movement' or 'Quite India movement' increased difficulties for the trouble-torn British Raj. The turmoil created all over the country by the 'Quite India Movement' also impacted the state of Tripura. Here I also tried to track down the events related to the 'Quite India Movement' in Tripura during the war and how the ruling class of princely Tripura met those challenges. In a nutshell, through this paper, an attempt has been made to shed light on the relevant events, that took place in princely Tripura during the Second World War and analyse different events & developments related to it from various socio-economic and political aspects. Nevertheless, this paper is a small initiative for the history enthusiast to enhance the understanding of the role of Tripura in a global phenomenon like World War II and to reconstruct the events in a systematic way to conduct further study.

KEYWORDS: *Allied power, Axis power, Tripura, British suzerainty, Northeastern India, Invasion, Burma.*

INTRODUCTION

Tripura is one of the seven sisters of northeast India. Before merging with the Indian Union in 1949 it was ruled by as many as 185 Kings of the Manikya family who used to claim their descent from the legendary Lunar lineage. From being a 'C' category state to a Union territory of India and from a Union territory to a full-fledged state, the people of Tripura have witnessed a long path of constitutional transition. Before all these developments, it was a princely state under the British Suzerainty. The reign of Maharaja Birchandra Manikya marked the beginning of the modern era in Tripura. The notable rulers who ruled the state after him were Maharaja Radha Kishore Manikya, Maharaja Birendra Kishore Manikya & Maharaja Bir Bikram Kishore Manikya respectively. During the Second World War, Maharaja Bir Bikram Kishore Manikya was the ruler of Tripura. He is also known as the 'architect of modern Tripura' for his visionary policies and immense contribution in transforming Tripura. Tripura was indirectly involved in the Second World War along with the British army engaged in the eastern Indian frontiers. Due to this involvement, Tripura witnessed multifaceted effects in different spheres especially in the politics and economy of the state. This paper attempts to unravel the War-related developments during that time and how a global event like World War II left its mark on a frontier state.

India in World War II

In the initial years of conflict, the Britishers pushed India into the war against the will of its people. Enemies of Britain were not present on the Indian frontiers. However, the scenario changed after the Japanese involvement in the war. On 7th December 1941, the Japanese invasion of Pearl Harbor brought the war in Asia. This incident became a pivotal moment in World War II as it provoked the United States to formally enter the conflict the following day, declaring war on Japan. In the Eastern frontiers, Japan tasted some early and significant success. Japanese army hastily overran British Malaya and captured the strategic British stronghold of Singapore, an impregnable fortress. The fall of Singapore was a considerable blow to British prestige and control in Asia. After conquering the Philippines, the Dutch East Indies and Hong Kong, Japan invaded and occupied Burma, threatening British India. The eastern frontier of India became a heated battleground

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overnight. The first Japanese air raid on Calcutta took place on 20th December 1942, adding problems to the Britisher's fate.

To put a check on the enemy and save Britain's most valued possession, India, the Britishers took all possible measures and preparations. In 1939, the strength of the British India Army was 1 lakh 81 thousand, which had gone up to 25 lakhs in 1945. Similarly, the strength of the Royal Indian Navy & the Royal Indian Airforce reached up to 30000 each from 2300 & 1600 respectively. To train 4 lakh 70 thousand armed forces at once, 70 new training centres were established. More than 200 airfields and 7 fully functional major airports were commissioned. The 800-mile capacity of the Bengal-Assam Railway was quadrupled. At the time of war, 6500 ships of 3 crore 88 lakh 40 thousand tones were repaired in 56 factories of the country.

Indian Army in 1945 as follows:	Numbers (In Person)
Indian Armoured Corps	31000
Royal Indian Artillery	83000
Indian Engineer	263000
Indian Signal Corps	68000
Indian Medical Corps	167000
Royal Indian Army Service Corps	360000
Indian Army Ordnance Corps	64000
Indian Army Electrical & Medical Engineer	99000

In 1909, the number of commissioned Indian officers in the Army was 1115. And in 1945 this number increased to 15740. During the war, the Indian Army suffered a large number of casualties. At least 24338 soldiers were killed, 64354 armed personnel were injured, 11754 army men were gone missing and 79481 people were made prisoners of war. In the Second World War, the Indian Army won 31 Victoria Crosses, 27 of these were awarded for exceptional gallantry in the Burmese War. Apart from these, 20 more gallantry awards were won by the Indian Army. A total number of 4208 awards were presented to the Indian Army for displaying unparalleled bravery in the war.

Tripura in World War II

Before World War II, Maharaja Radha Kishore Manikya visited Europe thrice. His third voyage to Europe was forced to be a world tour due to breaking out of the Second World War. The tour was full of adventure, anxiety & risk. Maharaja and his companions returned to Calcutta safely on 24th December 1939.

Maharaja's Policy regarding World War II

"His Highness who was en route to America when War was declared against Germany on 3rd September, 1939, wired to the Viceroy immediately on arrival in New York, placing his personal services and the entire resources of the State at the disposal of His Majesty's Government."[1]

So, it was crystal clear from the beginning of the Second World War that the Maharaja of Tripura was readily available to help and render his services to Great Britain in this global conflict when it was not knocking at India or Tripura's door and was only limited to far West.

"The King with all his associates came back to Agartala on 11 Magh 1349 T.E. (25 January 1940). By an order dated 11 Magh 1349 Tripura era (25th January 1940), all political activities and propaganda were strictly prohibited in Tripura."[2]

After making a safe comeback home, Maharaja's policy to prohibit all political activities and propaganda immediately within the state reflected his concern for the British Government. This prohibition order was simply a testimonial to Maharaja's attempts to repress anti-British forces within his territory during such crisis hours.

"It was also decided to increase the strength of the Armed Police and Militia at an estimated expenditure of Rs. 50,000 in view of the possible utilisation of the regular State troops on duty outside the State, for which offer had promptly made."[3]

Maharaja's decision to strengthen and enhance the Army-police force along with the creation of the militia in various parts of the state indicates that he might have expected an upcoming conflict in the east Indian frontier.

"A War committee was also established under His Highness's orders dated the 19th Magh, 1349 T.E. (2nd February, 1940) more or less for the same purpose for which District War committees in British India were formed."[4]

An internal security and A.R.P and Civic Defence Schemes were prepared and organizations initiated or set up including Civic Guards. The state adopted all laws and rules relating to the war including those for rationing and control of various commodities and civil supplies. Defence of India ordinance and similar other legal measures had been adopted so far as the conditions in the state necessitated. It was declared that, "As his Majesty's Government is at war with Germany, it is hereby ordered that any potential hostile foreigners entering into or

[1] *Bodhjung, R Bodhjung, Rana, Tripura State Consolidated Administrative Report, 1937 – 1940, p. 14*
[2] *Gan-Chaudhuri, Dr. Jagadis, A Constitutional History of Tripura, p. 290*
[3] *Bodhjung, Rana, Tripura State Consolidated Administrative Report, 1937 – 1940, p. 14*
[4] *Bodhjung, Rana, Tripura State Consolidated Administrative Report, 1937 – 1940, p. 15*

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living in Tripura state be arrested at once and kept in custody pending orders of the Political Department."[5]

"In 1941, Tripura witnessed abnormal situation. The Maharaja in his message to the people explained the position of Tripura and its attitude with a view to call up the full energy of the people for vigorous activities in aid of Great Britain in the War."[6]

From all these activities it is evident that as a Princely state under British suzerainty, the ruler of Tripura gave his full sup port and co-operation to the British Government.

High prices of Commodities Due to War

The extreme demand of the Great War had an adverse economic effect all over British India in the form of rapid price rise, famine, exploitative taxes & inflation. The heat of economic evils could be felt in Tripura too.

"Price of rice rose gradually from the second year of the triennium till they reached abnormal proportions towards its end, those of other commodities also evincing a substantial rise, while shortage of stock and high prices in the adjoining British district had their reaction in the State and gave strong impetus to export and smuggling. The changed condition of the rice market came in, no doubt as a matter of relief to the agricultural population and perchance of gain to middlemen and traders, but the landless classes with a limited income were soon thrown on the verge of breakdown. Wages of labour also went up, in spite of a rapid influx of labour population, the normal demand being considerably affected by new and attractive sources of diversion."[7]

In 1943, a disastrous famine broke out in Bengal. The government of Tripura made vigorous campaign with the slogan: **Grow more food**. From Bengal numerous Muslims infiltrated into Tripura in swarms."[8]

In addition to these, public health turned unsatisfactory with the outbreak of malaria, cholera, dysentery, and smallpox. Cattle diseases caused havoc in some places and proved a grave menace in the complications of the economic situation.

Maharaja already constituted a committee of nine members on 18th Magh, 1349 Tripura era (February, 1940) to take precautions against abnormal price-rise and to keep people informed all about the war and also to collect donations to be given to the war fund.

Monetary contributions by Maharaja in Great Britain's war efforts

From the beginning of the war, Maharaja had placed all the resources of the state and his service at the disposal of the crown. Towards the end of 1939-40, an announcement was made of contributions in various war-related funds.

In 1940 the following donations to the war fund were made:[9]

Indian Red Cross Society	20,000/-
St John Ambulance Association	20,000/-
St. Dunstan's Fund	20,000/-
Viceroy War purpose fund	30,000/-
Miscellaneous	88,755/-

The following donations to the war fund were made in 1941:[10]

Indian Red Cross Society	20,000/-
St John Ambulance Association	20,000/-
St. Dunstan's Fund	20,000/-
Viceroy's War purpose fund	30,000/-
Miscellaneous	1,26,716/-

The following donations to the war fund were made in 1942:[11]

Indian Red Cross Society	20,000/-
St John Ambulance Association	20,000/-
St. Dunstan's Fund	20,000/-
Viceroy's War purpose fund	30,000/-
Miscellaneous	2,11,488/-

[5] *Roychoudhury, Nalini Ranjan, Tripura Through the Ages, p. 64*
[6] *Gan-Chaudhuri, Dr. Jagadis, A Constitutional History of Tripura, p. 291*
[7] *Bodhjung, Rana, Tripura State Consolidated Administrative Report, 1940 -1943 p.1*
[8] *Gan-Chaudhuri, Dr. Jagadis, A Constitutional History of Tripura, p. 295*
[9] *Gan-Chaudhuri, Dr. Jagadis, A Constitutional History of Tripura, p. 291*
[10] *Gan-Chaudhuri, Dr. Jagadis, A Constitutional History of Tripura, p.292*
[11] *Gan-Chaudhuri, Dr. Jagadis, A Constitutional History of Tripura, p. 293*

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The following contributions were made to the war fund in 1943:[12]

Indian Red Cross Society	20,000/-
St John Ambulance Association	20,000/-
St. Dunstan's Fund	20,000/-
Viceroy's War purpose fund	30,000/-

The following donations to the war fund were given in 1944:[13]

Indian Red Cross Society	20,000/-
St John Ambulance Association	20,000/-
St. Dunstan's Fund	20,000/-
Viceroy's War purpose fund	30,000/-

During this tenure investment in 3% Defence Bonds stood at 1,25,000/- by the state, Rs. 1,49,000/- by Maharaja personally and Rs. 21,000/- by local Banks. Apart from these, the annual rent for the polo ground at Comilla occupied by Indian Army troops amounted to Rs. 9,540/- was remitted by his highness Maharaja Bir Bikram Kishore Manikya. Huge quantities of materials like timber, bamboo, cane and other forest produce were supplied for extensive roads and military constructions in and outside of the state.

Taking action on the Government of India's request Maharaja Bir Bikram allowed the Famine Inquiry Commission to use a portion of Tripura House, Calcutta in 1944. Again, at the request of the Government of Bengal, he permitted the Bengal Administrative Inquiry Committee to use a few rooms of Tripura House, Calcutta.

Mid-War Events in Tripura.

The Fall of Burma at the hands of Japan had brought the war to the very door of India. The world war was no longer a distant land phenomenon. The whole northeastern region including Tripura came under the direct threat of the Japanese invasion. Most of the ladies and children of the royal family were already sent to Baria in Maharashtra and Panna in Madhya Pradesh suspecting the danger at an early stage. The first Japanese air raid on Calcutta took place on 20th December 1942. To check Japanese advancement further, preparations were made along with the eastern borders. Thus, Tripura came under the warring zone.

The Japanese air raid on Agartala airport took place on 20th November 1943. Overnight Agartala turned into a battleground. Hundreds of British, Indian and Negro soldiers camped in and around Agartala. The pressures of modern warfare compelled rapid changes and road construction. Maharaja Bir Bikram deployed Tripura troops in Chittagong Hill Tract, Arakan and Burma to cooperate with British-Indian Troops in checking the Japanese advancement.

In June 1942, Maharaja organised Tripura Rajya Rakshi Bahini, Chaudda Devatar Dal, Palli Rakshi Samiti, and Palli Rakshi Dal. All these home guards and village guards had their units in every village. It was a sort of militia arrangement in case of the enemy's advancement to the interior part of the state. In August 1942 Maharaja Bir Bikram was promoted to the honorary rank of Major in His Majesty's regular army.

In October 1943 Lord Wavell succeeded Lord Linlithgow as Viceroy of India. A disastrous famine broke out in Bengal in the same year which impacted the princely state of Tripura too. The Government of Tripura stressed growing more food to combat famine. An ample amount of Muslim immigration took place in Tripura from adjoining Bengal province.

In 1943, Tripura virtually became an active battleground and was subjected to the Japanese offensive including air strikes and heavy bombing. The utmost urgency to the speedy completion of military construction irrespective of cost enriched many people including contractors, labourers and peasants.

In 1943 the services of the First Tripura Bir Bikram Manikya Rifles were promptly placed at the disposal of the Government of India. All other units of the forces were strengthened and kept ready for emergencies. For guerrilla warfare, another contingent named, the Tripura Mahabeer Legion was raised. The Tripura Rajya Rakshi Bahini was raised to man a chain of picket posts all along the state border. At the request of Military authority, several works including the construction of strategic trunk roads were undertaken by the Government of Tripura.

In 1942 and 1943, the First Tripura Rifles and the Tripura Mahabeer Legion worked with the 14th Indian Division, which was the largest single army deployed in the world war. Tripura troops served in Arakan, protecting the lines of communication of the forward troops and killed a large number of Japanese, through skilful ambushes.

"On 11 May 1943, a public reception was given to the Tripura Mahabeer Legion at Agartala on return from the Arakan campaign. On 22 May 1943, the 1st Tripura Rifle returned to Agartala and were given a very hearty reception."[14]

On 19 August 1943, a tragic accident took place during a mortar fire practice demonstration. Lt. Col. Kumar K.C. Deb Barman, Captain Maharajkumar ArjunKisor Deb Barman Bahadur, Major Harka Bahadur, and Major D.M.B Smart died on the spot."[15]

[12] *Gan-Chaudhuri, Dr. Jagadis, A Constitutional History of Tripura, p.296*
[13] *Gan-Chaudhuri, Dr. Jagadis, A Constitutional History of Tripura, p. 297*
[14] *Gan-Chaudhuri, Dr. Jagadis, A Constitutional History of Tripura, p. 296*
[15] *Gan-Chaudhuri, Dr. Jagadis, A Constitutional History of Tripura, p. 297*

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Japan again bombed Agartala airfield on 29th November 1943. The officers of Agartala Airfield became terrified and deserted the place swiftly. Gedu Miah[16] rushed to the airfield and lifted several bags full of Indian currency Notes. (Aghor Dewarma: Tripuray Communist Party Ebang Ganatantric Andolaner Prathamik star: Agartala, 1986; p.27)

In early 1944, the Japanese troops marched towards Imphal. British Indian Army put up a stiff resistance. After numerous bloody conflicts, the Japanese forces retreated from Imphal in July 1944.

On 8th March 1944, Maharaja Inspected a camp in Sonamura. The British army officers came to Agartala for inspection on 18th April 1944. On 24th September 1944, Bir Bikram Manikya inspected Jamatia troops at Udaipur. Maharaja inspected the Dohajari battlefield in Chittagong on 16th October 1944.
Japanese surrender on 15th August 1945 brought an end to the prolonged war. Tripura heaved a sigh of relief. In January 1946, the British Government honoured Maharaja Bir Bikram by conferring the distinguished title of Knight Grand Cross of the Order of the British Empire.

"On 3 February 1946, the Tripura troops landed at Calcutta from Burma. The Maharaja Went to welcome them there. On 5 February 1946, they came back to Agartala. They were accorded a hearty reception. On 9 February 1946, the British Government acknowledged the services of the Tripura Rifles. Field Marshal His Excellency Sir Claude Auchinleck wrote a letter to His Highness Maharaja Bir Bikram Kisor Manikya Bahadur. An extract from the letter runs thus:
Now that the Tripura Rifles have finally returned to the state, I would like to record my gratitude to Your Highness for having placed them at the disposal of the crown during the war.

Almost from the day they left the state, they have been employed in actively fighting the Japanese. They have covered many miles in Burma during these long years of war and have always earned the highest praise from the commanders under whom they have served. They have made the name of Tripura famous.
I wish all ranks every success in their future."[17]

Revolutionary Activities in 1939

Revolutionary incidents within the state increased in the early part of 1939. It was reported that some students of Umakanta Academy and Tulshibati Girls' H.S. School at Agartala hoisted Congress flags in front of their schools. They were expelled from Tripura. Due to their anti-governmental activities, Sachindra Lal Singha and his other associates were exiled from Tripura for one year and six months respectively. The exiled revolutionaries started roaming around the border areas of the state in British Districts, provoking the bordering inhabitants who were subjects of Maharaja's Zamindary of Chakla Roshnabad to approach the Maharaja to abolish Ghasuri Kar[18]. A crowd of four thousand people gathered peacefully before the royal palace demanding the abolition of this tax. However, their peaceful representation did not ripe any fruit. "Some revolutionaries like Sachindra Lal Singha, Sukhamoy Sengupta, Umesh Lal Singha and Ashu Mukherjee began to deliver their speeches against the Government of Tripura in its bordering places. So, they were arrested by the British authority and handed over to the Tripura State police who kept them in Central Jail, Agartala without any trial. They were released in the early part of 1945 from Agartala Central Jail. Biren Datta of Janamangal Samiti who was already arrested was released along with others."[19]

August Movement of 1942 and Tripura

After the failure of the Crips Mission, a state of uncertainty prevailed in Indian politics. On 10 May Gandhi wrote in his paper: "The Presence of the Britishers in India is an invitation to Japan to invade India" and in June he wrote: "Leave India in God's hands, or in modern parlance, to anarchy."[20] On 8th August, amidst the war due to ongoing disagreement with the British Government, All-India Congress Committee decided to launch a massive mass movement under the leadership of Mahatma Gandhi. The very next morning Gandhi was arrested and interned along with other key leaders of Congress. The All-India Congress and Provincial Congress committees were banned by the Government. Protesting people without proper leadership turned violent. Government establishments and lines of communication came under attack. A serious disorder broke out in different parts of the country. In reply, the British Government banked on excessive force to suppress the movement.

The heat of the August movement was felt in Tripura also. A large number of people in Tripura took part in this movement and were arrested and exiled by the Government. "On the 6th September, 1942, the Government of Tripura issued a notification by which (i) the Congress Working Committee, (ii) the All-India Congress Committee and (iii) All provincial and District Congress Committee were declared unlawful associations within the meaning of part II of the Indian criminal Law Amendment Act, 1908, as adopted in the State."[21]

Role of the Great War behind the Reang Unrest (1942-43)

Reang uprising led by Ratanmani was one of the important episodes in the reign of Maharaja Bir Bikram Manikya. It was partly a socio-religious movement and an anti-feudal movement. The key reasons behind this uprising were oppression by the intermediaries, discriminatory tax burden, and privileges held by the Choudhuries.[22] While Maharaja's appointment of Khagendra Reang as Rai over the existing

[16] *Gedu Miah, who set up a branch of Anjuman-e-Islamee at Agartala and wanted to annex Tripura with East Pakistan.*
[17] *Gan-Chaudhuri, Dr. Jagadis, A Constitutional History of Tripura, p. 299-300*
[18] *Ghasuri Kar: Every British Subject who wanted to have his cattle reared in the state had to pay the tax of eight annas per owner annually.*
[19] *Roychoudhury, Nalini Ranjan, Tripura Through the Ages, p. 74.*
[20] *Shastri, K. A. Nilakanta & Srinivasachari, G., Advanced History of India, p. 739.*
[21] *Roychoudhury, Nalini Ranjan, Tripura Through the Ages, p. 74*
[22] *Like all other tribal societies, the Reang society was dominated by the village headmen who were known as choudhuries. The head of the choudhuries was called Rai.*

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incumbent fuelled the situation as it was against customary practice.

During the Second World War Maharaja Bir Bikram Kishor Manikya determined to raise a band of soldiers from the Reang Community. Regarding this, he assigned the Choudhuries to collect soldiers from the Reang youths. The Choudhuries failed and it was reported to the King that Ratanmani and his disciples obstructed them from recruiting Soldiers from the Reang youths. In addition to this, the sudden price rise of essential commodities due to War conditions pushed the Reang population into distress. All available paddy was purchased to feed the army and the people of Agartala town. Some selfish Choudhuries were involved in hoarding as they wanted to make profit from this situation. Ultimately famine prevailed all over the areas of Amarpur, Udaipur, Belonia and Subroom. Ratanmani and his disciples set up some Dharma Gola (for the distribution of food) in their villages which increased their popularity and many became Ratanmani's disciples. Though the uprising was suppressed brutally by the authority.

Nehru's letter to the Maharaja of Tripura

Senior Congress leader Jawahar Lal Nehru was informed that many members of the Tripura Rajya Gana Parishad and Congress party were imprisoned without any trial since the beginning of the Second World War. They were treated very badly in prison even though many of them were seriously ill. Further, he came to know that since the beginning of the year 1940 all meetings and processions were banned and civil liberty was completely curtailed in Tripura. "He was surprised with these news and sent a letter to Maharaja of Tripura on 9th December, 1945 with a request to the Maharaja to enquire about this news."[23] "The Maharaja in his reply on 14th December, 1945 denied all these charges."[24]

The Socio-Political Implications of World War II in Tripura

The Second World War impacted Tripura in the military, economic, and Socio-Political aspects. It was evident from the policies adopted by the then-ruler of Tripura that ensuring the British interest was his top priority during the war. In the early days of the war, Tripura kept all its resources in the service of Great Britain's war preparation. And at the later stage when the Japanese dragged the war in the door of Tripura and as well as India, we witnessed the direct military engagement from Tripura forces on behalf of the crown. All the wartime laws and regulations passed by the Maharaja to ensure the British interest and suppression of anti-British revolutionary activities with hard hands indicated his firm stand in favour of the British Raj.

During the war, common people faced adverse economic distress as they witnessed the price rise of essential commodities by leaps and bounds. Bengal, the neighbouring British province of Tripura, witnessed one of its worst famines, which claimed almost three million lives. Naturally, all these events affected Tripura to a great extent. During the War and post-war, economic conditions were not favourable and people faced miserable economic hardship.

Economic distress and social discrimination caused simmering discontent, resulting in the 'Reang Uprising' led by Ratanmani. Revolutionary leaders like Sachindra Lal Singha, Sukhamay Sengupta etc took up various programs in this turbulent time to pressurise the government. Prohibition of political programs, propaganda and detention of leaders without trial by the ruler dragged the attention of the national leaders. Nehru's letter to Maharaja Bir Bikram Kishore Manikya regarding the arrest and ill-treatment of local leaders is a testimonial of these events. Though in reply the King denied all the claims made by this veteran Congress leader.

From the perspective of the war, Tripura was strategically important for the allied powers. Being situated at the junction of Burma, Assam and Bengal border Tripura's position was significant to mobilize the forces in the eastern battlefield and secure undisturbed logistic support to the soldiers who were already fighting on the Burmese front. This strategic importance of Tripura during the war compelled the Britishers and the then ruler of the state to strengthen the existing infrastructure and start some new projects. "In the wake of the Second World War, the 10-line magenta exchange was started at Agartala. There were three telephone lines. The telephone centre was first opened in the premises of the royal palace connected to Comilla trunk junction."[25] "During the Second World War, Akhaura road became the first pitch road and the road named Akhaura road as it went up to Akhaura station."[26] Establishment of Agartala airport (a technical base for the Royal Air Force), Kailashahar and other airports were built to facilitate to allied powers. "According to AAI official S. Haokip Jempu, the Agartala airport was used as a technical base for the Royal Air Force during World War-II when the allied forces took on the Japanese soldiers in Arakan Ranges, in Burma, now Myanmar. The first known flight which took off from this airport was Curtise C-46 Commando transport aircraft of 4th Combat Cargo Group (4th CCG) of the United States which flew to Burma (Myanmar) during World War II in December and January 1945."[27] "According to historian and writer Pannalal Roy, the land for the Agartala, Kailashahar and various other (now abandoned) airports in Tripura had been donated by the then Tripura Kings."[28] The strategic importance of the Agartala airport could be understood easily by the Japanese eagerness and efforts to destroy it. In this connection, the Japanese bombers attacked twice at Agartala Airport in 1943. This Agartala Airport now known as Maharaja Bir Bikram Kishore Manikya Airport is the single operational airport of Tripura which was elevated to International Airport in the recent past by the Ministry of Civil Aviation. So, in this regard, it can be said that due to the war, Tripura had some positive developments as well, especially in the field of transportation

[23] *Roychoudhury, Nalini Ranjan, Tripura Through the Ages, p. 75*
[24] *Roychoudhury, Nalini Ranjan, Tripura Through the Ages, p. 75*
[25] *Lodh, Debasis, Aiee Shahar Agartala, p. 34*
[26] *Lodh, Debasis, Aiee Shahar Agartala, p. 50*
[27] *World War II era Agartala airport to be 3rd international airport in northeast, Deccan Herald, 9th January 2022, (Accessed on 15th October, 2024)*
[28] *World War II era Agartala airport to be 3rd international airport in northeast, Deccan Herald, 9th January 2022, (Accessed on 15th October, 2024)*

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and communication in the forms of airports, massive road constructions, telecommunication and other infrastructural developments.

World War II made a profound contribution to awakening the political consciousness among the common masses. Due to war and famine a large number of refugees entered in the state, along with them, they bore their political ideas, and social and cultural practices from other parts of India. On the other side Americans and British contingents came here with the British Indian Army to fight in this part of the world, with them they brought global news, political ideas, progressive mindset and Western culture. The interaction of the local people with these soldiers and refugees resulted in the exchange of political and cultural ideas. The formation of various socio-political organisations like Tripura Rajya Jana Sikhya Samiti (1945), Tripura Rajya Praja Mandal (1946), Tripura State Congress (1946) & state level Communist party (1949) just after the great war reflected the socio-political awakening and aspiration of the people.

The Second World War completely changed the power alignment in the international sphere. Washington and Moscow replaced London and Paris as new global power centres. Major Colonial powers like Great Britain and France faced significant economic and military losses. They could not hold on to their colonies with such war-torn economic and devastated military strength. On the other hand, due to the war, native colonial soldiers came in contact with liberal social and political ideas, which inspired them to fight for their freedom. The national movement caught fire against these colonial powers. In India, anti-British sentiments were also intensified as common masses rose with a nationalistic spirit. Maharaja Bir Bikram Kishore Manikya predicted India's independence and upcoming challenges rightly. However, he passed away on 17th May 1947, a few months before India's independence but it was told that he was willing to join in Indian dominion after independence with this connection he nominated Baboo Girijasankar Guha to represent Tripura in the Constituent Assembly of India for drafting the new constitution.

CONCLUSION

Tripura's involvement in the Second World War underlined its strategic importance in this global conflict. The Second World War almost impacted every nation. Along with India, this global phenomenon left some immediate and long-lasting implications for Tripura. Being a transit point for the allied forces and a site of military operations, Tripura and its people witnessed multifaceted consequences in the social, political and economic spheres. The events that occurred in Tripura during this period shaped the historical narrative of the state. The role of Tripura in this global conflict reminds us of the complex interconnection and contribution of the King and local people with such global events as the Second World War.

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PROBLEMS OF TRANSLATING ENGLISH PHRASEOLOGICAL UNITS INTO UZBEK

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ANNOTATION
This article analyzes the difficulty encountered in the process of translating phraseological units from English to Uzbek, which are the most important units of any language. Furthermore, the role of lexical units in the translation of these units and some methods and considerations to overcome the problems faced by language learners are given.
KEY WORDS. *Phraseological units, stable compound, proverbs, alternative option, equivalent method, analogue.*

INGLIZ TILIDAGI FRAZEOLOGIK BIRLIKLARNI O'ZBEK TILIGA TARJIMA QILISH MUAMMOMALARI

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Abduvaxobova Maftuna Vohid qizi
Ilmiy rahbar: Iroda Ahmedovna Jo'rayeva

Annotatsiya. Ushbu maqolada har bir tilning eng muhim birligi hisoblangan frazeologik birliklarning ingliz tildan o'zbek tiliga tarjima qilish jarayonida uchraydigan qiyinchilik tahlil qilinadi. Shu bilan birga, bu birliklarning tarjimasida leksik birliklarning o'rni hamda til o'rganuvchilar duch kelayotgan muammolarni bartaraf etish uchun ba'zi usullar va mulohazalar keltirib o'tiladi.

Kalit so'zlar. Frazeologik birliklar, turg'un birikma, iboralar, muqobil variant, ekvivalent usuli, analog.

Kirish

Batahqiq, hozirgi kunga kelib tilshunoslikning ko'plab sohalari rivojlanib, yangi qirralari kashf etib kelinmoqda. Jumladan, tarjimashunoslikda alohida ahamiyatga ega bo'lgan frazeologiya sohasi ham tilshunoslikning muhim bo'lagi hisoblanib, bir maromda o'sishda davom etmoqda. Bu ilmiy terminning ta'rifiga to'xtaladigan bo'lsak, tilshunoslikda frazeologiya *(yunoncha "phrasis" – "ifoda" va "logos" – "ta'limot")* tildagi nutqga tayyor holda kiritilgan birliklarni hozirgi holati va o'tmishdagi taraqqiyotini tahlil qiluvchi bo'lim bo'lib, asosiy vazifasi frazeologizmlarning nutqda qo'llanish xususiyatlarini o'rganadi va ularni so'z birikmalaridan farqlashga xizmat qiladi. Chunki ibora so'zlar birikmasidan iborat bo'lishi kerak. Bu haqida V. V. Vinogradov, A. Abakumov, A. Shaxmatovlarning fikrlari qimmatga sazovordir [3;14]. Tildagi frazeologizmlarning ko'pchiligi xalq tomonidan yaratilgan bo'ladi. Shu o'rinda frazeologik olim A.V. Kunin aksariyat ingliz tili frazeologizmlarining muallifi noma'lumligini hamda ular xalq tomonidan yaratilgan degan fikrlarni asosli ravishda ko'rsatib o'tgan. Shunday qilib, frazeologizmlar sirasiga iboralar (proverbs), barqaror birikmalar (maqol, matal) kabilarni misol keltiramiz.

Ushbu soha bo'yicha butun dunyoda bir qancha olimlar sezilarli izlanishlar olib brogan va ilmiy tadqiqot ishlarini omma e'tiboriga havola etishga ulgurgan. Jumladan, o'zbek tilshunosligida frazeologizmlarni o'rganish 1950-yillarda boshlandi. Bu sohada Y.Pinxasov, M.Hasanov, I.Qo'chqortoyev, Sh.Raxmatullayev, A.Mamatov kabi taniqli tilshunoslar ilmiy ishlar yaratganlar. O'zbek frazeologiyasi sohasida tilshunos olim Sh.Raxmatullayev qo'shgan hissasi ulkandir. U o'zbek frazeologik birliklarini lug'aviy birlik sifatida o'rganishni boshlab berdi. Uning ilmiy tadqiqotlari va bu ilmiy faoliyatning mevasi bo'lgan "Frazeologik birliklarning asosiy ma'no turlari" (1955), "O'zbek frazeologiyasining ba'zi masalalari" (1966), "Nutqimiz ko'rki"

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(1970), “O’zbek tilining izohli frazeologik lug’ati” (1978) kabi qator kitoblari o’zbek tilshunosligida muhim nazariy va amaliy ahamiyatga ega [3;45].

Asosiy qism

Til o’rganuvchi talaba yoki o’quvchilar esa ingliz tilidagi mana shunday birliklarni o’zbek tiliga o’girishda bir qancha qiyinchiliklariga duch kelishmoqda hamda ushbu birliklarni o’zbek tilidagi tarjimasida muqobil variant topishda ham qator xatoliklarga yo’l qo’yishmoqda. Bunga asosiy sabab til o’rganuvchilar ushbu birliklarni so’zma-so’z tarjima qilishga urinishidir. Holbuki, frazeologik birliklar obrazlilik va emotsional-ekspressivlikni yuzaga keltiruvchi vositalar bo’lib, ular badiiy, siyosiy va publitsistik matnlarning ifodaviy ta’sirchanligini oshirish uchun xizmat qiladi [1;144].

Yana bir dolzarb muammo sifatida shuni ta’kidlash joizki, ingliz tilidan o’zbek tiliga tarjima qiladigan lug’atlar ham mukammal tuzilmagan, ya’ni aksariyat lug’atlar so’zning mustaqil ma’nosini chiqarib beradi va uning turg’un birliklar bilan birga kelish holatlariga misollar kamdan-kam topiladi. Aytaylik, ingliz tilidagi "a burnt child dreads the fire" iborasining o’zbek tilidagi tarjimasini lug’atlardan topish qiyin bo’lib, ma’nosini anglab yetish talaba yoki o’quvchilar uchun biroz qiyin. Ba’zi lug’atlarda *(Cambridge dictionary)* ingliz tilidagi tushuntirishlar *(definition)* berilganligini ko’rishimiz mumkin, ammo bu iborani qaysi vaziyatda ishlatish haqida ma’lumot berilmaydi. Masalan, yuqoridagi iborani o’zbek tilidagi muqobili “bir marta og’zi kuygan qatiqni ham puflab ichadi” deb qaralsa, odatda bir marta xato ish qilgan inson, so’ngra doim ehtiyot bo’lishga harakat qiladi degan ma’noda qo’llanadi. Shu bois til o’rganuvchilar uchun qulaylik sifatida har bir tilning alohida qatlami bo’lgan frazeologik birliklarning qo’llanish maqsadini ko’rsatuvchi lug’at tuzish maqsadga muvofiq bo’lar edi.

So’zlarni tarjima qilish va ularning ma’nosini ona tilida aks ettirish katta mahorat talab etadigan faoliyatdir. Ana shunday mahurat egasi, tarjimon va olim G’aybulla Salomov o’zining asarlarida tarjima qilishdagi mana shunday nozik jihatlarga e’tibor qaratgan. Xususan, frazeologik birliklarni tarjima qilishning o’ziga xos quyidagi to’rt usulini ko’rsatib o’tgan:

Maqol, matal va idiomalar tarjimasida uch prinsip hukm suradi:

1) asl nusxadagi frazeologizmga tarjima tilidan teng qiymatli ekvivalent qidirib topish;

2) asar o‘girilayotgan tildan monand muqobil variant topib qo‘yish;

3) frazeologizmni aynan, so‘zma-so‘z tarjima qilish.

Har uchala hol ham uchramagan taqdirda tarjimon ularning umumiy ma’nosini aks ettirish bilan kifoyalanishga majbur bo‘ladi [1; 121]. Bu usullardan foydalangan holda tarjima qilish jarayonni qisman osonlashtirishga yordam beradi. Birinchi usulda ingliz tilidagi iboralarning o’zbek tilidagi ham semantik, ham leksik jihatdan teng bo’lgan ibora topishdir. Xususan, *“in the seventh heaven” – “yettinchi osmunda”* iborasini yaqqol misol sifatida keltirib o’tishimiz mumkin.

Ikkinchi usul bu ingliz tilidagi ba’zi iboralarning aynan tarjimasini topish mushkul bo’lgan vaziyatda, iboradagi ba’zi obrazlari o’zbek tilida o’zgargan muqobil variantini topishdan iboratdir. Masalan, inglizlar tilidagi *"nothing comes out of the sack but what was in it"* turg’un birikmani o’zbek tiliga *“qozonda bori cho’michga chiqadi”* deb tarjima qilinsa, ma’nodaga putur yetmaydi faqat ikki obrazlar (sack-to’rva-qozon) o’rtasida farq yuzaga keladi. Uchinchi tarjima usuliga to’xtaladigan bo’lsak, ikkala tildagi iboralardagi so’zlar bir biriga mos tushadi va ma’no ham aniq ifodalanadi. Misol uchun *“as red as a cherry” – “olmadey qizil”* yoki *“as cold as ice” – “muzday sovuq”* kabi keng qo’lladigan frazeologik birliklar so’zma-so’z tarjima qilinganiga guvoh bo’lamiz.

Shunday hollar bo'ladiki, tarjima tilida asliyat tiliga na ekvivalenti va na o'xshash frazeologik birikma topiladi.Bunday hollarda turg’un birikmalarni tasviriy ifoda yo’li bilan tarjima qilish ma’qul ko’riladi. Tasviriy usul erkin ko'chma ma'noga asoslanmagan frazeologik birliklami qo'lIashni talab etadi: "a skeleton in the cup" - "oila siri", "in a whole skin"- "bekamu-ko'st, soppa-sog', sog'-salomat beziyon" va shu kabilar [4;21].

Umuman olganda, tarjima san’ati ancha ko’p kuch va bilim talab qiladigan jarayondir. Har qanday so’zni yoki so’z birikmasini tarjima qilishda tarjimon hech bir detalni chetda qoldirishi kerak emas. Ayniqsa, iboralarni bir tildan boshqasiga o’girishda milliy kaloritning saqlanishi eng asosiy e’tiborga olinishi kerak bo’lgan xususiyatdir. O’z o’rnida bunday muvozanatni saqlash alohida vaqt talab etadi va tilning so’z boyligi ham muhim rol o’ynaydi. Ma'no jihatdan *“to carry coals to Newcastle”* iborasi, *“Marg'ilonga atlas tashimoq”*, “Chinozga baliq tashimoq” deb emas, balki neytral ma'noga ega *“daryoga suv tashimoq”*, *“o'nnonga o'tin olib bormoq”* kabi neytral birikmalar topish, zarur bo'lsa, yangi erkin frazeologik birliklar yaratish tavsiya etiladi [6;96].

Yana bir mashhur olim A.V.Kuninning inglicha-o’zbekcha iboralar tarjimasidagi tadqiqotlari diqqatga sazovordir. U tomonidan tuzilgan “Inglizcha-ruscha frazeologik lug‘at”ning kirish qismida frazeologik birliklarni tarjima qilishda lug‘atda qo‘llanilgan usullar haqida ma’lumot berilgan va bu quyidagi 6 usuldan iborat:

1. Ekvivalent usuli ya’ni o’zbek tilidan aynan mos keladigan ibora topishdir: as cold as ice - muzdek sovuq;

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2. Analog, ya'ni ingliz tilidagi iboraga mazmunan muqobil, ammo obraz jihatidan farq qiladigan birlik topish: when pigs fly - tuyani dumi yerga tekkanda;
3. Tasviriy tarjima (free word combination) usulida frazeologik birliklar erkin so'zlar bilan tarjima qilinadi: cross the floor of the house - bir partiyadan boshqasiga o'tmoq;
4. Antonim tarjima, ya'ni inkor shakldagi iborani tarjima tiliga bo'lishli mazmun bilan yoki aksincha o'girish: Don't count your chickens before they are hatched – Jo'jani kuzda sanaymiz ;
5. Kalkalash yoki so'zma so'z tarjima. Tarjimon inglizcha fikrlash, iboradagi obrazni ko'rsatmoqchi bo'lganda qo'llaniladi: The moon is not seen when the sun shines – Quyosh nur sochayotganda oy ko'rinmaydi;
6. Aralash tarjima (Combined translation) usulidan yuqoridagi usullar mos kelmasagina foydalanish mumkin: "look not a gift horse in the mouth" - "berganning betiga qarama" kabi.

Yuqoridagi misollardan ko'rishimiz mumkinki, frazeologik birliklarni ingliz tilidan o'zbek tiliga tarjima qilishda bu iboroni har jihatdan tahlil qilish kerak bo'ladi. Uning faqatgina bir jihati, ya'ni semantik tomonidan emas, balki undagi milliy ruh va leksikologik jihatlari ham inobatga olinishi lozim.

Xulosa

Keltirilgan fikr-mulohazalarga xulosa qilib shuni aytish joizki, frazeologiya bu tilning ko'rki deb qaraladi va u orqali hozirgi kunda insonlar tomonidan tilga qo'yilgan talab qondirolmoqda, ya'ni qisqa, ta'sirli va majoziy ma'no orqali fikr ifodalash istagi. Ingliz tilidadagi frazeologik birliklarning tarjimasida yuzaga kelayotgan qiyinchiliklarni yuqorida ta'kidlangan usullar yordamida bartaraf etish til o'rganuvchilar uchun qulay bo'la oladi. Bundan tashqari, tilni o'rganish jarayonida o'sha xalqning madaniyati, urf-odatlari bilan ham tanishish tildagi so'zlarni osonroq tarjima qilish imkoniyatini oshiradi. Yana bir talabalarga yengilik yaratib beryechim sifatida alohida inglizcha-o'zbekcha iboralarning ma'no-mazmunini to'liq ifodalaydigan lug'at tuzishni kiritish mumkin. Bu borada fikr-mulohazalar talaygina bo'lib, olimlardan va yosh yaratuvchilardan ko'proq izlanishni talab etadi.

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A REVIEW STUDY ON THE ASSESSMENT OF OPERATIONAL EFFICIENCY

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ABSTRACT

A thorough background investigation is always necessary before beginning any research. A thorough and in-depth research review is always a solid foundation for study. A researcher must always get familiar with the current study areas, techniques, and tools that have been employed by other researchers to conduct studies of a similar nature. Only then will the researcher be able to identify the gaps in the current body of study and determine how to contribute to it. Researchers' fascination with analysing the operational efficiency of businesses in related industries has never gone away because businesses may be highly efficient one year and inefficient the next. As a result, doing research on operational efficiency analysis necessitates a solid foundation of in-depth information examination. In order to help the research community move this field further in the future, this publication has sought to provide a summary of the results of some operational efficiency analysis literature that is already available in the research domain.

KEYWORDS: *Operational efficiency analysis, literature review*

1. INTRODUCTION

Over the years, scholars and business stakeholders have paid close attention to evaluating the operational efficiency of businesses in the same industry. The operational effectiveness of businesses engaged in comparable business activities or domains is assessed in this comparative analysis. Such an examination seeks to shed light on how these chosen businesses are performing effectively and which is outperforming the others.

Numerous industries, including banking, insurance, pharmaceuticals, fertilizers, electricity distribution, cars, airlines, ceramics, plastics, tea production, paper manufacturing, cement production, information technology, diamonds, sugar production, textiles, and many more, have been the subject of comparative analysis.

A comparative analysis of companies operating in the same industries has been carried out in various countries, such as the United States, the United Kingdom, Germany, Japan, Metro Manila, China, Nigeria, Europe, Sweden, South Africa, New Zealand, Pakistan, and several others.

A literature review is crucial in research as it familiarizes the researcher with prior studies related to the subject. It provides in-depth insights into earlier investigations conducted in the chosen area, aiding in identifying the gaps between existing research and the upcoming study. Consequently, this section aims to encapsulate the reviewed literature concerning the analysis of operational efficiency.

2. DEFINITION OF TERMS UTILISED

- **Analysis of Operational efficiency**

Analysis of operating efficiency stands for analysing/ studying how the business units are operating whether efficiently or inefficiently. Thereby, it assesses the performance of business units operationally.

Operational Efficiency is a vital concept for organizations striving to boost their performance and profitability. It involves the ability to produce goods or offer services in the most effective way, utilizing the least resources, time, and effort while ensuring quality. A comprehensive overview of its key elements and significance is presented as follows:

Key Elements of Operational Efficiency

- **Process Optimization**:
  - Streamlining workflows to remove unnecessary steps.
  - Applying approaches like Lean and Six Sigma to enhance productivity and minimize waste.
- **Resource Utilization**:
  - Effectively using human, financial, and physical resources.
  - Distributing workloads among employees to avoid bottlenecks and inefficiencies.
- **Cost Management**
  - Identifying and reducing costs without compromising quality.
  - Examining overhead and operational expenses to uncover savings opportunities.
- **Quality Control**
  - Ensuring that products and services adhere to established standards.

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- Creating feedback loops for ongoing quality improvement.

❖ **Technology Integration**
- Utilizing automation and technology to enhance processes.
- Employing data analytics to inform decisions and track performance.

❖ **Supply Chain Management**
- Streamlining the supply chain to reduce delays and costs.
- Cultivating strong supplier relationships for better negotiation and reliability.

Significance of Operational Efficiency

❖ **Cost Reduction**
- Improved efficiency leads to lower costs, enabling businesses to allocate resources effectively and increase profit margins.

❖ **Enhanced Productivity**
- Streamlined processes result in faster production times and higher output, allowing organizations to better meet demand.

❖ **Better Customer Satisfaction**
- Efficient operations enhance service delivery and product quality, leading to improved customer experiences and loyalty.

❖ **Competitive Edge**
- Organizations that operate efficiently can surpass competitors by offering lower prices, superior quality, or quicker service.

❖ **Sustainability**
- Minimizing waste and optimizing resource use supports environmental sustainability, attracting socially conscious consumers.

- **Literature review**

A literature review involves examining the vast array of existing knowledge, allowing us to forge our own path in the research process. It is akin to utilizing the foundation of what has already been accomplished to carve out our unique direction.

- **Empirical Literature**

Literature in empirical sense stands for historical literature already existing in the area of study which researcher wants to explore.

Empirical literature consists of research studies based on observed and measured data rather than theory. It involves systematic data collection and analysis to test hypotheses or explore phenomena. This body of work is crucial for validating theories, informing practice, and guiding future research across various academic disciplines.

3. SIGNIFICANCE OF THE STUDY

Studying the operational efficiency of business units is significant for several reasons. Firstly, it helps identify inefficiencies, leading to cost reductions that improve profit margins. By enhancing processes, organizations can boost productivity, allowing them to meet demand more effectively. Additionally, a focus on operational efficiency often results in higher quality products and services, which increases customer satisfaction and loyalty. Efficient operations also provide a competitive advantage, enabling businesses to respond more swiftly to market changes and outperform their competitors. Furthermore, understanding operational efficiency allows for better allocation and utilization of resources, minimizing waste and promoting sustainability by reducing energy consumption and waste production. Overall, analyzing operational efficiency is essential for driving long-term success and adaptability in a competitive marketplace.

The study has relevance in the sense for undertaking any research review of existing literature is needed, this paper will highlight the summaries of many works already conducted facilitating new researchers to undertake research in such arenas easily.

4. OBJECTIVES OF THE STUDY

The objectives of this paper are:

a. To facilitate the researchers with the existing knowledge of operational efficiency analysis presented in condensed form.
b. To have an idea of general/ common tools of analysis employed by prior scholars for analysis of operational efficiency.
c. To know about the important indicators of operational efficiency.

5. RESEARCH METHODOLOGY

This research paper is mainly descriptive and analytical in nature. The study is mainly based on secondary data. Such data has been collected from already published sources. Research works taken in this study for analysis are mainly obtained from already published sources. An attempt has been made to include even international works in this analytical review.

6. LIMITATIONS

The limitations of this study are as under:

a. Limited articles only are considered for analytical purpose.
b. Research works having analysis of operational efficiency are only considered.

7. REVIEW OF EMPIRICAL LITERATURE

The empirical literature encompasses an examination of studies conducted to advance the existing knowledge within a specific field of study. This review enables the researcher to become well-acquainted with the goals, methods, and instruments employed by previous researchers in their respective fields of engagement.

- **Author:** Amritpal Singh Dhillon and Hardik Vachhrajani
  Year: 2012
  Industry: Power Generating
  Tools used: Average, Ratio analysis and Correlation analysis
  Examination: Operational Efficiency of GIPCL from 2005-06 to 2010-11
  Conclusions: The operational efficiency of the company was found to be good and it referred to the profitable, efficient and judicious use of resources

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available to the GIPCL in perfect consonance with clearly laid down financial policies relating to the operation when compared within power manufacturing industry.

- **Author:** Womack, J.P., & Jones, D.T.
  Year: 1996
  Industry: Manufacturing
  Tools Used: Lean methodologies, value stream analysis
  Examination: Reduction of waste and improvement of cycle times
  Conclusions: The adoption of lean practices effectively decreases waste and boosts production efficiency, enhancing competitive advantage.
- **Author:** Antony, J.
  Year: 2004
  Industry: Manufacturing
  Tools Used: Six Sigma techniques, DMAIC process
  Examination: Defect rates and process performance
  Conclusions: Employing Six Sigma leads to notable enhancements in quality and operational efficiency by reducing defects and engaging staff in quality control.
- **Author:** Kaplan, R.S., & Porter, M.E.
  Year: 2008
  Industry: Healthcare
  Tools Used: Lean healthcare strategies, process flow analysis
  Examination: Patient throughput and waiting durations
  Conclusions: Implementing lean strategies in healthcare settings improves patient flow and shortens wait times, resulting in greater patient satisfaction and operational efficiency.
- **Author:** Kwortnik, R.J., & Thompson, G.M.
  Year: 2009
  Industry: Hospitality
  Tools Used: Service delivery analysis, customer feedback mechanisms
  Examination: Speed of service delivery and customer satisfaction
  Conclusions: Streamlined service delivery processes significantly enhance customer satisfaction and loyalty in the hospitality industry.
- **Author:** Chopra, S., & Meindl, P.
  Year: 2016
  Industry: Supply Chain Management
  Tools Used: Inventory control methods, logistics improvement strategies
  Examination: Inventory turnover and logistics expenditures
  Conclusions: Efficient inventory management and logistics practices markedly enhance supply chain performance and reduce operational costs.
- **Author:** Brynjolfsson, E., & McAfee, A.
  Year: 2014
  Industry: Various
  Tools Used: Automation solutions, AI technologies
  Examination: Labor productivity and cost-effectiveness
  Conclusions: The integration of automation and AI significantly boosts operational efficiency by optimizing processes and lowering labour expenses.
- **Author:** Provost, F., & Fawcett, T.
  Year: 2013
  Industry: Various
  Tools Used: Data analytics tools, performance indicators
  Examination: Speed of decision-making and operational results
  Conclusions: Organizations that employ data analytics are better equipped to make informed decisions, leading to enhanced operational efficiency.
- **Author:** Porter, M.E., & van der Linde, C.
  Year: 1995
  Industry: Various
  Tools Used: Sustainability assessments, operational reviews
  Examination: Waste management and cost efficiency
  Conclusions: Implementing sustainable practices can effectively lower operational costs while improving efficiency, indicating that environmental sustainability can align with business objectives.
- **Author:** Harter, J.K., Schmidt, F.L., & Hayes, T.L.
  Year: 2002
  Industry: Various
  Tools Used: Employee engagement surveys, productivity metrics
  Examination: Levels of employee engagement and their impact on productivity
  Conclusions: Increased employee engagement is linked to higher productivity and reduced turnover rates, positively influencing operational efficiency.
- **Author:** Becker, B.E., & Huselid, M.A.
  Year: 1998
  Industry: Various
  Tools Used: Training programs, performance assessments
  Examination: Relationship between training investment and operational efficiency
  Conclusions: Investing in employee training significantly improves operational efficiency by enhancing skills and boosting productivity.
- **Author:** Camp, R.C.
  Year: 1989
  Industry: Various
  Tools Used: Benchmarking techniques, performance metrics
  Examination: Best practices across different sectors
  Conclusions: Benchmarking against industry leaders helps identify best practices that can be implemented to enhance operational efficiency.
- **Author:** Imai, M.
  Year: 1997
  Industry: Various
  Tools Used: Kaizen methods, improvement initiatives
  Examination: Effects of continuous improvement on operational outcomes
  Conclusions: A commitment to continuous improvement cultivates innovation and drives

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operational efficiency, leading to lasting performance improvements.

- **Author:** Kaplan, R.S., & Norton, D.P.
  Year: 1992
  Industry: Various
  Tools Used: Balanced Scorecard framework, performance evaluation
  Examination: Financial performance and internal processes
  Conclusions: The Balanced Scorecard effectively aligns operational activities with strategic objectives, thereby enhancing overall operational efficiency.

SUMMARY OF ABOVE REVIEWS

The reviews provide a comprehensive analysis of operational efficiency across various industries, showcasing diverse methodologies and their impacts. Dhillon and Vachhrajani (2012) assessed GIPCL's resource utilization, finding it effective within the power generation sector. Womack and Jones (1996) emphasized the significance of lean practices in manufacturing, highlighting waste reduction and enhanced productivity. Antony (2004) demonstrated that Six Sigma techniques lead to notable improvements in quality and operational efficiency. Kaplan and Porter (2008) reported that implementing lean strategies in healthcare settings boosts patient flow and satisfaction. Additional studies underscore the importance of data analytics, employee engagement, training investments, and continuous improvement, revealing how these factors collectively enhance operational efficiency and provide a competitive edge across sectors like hospitality and supply chain management. Overall, these findings illustrate that a strategic focus on operational efficiency is vital for organizations aiming to thrive in today's competitive landscape.

8. CONCLUSION

This research paper highlights that studies on operational efficiency have been conducted across nearly all industries; however, the methodologies used by researchers vary significantly. It provides a concise overview of the various analytical approaches employed in operational efficiency research, serving as a valuable resource for researchers aiming to guide their future studies in a relevant direction.

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PURCHASE BEHAVIOUR OF PADDY FARMERS TOWARDS HYBRID PADDY SEEDS IN DHARAMPUR TALUKA OF VALSAD DISTRICT

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ABSTRACT

Seed is the initial point of cropping cycle. Seeds play a vital role in agriculture and the seeds industry is rapidly growing due to the rising demand for increased food production and high quality seeds. The primary aim of this study was to explore the purchase behaviour of farmers regarding hybrid paddy seeds. To fulfill the objective descriptive research design was adopted with Multi-stage sampling method. Initially, Dharampur taluka was purposefully selected from 6 talukas in Valsad district. In the next stage, 10 villages were randomly selected within Dharampur taluka. Finally, 10 paddy farmers were conveniently selected from each village, resulting in a total sample size of 100 farmers. The structured interview schedule was used to collect the primary data from farmers. The collected data was analyzed with the help of statistical tools as simple percentage analysis, weighted average mean, rating scale, etc. The study found that most farmers (56%) were belonged to 41 to 50 year age group, primarily had secondary education (45%) and commonly combined farming with animal husbandry (58%). Most of the farmers (56%) owned small, fragmented land under 1 hectare. Hybrid paddy seed purchase was influenced by past experience and product benefits.

KEY WORDS: *Socio-economic profile, Purchase behaviour, Paddy farmers, Hybrid paddy seeds, Valsad district*

1. INTRODUCTION

Seeds are vital and fundamental component for producing agricultural crops. It is the most cost-effective way to boost both production and productivity and seed quality contributes to about 20-25% of overall productivity (DoA&FW, 2024). The shift from farmers saving seeds to purchase high-yielding varieties (HYVs) and hybrid seeds is crucial for ensuring quality seed production and timely availability, which are vital for national food security (Pandey et al., 2020). The global seed industry showed significant growth in last decade. It grew from US$ 52 billion in 2014 to US$ 70 billion in 2023-24, reflecting a compound annual growth rate of 4.5%. India holds the position of the fifth-largest seed market in the world, with United States, China, France and Brazil being the only countries ahead in terms of market size (NSAI, 2024). There are many growth drivers of seed industry in last few decades like, the introduction of Bt cotton in 2002 led to a significant increase in cotton cultivation, driving hybrid cotton seed demand, Hybrid maize and rice seeds also saw rapid growth, raising yields and market value, open-pollinated varieties and vegetable seeds experienced noteworthy market expansion due to increased seed replacement rates and usage (Manjunath et al., 2013). The Seed Replacement Rate (SRR) refers to the percentage of crop area sown with certified or quality seeds, rather than seeds saved from previous harvests, during a planting season. This rate provides insights into the extent of quality seed usage by the farmers (Gupta, 2021).

The Indian Seed Programme significantly supports agriculture by advancing hybrid seed production, industry collaboration and crop biotechnology, through streamlined regulations and public awareness are essential for broader adoption (Singh et al., 2019). By 2050, India's growing population will pressure farmers to boost production despite limited resources. Improved seeds replacement strategies, stress-resistant varieties and advancements in seed technology are crucial. India must enhance infrastructure, research and collaboration between public and private sectors to increase productivity and compete in global seed markets (Kumar et al., 2018). The vegetable seed industry has significant potential in agriculture-driven economies like India. Ensuring timely, affordable access to quality seeds is crucial, with strict seed laws needed to protect farmers. Public-private collaboration in R&D, germplasm exchange and policy improvements can boost seed quality and availability, especially benefiting smaller seed companies (Koundinya and Kumar, 2014). A robust seed production system is vital for food security and agricultural growth. Declining breeder seed availability poses long-term risks to quality seed access. Timely planning and coordination among stakeholders are needed demand. India's diverse agro-climatic zones and government support offer potential to boost the seed sector and global trade (Chauhan et al., 2016).

Paddy cultivation is essential for food security and rural livelihoods in India, with hybrid paddy seeds gaining prominence due to their potential for higher yield, pest resistance and adaptability to changing climates. Present study examines the purchase behaviour of paddy farmers in

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Dharampur Taluka of Valsad District of Gujarat State, where paddy is a key crop and staple food.

2. OBJECTIVES OF STUDY

The primary objectives of study were to study the socio-economic profile of paddy farmers and to study the farmers' purchase behaviour towards hybrid paddy seeds.

3. MATERIALS AND METHODS

For present study, a Descriptive Research design was used to address the research objectives. The research was conducted in Dharampur taluka of Valsad district, which consists of 6 talukas. In the year 2021-22, Valsad district's area under paddy cultivation was 70,950 hectares and production was 2,75,505 MT. (NABARD, 2024) For this study, a multi-stage sampling method was used. In the very first stage, Dharampur taluka of Valsad district was purposively chosen. In the second stage, a random selection of 10 villages of Dharampur taluka were carried out. In the third stage, 10 paddy growing farmers were conveniently selected from each of these villages, results in a total sample size of 100 farmers. Based on available literature the interview schedule was prepared. The primary data was collected through personal interviews with farmers, with the help of structured interview schedule as data collection tool. To analyze data, several analytical tools were used, including percentage analysis, mean, tabular analysis and rating scale to draw meaningful conclusions.

4. RESULTS AND DISCUSSION

4.1 Socio-economic profile of farmers

The study revealed that 56% of farmers were belonged to 41 to 50 year age group, followed by 19% were belonged to 51 to 60 year age group, 18% were belonged to 31 to 40 year age group, while only 4% were over 60 year age and 3% were belonged to 21 to 30 year age group. This finding supports the finding of (Vasava, 2013) who stated that most (60%) of the farmers of tribal area in South Gujarat were middle aged (36 to 56 year). In case of education, 45% of farmers had secondary level education, 29% had below SSC level education, 22% had HSC level education and 4% had a UG/PG degree. Regarding occupations, 58% farmers were involved in both farming and animal husbandry, 25% farmers relied solely on farming, 10% were engaged in farming and services and 7% combined farming with business. Income distribution showed that 46% of farmers earned between Rs. 2,00,001 to 3,00,000 annually, followed by 39% earning Rs. 3,00,001 to 4,00,000. Only 7% farmers had income between Rs. 4,00,001 to 5,00,000, while 5% farmers had income above 5,00,000 and 3% farmers had income below 2,00,000. This finding supports the finding of (Dinakar, 2016) who found that 38.21% farmers in South Gujarat have income of 2,00,000 to 4,00,000. Landholding were small and fragmented, with 56% owning less than 1 hectare, 41% owning between 1 to 2 hectares, 2% holding between 2 to 4 hectares and only 1% with land between 4 to 10 hectares. No large farmers were found in study area. This finding supports finding of (Tengli and Sharma, 2017) that most (54%) of the farmers in South Gujarat were marginal and small farmers. All farmers in study area uses rain water as irrigation but late maturing varieties requires more water so, there were 41% farmers has different irrigation sources. The monsoon is unpredictable and the late maturing varieties takes more than 130 days to grow completely so, those farmers who has different irrigation sources can grow late maturing varieties.

4.2 Purchase behaviour of farmers towards hybrid paddy seeds

Table 1 Duration of Variety and Sources of Information

Duration of Variety (n = 100, multiple responses)		
Paddy Variety	**Frequency**	**Rank**
Early Duration (90-110 days)	63	I
Medium Duration (111-130 days)	21	III
Late Duration (More than 130 days)	26	II
Sources of Information for purchase of Hybrid Paddy Seeds (n = 100, multiple responses)		
Source	**Frequency**	**Rank**
Fellow Farmers	26	IV
Company Representative	88	I
Dealer	41	III
Advertisement	17	V
Farmers Meetings	69	II

Table 1 shows the duration of variety farmers grow. Most of the farmers grow early duration (90-110 days) variety followed by late duration (more than 130 days) variety and medium duration (111-130 days) variety. Early duration variety complete their life cycle within the monsoon season; however late duration variety requires more water. Therefore, it is assumed that late duration varieties are grown only by farmers who have irrigation facilities. (Dubey, 2021) found that medium duration (111-130 days) variety was most preferred by farmers (54.2%), followed by short duration (90-110 days) (20.8%) and long duration (more than 130 days) (18.3%). Farmers primarily gain awareness of hybrid seeds through company representative, followed by farmers meetings, dealers, fellow farmers and advertisements. (Divya, 2002) found that agricultural extension officers were ranked as prime source of information for hybrid rice purchase followed by Local dealers, peer groups and agricultural universities.

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Table 2 Place of Purchase and Preferred Packaging Size

Place of Purchase for Hybrid Paddy Seeds		
Place	**Frequency**	**Percentage**
Co-operative	0	0%
Local Dealers	100	100%
Online Platform	0	0%
Total	**100**	**100%**
Preferred Packing Size of Hybrid Paddy Seeds		
Packaging Size	**Frequency**	**Percentage**
1 Kg	86	86%
3 Kg	14	14%
Total	**100**	**100%**

Table 2 shows that all farmers in the study area buy hybrid paddy seeds from local dealers. Farmers choose packaging size according to their requirements. All farmers in the study area prefer 1Kg packaging. However, 14% farmers also prefer 3 Kg packaging.

Table 3 shows the different factors considered by farmers at the time of purchase of hybrid paddy seeds. Farmers were asked to give response on 5 – point rating scale on 1 – Unimportant, 2 – Somewhat Important, 3 – Neutral, 4 – Important, 5 – Highly Important. Based on responses cumulative score was calculated. The mean was calculated on the basis of cumulative score. The rank was given according to mean. The research depicted that past experience is the most considered parameter with the mean of 4.10, influencing hybrid seed purchase, followed by product benefits (mean 4.05), price (mean 3.86), quality (mean 3.59), dealer recommendation (mean 3.44) and packaging size (mean 2.75). (Ram, 2021) found that yield (60.3%) was most important parameter in purchase of hybrid paddy seeds, while price was least considered parameter. (Bisht, 2010) found that grain types were most important parameter with the mean of 4.48 followed by price (mean 4.06).

Table 3 Factors considered by farmers for purchase of hybrid paddy seeds (n=100)

Parameters	HI (5)	I (4)	N (3)	SI (2)	UI (1)	CS	Mean	Rank
Price	36 (180)	32 (128)	18 (54)	10 (20)	4 (4)	386	3.86	III
Dealer recommendation	26 (130)	28 (112)	20 (60)	16 (32)	10 (10)	344	3.44	V
Past experience	58 (290)	11 (44)	19 (57)	7 (14)	5 (5)	410	4.10	I
Product quality	32 (160)	25 (100)	21 (63)	14 (28)	7 (7)	359	3.59	IV
Packaging size	7 (35)	10 (40)	49 (147)	19 (38)	15 (15)	275	2.75	VI
Benefits of product	53 (265)	18 (72)	15 (45)	9 (18)	5 (5)	405	4.05	II

HI: Highly Important
I: Important
N: Neutral
SI: Somewhat Important
UI: Unimportant
CS: Cumulative Score
CS = Maximum Scale × No. of Respondents
Mean = CS / Total No. of Respondents

5.CONCLUSION

The global seed industry has seen significant growth, with India emerging as the fifth-largest seed market. However, many Indian farmers still rely on farm-saved seeds, underscoring the need for better seed replacement strategies and access to quality seeds. A study of farmers in Dharampur taluka of Valsad district reveals that farmers in the region, mostly middle aged with secondary level education, manage small, rainfed farms. The study reveals that factors like seed cost, quality, performance and dealer influence shape farmers' purchase decisions for hybrid seeds. Past experience and product benefits are key parameters in their seed choices.

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