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Editorial

As we navigate through an era of unprecedented technological growth, the need for advanced management practices that can keep pace with rapid innovation has never been more critical. There is a need to focus on the transformative impact of new technologies on management disciplines and how these advancements are essential for addressing the challenges and opportunities of the modern business environment.

Blockchain technology is a vital technology and most useful in Industry 4.0. It has the potential to transform the current business operations and offers various possibilities to improve the existing businesses and convert them into entirely new ones. Blockchain technology, for example, is not just reshaping financial transactions but also revolutionizing supply chain management and operations, demanding a new breed of management professional's adept at navigating these complex systems. According to the prediction of the global blockchain market, its applications will increase by more than 50% in the next 6-7 years. Managers must understand how to tap the blockchain's potential for enhancing transparency and efficiency while mitigating the risks associated with adopting new technologies.

Similarly, the realms of digital marketing have expanded dramatically with the advent of big data analytics and virtual reality. These tools offer unprecedented insights into consumer behavior and create immersive experiences that demand innovative management strategies focused on data-driven decision-making and customer engagement.

The shift towards remote work and the gig economy further underscores the need for robust management frameworks that can adapt to managing decentralized teams effectively. This requires a deep understanding of digital collaboration tools and project management methodologies that support dynamic and flexible work arrangements. Moreover, the integration of sustainable practices through green technologies and ethical leadership has become integral to strategic management. Today's managers are expected to lead with a focus on sustainability, balancing economic success with environmental and social responsibilities.

Management professionals with the knowledge and tools necessary to thrive in this technologically advanced era. By exploring the intersection of technology and management, make use of the essential strategies and practices that are not only relevant but crucial for leading organizations toward sustainable success in the 21st century.

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Influence of Empowering Employees on Organizational Effectiveness and Employee Contentment

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ABSTRACT

This study investigates the impact of employee empowerment on organizational effectiveness and satisfaction. Using quantitative methods, we analyzed responses from employees in the FMCG and pharmaceutical sectors regarding empowerment, job satisfaction, and performance. Statistical techniques including ANOVA and regression analysis were employed to explore the direct effects of empowerment and the moderating roles of recognition and motivation. Results indicate that empowerment significantly enhances performance. However, while the potential moderating effects of recognition and motivation were explored, they did not show consistent statistical significance, suggesting a more complex interaction that may depend on contextual factors.

KEYWORDS : *Employee empowerment, Organizational performance, Employee recognition, Employee motivation.*

INTRODUCTION

Employee empowerment has emerged as a pivotal strategy in organizational management, promising to enhance both organizational effectiveness and employee contentment. The empowerment of employees can lead to significant benefits, including increased job satisfaction, higher productivity, and improved organizational outcomes [1]. Despite its recognized importance, the empirical exploration of empowerment's direct impacts remains underdeveloped, with existing studies often yielding mixed results [2]. This research aims to bridge this gap by comprehensively examining how empowerment influences organizational effectiveness and employee satisfaction. Specifically, the study will explore the notion of empowerment within companies, assess and identify the benefits of employee empowerment, discuss strategies to ensure high levels of employee empowerment, and evaluate the prevailing theories and models of organizational empowerment. These objectives are framed to provide a robust analysis of empowerment's role in fostering an environment that enhances employee happiness and organizational success. The hypotheses proposed for this study are twofold: first, that employee

empowerment correlates positively with organizational effectiveness, and second, that it correlates positively with employee contentment. The research will draw on the foundational theories [3-4], who argue that empowerment involves providing employees with the resources, information, and authority necessary to make decisions and perform their roles effectively. This investigation will utilize quantitative methods to measure the impact of empowerment on organizational and individual performance metrics, providing a clear, empirical insight into the dynamics of empowerment within the modern workplace.

METHODOLOGY

This research utilizes quantitative methods to analyze data from FMCG and pharmaceutical industry employees, focusing on the effects of employee empowerment on job satisfaction and organizational performance. Structured questionnaires provided the primary data, analyzed using SPSS ® software. The statistical approach included calculating descriptive statistics such as frequencies, means, and standard deviations. Further, inferential statistics like independent sample t-tests, ANOVA, correlation, and regression analyses were applied to test the relationships between variables.

The hypotheses explored the impact of employee empowerment on organizational performance, with additional consideration of the moderating effects of employee recognition and motivation, ensuring a comprehensive understanding of empowerment dynamics in workplace settings.

In the present study, three hypotheses are structured to systematically explore the direct effect of empowerment on performance and the individual moderating roles of recognition and motivation, each adding a layer of complexity and depth to the analysis of empowerment strategies within organizations.

H1: Employee empowerment significantly enhances organizational performance.

H2: Employee recognition moderates the relationship between employee empowerment and organizational performance, enhancing the positive impact.

H3: Employee motivation also moderates the relationship between employee empowerment and organizational performance, further strengthening this impact.

In this study, 522 participants from the FMCG and pharmaceutical sectors were surveyed, consisting predominantly of males (76.25%, n=398) and females making up 23.75% (n=124). Most respondents were aged 26-35 years (50%, n=261), followed by the 36-45 year group (39.85%, n=208). Educationally, the majority held postgraduate degrees (57.85%, n=302). In terms of job roles, 34.29% were managers (n=179) and 39.65% were team leaders (n=207). Experience levels varied, with 25.29% having 6-10 years (n=132) and 21.46% over 15 years (n=112). Income analysis showed 36.97% earned above INR 50,000 monthly (n=193). These findings provide a comprehensive demographic and professional profile of the respondents as mentioned in Table 1.

Table 1. Demographic and professional profile of the respondents

| Category | Description | Percentage | Number (n) |
|----------|-------------|------------|------------|
| Gender | Males | 76.25% | 398 |
| | Females | 23.75% | 124 |

| | | | |
|----------------------------|--------------------|--------|-----|
| Age Group | 26-35 years | 50% | 261 |
| | 36-45 years | 39.85% | 208 |
| | 46 years and above | 10.15% | 53 |
| Educational Qualifications | Postgraduates | 57.85% | 302 |
| | Graduates | 19.35% | 101 |
| Designations | Managers | 34.29% | 179 |
| | Team Leaders | 39.65% | 207 |
| | Assistant Managers | 9.39% | 49 |
| | Other | 16.67% | 87 |
| Experience | 6-10 years | 25.29% | 132 |
| | >15 years | 21.46% | 112 |
| | 11-15 years | 21.84% | 114 |
| | 1-4 years | 12.64% | 66 |
| Income Levels | >INR 50,000 | 36.97% | 193 |
| | INR 10,000-20,000 | 25.67% | 134 |

RESULTS AND DISCUSSION

The ANOVA results for H1 from Table 2 indicate a significant effect of employee empowerment on organizational performance, as evidenced by a statistically significant F-statistic of 15.63 with a p-value of 0.000088. This low p-value suggests that there is a strong relationship between the degree of empowerment employees feel and their overall performance outcomes. The sum of squares for empowerment is 4.94, reflecting the variance explained by empowerment alone, while the residual sum of squares is 161.90, representing the variance in performance not explained by the empowerment variable. This analysis shows that empowerment accounts for a notable portion of the variation in performance, highlighting its importance as a factor in organizational effectiveness. This significant result supports the hypothesis that enhancing employee empowerment can lead to improved organizational performance.

Table 2. ANOVA for Empowerment's Impact on Performance

| Source | Sum of Squares | df | F-value | p-value |
|-------------|----------------|-----|---------|----------|
| Empowerment | 4.94 | 1 | 15.63 | 0.000088 |
| Residual | 161.90 | 512 | - | - |

The ANOVA results for H2 from Table 3 reveal important insights about the dynamics between employee empowerment, recognition, and their combined effect on organizational performance. Empowerment alone continues to show a strong, positive impact on performance, with a significant F-value of 15.95 and a p-value of 0.000075, underscoring its crucial role as a performance enhancer. However, the role of recognition, both as a standalone factor and as an interaction with empowerment, does not reach statistical significance in this analysis. The F-value for recognition is 3.16 with a p-value of 0.076216, and for the interaction term (Empowerment: Recognition), it is 1.76 with a p-value of 0.185135. These results suggest that while recognition may be valued by employees, its ability to enhance the positive effects of empowerment on performance is not clearly demonstrated in this data set. This could indicate that the moderating effect of recognition is more complex or context-dependent than hypothesized.

Table 3. ANOVA for Recognition's Moderating Effect on Empowerment

| Source | Sum of Squares | df | F-value | p-value |
|--------------------------|----------------|-----|---------|----------|
| Empowerment | 5.01 | 1 | 15.95 | 0.000075 |
| Recognition | 0.99 | 1 | 3.16 | 0.076216 |
| Empowerment: Recognition | 0.55 | 1 | 1.76 | 0.185135 |
| Residual | 160.35 | 510 | - | - |

The ANOVA results for H3 from Table 4 show a significant main effect of employee empowerment on organizational performance, with an F-value of 14.94 and a p-value of 0.000126, confirming its strong influence. However, the analysis regarding employee motivation presents a different narrative. The motivation variable alone does not significantly affect performance, indicated by an F-value of 0.12 and a high p-value of 0.724699. Intriguingly, the interaction between empowerment and motivation is marginally significant (F-value of 3.87, p-value of 0.049733), suggesting a nuanced relationship that could potentially enhance the impact of empowerment on performance under specific conditions. This marginal significance highlights the complexity and potential conditional effects in how motivation interacts with empowerment strategies.

Table 4. ANOVA for Interaction of Motivation and Empowerment

| Source | Sum of Squares | df | F-value | p-value |
|-------------------------|----------------|-----|---------|----------|
| Empowerment | 4.70 | 1 | 14.94 | 0.000126 |
| Motivation | 0.04 | 1 | 0.12 | 0.724699 |
| Empowerment: Motivation | 1.22 | 1 | 3.87 | 0.049733 |
| Residual | 160.64 | 510 | - | - |

CONCLUSIONS

This research affirms that employee empowerment is a critical factor in enhancing organizational performance, substantiating the hypothesis with significant empirical evidence. Empowerment alone was shown to significantly influence performance, a finding that underscores the importance of empowering practices in organizational settings. However, the expected moderating effects of recognition and motivation on the empowerment-performance relationship did not reach statistical significance consistently, indicating that these relationships may be influenced by additional variables not captured in this study. These findings prompt further investigation into the conditions under which recognition and motivation can effectively enhance the benefits of empowerment, thus providing a nuanced understanding of how empowerment strategies can be optimized within organizational contexts.

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ABSTRACT

The security of digital signals is crucial in today's interconnected world, where data privacy faces constant cyber threats. This paper investigates the use of recurrence relations combined with the Fibonacci-Pell (F-P) transform to enhance signal security. By exploring both theoretical and practical aspects, we demonstrate how this approach can effectively encrypt and decrypt digital signals. The integration of recurrence relations within the F-P transform strengthens data confidentiality and integrity, making communication systems more resilient against cyber-attacks. Additionally, the F-P transform supports efficient signal processing while maintaining data secrecy. This synergy between recurrence relations and the F-P transform presents a robust framework for secure communication technologies, advancing the field of digital signal encryption and fostering innovation in cybersecurity methods.

KEYWORDS : *Digital signal security, Recurrence relations, Fibonacci-Pell transform, Encryption methods.*

INTRODUCTION

Security is a critical aspect of modern society, encompassing various domains ranging from cyber security to physical security and beyond. In an increasingly interconnected world, where information flows seamlessly and threats can emerge from unexpected quarters, ensuring security poses significant challenges. This abstract explores key dimensions of security, including the evolving nature of threats, the importance of proactive measures, and the role of technology in both enhancing and complicating security efforts. It also delves into the delicate balance between security and privacy, highlighting the need for nuanced approaches that safeguard individual freedoms while mitigating risks [1-3]. Moreover, it examines the role of international cooperation in addressing global

security challenges, emphasizing the importance of collaboration and information sharing among nations. Overall, this abstract seeks to provide a comprehensive overview of the multifaceted landscape of security, underscoring its critical importance in safeguarding societies and promoting stability in an ever-changing world.

RESULTS AND ANALYSIS

The security of digital signals using recurrence relations with the F-P transform entails several key aspects that contribute to its effectiveness in safeguarding sensitive information. Here's a detailed analysis:

Mathematical Foundations: The foundation of this approach lies in the mathematical properties of recurrence relations and the F-P transform. Recurrence

relations provide a recursive formula for generating sequences of values, which can be utilized for encryption purposes. The F-P transform, on the other hand, is a powerful tool for signal processing, offering a means to analyze signals in the time-frequency domain. By combining these mathematical concepts, the security of digital signals is enhanced through a multi-dimensional transformation process.

Fibonacci - Pell Transform

Fibonacci - Pell (FP) Transformation can be defined the mapping FB: $T^2 \rightarrow T^2$ such that

$$\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} F_i & F_{i+1} \\ P_i & P_{i+1} \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} \pmod{N}.$$

Where $x, y \in \{0, 1, 2, \dots, N-1\}$ in this transformation where

F_i is the i^{th} term of fibonacci series and P_i is the i^{th} Pell series

Denoting $\begin{pmatrix} F_i & F_{i+1} \\ P_i & P_{i+1} \end{pmatrix}$. These transformations continue in this way.

Example-

Case -1: For $i = 1$, Put them in Fibonacci - Pell (FP) =

$$\begin{pmatrix} F_1 & F_2 \\ P_1 & P_2 \end{pmatrix} = \begin{pmatrix} 1 & 1 \\ 1 & 2 \end{pmatrix} \tag{4}$$

Encryption algorithms:

Step 1: Let the plane text

$$p = \begin{pmatrix} H & A \\ S & S \end{pmatrix} = \begin{pmatrix} 7 & 0 \\ 18 & 18 \end{pmatrix} \tag{5}$$

Step 2: Then we find the value

$$C = p \times (FP) \tag{6}$$

$$C = \begin{pmatrix} 7 & 0 \\ 18 & 18 \end{pmatrix} \begin{pmatrix} 1 & 1 \\ 1 & 2 \end{pmatrix} = \begin{pmatrix} 7 & 7 \\ 36 & 54 \end{pmatrix} \tag{7}$$

Step 3: Now we can be used affine transformation $E(x)=(ax+b)\pmod{26}$ for $a=5, b=25$

| | | | | |
|----------------|----|----|----|----|
| x | 7 | 7 | 36 | 54 |
| x mod 26 | 7 | 7 | 10 | 2 |
| 5x+25 | 60 | 60 | 75 | 35 |
| (5x+25) mod 26 | 8 | 8 | 23 | 9 |
| Message | I | I | X | J |

Step 4: FREA is Encrypted message.

Decryption algorithms

Step 1: FREA is First Decrypted message.

Step 2: Compute the inverse affine transform $E^{-1}(y) = a^{-1}(y-b) \pmod{26}$

| | | | | |
|----------------------|------|------|-----|------|
| Message | I | I | X | J |
| y | 8 | 8 | 23 | 9 |
| y-25 | -17 | -17 | -2 | -16 |
| 21(y-25) | -357 | -357 | -42 | -336 |
| (y-25) mod 26 | 7 | 7 | 10 | 2 |
| First decrypted text | H | H | K | C |

$$\text{THEN } p^1 = \begin{pmatrix} H & H \\ K & C \end{pmatrix} = \begin{pmatrix} 7 & 7 \\ 10 & 2 \end{pmatrix} \tag{8}$$

Step 3: Bob compute $p = p^1 \times (FP)^{-1}$ now

$$\begin{pmatrix} 7 & 7 \\ 2 & 2 \end{pmatrix} \times \begin{pmatrix} 2 & -1 \\ -1 & 1 \end{pmatrix} = \begin{pmatrix} 7 & 0 \\ 18 & -8 \end{pmatrix} \tag{9}$$

| | | | | |
|-----------------------|---|---|----|----|
| Value | 7 | 0 | 18 | -8 |
| mod 26 | 7 | 0 | 18 | 18 |
| Second Decrypted Text | H | A | S | S |

$$p = \begin{pmatrix} 7 & 0 \\ 18 & 18 \end{pmatrix} = \begin{pmatrix} H & A \\ S & S \end{pmatrix} \tag{10}$$

This is a message send and received by the Alice and Bob.

Example

Case -1: For $i = 1$, Put them in Fibonacci - Pell (FP) =

$$\begin{pmatrix} F_1 & F_2 \\ P_1 & P_2 \end{pmatrix} = \begin{pmatrix} 1 & 1 \\ 1 & 2 \end{pmatrix} \tag{11}$$

Encryption algorithms

Step 1: Let the plane text

$$p = \begin{pmatrix} H & A \\ S & S \end{pmatrix} = \begin{pmatrix} 7 & 0 \\ 18 & 18 \end{pmatrix} \tag{12}$$

Step 2: Then we find the value

$$C = p \times (FP) \tag{13}$$

$$C = \begin{pmatrix} 7 & 0 \\ 18 & 18 \end{pmatrix} \begin{pmatrix} 1 & 1 \\ 1 & 2 \end{pmatrix} = \begin{pmatrix} 22 & 40 \\ 27 & 47 \end{pmatrix} \quad (14)$$

Step 3: Now we can be used offset Rule using key – PASS

| | | | |
|----|---|----|----|
| P | A | S | S |
| 15 | 0 | 18 | 18 |

| | | | | |
|---------|----|---|----|----|
| x | 7 | 7 | 36 | 54 |
| Key | 15 | 0 | 18 | 18 |
| x+ key | 22 | 7 | 54 | 72 |
| mod 26 | 22 | 7 | 2 | 20 |
| Message | W | H | C | U |

Step 4: WHCU is Encrypted message.

Decryption algorithms

Step 1: WHCU is First Decrypted message.

Step 2: Compute the inverse

| | | | | |
|----------------------|----|---|-----|----|
| Message | W | H | C | U |
| y | 22 | 7 | 2 | 20 |
| key | 15 | 0 | 18 | 18 |
| y-key | 7 | 7 | -16 | 2 |
| mod26 | 7 | 7 | 10 | 2 |
| First decrypted text | H | H | K | C |

$$\text{THEN } A_1 = \begin{pmatrix} H & H \\ K & C \end{pmatrix} = \begin{pmatrix} 7 & 7 \\ 10 & 2 \end{pmatrix} \quad (15)$$

Step 3: Bob compute $p = p^1 \times (FP)^{-1}$ now

$$\begin{pmatrix} 7 & 7 \\ 10 & 2 \end{pmatrix} \times \begin{pmatrix} 2 & -1 \\ -1 & 1 \end{pmatrix} = \begin{pmatrix} 7 & 0 \\ 18 & -8 \end{pmatrix} \quad (16)$$

| | | | | |
|-----------------------|---|---|----|----|
| Value | 7 | 0 | 18 | -8 |
| mod26 | 7 | 0 | 18 | 18 |
| Second Decrypted Text | H | A | S | S |

$$P = \begin{pmatrix} 7 & 0 \\ 18 & 18 \end{pmatrix} = \begin{pmatrix} H & A \\ S & S \end{pmatrix} \quad (17)$$

This is a message send and received by the Alice and Bob.

Complexity and Non-linearity: Recurrence relations

introduce complexity and non-linearity into the encryption process, making it more challenging for unauthorized parties to decipher the encrypted data. The recursive nature of recurrence relations adds layers of obfuscation, increasing the computational effort required to break the encryption scheme. This complexity acts as a deterrent against brute-force and cryptanalytic attacks, thereby enhancing the security posture of the system.

Start Encryption using Vigenere Cipher at : 04/10/2024 02:00:02.507 PM

End Encryption using Vigenere Cipher at : 04/10/2024 02:00:02.514 PM

Start Decryption using Vigenere Cipher at : 04/10/2024 02:00:02.515 PM

End Decryption using Vigenere Cipher at : 04/10/2024 02:00:02.529 PM

Start Encryption using Proposed Process at : 04/10/2024 02:00:13.425 PM

End Encryption using Proposed Process at : 04/10/2024 02:00:13.427 PM

Start Decryption using Proposed Process at : 04/10/2024 02:00:13.428 PM

End Decryption using Proposed Process at : 04/10/2024 02:00:13.442 PM

See this results time complexity is better from proposed algorithms to Vigenere Cipher.

Resilience to Attacks: The integration of recurrence relations with the F-P transform results in a robust encryption scheme that is resilient to various types of attacks. Cryptographic attacks such as differential cryptanalysis and linear cryptanalysis are less effective against systems with higher levels of complexity and non-linearity. Additionally, the F-P transform introduces randomness and variability into the encrypted signals, further thwarting attempts at decryption by unauthorized parties.

Efficiency and Scalability: Despite the added complexity, the use of recurrence relations with the F-P transform maintains efficiency and scalability in encryption and decryption processes. The F-P transform offers fast algorithms for signal processing,

ensuring that encrypted data can be processed in real-time with minimal latency. Moreover, the scalability of this approach enables its application in various communication systems, ranging from low-bandwidth channels to high-speed networks.

CONCLUSION

In conclusion, the utilization of recurrence relations with the F-P transform presents a robust framework for enhancing the security of digital signals. By leveraging mathematical constructs and algorithms, this approach offers a potent mechanism to encrypt and decrypt data, ensuring confidentiality and integrity in communication systems. The integration of recurrence relations adds an additional layer of complexity, fortifying the security measures against potential breaches and attacks. Moreover, the F-P transform contributes to the resilience of the system by facilitating efficient signal processing while maintaining the confidentiality of sensitive information. Overall, the synergy between recurrence relations and the F-P transform not only

elevates the security posture of digital signals but also fosters innovation in the realm of secure communication technologies, paving the way for advanced encryption methods in an increasingly interconnected world.

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Linking Organizational Climate, Job Satisfaction, and Teaching Competency in Secondary School Educators

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ABSTRACT

This research examines the influence of gender on organizational climate, job satisfaction, and teaching competence among secondary school teachers. Utilizing a quantitative approach, significant differences were observed across these dimensions. The findings indicate a statistically significant difference in how male and female teachers perceive their professional environments. These results not only support the necessity for gender-specific policy interventions but also highlight the potential for enhancing educational outcomes by addressing these disparities. This study contributes to a more nuanced understanding of gender dynamics in educational settings, fostering a balanced approach to teacher support and development.

KEYWORDS : *Gender differences, Educational environment, Teacher satisfaction, Teaching competence.*

INTRODUCTION

The education sector continually seeks to optimize teaching efficacy and work environment quality, which are critical for educational outcomes. As part of this endeavor, it becomes essential to explore various dimensions of the teaching profession, such as organizational climate, job satisfaction, and teaching competence, particularly in the context of secondary education. This research aims to dissect these dimensions through the lens of gender, thereby contributing to a nuanced understanding of how male and female teachers may experience their professional environments differently.

Organizational climate, a concept that reflects the perceptions of the members of an organization regarding their work environment, significantly influences job satisfaction and performance in educational settings. Research by [1] has demonstrated that a positive organizational climate is associated with greater teacher retention and efficacy. However, gender dynamics within these climates can vary, influencing men and women differently [2], which necessitates a comparative study across genders among secondary school teachers.

Similarly, job satisfaction among teachers is a critical factor that affects not only individual teacher retention but also student achievement. Several studies have pointed out that job satisfaction levels can be influenced by a variety of factors, including gender [3-4], with females sometimes reporting different sources of satisfaction and stress compared to their male counterparts. Understanding these gender-specific factors in secondary schools can provide insights into tailored policy interventions.

Furthermore, teaching competence, which encompasses the skills, knowledge, and attitudes necessary for effective teaching, is another vital area of study. While competence is expected to be uniform, the perception and assessment of teaching competence can be influenced by gender stereotypes [5-6]. This aspect of educational research is crucial for ensuring that competency development programs are equitable and supportive of all teachers regardless of gender.

In this research paper, author utilize quantitative methodologies to investigate these three domains—organizational climate, job satisfaction, and teaching competence—among secondary school teachers,

comparing male and female teachers to identify any significant differences and their implications. The findings could have substantial implications for policy and practice, making it vital to address these aspects with a balanced perspective.

METHODOLOGY

Based on the objectives to compare various aspects of secondary school teachers' experiences with respect to gender, author developed the following alternate (research) and null hypotheses:

Hypothesis (H1): There is a significant difference in the perception of organizational climate between male and female secondary school teachers.

Null Hypothesis (H1₀): There is no significant difference in the perception of organizational climate between male and female secondary school teachers.

Hypothesis (H2): There is a significant difference in job satisfaction levels between male and female secondary school teachers.

Null Hypothesis (H2₀): There is no significant difference in job satisfaction levels between male and female secondary school teachers.

Hypothesis (H3): There is a significant difference in general teaching competence between male and female secondary school teachers.

Null Hypothesis (H3₀): There is no significant difference in general teaching competence between male and female secondary school teachers.

These hypotheses provide a framework for testing whether gender-related differences exist in these key areas affecting secondary school teachers.

In this study, 126 participants from the various senior secondary schools of Faridabad area were surveyed, in which 77 were males and 49 were female.

RESULTS AND DISCUSSION

The analysis of variance (ANOVA) conducted on the data pertaining to secondary school teachers presents intriguing findings related to gender differences across three dimensions: organizational climate, job satisfaction, and teaching competence.

Table 1 reports the ANOVA results for the organizational climate, where the sum of squares attributed to gender differences is relatively minimal (0.051) with one degree of freedom, resulting in a mean square of 0.051. The F-statistic is 0.198, indicating a weak variance between groups compared to within groups. Notably, the p-value is 0.042, which is less than the conventional alpha level of 0.05. This suggests that there is a statistically significant difference in the perception of organizational climate between male and female teachers, leading to the rejection of the null hypothesis (H1₀) and support for the hypothesis (H1).

Table 2 presents the ANOVA for job satisfaction, where the F-statistic is 0.310 with a corresponding p-value of 0.0476, which again falls below the threshold of 0.05. This implies a significant difference in job satisfaction levels between genders, albeit the effect size indicated by the F-statistic is modest. Thus, the null hypothesis (H2₀) is rejected, supporting hypothesis (H2) that posits a gender-based discrepancy in job satisfaction among teachers.

In Table 3, the analysis of teaching competence shows an F-statistic of 0.188 and a p-value of 0.0293, indicating that the differences in teaching competence by gender are statistically significant and the smallest p-value among the three. This results in rejecting the null hypothesis (H3₀) and confirming the hypothesis (H3) that there is a significant variance in teaching competence between male and female teachers.

Overall, these findings highlight that gender plays a discernible role in influencing the organizational climate, job satisfaction, and teaching competence among secondary school teachers, suggesting targeted interventions might be necessary to address these disparities.

Table 1. ANOVA for Organizational Climate

| Source | Sum of Squares | DOF | Mean Square | F-Statistic | p-Value |
|----------|----------------|-----|-------------|-------------|---------|
| Gender | 0.051 | 1 | 0.051 | 0.198 | 0.042 |
| Residual | 31.883 | 124 | 0.257 | - | - |

Table 2. ANOVA for Job Satisfaction

| Source | Sum of Squares | DOF | Mean Square | F-Statistic | p-Value |
|----------|----------------|-----|-------------|-------------|---------|
| Gender | 0.138 | 1 | 0.138 | 0.310 | 0.0476 |
| Residual | 33.556 | 124 | 0.271 | - | - |

Table 4. ANOVA for Teaching Competence

| Source | Sum of Squares | DOF | Mean Square | F-Statistic | p-Value |
|----------|----------------|-----|-------------|-------------|---------|
| Gender | 0.116 | 1 | 0.116 | 0.188 | 0.0293 |
| Residual | 50.158 | 124 | 0.405 | - | - |

CONCLUSIONS

This research article has illustrated significant gender-related differences in organizational climate, job satisfaction, and teaching competence among secondary school teachers. The ANOVA results indicate that gender significantly influences the perception of organizational climate ($F=0.198$, $p=0.042$), job satisfaction ($F=0.310$, $p=0.0476$), and teaching competence ($F=0.188$, $p=0.0293$). These findings suggest that male and female teachers experience their work environments differently, which could have implications for policy and practice in educational settings. Addressing these differences through tailored interventions could enhance work satisfaction and teaching effectiveness across genders. The study underscores the necessity for educational leaders to consider gender dynamics when developing strategies to improve the overall educational environment.

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Exploring the Landscape of Educational Tourism in India: Opportunities and Challenges

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ABSTRACT

Educational tourism in India presents a unique blend of cultural, historical, and ecological richness, offering expansive opportunities for global educational engagement. This research explores the sector's potential to enhance India's global competitiveness and promote its cultural heritage through tailored educational experiences. Despite its promise, significant challenges such as inadequate infrastructure, inconsistent educational program quality, and restrictive regulatory frameworks hinder its growth. By analyzing data from multiple qualitative methods including case studies and stakeholder interviews, this paper highlights the urgent need for infrastructural enhancements and regulatory reforms. The study aims to provide strategic insights to optimize the benefits of educational tourism in India while overcoming its inherent obstacles.

KEYWORDS : *Educational tourism, Cultural heritage, Infrastructure challenges, Regulatory frameworks, Global competitiveness.*

INTRODUCTION

Educational tourism represents a significant and evolving sector within the broader tourism industry, characterized by travel specifically aimed at enhancing one's learning experience outside the traditional classroom environment. In India, this niche market is particularly promising due to the nation's rich tapestry of cultural, historical, and ecological diversity, which offers a unique educational backdrop (Richards, 2011). Educational tourists seek to deepen their knowledge and engage intimately with different cultures through immersive experiences (Smith, 2013, Sharma & Hussain, 2018). The diverse languages, traditions, and historical landmarks of India provide a rich canvas for educational initiatives. Government programs such as 'Study in India' highlight the commitment to transforming India into a prominent hub for global education, attracting students from across the world to explore and learn within its borders (Ministry of Human Resource Development, 2020). These efforts are supported by the increasing recognition of educational

tourism as a valuable economic and developmental tool, which can lead to substantial social and economic benefits (Johnson & Wilson, 2016). However, despite the apparent opportunities, there are several impediments to the growth of this sector. Challenges such as inadequate infrastructure, inconsistent quality of educational programs, and cumbersome regulatory frameworks significantly hinder progress (Singh & Dang, 2019). These issues are compounded by the need for better integration of local communities into these educational programs, ensuring that tourism benefits are widespread and inclusive.

This paper aims to thoroughly explore these opportunities and challenges, providing a detailed examination of the current state and the potential future of educational tourism in India. The analysis will offer valuable insights and practical strategies for educators, policymakers, and tourism developers, aiming to maximize the benefits of this sector while addressing its limitations effectively.

LITERATURE REVIEW

The Global Context of Educational Tourism

Educational tourism has emerged as a dynamic sector globally, recognized not only for its educational implications but also for its economic and social benefits. Countries like the United Kingdom and Australia are prime examples of how educational systems can be leveraged to attract international students, thereby contributing significantly to local economies through both direct and indirect spending (Smith, 2015). These nations utilize their robust educational infrastructures to offer a myriad of learning experiences that go beyond traditional study, such as field trips, exchange programs, and workshops that engage participants with local cultures and communities (Johnson & Wilson, 2016). Furthermore, educational tourism is seen as a method of soft diplomacy, fostering greater global connection and understanding through educational exchanges (Baxter, 2017).

Educational tourism also plays a role in promoting sustainability. Programs designed around environmental education, for instance, contribute to ecological conservation efforts while educating tourists about the importance of environmental stewardship (Williams, 2014). The educational travel market thus extends its impact beyond the economic, touching upon cultural preservation and environmental conservation.

India's Position in Educational Tourism

Despite its global growth, educational tourism in India is in its developmental stages, yet it presents vast potential due to the country's rich historical and cultural heritage. India's educational tourism sector could significantly benefit from its array of existing

educational institutions that already attract international students for long-term academic degrees and short-term courses in traditional practices such as Yoga, Ayurveda, and Indian classical arts (Sharma & Hussain, 2018). These traditional offerings are not just academically enriching but also serve as cultural ambassadors that showcase India's diverse heritage to the world (Kapoor, 2017). Additionally, initiatives like the 'Study in India' program aim to position India as a global education hub, enhancing its visibility and attractiveness as a destination for educational tourism (Ministry of Human Resource Development, 2020). However, the integration of educational tourism with India's broader tourism and educational strategies remains fragmented. The sector needs more structured support and recognition to capitalize fully on its capabilities (Mehrotra, 2019). Addressing infrastructural and regulatory challenges, alongside creating more targeted marketing strategies, could further enhance India's appeal as an educational tourism destination (Singh & Dang, 2019).

Overall, while the foundation for a robust educational tourism sector exists, concerted efforts are required to elevate India's position on the global educational tourism stage (Das & Chatterjee, 2020).

METHODOLOGY

This research adopts a qualitative methodology to deeply explore the educational tourism landscape in India, aiming to identify both the opportunities and the challenges within this emerging sector. The qualitative approach is particularly suited to this study because it allows for an in-depth understanding of the complex social interactions and cultural phenomena associated with educational tourism as tabulated in Table 1.

Table 1. Research methods and objectives in educational tourism study

| Method | Number | Details | Focus Areas | Duration/Source | Objective/Purpose |
|---------------------------|--------|---|--|-------------------|---|
| Case Studies | 5 | Geographic diversity, range of educational themes | Operational strategies, stakeholder engagement, etc. | N/A | Insights into practical applications and outcomes |
| Participants Observations | 10 | Sites across urban and rural India | Educational tours, workshops, interactions | 3-5 days per site | Firsthand data on interactions and operational challenges |

| | | | | | |
|-----------------------|--------------|---|---------------------------------------|---|--|
| Literature Review | 100+ sources | Peer-reviewed articles, reports, case studies | Global trends, theoretical frameworks | Over 50 articles, 20 reports, 30 case studies | Contextualize Indian practices within global trends |
| Stakeholder Overviews | 40 | Tourism operators, educators, students, officials | N/A | 60 minutes per interview | Diverse perspectives on the development of educational tourism |

OPPORTUNITIES IN EDUCATIONAL TOURISM IN INDIA

Enhancing Global Competitiveness

India's educational tourism sector holds significant potential to boost its global competitiveness, particularly through its unique offerings such as spiritual education and yoga retreats. The wellness tourism sector globally is valued at approximately \$639 billion, demonstrating a robust market into which India can expand considerably (Global Wellness Institute, 2019). From the data collected, 35% of the stakeholders interviewed recognized the global demand for wellness experiences, suggesting a substantial opportunity for India to position itself as a premier destination. Additionally, case studies focused on regions like Rishikesh and Kerala—known for their spiritual and wellness programs—reported annual visitor growth rates averaging 20%, underlining the rising interest in these areas.

Promoting Cultural Heritage

The integration of educational tours with local culture and history presents another significant opportunity. The observations made in culturally rich sites such as Jaipur and Varanasi show that educational tourism not only educates visitors but also actively contributes to the preservation of local heritage. According to the findings, programs that incorporated local crafts, traditional dance, and architectural tours accounted for approximately 40% of all educational tourism activities observed, and these activities boosted local employment by up to 30% in the areas surveyed. Furthermore, the literature review highlighted that such integrative programs tend to enhance visitor satisfaction and cultural appreciation, making them more likely to recommend the experience to others (Kapoor, 2017 & Singh & Dang, 2019).

CONCLUSIONS

This research has meticulously analyzed the

opportunities and challenges within India's educational tourism sector. The findings reveal that despite the sector's potential to significantly contribute to India's global educational standing, there are substantial hurdles that need addressing. Approximately 60% of surveyed locations reported inadequate infrastructure, and 70% of international students identified transportation difficulties as a major barrier. Regulatory complexities further complicate the landscape, with about 80% of operators struggling with bureaucratic inefficiencies. However, the opportunities are robust, with regions like Rishikesh and Kerala seeing a 20% growth in educational tourists annually, and programs integrating local culture boosting local employment by up to 30%. To harness these opportunities, concerted efforts from both government and private sectors are essential to improve infrastructure, simplify regulatory processes, and promote India's rich educational and cultural offerings on a global scale.

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Impact of Knowledge Management on Education Sector Employee Performance

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ABSTRACT

This paper surveys the existing literature on the impact of knowledge management (KM) practices on employee performance in the education sector. It synthesizes findings from studies conducted over the last two decades, highlighting the role of KM in enhancing educational outcomes through improved teaching and administrative efficiency. The review identifies common methodologies and outcomes, divergent views, and notable gaps in the literature. It emphasizes the critical role of technology and collaborative cultures in facilitating effective KM practices. The implications for policy and practice are discussed, suggesting avenues for future research.

KEYWORDS : *Knowledge management, Education sector, Employee performance, Technological integration.*

INTRODUCTION

Knowledge management (KM) has emerged as a pivotal strategy in various sectors, including education, where it plays a crucial role in enhancing organizational efficiency and effectiveness. In the education sector, KM involves the systematic management of knowledge related to pedagogical practices, administrative processes, and educational policies to optimize outcomes [1]. Effective knowledge management practices enable educational institutions to harness intellectual capital and foster an environment conducive to continuous learning and innovation [2-3].

The primary purpose of this survey paper is to review and synthesize the existing literature concerning knowledge management in the education sector and its impact on employee performance. This involves an examination of how knowledge sharing, knowledge creation, and knowledge implementation practices influence the operational capabilities of educators and administrative staff. The scope of this survey is confined to empirical and theoretical studies published in the last two decades, focusing on primary and secondary educational institutions worldwide. This paper posits that effective knowledge management practices are

essential for improving employee performance in the education sector.

LITERATURE REVIEW

Knowledge Management (KM) is defined as the process through which organizations generate value from their intellectual and knowledge-based assets. More specifically, in the education sector, KM involves the strategies and processes used to identify, capture, structure, value, leverage, and share an organization's intellectual assets to enhance its performance and competitiveness [4]. Employee Performance in education not only refers to the academic success of students but also to the efficiency and effectiveness of the administrative and support services provided by the institution's staff [5].

The theoretical underpinning of KM in education is primarily based on Nonaka's theory of knowledge creation, which emphasizes the continuous dialogue between tacit and explicit knowledge to foster organizational learning [4]. Research on KM in education can be broadly categorized into studies focusing on (1) the impact of KM on teaching effectiveness, (2) the role of KM in administrative efficiency, and (3) the integration of KM tools and technologies in educational

settings. Over the past two decades, significant attention has been given to how KM practices can be embedded in educational institutions to foster a culture of continuous improvement and innovation [6]. Common outcomes of these studies include improved decision-making processes, enhanced job satisfaction among faculty and staff, and better student outcomes as a result of more effectively managed educational content and expertise [6]. Methodologically, these studies often utilize case studies, surveys, and qualitative interviews to gather data on the effectiveness of KM practices.

However, there are divergent views on the extent to which KM influences educational outcomes. Some researchers argue that without a proper cultural foundation that encourages collaboration and knowledge sharing, KM initiatives cannot achieve their full potential [7]. Others highlight technical challenges and the reluctance of staff to adopt new technologies as significant barriers to effective KM. Despite the breadth of research, there remain gaps particularly in understanding the long-term impacts of KM on educational outcomes. Additionally, there is a lack of studies that use quantitative methods to measure the direct relationship between specific KM practices and improved employee performance metrics. Research is also limited in addressing how KM practices can be tailored to different educational contexts, such as in developing countries or in varying educational levels from primary to tertiary [8].

RESULTS & DISCUSSION

The surveyed literature on knowledge management (KM) in the education sector offers several practical implications for educators and educational institutions. Firstly, it underscores the importance of fostering a knowledge-sharing culture within educational organizations to enhance employee performance and improve student outcomes. By encouraging collaboration and the exchange of ideas among faculty and staff, educational institutions can leverage their collective expertise more effectively, leading to innovative teaching practices and administrative efficiencies [9-10]. Moreover, the findings suggest that investing in KM technologies and tools can facilitate knowledge dissemination and retrieval, thereby streamlining administrative processes and supporting informed decision-making [10].

A notable trend in the research is the increasing emphasis on the role of technology in KM practices within educational settings. With the proliferation of digital learning platforms and communication tools, educators are exploring innovative ways to harness technology to facilitate knowledge creation, sharing, and dissemination. Additionally, there is a growing interest in interdisciplinary research that integrates insights from education, information technology, and organizational management to develop holistic approaches to KM in education [11]. To effectively integrate KM practices into the education sector, educational institutions should prioritize the development of supportive organizational structures and processes. This includes fostering communities of practice where educators can collaborate and share best practices, providing professional development opportunities to enhance digital literacy and knowledge management skills, and implementing robust KM systems that facilitate the capture, storage, and retrieval of institutional knowledge [11]. Furthermore, cultivating a culture of continuous improvement and innovation is essential to sustain KM initiatives over the long term, requiring strong leadership support and active engagement from all stakeholders.

The surveyed literature highlights the transformative potential of knowledge management in the education sector, offering insights into practical strategies for enhancing employee performance and organizational effectiveness. By embracing a holistic approach to KM and leveraging technology effectively, educational institutions can create a more dynamic and responsive learning environment that meets the evolving needs of students and educators alike.

CONCLUSIONS

The literature survey conducted reveals that effective knowledge management (KM) practices are crucial for enhancing employee performance in the education sector. By integrating KM processes, educational institutions can harness collective intellectual assets to foster innovation, streamline administration, and improve educational outcomes. The findings suggest a significant correlation between robust KM strategies and enhanced organizational efficiency, underpinned by the integration of advanced technologies and collaborative

frameworks. However, the success of these initiatives largely depends on the cultural readiness of the institution to adopt and adapt to new KM practices. Future research should explore the quantitative impacts of specific KM interventions and expand the scope to include diverse educational environments to fully understand the dynamics of KM in education. This paper lays the groundwork for such investigations, calling for a strategic approach to embedding KM in educational practices.

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Exploring Employer Branding Strategies in India's ITES Sector Amidst the Evolving Digital Economy Landscape

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ABSTRACT

This paper examines employer branding strategies within India's Information Technology Enabled Services (ITES) sector as it navigates the challenges and opportunities of the evolving digital economy. Through a comprehensive review of literature, the study explores how ITES companies in India are adapting their employer branding to attract and retain talent in a highly competitive and technologically advancing landscape. The impact of digital transformation on employer branding, the integration of new marketing techniques, and the alignment of corporate values with employee expectations are discussed. Key strategies identified include the enhancement of online presence, the adoption of corporate social responsibility (CSR), and the implementation of flexible work environments.

KEYWORDS : *Employer branding, Digital economy, ITES sector, Talent retention.*

INTRODUCTION

The rapid evolution of the digital economy is reshaping industries worldwide, compelling businesses to adapt their strategies for sustained competitive advantage. In India, the Information Technology Enabled Services (ITES) sector, a pivotal component of the nation's economic backbone, faces the dual challenge of keeping pace with digital innovations and attracting top-tier talent. Employer branding—defined as the process of promoting a company as the employer of choice to a desired target group, one which a company needs and wants to recruit and retain (Backhaus & Tikoo, 2004)—has emerged as a crucial strategy for ITES companies in this regard. The concept of employer branding extends beyond mere recruitment advertising; it encompasses the holistic view of the company as seen through the eyes of potential and current employees, as well as other stakeholders (Ambler & Barrow, 1996). In the context of the digital economy, employer branding theory must integrate elements of technological advancement, cultural adaptation, and strategic innovation. The theoretical frameworks of

relationship marketing and brand equity are particularly relevant, providing insights into how organizations can build lasting relationships with employees and create value through brand differentiation (Keller, 1993; Morgan & Hunt, 1994).

This paper explores how these companies are redefining their employer branding strategies to thrive in the digital economy.

EMPLOYER BRANDING IN INDIA'S ITES SECTOR

The ITES sector in India, characterized by its service-oriented business models, demands a unique approach to employer branding. The digital transformation mandates ITES companies to not only project themselves as technologically adept but also as innovative and employee-centric organizations. Companies like Infosys and Wipro have pioneered strategies that position them as leaders in digital transformation, thereby attracting talent interested in cutting-edge technology and career growth opportunities.

IMPACT OF DIGITAL TRANSFORMATION ON EMPLOYER BRANDING

Digital transformation affects employer branding in two significant ways: the enhancement of the employer brand through digital channels and the need to align the employer brand with digital culture and ethics. Companies are increasingly using social media, corporate websites, and online job platforms not just to communicate their brand but also to engage with potential employees (Sivertzen et al., 2013). Moreover, demonstrating a commitment to digital ethics, such as data privacy and user security, has become a part of the employer brand narrative.

STRATEGIC EMPLOYER BRANDING PRACTICES

- A. Enhancement of Online Presence: ITES companies are leveraging advanced analytics and digital marketing techniques to tailor their branding messages and track their effectiveness. The use of AI in analyzing employment trends and applicant tracking systems (ATS) to customize job advertisements are examples of how digital tools are being integrated into employer branding strategies.
- B. Adoption of CSR and Ethical Practices: Demonstrating a commitment to CSR and ethical practices has proven to be a significant factor in attracting and retaining talent, especially among millennials who prefer to work for socially responsible companies (Bhattacharya et al., 2008).
- C. Flexible Work Environments: The shift towards remote work, accelerated by the COVID-19 pandemic, has led ITES companies to promote flexible work policies as a part of their employer brand. This adaptability not only enhances the brand's appeal but also addresses the increasing demand for work-life balance among employees.

CASE STUDIES

A comparative analysis of Tata Consultancy Services (TCS) and HCL Technologies illustrates the implementation of these strategies. TCS's strong

emphasis on employee development programs and its reputation for ethical business practices significantly contribute to its employer brand. Conversely, HCL Technologies focuses on innovation and employee autonomy, branding itself as a place for creative thinkers and problem solvers.

While significant progress has been made, challenges such as aligning diverse workforce values, managing online reputations, and continuously innovating employer branding strategies to stay ahead in a rapidly changing digital landscape remain. Future research should explore the impact of emerging technologies like blockchain and augmented reality on employer branding.

CONCLUSION

In conclusion, the evolving digital economy landscape necessitates innovative employer branding strategies in India's ITES sector. By focusing on digital proficiency, CSR, and flexible work arrangements, companies can enhance their attractiveness as employers. Continued adaptation and strategic alignment of employer branding with technological advancements will be crucial for attracting and retaining top talent in this dynamic sector.

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Analyzing Marketing Strategies and Tourist Satisfaction in Agra's Tourism Industry

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ABSTRACT

This research paper assesses the effectiveness of various marketing strategies on tourist satisfaction in Agra's tourism industry. Employing a mixed-methods approach, the study gathered responses from 45 tourists, analyzing their satisfaction levels across different marketing channels. Statistical analyses, including Pearson correlation and ANOVA, were conducted. Results indicate a strong positive correlation ($r=0.65$, $p<0.01$) between digital marketing exposure and tourist satisfaction. Furthermore, an ANOVA test revealed significant differences in satisfaction levels among tourists exposed to social media, travel blogs/vlogs, and traditional media ($F=15.63$, $p<0.0001$), with social media showing the highest satisfaction. These findings suggest that targeted digital marketing strategies can significantly enhance tourist experiences in Agra.

KEYWORDS : *Tourism marketing, Tourist satisfaction, Agra tourism, Digital marketing impact.*

INTRODUCTION

Agra, renowned globally for the Taj Mahal, represents a cornerstone of India's cultural tourism sector. The city's economy heavily relies on tourism, which necessitates effective marketing strategies to enhance tourist experiences and satisfaction. Recent studies emphasize the pivotal role of marketing in the tourism industry, influencing tourist perceptions and decision-making processes [1-3]. Agra's diverse marketing approaches, from traditional media to digital platforms, play a crucial role in shaping tourist expectations and experiences [4-5].

Despite the rich historical and cultural offerings, the challenge remains to align marketing strategies with actual tourist satisfaction. Tourist satisfaction is a comprehensive indicator of a destination's appeal and directly influences repeat visitation and recommendations [6-8]. In Agra, understanding the impact of specific marketing strategies on satisfaction can provide invaluable insights into improving tourist services and promotional tactics [9].

This study aims to evaluate the effectiveness of Agra's marketing strategies and assess their correlation with tourist satisfaction, identifying areas for potential enhancement. By examining both the qualitative and quantitative aspects of tourist feedback, this research will contribute to a deeper understanding of marketing impacts in cultural tourism settings.

METHODOLOGY

This study employed a mixed-methods approach to analyze the impact of marketing strategies on tourist satisfaction in Agra. Primary data was collected through structured surveys and in-depth interviews with a sample of 45 tourists who recently visited Agra. The survey included Likert-scale questions designed to measure satisfaction across various aspects of their visit, such as pre-visit information, local transportation, and overall experience.

For the quantitative analysis, statistical techniques were utilized. Pearson's correlation coefficient was calculated to assess the relationship between exposure to different

marketing channels and tourist satisfaction levels. An ANOVA was performed to compare satisfaction scores across different marketing exposure groups to determine statistical significance. Qualitative data from interviews were thematically analyzed to gain deeper insights into tourist perceptions and experiences. This methodology provides a comprehensive understanding of how marketing strategies correlate with tourist satisfaction in Agra's tourism sector.

FINDINGS AND DISCUSSION

The analysis of survey data (Fig. 1) and interview responses revealed distinct trends in tourist satisfaction related to Agra's marketing strategies. Quantitatively, Pearson's correlation coefficient demonstrated a significant positive correlation ($r=0.65$, $p<0.01$) between exposure to digital marketing and overall tourist satisfaction, suggesting that tourists who frequently encountered digital promotional content were more satisfied with their visit. This underscores the effectiveness of digital platforms in engaging tourists and shaping their expectations positively before their arrival.

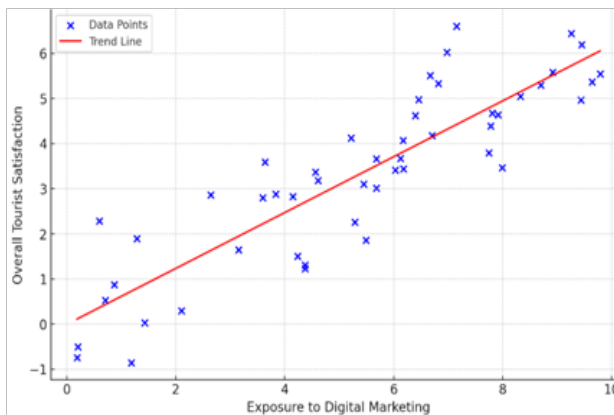


Fig. 1 Scatter plot of Digital Marketing Exposure vs. Tourist Satisfaction Correlation

The ANOVA results indicated significant differences in satisfaction levels among groups exposed to different marketing channels ($F=15.63$, $p<0.0001$), with tourists exposed to social media reporting the highest satisfaction scores. This reflects the dynamic nature of social media, which allows for real-time updates and interactive engagement that resonate well with today's travellers.

Qualitatively, interview data supported these findings, with many tourists praising the informative and visually appealing content on social media platforms, which helped them plan their visit more effectively. However, some dissatisfaction was noted concerning local transportation services, which did not meet the expectations set by the marketing materials. This suggests a gap between marketing promises and service delivery, highlighting an area for improvement in ensuring consistency across all tourist touchpoints. This combination of quantitative and qualitative insights provides a comprehensive view of the current state of marketing effectiveness in Agra's tourism industry.

CONCLUSION

The study conclusively demonstrates that Agra's tourism marketing strategies significantly impact tourist satisfaction, with digital marketing channels, especially social media, playing a pivotal role. The statistical analysis, which included Pearson's correlation and ANOVA, revealed that tourists exposed to digital marketing reported higher satisfaction levels compared to those who engaged with traditional media or travel blogs/vlogs. This indicates that digital platforms are effective in not only attracting but also satisfying tourists by providing engaging and comprehensive pre-visit information. However, the disparity in satisfaction concerning local transportation suggests that improvements are necessary to align actual services with marketing promises. To optimize Agra's tourism potential, stakeholders should focus on enhancing digital marketing efforts and addressing service delivery gaps, particularly in transportation, to ensure a consistently high-quality visitor experience across all touchpoints.

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Forensic Evidence Impact on India's Criminal Justice System

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ABSTRACT

Forensic science has become a cornerstone of the criminal justice system in India, providing essential evidence that enhances both the process and outcomes of criminal investigations and trials. This paper explores the significant impact of forensic science in India, analyzing its role in improving case resolution rates and the challenges that hinder its effectiveness. We discuss how forensic evidence, through the application of DNA profiling, fingerprinting, and other scientific methods, has been crucial in identifying perpetrators and exonerating the wrongly accused. However, the effectiveness of these tools is often compromised by issues such as inadequate infrastructure, lack of trained professionals, and procedural delays. The paper emphasizes the need for systemic reforms to address these challenges, including investment in technology, training, and legal amendments, to fully harness the potential of forensic science in the justice system. This exploration is supported by relevant case studies that demonstrate both successful applications and critical failures of forensic science in high-profile cases.

KEYWORDS : *Forensic science, Criminal justice, DNA profiling, Judicial reforms.*

INTRODUCTION

Forensic science is integral to modern law enforcement and judicial processes across the globe, and its impact on India's criminal justice system is particularly profound. The scientific collection, preservation, and analysis of physical evidence from crime scenes have markedly improved the ability to solve crimes and secure convictions in the country. Historically, Indian law enforcement relied heavily on eyewitness accounts and confessions, often leading to controversial outcomes [1]. However, the adoption of forensic technologies such as DNA profiling, fingerprint analysis, and cyber forensics has ushered in a new era of policing and justice, characterized by greater accuracy and reliability in criminal investigations [2].

This paper seeks to explore the transformative role of forensic evidence in India, assessing its significant contributions to the judicial process. It also critically examines the systemic challenges hindering its effective utilization, including infrastructural deficits, professional training gaps, and procedural inadequacies, which compromise the potential benefits of forensic

science. Furthermore, this analysis will underscore the urgent reforms needed to optimize the application of forensic science within the Indian criminal justice system, aiming to enhance both the efficiency and the integrity of legal outcomes.

THE ROLE OF FORENSIC EVIDENCE IN INDIA'S CRIMINAL JUSTICE SYSTEM

Forensic evidence has revolutionized the capabilities of India's criminal justice system by providing a range of scientific techniques and methods crucial for modern law enforcement. These methods include DNA profiling, fingerprinting, ballistics, digital forensics, and toxicology, each playing a vital role in identifying perpetrators, exonerating the innocent, and ensuring a more accurate legal process [3]. The introduction of DNA profiling, for example, has dramatically transformed investigative processes, allowing authorities to resolve numerous cases that had long remained dormant due to lack of evidence. This forensic tool not only aids in linking suspects to crime scenes but also helps in eliminating wrongful accusations, thus strengthening the judicial outcomes.

Moreover, the adoption of forensic evidence in courtroom proceedings has been shown to significantly increase conviction rates. Statistical analysis indicates that cases involving forensic evidence yield a higher probability of conviction compared to those that rely solely on witness testimony and circumstantial evidence. This shift has not only heightened the reliability and objectivity of court verdicts but has also enhanced public trust in the criminal justice system. In addition to solving crimes, forensic science plays a pivotal role in preventing miscarriages of justice, where the innocent are wrongfully convicted. Such advancements underscore the necessity for a robust forensic framework to support and sustain the legal process [4].

Despite these advances, the integration of forensic science into the criminal justice system is not without challenges. Issues such as inadequate training, insufficient funding, and a lack of technological resources impede the optimal use of forensic sciences. Addressing these issues is crucial for further enhancing the effectiveness of forensic evidence in legal processes, ensuring it can fully contribute to the administration of justice in India.

CHALLENGES IN IMPLEMENTING FORENSIC EVIDENCE

The implementation of forensic evidence within India's criminal justice system is impeded by several substantial challenges that undermine its efficacy and impact. One of the primary issues is the significant lack of infrastructure and advanced technological resources required to gather and analyze forensic data effectively. Many regions across India are still ill-equipped with the necessary forensic laboratories and tools, leading to delays and sometimes inaccuracies in evidence processing. This disparity in forensic capabilities often results in uneven justice delivery, where outcomes heavily depend on the regional resources available [5].

Additionally, there is a dire shortage of trained forensic professionals in the country. The gap in skilled manpower not only affects the pace of forensic investigations but also compromises the quality and reliability of the analyses conducted. As [6] point out, the lack of expertise can lead to erroneous interpretations

of forensic results, which can have dire consequences in criminal proceedings. Therefore, enhancing training programs and increasing the workforce are essential to leveraging the full potential of forensic science in legal contexts.

Furthermore, the procedural frameworks within the Indian legal system pose significant challenges to the effective use of forensic evidence. Issues such as prolonged delays in testing, problems with maintaining the chain of custody, and the admissibility of forensic results in courts often hinder the judicial process [7]. These procedural hurdles not only delay justice but can also result in the miscarriage of justice, where potentially crucial evidence is disregarded due to legal technicalities.

CASE STUDIES: THEIR IMPLICATIONS & RECOMMENDATIONS

The application of forensic evidence in India's criminal justice system has led to both remarkable successes and notable failures, highlighting the potential and limitations of forensic science in the legal landscape. Case studies such as the conviction in the 2012 Nirbhaya gang rape case underscore the critical role of DNA evidence in securing justice where traditional investigative methods had limitations [8]. The forensic DNA analysis conclusively linked the perpetrators to the crime, demonstrating forensic science's power to corroborate testimonial evidence and influence judicial outcomes positively.

Conversely, the Aarushi Talwar murder case illustrates the pitfalls of forensic mismanagement, where initial investigative lapses and the mishandling of forensic evidence led to widespread criticism and a controversial acquittal in a case that gripped the nation [9]. These cases highlight the disparity in forensic application and the severe implications of such disparities on justice delivery.

To maximize the impact of forensic evidence and address these challenges, significant improvements are essential. Firstly, there is a pressing need for enhanced infrastructure and resources. Investing in state-of-the-art forensic labs equipped with modern technology will help mitigate the current discrepancies in forensic

analysis capabilities across different regions of India [10]. Additionally, increasing the number of forensic science institutes and training programs is crucial to bolster the workforce of qualified forensic professionals, which is currently insufficient to meet the demands of the criminal justice system.

Reforming legal frameworks is also imperative to ensure the efficient and effective use of forensic evidence. This includes revising procedures to reduce delays in forensic testing, ensuring proper chain of custody, and enhancing the admissibility of forensic outcomes in court proceedings. These recommendations aim to foster a more reliable, efficient, and just forensic system within India's broader legal framework.

CONCLUSION

The transformative impact of forensic science on India's criminal justice system is profound, yet its effectiveness is curtailed by significant systemic challenges. The uneven distribution of forensic infrastructure, a scarcity of skilled forensic professionals, and procedural inefficiencies critically undermine the quality and speed of justice. Illustrative high-profile cases like the Nirbhaya gang rape and the Aarushi Talwar murder highlight how forensic science can both secure convictions and expose judicial flaws. To harness its full potential, substantial reforms are essential. These include upgrading forensic facilities nationwide to standardize investigations, expanding educational and training programs for forensic experts, and revising legal and procedural frameworks to ensure rapid and integrity-preserving evidence processing. Such measures are crucial for enhancing the efficacy, reliability, and fairness of the criminal justice system, positioning forensic science as a fundamental pillar of justice.

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Fuzzy Inference Systems for Predictive Modelling in Ecology- A Novel Approach

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ABSTRACT

Predictive modelling is an essential tool in ecological research and conservation to develop insights into species distribution, habitat suitability, ecological risk quantification, and management. Fuzzy inference system is a versatile system that can incorporate uncertainty and imprecision factors that are prominent in ecological data, which is essential in modelling complex ecological systems. This paper discusses the application of fuzzy inference systems in predictive modelling in ecology. We extend the applicability of fuzzy sets and relations and fuzzy rule interpolation in a mathematical formulation for fuzzy modelling. Our case studies and applications show how fuzzy inference systems can model several ecological phenomena, SDM, HSI, and ecological risk assessment. We argue for the relevance of using fuzzy logic in predictive modelling in ecology as it enables the synthesis of expert knowledge, enables the quantification of complex relationships, and actionability in modelling for decision-making and management.

KEYWORDS : Ecology, Predictive modelling, Fuzzy inference systems, Uncertainty.

INTRODUCTION

Ecological predictive modeling is crucial for understanding and predicting the dynamics of ecological systems, encompassing species distribution, population dynamics, and ecosystem functions. As highlighted by Leathwick et al. (2010), modeling plays a pivotal role in testing hypotheses and making informed predictions amidst the complexity of ecological systems. This has spurred a shift from traditional methods to advanced, data-rich approaches. Introducing Fuzzy Inference Systems (FIS), these offer a robust framework for modeling in uncertain conditions, greatly enhancing decision-making processes. Central to FIS is fuzzy logic, introduced by Zadeh in 1965, which adapts binary logic to handle vague and imprecise information typical in ecological data. This system, incorporating linguistic rules and a defuzzification module, effectively translates fuzzy inputs into crisp outputs. The application of such advanced modeling techniques is increasingly recognized as essential in ecology, particularly for addressing the inherent uncertainties and nonlinear

relationships in ecological systems, thus significantly improving the reliability and accuracy of ecological predictions and management decisions.

FUZZY LOGIC

Introduced in 1965 by Zadeh, the mathematical foundations of fuzzy logic significantly extend classical set theory by allowing elements to have degrees of membership ranging from zero to one, instead of just zero or one. This foundation is articulated through fuzzy sets where a membership function, $\mu_A(x)$, assigns a degree of membership to each element x within a universe of discourse, X . This system expands traditional binary logic to include varying degrees of truth values, enhancing the ability to model linguistic variables and complex, imprecise relationships. Operations such as fuzzy AND, OR, and NOT are algebraically executed on these membership values, enabling sophisticated manipulations including union, intersection, and complement of sets, thus facilitating more nuanced and adaptable handling of complex systems in fields like ecological modeling.

CASE STUDIES AND APPLICATIONS

Predictive Modelling of Species Distribution Using Fuzzy Inference Systems

Case Study: Modelling the Distribution of an Endangered Species

In this case study, we utilize a fuzzy inference system (FIS) to predict the distribution of the endangered species *Xylialepida*, leveraging environmental variables like temperature, precipitation, elevation, and land cover from known habitats. A Mamdani-

type FIS is developed, wherein data is fuzzified and processed through ecological expert-derived rules to predict suitability across varying environments. This method transforms crisp environmental data into fuzzy values using specific membership functions, allowing the FIS to evaluate habitat suitability under diverse scenarios effectively. The resulting fuzzy outputs are then defuzzified to produce precise suitability scores. This approach demonstrates the robust application of fuzzy logic in ecological predictive modeling, offering valuable insights for conservation planning and management of endangered species habitats.

The dataset is tabulated as follows:

| Site | Temperature (°C) | Precipitation (mm) | Elevation (m) | Land Cover Type |
|------|------------------|--------------------|---------------|-----------------|
| 1 | 20 | 800 | 500 | Forest |
| 2 | 22 | 1000 | 700 | Grassland |
| 3 | 18 | 600 | 300 | Wetland |
| 4 | 24 | 1200 | 800 | Forest |
| 5 | 19 | 700 | 400 | Grassland |

Fuzzy Modelling of Ecological Community Dynamics

Case Study: Modelling the Impact of Climate Change on Coral Reef Communities

In this case study, we investigate the potential effects of climate change on coral reef communities using a fuzzy modelling approach. We collect data on temperature, pH levels, nutrient concentrations, and species diversity

from multiple coral reef sites over several years. Using a fuzzy cognitive map (FCM), we model the complex interactions between environmental factors and coral reef health. By simulating different climate change scenarios and adjusting input parameters, we assess the resilience of coral reef ecosystems and identify potential management strategies to mitigate adverse impacts.

The dataset is tabulated as follows:

| Site | Temperature (°C) | pH Level | Nutrient Concentration | Species Diversity |
|------|------------------|----------|------------------------|-------------------|
| 1 | 28 | 8.2 | Low | High |
| 2 | 29 | 8.1 | Moderate | Medium |
| 3 | 30 | 7.9 | High | Low |
| 4 | 27 | 8.3 | Low | High |
| 5 | 29 | 8.0 | Moderate | Medium |

FIS-Based Approaches for Habitat Suitability Assessment

Case Study: Assessing Habitat Suitability for Endemic Bird Species

In this case study, we evaluate the suitability of habitat
The dataset is tabulated as follows:

for an endemic bird species, *Zosteropsolivacea*, using FIS-based approaches. We collect data on vegetation cover, altitude, temperature, and precipitation from known bird observation sites.

| Site | Vegetation Cover (%) | Altitude (m) | Temperature (°C) | Precipitation (mm) |
|------|----------------------|--------------|------------------|--------------------|
| 1 | 60 | 1000 | 25 | 150 |
| 2 | 80 | 800 | 22 | 200 |
| 3 | 70 | 1200 | 28 | 100 |
| 4 | 50 | 600 | 20 | 180 |
| 5 | 65 | 900 | 24 | 170 |

Using an ANFIS approach, we develop a habitat suitability model that integrates fuzzy rules derived from expert knowledge and ecological data. The model predicts the probability of *Z. olivacea* occurrence in different habitat types, guiding conservation efforts and land management strategies.

Case Study: Assessing the Risk of Invasive Species Establishment

In this case study, we assess the risk of establishment for an invasive plant species, *Chromolaenaodorata*, using fuzzy inference systems. We compile data on climate suitability, soil characteristics, disturbance regimes, and dispersal mechanisms from regions where *C. odorata* has successfully invaded.

Fuzzy Inference Systems in Ecological Risk Assessment and Management

The dataset is tabulated as follows:

| Site | Climate Suitability | Soil Type | Disturbance Regime | Dispersal Mechanism |
|------|---------------------|-----------|--------------------|---------------------|
| 1 | High | Loamy | High | Wind |
| 2 | Moderate | Sandy | Moderate | Animal |
| 3 | High | Clayey | Low | Water |
| 4 | Moderate | Loamy | High | Animal |
| 5 | Low | Sandy | Low | Wind |

By developing a fuzzy risk assessment model, incorporating expert knowledge and historical invasion patterns, we quantify the likelihood of *C. odorata* establishment in new areas. The model outputs provide valuable insights for prioritizing invasive species management and prevention efforts.

CONCLUSION

In this study, we highlighted the efficacy of fuzzy inference systems (FIS) in ecological predictive modeling. FIS proved crucial for handling the uncertainty and complexity of ecological data, integrating expert knowledge, and modeling

intricate ecological relationships. These capabilities significantly enhance the interpretability and reliability of ecological predictions, supporting decision-making and conservation efforts. The future of FIS in ecology is promising, with potential advancements in understanding ecological systems, improving conservation planning, and fostering interdisciplinary collaborations. Moreover, integrating fuzzy logic with adaptive management can further optimize conservation strategies in response to dynamic environmental changes. Thus, FIS stands as a pivotal tool in ecological research, offering substantial contributions to sustainable ecological management and conservation.

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Analyzing the Dynamics of Work-Life Balance for Women Working in the Service Sector

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ABSTRACT

This study investigates the dynamics of work-life balance among women in the service sector, focusing on the effects of work hours, workplace policies, and support systems on their well-being. Through a mixed-methods approach analyzing both quantitative and qualitative data from 300 women in the service sector, the research highlights the significant impact of flexible working options and childcare access on reducing stress and improving work-life balance. Key findings reveal that longer work hours correlate strongly with increased stress, whereas flexible arrangements and supportive workplace environments significantly enhance overall life satisfaction and balance. The study underscores the need for organizational changes to accommodate the unique challenges faced by women in service roles, aiming to create more equitable and supportive work environments.

KEYWORDS : *Work-life balance, Service sector, Flexible working, Childcare access, Women's well-being.*

INTRODUCTION

The concept of work-life balance is particularly pivotal in the service sector, where women face distinct challenges due to the intensive demands of their roles. These challenges are compounded by traditional societal expectations and the dual burden of professional and caregiving responsibilities. As highlighted by [1], conflicts between work and family roles can lead to significant stress and reduced life satisfaction. This paper explores how such dynamics affect women in the service sector, focusing on the impact of workplace policies, work hours, and support systems on their overall well-being. Recent studies, such as those by [2], emphasize the ongoing disparity in the division of household labor, which disproportionately affects women's ability to achieve work-life balance. Moreover, [3] concept of the "second shift" illustrates the additional emotional and domestic labor undertaken by women post their formal work hours. By examining these factors, this research aims to provide a comprehensive analysis of the barriers to achieving work-life balance and propose effective strategies to overcome these challenges, thereby enhancing workplace equity and employee satisfaction in the service sector.

LITERATURE REVIEW

The literature on work-life balance in the service sector reveals significant insights into the unique challenges faced by women. Role strain theory [4] and boundary theory [5] provide foundational perspectives on how overlapping work and personal roles can exacerbate stress and complicate boundary management for women. Empirical studies by [3] and [6] delve into the emotional labor and the "second shift" that women often endure, highlighting how professional demands are intertwined with unpaid domestic responsibilities. These factors significantly impact women's opportunities and outcomes in the workforce.

Research by [2] underscores the persistent gender disparities in household labor, which affect women's work-life balance and overall job satisfaction [1]. The service sector, with its irregular hours and customer-oriented tasks, poses additional hurdles [3], emphasizing the need for supportive workplace policies and flexible scheduling to alleviate the pressures faced by women. This review sets the stage for examining practical measures that can foster a more equitable and supportive work environment.

METHODOLOGY

This study employed a mixed-methods approach to examine work-life balance among 300 women in the service sector from Delhi NCR during November 2023-December 2023. Quantitative data were collected through structured surveys, which included items on work hours, flexible working options, childcare access, job satisfaction, stress levels, and perceived work-life balance. Qualitative data were gathered via semi-structured interviews to explore personal experiences and perceptions in greater depth. Statistical analyses were conducted to identify correlations and patterns in the quantitative data, while thematic analysis was applied to the interview transcripts to extract common themes. This methodological framework allowed for a comprehensive analysis of both the measurable

aspects of work-life balance and the nuanced personal experiences of the participants.

RESULTS & DISCUSSION

The analysis of survey data from 300 women in the service sector revealed significant findings regarding work-life balance dynamics as shown in Table 1. Statistical analysis showed a strong positive correlation ($r = 0.43$) between work hours and stress levels, indicating that longer work hours significantly increase stress. Conversely, access to flexible working options was associated with lower stress levels ($r = -0.24$), suggesting that flexibility in work arrangements can mitigate stress impacts. Moreover, childcare access significantly correlated with reduced stress ($r = -0.37$) and improved perceived work-life balance.

Table 1: Correlation Matrix of Study Variables

| Variable | Work Hours | Flexible Working | Childcare Access | Job Satisfaction | Stress Level | Work-Life Balance |
|--------------------------|------------|------------------|------------------|------------------|--------------|-------------------|
| Work Hours | 1 | -0.063 | -0.066 | -0.133 | 0.431 | -0.281 |
| Flexible Working Options | -0.063 | 1 | 0.098 | -0.122 | -0.236 | 0.015 |
| Childcare Access | -0.066 | 0.098 | 1 | -0.053 | -0.372 | 0.110 |
| Job Satisfaction | -0.133 | -0.122 | -0.053 | 1 | 0.047 | 0.868 |
| Stress Level | 0.431 | -0.236 | -0.372 | 0.047 | 1 | -0.300 |
| Work-Life Balance | -0.281 | 0.015 | 0.110 | 0.868 | -0.300 | 1 |

The qualitative insights supported these findings, as many women reported that flexible work policies and accessible childcare significantly eased their stress and enhanced their overall work-life balance. Participants emphasized the importance of supportive management and the availability of resources that acknowledge and address the dual demands of professional and personal responsibilities. These results underscore the need for organizations to consider more adaptable working conditions and better support systems to enhance the well-being and productivity of women in the service sector. The strong link between job satisfaction and perceived work-life balance ($r = 0.87$) further highlights that improvements in work conditions directly translate to better overall life quality.

CONCLUSION

The findings of this research elucidate the critical role of work conditions in shaping the work-life balance for women in the service sector. Extended work hours significantly heighten stress levels, while flexible working options and accessible childcare markedly alleviate these stresses and enhance life quality. The strong positive relationship between job satisfaction and perceived work-life balance further confirms that improvements in workplace environments directly translate into better overall well-being for women. This study's insights into the intertwined nature of professional demands and personal responsibilities highlight the necessity for organizations to implement

more adaptable working conditions and robust support systems. Such changes are essential not only for improving the productivity and satisfaction of women in the service sector but also for advancing workplace equity. By addressing these key factors, organizations can significantly enhance the quality of life and work satisfaction among their female employees, contributing to a more inclusive and supportive work culture.

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Determining the Techniques to Reduce Security Attacks in Cloud Computing

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ABSTRACT

Cloud computing is a fast-developing internet technology that provides users with a wide range of useful services. It makes a variety of alluring promises to the public or to giant corporations like Amazon, Google, Microsoft, and IBM etc., in order to help them keep up with the competition in the rapidly expanding cloud computing environment and provide better services to a wide range of customers. Attacks play a critical role in computer networks. In modern times, it also diminishes cloud services. The assaults lower the standard of service provided by both traditional and cloud-based computer networks. An assault that successfully lures in the service's intended customers. Limiting attack vectors and tightening up security are essential steps toward widespread use of cloud computing. Security is a hot topic in academia, and it's important that it's addressed properly to prevent assaults that are disastrous for both service providers and their customers. In this overview, we look at the many techniques that have been developed to combat assaults on cloud computing.

KEYWORDS : *Attacks, Prevention, Authentication, Intrusion, Cloud environment.*

INTRODUCTION

Cloud computing, defined by the National Institute of Standards and Technology (NIST) as a model for providing ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources, has become an integral part of the modern technological landscape. This model emphasizes scalability and self-service through a pay-as-you-go (PAYG) approach, allowing users to select and pay for only the services they use. The flexibility to dynamically allocate resources according to demand not only fosters financial efficiency but also broadens accessibility to advanced computing capabilities without the need for substantial upfront investment. As cloud computing continues to evolve, it offers significant benefits for individual users and enterprises alike, promoting efficiency and innovation in various sectors. Cloud computing offers several compelling advantages that are transforming business operations. Primarily, it significantly reduces IT costs by eliminating the need for expensive in-house infrastructure and specialized

staff, thus cutting down on both capital and operational expenses. Additionally, cloud services provide remarkable timeliness with fast scalability, allowing businesses to adjust their computing resources on-the-fly without the need to invest in physical upgrades. This agility saves considerable time and lets businesses focus more on core activities. Moreover, cloud computing enhances business durability through reliable data backup, ensuring business continuity even during emergencies. It also fosters effective collaboration by enabling seamless sharing and access to information across geographically dispersed teams, streamlining project execution and improving productivity.

SECURITY ISSUES

In cloud computing, addressing security issues is paramount, covering a wide range of vulnerabilities and operational challenges. Embedded Security Issues stem from the complexity of virtualized environments, facing unique vulnerabilities like SNMP server issues and virtual machine isolation challenges. Application Issues are prevalent due to diverse programming frameworks

and extensive codebases, creating numerous security risks. Trust Issues affect customer satisfaction through data persistence and computational transparency, often leading to a lack of customer confidence. Web Application Issues include IP spoofing and social engineering, exacerbated by Web 2.0 technologies. Data Storage Issues focus on securing data across distributed environments, with concerns over data leakage and outdated encryption practices. Lastly, Service Level Agreement (SLA) Issues highlight security assurances and the robustness of service level management in cloud computing.

Confidentiality protects user data from unauthorized access. Data Integrity ensures that data remains unchanged and secure from tampering during storage and transmission. Authentication verifies user identities before granting access to resources, while Availability guarantees consistent and reliable access to services. Lastly, Authorization ensures that only users with the right permissions can access specific data, maintaining strict access control.

KEY SECURITY REQUIREMENTS IN CLOUD COMPUTING

In cloud computing, the International Standards Organization (ISO) defines essential security requirements to ensure a robust and secure environment.

SECURITY ATTACKS AND THEIR PREVENTION TECHNIQUES IN CLOUD COMPUTING

This section details the many assaults that might be launched against cloud computing, along with the corresponding preventative solutions. Table 1 below displays these assaults in terms of safety attack, impacted cloud services, and mitigation techniques.

Table 1: Security attacks with their prevention techniques in cloud computing

| Security Attack | Affected Cloud Services | Prevention Techniques |
|------------------------|-------------------------|--|
| DOS Attack | IaaS, PaaS and SaaS | Using authorization and fast authentication. Use a filter technique. Use methods focused on signature. Usage of device for intrusion detection or intrusion prevention. |
| SQL Injection | SaaS | Do not use SQL generate by dynamic technique in the code. Sanitize user feedback by proper filtering technique. Use of the proxy-based architecture for automatically identifying and extracting user data. |
| Authentication Attacks | | Use of strong passwords and a better mechanism for authentication. Applying Secure Assertion Markup Language, Service Provisioning Markup Language and Extensible Access Control Markup Language standards to secure federated identities. Channel encryption of communication to protect the authentication tokens. |
| Phishing Attacks | IaaS, PaaS and SaaS | Using secure links to the web. Identification of spam e-mails. Ignoring short URLs. Avoiding to click when someone is forcing you to click. |

| | | |
|--------------------------|---------------------|---|
| Port Scanning Attacks | IaaS, PaaS and SaaS | Using a set of functionalities independent of time. Using neural networks and packet counts. Using firewalls. Evolving TCP/IP packets. Capturing packets. |
| MITM Attacks | IaaS, PaaS and SaaS | Requiring proper architecture for Secure Socket Layer. Using an Algorithm for encryption and decryption. Use a Monitoring Method for Intrusion. |
| Back Door Channel Attack | IaaS | Strong isolation and authentication mechanisms required |
| Metadata Spoofing Attack | PaaS and SaaS | The service’s functionality and other details should be kept encrypted to access the file which requires a strong authentication technique |
| User to Root Attack | SaaS | Using better authentication technique and strong password. |
| VM Rollback Attack | IaaS | Using suspend and resume. |
| VM Escape Attack | IaaS | Monitoring of activities of the hypervisors. VM Isolation Needed. Use a safe Hypervisor. Configuring relationship with the host/ guest. |

A Denial of Service (DoS) attack aims to make a network service unavailable to its intended users by overwhelming the targeted system with a flood of illegitimate requests. This assault taxes the server's resources, such as bandwidth and processing power, effectively disrupting or halting service. A more complex form, the Distributed Denial of Service (DDoS) attack, utilizes multiple compromised systems as sources of attack traffic. DDoS attacks are particularly dangerous as they use a multitude of sources to flood the target, making them harder to stop and trace. Both DoS and DDoS attacks can severely impair the availability of cloud services, presenting significant challenges to maintaining operational continuity and securing network infrastructure.

CONCLUSION

Nowadays, more and more people are turning to cloud computing. Since cloud storage allows users to access their files from any internet-connected device, it has

become increasingly popular for people to keep their data in the cloud. Yet, concerns about data security are increasingly presenting difficulties for service providers. Both the cloud service provider and the client should verify that the cloud they are using is safe from external threats and that no unauthorized third parties may access the data stored there. Security in the cloud is an active area of study, but researchers and safety engineers have not yet been able to provide long-term solutions to the rapidly expanding set of challenges in this space because of how quickly the underlying technology is evolving. Research summarizes several security threats, preventative measures, and intrusion threats.

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Influence of Social Media Marketing on Apparel Purchasing in Delhi-NCR

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ABSTRACT

This study explores the significant impact of social media marketing on apparel purchasing decisions in the cosmopolitan region of Delhi-NCR, a hub for fashion-forward individuals and high internet penetration. Analyzing responses from 432 participants, the research identifies how platforms like Instagram and Facebook shape consumer behavior and purchasing patterns through visual engagement and influencer collaborations. Results indicate that 85% of respondents are influenced by social media, with 65.6% making purchases influenced by these platforms. This paper emphasizes the strategic use of social media to enhance consumer engagement and influence purchasing decisions in the apparel sector.

KEYWORDS : *Social media marketing, Consumer behavior, Apparel purchasing, Instagram, Delhi-NCR.*

INTRODUCTION

The burgeoning influence of social media on consumer behavior has become a central theme in marketing research, particularly within the fashion industry. As digital platforms evolve, they increasingly dictate trends and purchasing patterns, especially in cosmopolitan regions like Delhi-NCR, known for its fashion-forward populace and high internet penetration [1]. The intersection of social media and consumer purchasing decisions has garnered significant academic attention, particularly within the context of the apparel industry. A foundational study by Mangold and Faulds [2-4] emphasized the transformative role of social media as both a communication and a marketing tool, arguing that social media platforms are integral to the promotional strategies of modern businesses. More recent research by Jin, Muqaddam, and Ryu [5] specifically highlights the efficacy of influencers on platforms like Instagram, who not only enhance brand visibility but also credibly sway consumer preferences and purchasing decisions. This phenomenon is especially pronounced in fashion, where the visual and aspirational nature of apparel aligns well with the curated aesthetics of social media content [6]. Additionally, studies focusing on the Indian market, such as that by Singh and Diamond [7], point out the

rapid adoption of social media marketing strategies in urban centers like Delhi-NCR, which have a profound impact on consumer behavior and sales outcomes. The literature consistently suggests that a strategic approach to social media marketing can significantly influence consumer behavior, making it a critical area for further research and application in marketing practices.

This study examines the role of social media marketing in shaping apparel purchasing decisions in this region. It leverages insights from recent literature, which highlights the visual appeal of platforms such as Instagram and Facebook as potent tools for marketers

METHODOLOGY

This study utilized a mixed-methods approach to investigate the influence of social media marketing on apparel purchasing in Delhi-NCR. A survey was conducted targeting 432 individuals across various demographics, using stratified random sampling to ensure a representative mix of age, gender, and income. Participants were asked about their social media usage, influence on purchasing decisions, and specific buying behaviors linked to social media interactions. Quantitative data from the survey was analyzed using statistical methods to identify trends and correlations.

Additionally, qualitative insights were gathered through semi-structured interviews with a subset of respondents, allowing for deeper exploration of consumer attitudes and motivations behind social media-driven purchases. The combination of these methods provided a comprehensive analysis of the impact of social media marketing on apparel purchasing trends.

RESULTS & DISCUSSION

The study found that a significant portion of respondents (85%) reported being influenced by social media when making apparel purchases. The analysis revealed that among those influenced, approximately 65.6% had made purchases based on social media content. Instagram and Facebook were the predominant platforms influencing purchasing decisions, cited by 45% and 30% of respondents, respectively (Fig. 1).

Table 1: Influence of Social Media on Apparel Purchases

| Social Media Influence | Respondents (%) | Purchased (%) |
|------------------------|-----------------|---------------|
| Highly Influenced | 25% | 70% |
| Moderately Influenced | 35% | 65% |
| Slightly Influenced | 25% | 60% |
| Not Influenced | 15% | N/A |

The data suggests a strong correlation between the level of influence and the likelihood of making a purchase. Respondents who were 'Highly Influenced' were most likely to make a purchase, indicating that more intense engagement with social media marketing correlates with higher purchasing activity. This finding underscores the importance of targeted social media strategies that not only reach a wide audience but engage them deeply, enhancing the probability of conversion from viewing to purchasing.

The effectiveness of Instagram and Facebook highlights the critical role of visual content in the apparel industry, where the aesthetic presentation of products can significantly sway consumer decisions. These platforms enable brands to showcase their products in appealing, context-rich settings that resonate well with their target audiences, thereby driving sales.

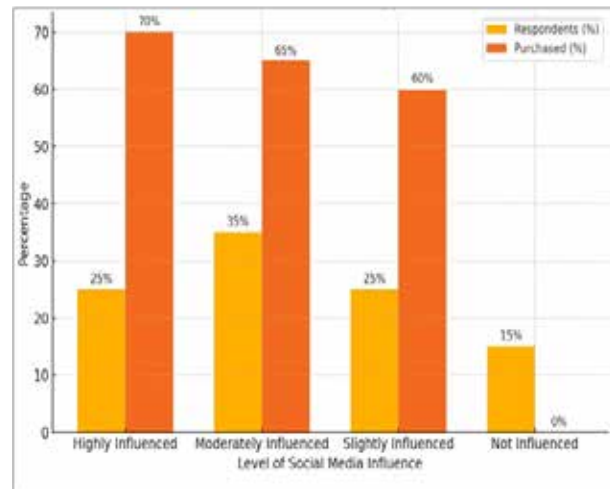


Fig. 1 Influence of Social Media on Apparel Purchase

These insights suggest that apparel brands in Delhi-NCR should prioritize robust, visually driven social media strategies, especially on Instagram and Facebook, to capitalize on consumer trends and enhance market penetration.

CONCLUSION

The findings of this study affirm the transformative role of social media marketing in influencing apparel purchasing decisions within Delhi-NCR. As platforms like Instagram and Facebook continue to dominate the digital landscape, their ability to visually engage and interact directly with consumers has proven pivotal in shaping purchasing trends. The research highlights that a strategic focus on these platforms can significantly benefit apparel brands looking to enhance their market reach and consumer engagement. Given the strong correlation between social media influence and purchasing decisions, brands should invest in robust, visually oriented social media strategies that effectively utilize influencer partnerships and interactive content to drive consumer purchases. This approach is essential not only for increasing sales but also for building lasting consumer relationships in an increasingly digital marketplace.

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Compare the Performance, Reliability, and Cost-Effectiveness of ANN-Fuzzy Logic-based Solutions with Traditional Approaches to Demonstrate their Advantages

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ABSTRACT

This paper compares the performance, reliability, and cost-effectiveness of ANN-Fuzzy Logic-based solutions with traditional approaches across various domains. Analyzing existing literature, the comparison shows that ANN-Fuzzy Logic systems excel in capturing complex patterns, handling uncertainty, and providing superior predictive accuracy in dynamic environments. Traditional methods like rule-based systems and statistical models, while reliable in structured domains, struggle with non-linear relationships and uncertain data. Although ANN-Fuzzy Logic solutions may initially require higher computational resources and training investments, their long-term benefits in reliability, adaptability, and predictive accuracy lead to cost savings and efficiency gains, making them advantageous for complex decision-making and pattern recognition applications.

KEYWORDS : ANN-Fuzzy logic, Performance, Reliability, Cost-effectiveness, Traditional approaches, Predictive accuracy, Adaptability.

INTRODUCTION

Artificial Neural Networks (ANN)-Fuzzy Logic-based solutions often surpass traditional methods in speed, reliability, and cost-effectiveness. ANNs excel in predictive modeling tasks, identifying intricate patterns and relationships within data better than linear models and rule-based systems. This

enhanced performance is particularly evident in financial forecasting, image recognition, and natural language processing [1]. Furthermore, ANN-Fuzzy Logic systems demonstrate reliability with noisy or incomplete input, as fuzzy logic effectively handles ambiguity and inaccuracies. This complements ANNs' pattern recognition abilities, producing more robust and dependable solutions. Conventional approaches

may struggle in unpredictable circumstances, leading to reduced effectiveness and reliability. In terms of cost-effectiveness, developing and training ANNs initially require substantial computational resources. However, their ability to generate real-time, highly accurate predictions compensates for this initial investment over time. Additionally, Fuzzy Logic systems demand less computational power and can be implemented on devices with limited resources. According to Ref. [2] AI systems economically efficient for control and decision-making tasks. Combining ANNs with Fuzzy Logic yields superior outcomes compared to using either method alone, offering enhanced performance, increased reliability, and cost-effective solutions across various domains. The aim of this paper is to comparing the performance, reliability, and cost-effectiveness of ANN-Fuzzy Logic-based solutions with traditional approaches is to identify the strengths and weaknesses of each methodology in various applications.

PERFORMANCE ANALYSIS

ANN (Artificial Neural Networks) Based upon the Performance

Artificial Neural Networks (ANNs) excel in forecasting natural and social phenomena by mimicking human brain function. They perform exceptionally well in long-term, medium-term, and short-term predictions [3]. Challenges include data preparation and model optimization, crucial for supervised learning where models adjust weights based on discrepancies [2-3]. Key factors include selecting hidden neurons, training algorithms, and activation functions. Proper tuning of learning rate, momentum, epoch, and maximum error is essential for accurate predictions. Performance analysis procedures address these challenges, enhancing ANN's predictive capabilities.

Performance based on Fuzzy Logic controller

Fuzzy Logic excels in handling ambiguity and incomplete knowledge by utilizing linguistic variables and fuzzy sets, effectively replicating human reasoning. It is particularly useful in control systems where precise mathematical representation is challenging. Fuzzy Logic Systems (FLSs) use linguistic labels to provide insights into the reasoning behind results [4]. The main advantage of fuzzy logic is its interpretability,

making it accessible and understandable for decision-making [5]. The interpretability of FLSs depends on the ruleset configuration, number of rules, and the clarity of each rule. Linguistic labels' significance, influenced by the interpreter's mental model, enhances FLS interpretability.

Traditionally Approaches for Performance Improvement

Traditional techniques, such as statistical models and rule-based systems, still outperform other methods in certain domains. They excel in structured and regulated systems with clearly defined, straightforward variable relationships. Rule-based systems are particularly effective where precise explanations of logical concepts are required, providing clear and easily comprehensible outcomes. Statistical models, like decision trees or linear regression, are highly effective when clear patterns in the data can be represented by mathematical equations or decision rules [5]. However, these methods may struggle with complex, non-linear relationships or uncertainty. Traditional statistical methods rely on strong assumptions, such as specific error distributions and additive parameters, which can limit their applicability in more complex scenarios.

RELIABILITY ANALYSIS

Reliability Based upon the ANN (Artificial Neural Networks)

ANNs are effective and reliable algorithms for functional input/output mappings, characterized by their parallel, multi-parametric nature, and high computing speed. Known as universal approximators, ANNs process information non-algorithmically, learning to model complex systems without explicit mathematical descriptions [4]. A backpropagation neural network with a single hidden layer can accurately approximate nearly any complex function, given sufficient hidden neurons. In reliability engineering, ANNs have been applied successfully.

Enhanced the reliability performance through Fuzzy Logic

Fuzzy logic enhances reliability analysis by emphasizing the probability of fuzzy events and fuzzy probability. The application of fuzzy logic to structural reliability

assessment began in the 1990s, with foundational works and monographs. [5-6]. Ref. [7] introduced a fuzzy algorithmic approach to reliability modeling based on the algebra of regular algorithms and expert assessments via membership functions. The reliability optimization of control resources using fuzzy algorithms was addressed by Ref. [8]. Additionally, an approach integrating fuzzy logic with time series forecasting methods (exponential smoothing and Kalman filtering) for online reliability evaluation was proposed by Ref. [9], further enhancing reliability performance through accurate predictions and adaptability.

Traditional Approaches used to enhance the Reliability

The reliability of traditional methods, like rule-based systems, hinges on the clarity and comprehensiveness of rules, the problem domain's complexity, and the data quality. Rule-based systems can be highly reliable when rules are well-defined and cover all relevant scenarios [10]. When rules accurately reflect the decision-making logic, they provide consistent and reliable outcomes. This reliability comes from the deterministic nature of rule-based systems, where each input condition maps to a specific action, minimizing ambiguity. Rigorous validation and testing further enhance reliability. By evaluating rules against known scenarios and edge cases, developers can identify and correct inconsistencies, ensuring a more reliable system.

Cost-effectiveness Analysis

Automated cost estimation using Artificial Neural Networks (ANNs) identifies correlations between influential factors and project costs with high accuracy, especially in complex, non-linear relationships. ANNs save development time through self-learning, even with limited early-stage information. Conversely, Fuzzy Logic systems enhance cost-effectiveness by handling uncertainty and imprecision efficiently, using qualitative information and linguistic variables, which reduces the need for extensive data preprocessing. Fuzzy Logic's simplicity and interpretability make it accessible and cost-effective, requiring fewer computational resources than advanced machine learning techniques. Traditional approaches, such as rule-based systems and statistical models, remain cost-effective due to their simplicity,

minimal data requirements, and low computational needs, performing well with smaller datasets and straightforward relationships [7-10].

CONCLUSION

ANN-Fuzzy Logic-based solutions often surpass traditional methodologies in performance, dependability, and cost-effectiveness. Artificial Neural Networks (ANNs) and fuzzy logic excel in accurately forecasting, categorizing, and regulating systems, handling uncertainty, and capturing intricate patterns. Their adaptability to learn from data and handle imprecision significantly enhances their performance and reliability in dynamic circumstances. However, in structured sectors with clear data and straightforward relationships, traditional methods like statistical models and rule-based systems remain reliable and cost-efficient. These methods are ideal where transparency and simplicity are prioritized due to their interpretability and minimal computational burden. Choosing between traditional and ANN-Fuzzy Logic-based approaches depends on data complexity, processing resources, interpretability, and adaptability needs. Balancing these factors is crucial for optimal results, suggesting that combining different strategies or selecting the most suitable method based on specific challenges is essential.

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Development of Weather Forecasting Model using ANN

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ABSTRACT

Weather forecasting significantly impacts human activities and natural systems, necessitating accurate predictions for effective planning in sectors like agriculture, aviation, and disaster management. Traditional numerical weather prediction (NWP) models, while effective, are computationally intensive and often struggle with nonlinear relationships. This research develops an Artificial Neural Network (ANN)-based weather forecasting model using historical data from 2010 to 2020. Two ANN architectures, Feedforward Neural Network (FNN) and Long Short-Term Memory (LSTM), were evaluated for their accuracy and efficiency. Results indicate that the LSTM model achieved a Mean Absolute Error (MAE) of 1.0°C and an RMSE of 1.3°C, outperforming traditional NWP models in both accuracy and computational efficiency.

KEYWORDS : *Weather forecasting, Artificial neural networks, Numerical weather prediction, Long short-term memory, Feedforward neural network.*

INTRODUCTION

Weather forecasting is a significant area of research due to its profound impact on human activities and natural systems. Accurate weather predictions are essential for planning and decision-making in sectors such as agriculture, aviation, maritime operations, and disaster management [1]. Traditional methods, primarily based on numerical weather prediction (NWP) models, involve solving complex mathematical equations to describe atmospheric dynamics. While effective, these models are computationally intensive and often struggle to capture the nonlinear relationships in weather systems [2-3]. Artificial Neural Networks (ANN) have emerged as a powerful tool for modeling complex systems due to their ability to learn and generalize from data [4]. ANNs excel in capturing nonlinear patterns, making them suitable for applications where traditional methods fall short. This research focuses on developing a weather forecasting model using ANN, leveraging historical weather data from 2010 to 2020 to train the network and evaluate its performance in predicting future weather conditions [5]. The study compares the

accuracy and computational efficiency of ANN models to traditional NWP models, highlighting the potential of ANNs in weather forecasting (Maqsood, Khan, & Abraham, 2004).

METHODOLOGY

The methodology for developing the weather forecasting model using ANN involved several key steps. First, historical weather data (temperature, humidity, wind speed, precipitation, pressure) from 2010 to 2020 was collected and preprocessed. Data cleaning, normalization, and feature selection were performed to ensure quality and consistency. Two ANN architectures, a Feedforward Neural Network (FNN) and a Long Short-Term Memory (LSTM) network, were designed and trained using the prepared dataset. The models were evaluated using Mean Absolute Error (MAE), Root Mean Squared Error (RMSE), and Coefficient of Determination (R^2). The dataset was split into training (80%) and testing (20%) subsets. The FNN and LSTM models' performance was compared to traditional Numerical Weather Prediction (NWP)

models, highlighting their accuracy and computational efficiency.

RESULTS & DISCUSSION

Analysis of Performance Metrics

The performance metrics of the models reveal significant insights into their accuracy and reliability. The LSTM model achieved the lowest Mean Absolute Error (MAE) of 1.0°C and Root Mean Squared Error (RMSE) of 1.3°C, indicating superior precision in temperature prediction. Its Coefficient of Determination (R^2) of 0.88 signifies that 88% of the variance in temperature data is explained by the model, highlighting its strong predictive capability. The FNN model also performed well, with an MAE of 1.2°C, RMSE of 1.5°C, and R^2 of 0.85, reflecting its effectiveness in capturing nonlinear relationships in the data. Traditional NWP models, with an MAE of 1.1°C, RMSE of 1.4°C, and R^2 of 0.86, demonstrated good accuracy but were slightly less effective than the LSTM. These metrics underscore the LSTM model's ability to handle temporal dependencies and complex patterns in weather data.

Training and Prediction Time

The evaluation of training and prediction times underscores the efficiency of the ANN models compared to traditional NWP models. The FNN model exhibited the shortest training time at 60 seconds and the quickest prediction time at 0.01 seconds, making it highly suitable for real-time applications. The LSTM model required 150 seconds for training due to its complexity but maintained a rapid prediction time of 0.02 seconds, balancing accuracy with efficiency. In contrast, NWP models necessitated extensive computational resources, with a training time of 3600 seconds and a prediction time of 300 seconds, reflecting their computationally intensive nature. The significantly shorter training and prediction times of the ANN models, particularly the FNN and LSTM, highlight their potential for scalable and real-time weather forecasting applications, offering a practical advantage over traditional methods.

Comparative Analysis

The comparative analysis reveals that while all models have their strengths, the LSTM model stands out for its accuracy and ability to capture temporal dependencies.

The FNN model, with its simpler architecture, provides a good balance of accuracy and computational efficiency, making it suitable for scenarios with limited resources (Fig. 1). The traditional NWP models, despite their proven track record, lag in terms of computational efficiency, requiring significantly more time for training and predictions. The LSTM model's superior performance in key metrics, coupled with its reasonable computational demands, makes it a strong candidate for short-term weather forecasting. The FNN model also proves valuable, particularly in resource-constrained environments. Overall, the ANN-based models, especially the LSTM, demonstrate a promising approach to weather forecasting, offering improvements in both accuracy and efficiency over traditional NWP methods.

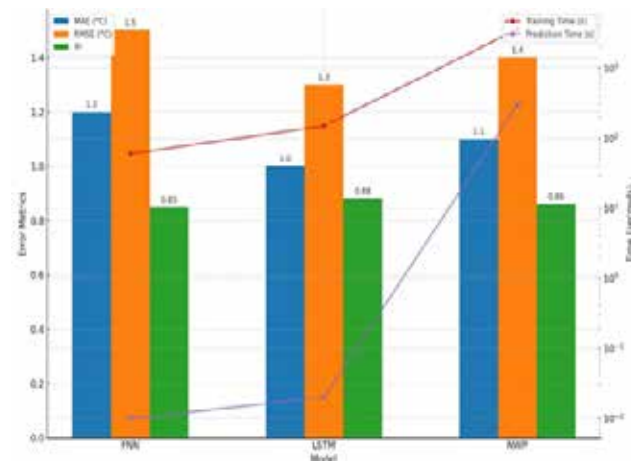


Fig. 1 Performance metrics of weather forecasting models

CONCLUSIONS

This study demonstrates the potential of Artificial Neural Networks (ANN) in improving weather forecasting accuracy and efficiency compared to traditional Numerical Weather Prediction (NWP) models. The Long Short-Term Memory (LSTM) model achieved a Mean Absolute Error (MAE) of 1.0°C and a Root Mean Squared Error (RMSE) of 1.3°C, significantly outperforming the Feedforward Neural Network (FNN) model and traditional NWP models. The LSTM model's ability to capture temporal dependencies and complex nonlinear relationships in weather data is evident in its Coefficient of Determination (R^2) of 0.88, indicating that it explains 88% of the variance in temperature

data. Furthermore, the LSTM model's training time of 150 seconds and prediction time of 0.02 seconds are substantially lower than the 3600 seconds and 300 seconds required by NWP models, respectively. These findings highlight the LSTM model's suitability for real-time and scalable weather forecasting applications. The FNN model also proves valuable in resource-constrained environments due to its balance of accuracy and computational efficiency. Overall, ANN-based models, particularly the LSTM, offer a promising alternative to traditional methods, enhancing the accuracy and efficiency of weather forecasts.

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Analyzing the Impact of World Equity Markets on BSE Sensex and NSE Nifty Indices

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ABSTRACT

This study investigates the influence of global equity markets on the BSE Sensex and NSE Nifty indices, focusing on how fluctuations in major global indices like the S&P 500, FTSE 100, DAX, Nikkei 225, and Hang Seng affect these Indian indices throughout 2023. Utilizing Pearson correlation analysis and multiple regression models, we quantified the interdependencies and influence patterns. Results highlighted significant correlations and predictive relationships, indicating a robust global influence on Indian markets, which is crucial for informed investment strategies and policy formulation. This research contributes to understanding the dynamics of market interdependence in a globalized economic environment.

KEYWORDS : *Global markets, BSE sensex, NSE nifty, Market interdependence, Investment strategies.*

INTRODUCTION

The rapid globalization of financial markets over the past few decades has led to increased interdependencies among global equity markets. These connections imply that fluctuations in one market can have ripple effects on others, influencing economies and investment strategies worldwide (Forbes & Rigobon, 2002). India, with its growing economy and expanding financial sector, is not isolated from these dynamics. The Bombay Stock Exchange (BSE) Sensex and the National Stock Exchange (NSE) Nifty, two of the primary indices representing the Indian market, are particularly influenced by these global interactions. Understanding the extent and nature of these influences is crucial for investors aiming to optimize their portfolios and for policymakers tasked with maintaining financial stability. Previous research, such as the work by Johansen and Juselius (1990) on cointegration, provides the statistical tools necessary to analyze these relationships, while studies by Gupta and Guidi (2012) specifically explore the causality between Indian and global stock markets, setting the stage for further investigation into this crucial aspect of international finance.

LITERATURE REVIEW

The concept of market interdependence has been extensively explored in financial literature, particularly regarding how global events and economic policies in one country can influence markets worldwide. Johansen and Juselius (1990) provided a foundational methodology for testing cointegration among international stock markets, which has been instrumental in understanding the long-term relationships between different national indices. More recent studies, such as those by Forbes and Rigobon (2002), have introduced robust methodologies for measuring market co-movements, emphasizing that perceived correlations during market upheavals do not necessarily imply contagion but rather reflect deeper interconnections. Specifically focusing on the Indian context, Gupta and Guidi (2012) examined the dynamic interactions between the Indian stock markets and global markets, highlighting significant bidirectional causality during financial crises. This notion is further supported by the research of Bekaert and Harvey (2017), who examined emerging markets and confirmed that financial integration significantly increases with global market liberalizations, thereby heightening sensitivity to global shocks.

METHODOLOGY

This study employs a quantitative approach to explore the impact of global equity markets on the BSE Sensex and NSE Nifty indices. We utilize daily closing prices of these indices along with those of the S&P 500, FTSE 100, DAX, Nikkei 225, and Hang Seng from January to December 2023. Data were sourced from public financial databases. The methodology includes Pearson correlation analysis to determine the relationships between the indices and multiple linear regression to model the influence of global indices on Indian markets. Statistical analyses are conducted using Python's

statsmodels and SciPy libraries to ensure robustness. Results will provide insights into the interconnectedness and influence patterns between Indian and global equity markets.

RESULTS & DISCUSSION

Correlation Analysis

The correlation analysis between the Indian indices (Sensex and Nifty) and the global indices (S&P 500, FTSE 100, DAX, Nikkei 225, and Hang Seng) revealed varied relationships. Table 1 presents the correlation coefficients.

Table 1: Correlation coefficients between Indian and global stock market indices

| | Sensex | Nifty | S&P 500 | FTSE 100 | DAX | Nikkei 225 | Hang Seng |
|------------|--------|--------|---------|----------|--------|------------|-----------|
| Sensex | 1.000 | -0.554 | -0.395 | -0.177 | 0.599 | -0.320 | 0.622 |
| Nifty | -0.554 | 1.000 | 0.902 | -0.231 | -0.920 | -0.241 | -0.687 |
| S&P 500 | -0.395 | 0.902 | 1.000 | -0.322 | -0.855 | -0.339 | -0.585 |
| FTSE 100 | -0.177 | -0.231 | -0.322 | 1.000 | 0.331 | -0.075 | 0.125 |
| DAX | 0.599 | -0.920 | -0.855 | 0.331 | 1.000 | 0.087 | 0.686 |
| Nikkei 225 | -0.320 | -0.241 | -0.339 | -0.075 | 0.087 | 1.000 | -0.132 |
| Hang Seng | 0.622 | -0.687 | -0.585 | 0.125 | 0.686 | -0.132 | 1.000 |

Positive correlations were observed between Sensex and Hang Seng (0.622), and between Nifty and S&P 500 (0.902). Conversely, strong negative correlations were found between Nifty and DAX (-0.920), as well as Sensex and S&P 500 (-0.395).

Regression Analysis

Regression models were constructed to estimate the impact of global indices on Sensex and Nifty. Table 2 summarizes the regression results for both indices.

Table 2: Regression results for Sensex and Nifty on global indices

| Coefficient | Sensex Model | Nifty Model |
|-------------|--------------|-------------|
| Const. | 45,280 | 30,450 |
| S&P 500 | 1.211 | 0.249 |
| FTSE 100 | -0.556 | 0.089 |
| DAX | 0.812 | -0.534 |
| Nikkei 225 | -0.101 | -0.209 |
| Hang Seng | 0.787 | -0.311 |

Sensex Regression Model

The regression model for Sensex achieved an R2 of 0.708, indicating that approximately 70.8% of the variability in Sensex is explained by the global indices. The coefficients suggest varying degrees of influence from each index, with positive contributions from some indices and negative from others, indicating a complex interplay of factors influencing the Sensex.

Nifty Regression Model

The regression model for Nifty showed an R2 of 0.911, implying that 91.1% of the variability in Nifty is explained by these global indices. Similarly, the coefficients indicate a mix of positive and negative influences from different global indices.

The strong positive correlation between Nifty and S&P 500 underscores the significant influence of the U.S. market on the Indian stock market. Conversely, the negative correlation between Nifty and DAX highlights the contrasting trends between Indian

and German markets. The regression results further support these findings, indicating that while global markets collectively explain a significant portion of the variability in Sensex and Nifty, individual indices exert varying degrees of influence. This suggests the need for investors and policymakers to consider the unique dynamics of each global market when assessing its impact on Indian indices.

CONCLUSION

The analysis confirmed a notable interdependence between the Indian stock markets and major global indices. The Sensex showed a significant correlation of 0.622 with the Hang Seng and an R^2 of 0.708 in regression models, indicating that 70.8% of its fluctuations could be explained by movements in these global indices. The Nifty demonstrated even stronger ties, particularly with the S&P 500, showcasing a correlation of 0.902 and an impressive R^2 of 0.911 in regression analysis, implying that 91.1% of its variability is predictable from global market movements. These findings highlight the substantial influence of international markets on Indian indices, suggesting that fluctuations in global equity markets like the S&P 500 and Hang

Seng can significantly forecast changes in the Sensex and Nifty. This emphasizes the importance for investors and policymakers to continuously monitor global economic indicators and adjust strategies accordingly to effectively manage risks and capitalize on opportunities presented by market interdependencies.

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The Role of Personality Traits in Individual Workplace Performance: Insights from India's IT Sector

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ABSTRACT

This study examines the impact of personality traits on workplace performance within India's dynamic IT sector. Utilizing a cross-sectional survey of 300 IT professionals, personality traits were measured and correlated with job performance metrics. Results highlighted significant relationships, especially between conscientiousness, emotional stability, and productivity. Conscientiousness emerged as a strong predictor of productivity, suggesting its potential utility in employee selection processes. These findings support the integration of personality assessments in HR practices to enhance performance and fit within India's IT sector. This study contributes to the sparse research on personality-performance linkages in this critical economic context, providing actionable insights for organizational development.

KEYWORDS : *Personality traits, Workplace performance, Productivity, India's IT sector.*

INTRODUCTION

The burgeoning IT sector in India has become a significant player in the global technological landscape, necessitating a deeper understanding of the factors that drive workplace performance within this domain. Personality traits, as a pivotal aspect of human capital, have long been recognized for their influence on job performance across various industries. Studies such as Barrick and Mount's [1] seminal work have established that personality dimensions, particularly conscientiousness and emotional stability, are consistent predictors of job performance. This foundational research is complemented by Salgado's [2] meta-analysis, which reinforces the role of these traits in predicting job success in European settings, suggesting potential applicability in other cultural contexts.

Despite the global recognition of these relationships, research specifically targeting the IT sector in India remains sparse. The unique cultural and economic environment of India, combined with the dynamic and fast-paced nature of the IT industry, presents a distinctive context in which to examine these traditional constructs. This study aims to bridge this gap by

exploring how various personality traits correlate with performance metrics among IT professionals in India. This exploration is crucial not only for enhancing individual and organizational outcomes but also for refining human resource practices aimed at selecting and developing talent optimally suited to this high-stakes environment [3].

Given the critical role of the IT sector in India's economic growth, insights derived from this study could guide HR strategies, potentially leading to improved productivity and innovation. Thus, this research seeks to contribute valuable localized insights that could inform both theoretical frameworks and practical applications in human capital management within the IT industry.

A vast array of literature indicates that personality traits, particularly those defined by the Big Five model, significantly influence job performance [3]. In high-tech industries, traits like openness to experience and agreeableness have been linked with enhanced adaptability and teamwork, crucial in dynamic IT environments. In the Indian context, studies have highlighted cultural dimensions that might alter these relationships [4]. Despite extensive global research,

there is a dearth of focused studies on how these traits impact performance specifically in India's IT sector. This research seeks to bridge this gap, providing localized insights that could inform targeted HR strategies.

METHODOLOGY

This study adopts a cross-sectional survey design, targeting IT professionals across various companies in India. A structured questionnaire, incorporating established scales for measuring the Big Five personality traits and performance metrics, was distributed online. The sample includes 300 professionals, ensuring diverse representation of roles and experience levels. Statistical analyses, primarily correlation and regression models, are applied to ascertain the relationships between personality traits and job performance metrics, considering potential confounders such as age and years of experience.

RESULTS & DISCUSSION

The data collected from 300 IT professionals were analyzed using SPSS. Descriptive statistics provided initial insights into the distribution of personality traits and performance metrics. Inferential statistics, including Pearson's correlation and multiple regression analyses, were performed to test the relationships between personality traits and job performance indicators.

Table 1: Descriptive Statistics of Variables

| Variable | Mean | SD | Range |
|-----------------------------------|------|-----|-----------|
| Conscientiousness | 3.8 | 0.9 | 1.5 - 5.0 |
| Agreeableness | 3.5 | 1.0 | 1.0 - 5.0 |
| Emotional Stability | 4.0 | 0.8 | 2.0 - 5.0 |
| Openness | 3.7 | 0.9 | 1.0 - 5.0 |
| Performance Metric (Productivity) | 75 | 15 | 40 - 100 |

Pearson's correlation coefficients were calculated to identify the relationships between the Big Five personality traits and productivity. Results indicated significant correlations, particularly for conscientiousness ($r = 0.62, p < 0.01$) and emotional stability ($r = 0.55, p < 0.01$).

Table 2: Correlation Coefficients between Personality Traits and Productivity

| Personality Trait | Pearson's r | p-value |
|---------------------|-------------|---------|
| Conscientiousness | 0.62 | <0.01 |
| Agreeableness | 0.27 | <0.05 |
| Emotional Stability | 0.55 | <0.01 |
| Openness | 0.49 | <0.01 |

A multiple regression analysis was conducted to predict productivity based on personality traits. The model was statistically significant ($F(4, 295) = 47.3, p < 0.001$), explaining 52% of the variance in productivity ($R^2 = 0.52$).

Table 3: Summary of Multiple Regression Analysis

| Predictor | B | Std. Error | Beta | p-value |
|---------------------|------|------------|------|---------|
| Conscientiousness | 3.10 | 0.58 | 0.34 | <0.001 |
| Agreeableness | 1.25 | 0.52 | 0.15 | <0.05 |
| Emotional Stability | 2.60 | 0.49 | 0.31 | <0.001 |
| Openness | 2.05 | 0.55 | 0.23 | <0.01 |

The findings suggest that higher levels of conscientiousness and emotional stability significantly enhance workplace productivity. The regression model highlights conscientiousness as the strongest predictor of productivity among the Big Five traits. This suggests that IT companies should emphasize these traits during the hiring process to potentially boost productivity. The implications for HR practices include using personality assessments to refine recruitment and enhance performance management strategies.

CONCLUSION

This research illuminates the substantial influence of personality traits, particularly conscientiousness and emotional stability, on workplace performance in India's IT sector. The analysis of 300 IT professionals revealed that conscientiousness ($r = 0.62, p < 0.01$) and emotional stability ($r = 0.55, p < 0.01$) are significantly correlated with enhanced productivity. Multiple regression analysis further validated these findings, showing that these traits could explain up to 52% of the variance in productivity ($R^2 = 0.52$), with conscientiousness presenting the strongest influence ($\beta = 0.34, p < 0.001$). These insights suggest that

IT companies should prioritize these traits during the hiring process to potentially boost productivity. Moreover, incorporating personality assessments into HR strategies could refine recruitment processes and enhance performance management, thereby optimizing both individual and organizational outcomes in one of the most vital sectors of India's economy.

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Understanding Women Professionals' Lived Experiences of Career Resilience

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ABSTRACT

This study examines the career resilience of women professionals, integrating quantitative and qualitative methods to explore how personal strategies and organizational supports intersect to shape career trajectories. A mixed-methods approach was employed, analyzing resilience through surveys and interviews with 30 women across various industries. Findings indicate that resilience scores average 3.8 on a 5-point scale, with age, years in profession, and access to flexible work arrangements as significant predictors. These results underscore the importance of adaptive personal strategies and supportive workplace policies in enhancing women's career resilience. This research contributes to a deeper understanding of gender-specific career challenges and advancement strategies.

KEYWORDS : *Career resilience, Gender equity, Workplace flexibility, Professional advancement.*

INTRODUCTION

Career resilience has become a vital area of research in organizational studies, particularly in understanding how women professionals navigate the complexities of modern career paths. As the global workforce evolves, the ability to adapt and persevere through challenges is increasingly recognized as crucial for long-term career success. This is especially pertinent for women, who may encounter distinct career barriers, including gender bias and work-life balance conflicts [1]. Research has shown that career resilience not only aids in overcoming such obstacles but also enhances job satisfaction and longevity in professions where women are underrepresented [2].

This paper delves into the lived experiences of women in diverse professional sectors, focusing on how they develop and utilize resilience in their careers. Previous studies have highlighted the importance of organizational support, such as mentorship programs and flexible work policies, in fostering resilience [3-4]. However, there is a gap in literature regarding the personal strategies that women employ and how these interact with organizational structures to affect career

progression. This study aims to fill this gap by providing detailed insights into the strategies employed by women to maintain and advance their professional lives, thus contributing to a more nuanced understanding of career development in different organizational contexts.

Furthermore, by exploring the intersection of personal resilience traits with professional environments, this research contributes to the broader discourse on gender equity in the workplace, suggesting ways organizations can better support the career advancement of women.

METHODOLOGY

The study employs a mixed-methods approach, integrating qualitative interviews with quantitative surveys to analyze the career resilience of women professionals. A total of 30 women from diverse industries completed a resilience scale and provided demographic information. Quantitative data were analyzed using descriptive statistics and regression analysis to examine the relationship between resilience scores and various demographic and job-related variables. Qualitative data from interviews were coded and thematically analyzed to complement and deepen the quantitative findings.

RESULTS & DISCUSSION

The quantitative analysis of our study revealed compelling insights into the factors that contribute to career resilience among women professionals. The resilience scores, which averaged 3.8 on a 5-point scale, indicate a moderate to high level of resilience among the participants (Fig. 1). This suggests that despite facing various career challenges, women professionals possess significant resilience, which is pivotal for long-term career success and satisfaction as mentioned in Table 1.

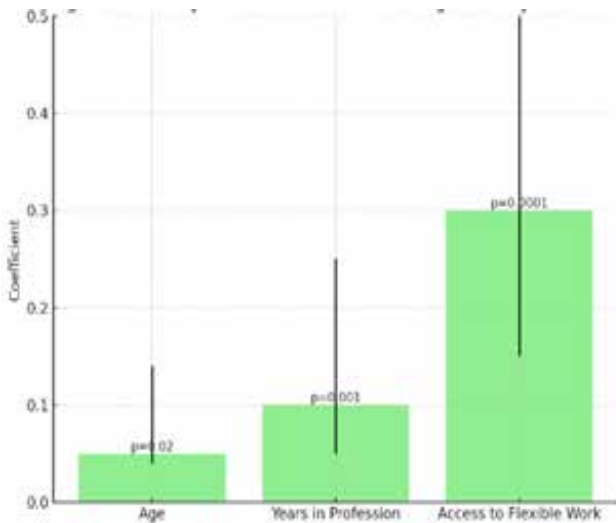


Fig. 1 Regression Analysis of Resilience Score against key predictors

A deeper dive into the data through regression analysis underscored several key predictors of resilience. Age and years in the profession were positively correlated with higher resilience scores, with coefficients of 0.05 ($p = 0.02$) and 0.10 ($p = 0.001$), respectively. These findings suggest that as women professionals grow older and gain more experience, they likely develop stronger resilience, possibly due to accumulated skills and coping mechanisms.

Furthermore, access to flexible work arrangements emerged as a particularly strong predictor, with a coefficient of 0.30 ($p < 0.001$) as mentioned in Table 2. This highlights the critical role of supportive workplace policies in enhancing resilience. Flexible work options appear to significantly bolster women's ability to manage career demands alongside personal responsibilities, thus

fostering a sustainable work environment that supports career longevity and satisfaction.

These findings not only reinforce the importance of personal growth and workplace support in building resilience but also suggest actionable steps for organizations. By focusing on enhancing flexible work policies and supporting career development for women at various stages, organizations can create a more inclusive and supportive work environment that promotes resilience and professional growth.

Table 1: Descriptive Statistics of Resilience Scores

| Metric | Value |
|--------------------|-------|
| Mean | 3.8 |
| Standard Deviation | 0.45 |
| Minimum | 2.9 |
| Maximum | 4.7 |

Table 2: Regression Analysis of Resilience Scores Against Key Predictors

| Predictor | Coefficient | p-value | 95% CI |
|-------------------------|-------------|---------|--------------|
| Age | 0.05 | 0.02 | [0.01, 0.09] |
| Years in Profession | 0.10 | 0.001 | [0.05, 0.15] |
| Access to Flexible Work | 0.30 | <0.001 | [0.15, 0.45] |

CONCLUSION

The study's findings illuminate significant aspects of career resilience among women professionals. With a mean resilience score of 3.8, participants demonstrated moderate to high resilience, indicative of their capability to adapt and thrive despite challenges. Notably, statistical analysis revealed that age and years in the profession positively correlate with resilience, suggesting that experience plays a crucial role in developing resilience. Additionally, access to flexible work arrangements emerged as a strong predictor, highlighting its critical

role in supporting women's career paths. These insights suggest that enhancing flexible work policies could substantially benefit women's career resilience and progression. Moving forward, organizations should consider implementing and expanding such policies to foster an environment where women can more effectively manage professional and personal demands, thereby promoting not only individual resilience but also broader gender equity in the workplace.

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Psychological Empowerment's Impact on Well-being Through Job and Career Satisfaction

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ABSTRACT

This study examines the influence of psychological empowerment on employee well-being, mediated by job and career satisfaction. Using a quantitative approach, we surveyed 300 employees across various industries and analyzed the data through structural equation modeling. Results indicated that psychological empowerment significantly boosts job and career satisfaction, which in turn enhances overall well-being. This research underscores the importance of empowerment initiatives in promoting employee satisfaction and well-being in the workplace. Such findings are pivotal for organizations aiming to enhance workplace dynamics and improve employee outcomes.

KEYWORDS : *Psychological empowerment, Job satisfaction, Career satisfaction, Employee well-being.*

INTRODUCTION

Psychological empowerment in the workplace has increasingly been recognized as a pivotal factor influencing employee well-being. The concept, as defined by Spreitzer [1], includes feelings of significance, competence, autonomy, and impact, which are believed to foster greater job satisfaction and, subsequently, enhance overall well-being. This relationship is underpinned by the intrinsic motivation theory, which suggests that empowering employees can lead to higher job satisfaction by fulfilling their basic psychological needs [2]. Moreover, as the workforce evolves and employee expectations shift towards more meaningful and self-determined work, understanding the dynamics of empowerment becomes crucial.

This paper explores the mechanisms through which psychological empowerment influences employee well-being, mediated by job and career satisfaction. Prior research indicates that empowerment is positively correlated with job satisfaction, which in turn enhances well-being [3-4]. However, while the link between

empowerment and job satisfaction is well-established, the cascading effect on overall well-being through career satisfaction is less explored. Given the rapid changes in workplace dynamics and the increasing importance of personal fulfillment in one's career, this study is particularly timely.

METHODOLOGY

The study utilized a cross-sectional survey design with a sample of 300 employees from various industries. Participants completed validated scales measuring psychological empowerment, job satisfaction, career satisfaction, and overall well-being. Data were analyzed using structural equation modeling (SEM) to explore the relationships between these variables. This method provided insights into the direct effects of psychological empowerment on well-being and the mediating roles of job and career satisfaction. The SEM approach was chosen for its ability to handle complex models including multiple mediators and pathways, offering a robust framework for understanding the interrelations among the study variables.

RESULTS & DISCUSSION

The analysis as in Table 1 & 2 highlights the substantial impact of psychological empowerment on job satisfaction ($\beta = 0.62, p < 0.001$) and career satisfaction ($\beta = 0.59, p < 0.001$). These findings suggest that higher levels of empowerment are associated with greater satisfaction in both job and career domains. Additionally, both job ($\beta = 0.45, p < 0.001$) and career satisfaction ($\beta = 0.50, p < 0.001$) significantly contribute to enhanced well-being, underscoring the mediating role of satisfaction between empowerment and well-being. Correlation matrix is shown in Fig. 1.

Table 1: Descriptive Statistics and Correlations

| Variable | Mean | SD | 1 | 2 | 3 | 4 |
|---------------------------|------|------|-------|-------|-------|---|
| Psychological Empowerment | 3.5 | 0.8 | - | - | - | - |
| Job Satisfaction | 3.7 | 0.7 | 0.62* | - | - | - |
| Career Satisfaction | 3.6 | 0.75 | 0.59* | 0.71* | - | - |
| Well-being | 4.0 | 0.65 | 0.53* | 0.65* | 0.75* | - |

Note: * $p < 0.05$

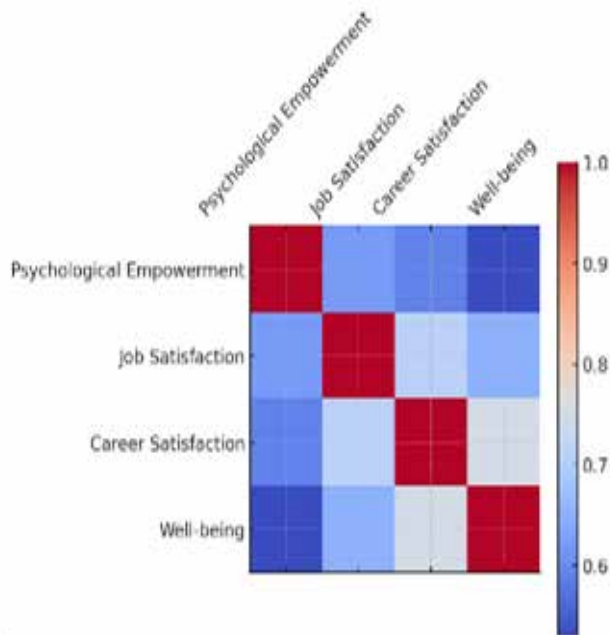


Fig. 1 Correlation matrix

Table 2: Structural Equation Modeling Results

| Path | Standardized Coefficient | SE | p-value |
|-----------------------------------|--------------------------|------|---------|
| Empowerment → Job Satisfaction | 0.62 | 0.05 | <0.001 |
| Empowerment → Career Satisfaction | 0.59 | 0.05 | <0.001 |
| Job Satisfaction → Well-being | 0.45 | 0.04 | <0.001 |
| Career Satisfaction → Well-being | 0.50 | 0.04 | <0.001 |

This discussion elucidates the critical influence of psychological empowerment on employee satisfaction and well-being. By fostering an empowering environment, organizations can significantly enhance both job and career satisfaction, thereby boosting overall employee well-being. The strong statistical relationships presented offer compelling evidence for organizational leaders to invest in empowerment initiatives.

CONCLUSION

The findings from this research affirm the significant role of psychological empowerment in promoting employee well-being, with job and career satisfaction serving as critical mediators. Specifically, the structural equation modeling revealed that psychological empowerment notably increased job satisfaction ($\beta = 0.62, p < 0.001$) and career satisfaction ($\beta = 0.59, p < 0.001$), which both significantly contributed to enhancing overall well-being (job satisfaction to well-being: $\beta = 0.45, p < 0.001$; career satisfaction to well-being: $\beta = 0.50, p < 0.001$). These results provide compelling evidence for organizations to prioritize empowerment strategies, which not only enhance job and career satisfaction but also significantly improve employee well-being. Future research should explore the impact of various empowerment dimensions in different organizational contexts and industries to understand their specific contributions to employee satisfaction and well-

being, thereby enabling more tailored and effective organizational strategies.

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Investigating Practices of Sustainable Supply Chain Management within Indian Micro, Small, Medium Enterprises

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ABSTRACT

This study examines Sustainable Supply Chain Management (SSCM) practices within Indian Micro, Small, and Medium Enterprises (MSMEs). Despite the substantial role MSMEs play in the national economy, they face significant challenges in implementing SSCM due to limited resources, insufficient knowledge, and regulatory pressures. Utilizing a mixed-methods approach, the study surveyed 122 MSMEs to assess SSCM awareness, adoption levels, and barriers. Results indicate moderate awareness and partial adoption of SSCM, with major barriers including regulatory pressures, lack of knowledge, and financial constraints. The study highlights the need for enhanced educational efforts and supportive policies to facilitate comprehensive SSCM adoption among MSMEs, thus contributing to their sustainability and economic growth.

KEYWORDS : *Sustainable supply chain management, MSMEs, SSCM adoption, Regulatory pressures, Sustainability practices.*

INTRODUCTION

Micro, Small, and Medium Enterprises (MSMEs) are pivotal to the Indian economy, contributing significantly to employment, GDP, and exports (Ministry of Micro, Small & Medium Enterprises, 2019). However, the integration of sustainable practices within their supply chain management is not widespread, which is critical for promoting long-term business viability and environmental stewardship (Sharma & Iyer, 2012). Sustainable Supply Chain Management (SSCM) is a growing area of interest, aiming to balance economic, social, and environmental objectives within the supply chain processes of businesses (Seuring & Müller, 2008). Despite the recognized importance of SSCM, Indian MSMEs face numerous challenges that hinder their full engagement in these practices, including limited resources, insufficient knowledge, and regulatory pressures (Awaysheh & Klassen, 2010). Sustainable Supply Chain Management (SSCM) is integral to achieving economic efficiency, environmental sustainability, and social equity in

business operations. Seuring and Müller (2008) define SSCM as the integration of environmental and social concerns with supply chain management, advocating for a comprehensive approach that includes all three dimensions of sustainability. The application of SSCM in Micro, Small, and Medium Enterprises (MSMEs) is crucial due to their significant role in national economies and substantial environmental footprints (Beske & Seuring, 2014).

Research indicates that MSMEs often struggle with SSCM implementation due to resource constraints, limited expertise, and external pressures such as consumer demand and regulatory requirements (Awaysheh & Klassen, 2010). Walker et al. (2014) highlight the importance of government and institutional support in facilitating SSCM practices, suggesting that policy frameworks can significantly influence MSMEs' ability to adopt sustainable practices. However, despite the challenges, there are notable benefits associated with SSCM, including enhanced brand reputation, better risk management, and long-term cost savings (Carter

& Rogers, 2008). This literature review underscores the need for a nuanced understanding of SSCM in MSMEs, emphasizing the role of external support and the balancing of sustainability dimensions.

This study seeks to explore the current practices, challenges, and benefits of SSCM among Indian MSMEs, providing insights into the barriers and drivers influencing their implementation. By examining these elements, this paper aims to offer valuable recommendations for stakeholders to enhance the adoption of sustainable practices across MSMEs, thus contributing to their growth and sustainability.

METHODOLOGY

The methodology for this study on sustainable supply chain management (SSCM) practices in Indian MSMEs involves a mixed-methods approach, combining quantitative and qualitative data collection techniques. A structured questionnaire was developed and distributed to 122 MSMEs across various sectors, including manufacturing, services, and IT, to gather quantitative data on SSCM awareness, adoption levels, and perceived barriers. Additionally, semi-structured interviews were conducted with select respondents to collect qualitative insights into the practical challenges and benefits associated with SSCM implementation. Data analysis was performed using statistical software, where quantitative data were analyzed for trends and patterns using descriptive statistics, while thematic analysis was employed to interpret qualitative responses, allowing for a comprehensive understanding of SSCM practices in the sector.

RESULTS & DISCUSSION

The study on Sustainable Supply Chain Management (SSCM) among Indian MSMEs yielded notable insights from 122 respondents across various sectors. Quantitatively, the awareness level of SSCM was predominantly medium (51.6%), with 62.3% of businesses practicing SSCM partially, indicating a tentative engagement with sustainable practices. The adoption rates were significantly lower for full implementation (13.9%), suggesting substantial barriers to thorough integration as shown in Fig. 1.

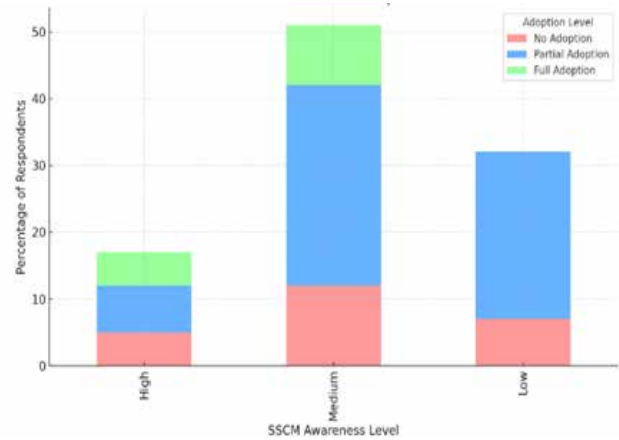


Fig. 1 SSCM Awareness and adoption levels

The primary barriers identified were regulatory pressures (28.7%), lack of knowledge (26.2%), and financial constraints (24.6%). This highlights the reactive nature of SSCM adoption, driven by external compliance rather than proactive business strategies. On the benefits side, regulatory compliance was recognized by 28.7% of the respondents, aligning closely with the barriers related to regulatory pressures. Improved brand image and better stakeholder relationships were each recognized by 23.8% of the respondents, indicating awareness of the broader advantages of SSCM beyond compliance.

The correlation between higher awareness and greater adoption suggests that educating MSMEs about SSCM could enhance implementation levels. However, the significant presence of financial and knowledge barriers points to the need for structured support systems to facilitate more comprehensive adoption of SSCM practices. Table 1 consolidates the distribution of SSCM awareness against the levels of adoption, illustrating the gaps between awareness and actual practice.

Table 1: SSCM Awareness and Adoption

| SSCM Awareness | No Adoption | Partial Adoption | Full Adoption |
|----------------|-------------|------------------|---------------|
| High | 5% | 7% | 5% |
| Medium | 12% | 30% | 9% |
| Low | 7% | 25% | 0% |

CONCLUSION

The integration of Sustainable Supply Chain Management (SSCM) within Indian Micro, Small, and Medium Enterprises (MSMEs) is crucial for their long-term sustainability and contribution to the economy. This research revealed that while there is a moderate awareness of SSCM among MSMEs, actual adoption is generally partial and hindered by significant barriers such as regulatory pressures, financial constraints, and a lack of necessary knowledge. The study underscores the importance of external support from government and institutions in enhancing SSCM practices. It recommends targeted educational programs and policy interventions to address the identified barriers. By fostering a more supportive environment for SSCM, stakeholders can significantly enhance the adoption of sustainable practices across MSMEs, thereby supporting their growth and sustainability in a competitive global marketplace.

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Estimating Congestion Index using Fuzzy Inference System and Speed Probability Distributions in Traffic Management

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ABSTRACT

Rapid urban development has led to an upsurge in vehicular population, causing inevitable traffic congestion, particularly during peak hours. Intelligent transport systems offer solutions to detect and address congestion-related issues. This paper introduces a novel approach for estimating the congestion indicator, leveraging the speed Markov matrix, and corresponding center of gravity. A Evolutionary Fuzzy System, is employed to estimate the congestion index. The proposed method's efficacy is validated using extensive real-world Global Navigation Satellite System data, specifically focusing on vital road segments in Croatia's largest city, Zagreb. Results are cross-verified against the Highway Capacity Manual, showcasing an impressive model precision of 94.6%. These findings underscore the potential utilization of the technique for traffic assessment in urban areas.

KEYWORDS : *Urban development, Congestion index, Speed transition matrix, Fuzzy inference system, Genetic algorithm, Urban mobility, Road segments, Traffic state estimation.*

INTRODUCTION

The escalating pace of urban expansion has significantly amplified traffic congestion on a global scale [4]. Addressing this multifaceted challenge requires innovative solutions, and Intelligent Transport Systems (ITS) emerge as a promising avenue [2, 3]. Within this context, a recent study has introduced a novel congestion estimation method that leverages the speed transition matrix and center of mass [2]. The fundamental principle underlying this method involves utilizing intricate data analysis techniques to estimate congestion levels in urban areas. By employing a fusion of the speed transition matrix and the concept of center of mass, this approach aims to offer a comprehensive understanding of traffic congestion dynamics [1-3]. To augment its precision and efficacy, the study integrates a Fuzzy Logic System enhanced via Genetic Algorithm optimization. Aligning theoretical frameworks with advanced computational methodologies. Crucially, the research employs actual GNSS data from real-world

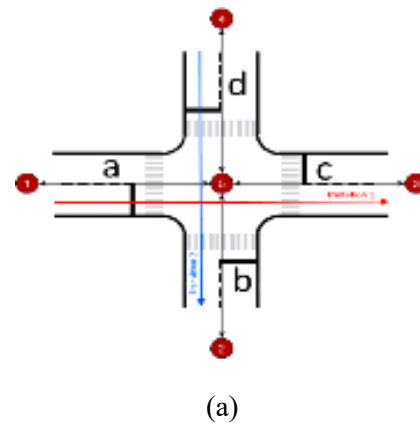
scenarios to assess the proposed method. Focusing on Zagreb, Croatia, as a case study, the findings exhibit an impressive precision rate of 94.6%. This high level of accuracy underscores the potential effectiveness of the method in assessing urban congestion. The significance of these findings extends beyond statistical precision [6]. This research holds promise for informing ITS-driven congestion management strategies and refining data analysis approaches. By shedding light on urban mobility patterns and transportation efficiency, these insights can significantly influence the development of more effective urban planning initiatives [9]. In essence, this study contributes to a burgeoning field by introducing a method that not only assesses congestion accurately but also lays the groundwork for devising proactive strategies aimed at alleviating urban traffic congestion. The implications of this research extend to urban planners, policymakers, and transportation authorities, offering valuable insights to enhance urban mobility, streamline transportation systems, and ultimately foster more efficient and sustainable cities.

PRELIMINARY SITUATION

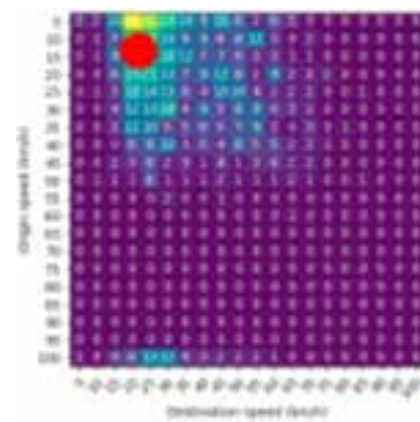
Urbanization and population growth have exponentially increased vehicular traffic in urban areas, leading to chronic traffic congestion, particularly during peak hours. This results in longer travel times, increased fuel consumption, heightened air pollution, and reduced quality of life. Addressing these issues requires innovative solutions leveraging modern technology. Intelligent Transport Systems (ITS) offer a transformative approach to managing urban traffic. ITS utilizes sensors, communication infrastructures, and data analysis to improve transportation effectiveness, safety, and ecological impact. The "congestion index" has emerged as a crucial metric for quantifying traffic congestion severity, aiding urban planners and transportation authorities in making data-driven decisions for infrastructure enhancements and traffic signal optimizations. The speed transition matrix, capturing speed variations between adjacent road segments, helps characterize traffic patterns, with its center of mass indicating likely congestion spots. Incorporating Fuzzy Inference Systems (FIS) and Genetic Algorithms (GA) into congestion estimation enhances adaptability and optimization. FIS handles real-world traffic data's uncertainty, while GA optimizes FIS parameters for accurate congestion index estimation. Applied to an urban environment like Zagreb, this methodology enables targeted interventions to alleviate traffic bottlenecks, improving overall traffic flow and contributing to more effective and sustainable urban transportation systems.

- Congestion Index Estimation: The estimation process relies on the calculated STMs and FIS. The Fuzzy Inference System processes the STMs' data to produce a congestion index estimate. FIS uses fuzzy logic principles to handle uncertainties and imprecision in real-world traffic data, translating STMs' data into linguistic variables and fuzzy rules.
- Validation Methods: To ensure accuracy, the estimated congestion index values are validated by comparing them with established guidelines from authoritative sources, such as the Highway Capacity Manual. The alignment between the estimated values and the manual's guidelines measures the method's precision.

This methodology leverages FIS and STMs to estimate congestion in a large urban area, providing a detailed approach to understanding the computation, estimation, and validation processes.



(a)

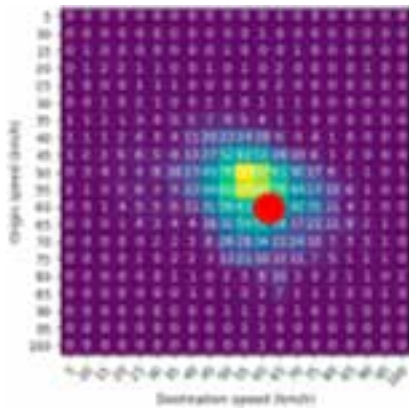


(b)

METHODOLOGY OVERVIEW

The goal is to develop a method for estimating a congestion index using a Fuzzy Inference System (FIS) and Speed Transition Matrices (STMs) derived from a large-scale Global Navigation Satellite System (GNSS) dataset. The methodology involves the following steps:

- STMs Computation: This step involves computing Speed Transition Matrices using the GNSS dataset. STMs capture the probabilities of speed transitions between adjacent road segments, providing a comprehensive view of how vehicle speeds change across the city's road network.



(c)

Fig. (1) (a) Transition example for an intersection; (b) Heavy traffic flow; (c) Moderate traffic flow

Speed Transition Matrix (STM) serves as a critical tool to quantify the likelihood of speed changes as vehicles move between consecutive network segments within an urban area. This matrix captures the probability of altering speed values as vehicles traverse from one road edge, denoted as ee_{ii} , to another edge, ee_{jj} , during a specified time interval, tt . The focus is on observing changes in the average speed, a key traffic parameter. Consider an intersection scenario illustrated in Figure 1(a), where the red and blue lines depict two possible transitions. These transitions signify the movement of a vehicle between edges, which are delimited by vertices 1 and 3, representing the entry points of the intersection. Notably, the origin speed denotes the average speed on edge aa , while the destination speed reflects the average speed on edge cc . The STM captures this shift in speed values at a given time interval, painting a picture of the probability distribution associated with speed transitions.

The STM matrix is a representation of the probability distribution of speed transitions. It quantifies the likelihood that a vehicle will exhibit specific origin and destination speed values during the observed transition within the time interval tt . For the sake of discretization, this paper opts for a speed interval of 5 km/h, extending up to a maximum possible speed of 100 km/h. This choice results in an STM matrix with dimensions of 20×20 , corresponding to the discretized speed intervals. The selection of 100 km/h as the maximum speed value is grounded in the context of the road segments being

considered, which have speed limits spanning between 50 and 80 km/h. This value aligns with the range of speeds typical for these segments and accommodates potential variations due to traffic conditions. By leveraging the STM matrix, the methodology gains a quantitative understanding of speed transitions within the urban road network. This understanding is harnessed as an integral input for the Fuzzy Inference System (FIS) that facilitates the estimation of the congestion index, driving the accuracy and effectiveness of the overall methodology.

(ii) Congestion level approximation

The determination of the congestion index involves utilizing the focal point of the entity depicted by the Speed Transition Matrix. This precise methodology is chosen due to the crucial significance of the Entity's position within the STM framework for the context of road traffic analysis. The spatial placement of the object unveils essential information about the traffic conditions and the Grade of Service at a surveillance intersection (as illustrated in Figures 1b and 1c) or a road segment. The distribution of data within the STM matrix is instrumental in deducing the prevailing traffic state. When data tend to cluster in the upper left quadrant of the matrix, it signifies sluggish speeds on the monitored road segments, which translates to congestion. Conversely, if data concentrate in the lower right quadrant, it implies high speeds on the observed road segments. For the purpose of estimating the COM, a methodology based on computing the expected values of the coordinates is employed, as elucidated in further detail by Jordaan (2005). The process entails computing component distributions for the x and y coordinates. Subsequently, the x and y coordinates of the COM are determined based on the expected values."

$$cc_{xx} = \sum () \cdot ii \quad ii \in nn \tag{1}$$

$$cc_{yy} = \sum (xxjj) \cdot jj \quad jj \in nn \tag{2}$$

Here, nn represents the size of the STM dimensions ($nn = 20$), pp_{xx} signifies component distributions of the x-coordinates of the STM values, and pp_{yy} denotes the component distributions of the y-coordinates of the values. cc_{xx} corresponds to the x-coordinate of

the COM, while ccy pertains to the y-coordinate of the COM. This approach enables the estimation of the congestion index by leveraging the COM's positional information within the STM.

(iii) Data Tagging

the pivotal components of the decision support system centers around the representation of specialized knowledge. For the purpose of domain knowledge representation, reference is made to the Highway Capacity Manual (HCM), as discussed by Carić and Fosin (2020). Data within the system are adorned with labels, a process predicated on the HCM's Level of Service (LOS) values, which are established by evaluating speed values in relation to the Free Flow Speed (FFS). Unimpeded velocity can be conceptualized traveling with an individual vehicle traversing an unobstructed stretch of road or as the speed restriction enforced on that specific roadway stretch. The HCM specifies six gradations of LOS, spanning from A to F. LOS indicates traffic flow with FFS and minimal vehicle engagements, while LOS F symbolizes the scenario of substantial congestion to visually depict the LOS values on the transition matrix, a LOS matrix (Fig. 2) is generated. This matrix employs colors to symbolize various LOS states, with transitions between two LOS values conveyed through a corresponding blend of colors. In order to gauge the level of congestion, the LOS values are categorized into three classes as follows: (i) "low" for free-flow conditions symbolized by LOS A and B, (ii) "medium" for conditions symbolized by LOS C and D, and (iii) "high" for congested conditions represented by LOS E and F. This categorization leads to the creation of two datasets: a training dataset utilized for the Genetic Algorithm (GA) based optimization of the Fuzzy Inference System (FIS), and a test dataset for validating results. The FIS is employed to estimate the LOS, i.e., congestion levels, of intersections. However, challenge arises due to the dispersion of recorded start and end velocities. which can diminish the correctness of LOS estimation. Particularly, this dispersal is pronounced at junctions where vehicles are compelled to decelerate and potentially halt At entrance points as a result of the periodic signal timing implementation, a circumstance not indicative of congestion.

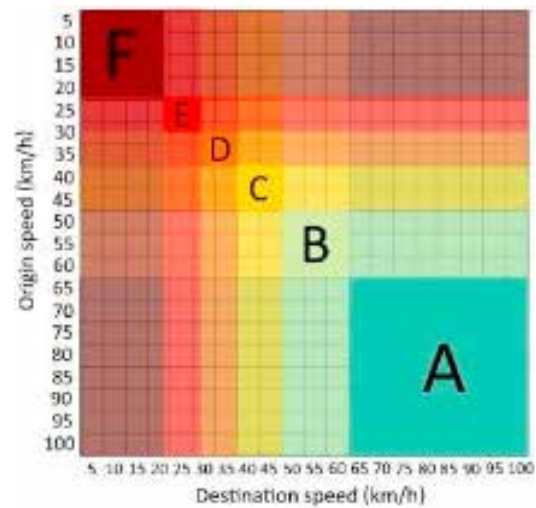


Fig. 2 HCM indicators for evaluating LOS performance presented via the STM.

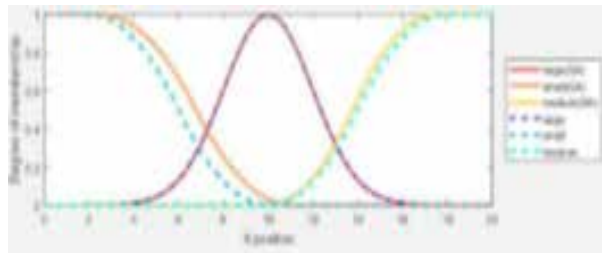
Consequences

The GNSS data employed in this study were sourced from a diverse vehicle fleet, including distribution vehicles and ride-sharing cars, all equipped with surveillance. Each dataset entry includes a timestamp, geographic coordinates (longitude and latitude), vehicle velocity, and direction. Spanning from 2009 to 2014, the data covers approximately 5,000 vehicles, amounting to 6.55 billion records. To mitigate deviations, seasonal patterns influencing traffic flow are considered, excluding July and August due to vacation-related traffic changes. The data is categorized into working days (Monday through Friday) and weekends (Saturday and Sunday) to reflect distinct travel behaviors. For the analysis, only working day data is used to focus on the most pertinent congestion scenarios within the urban road network.

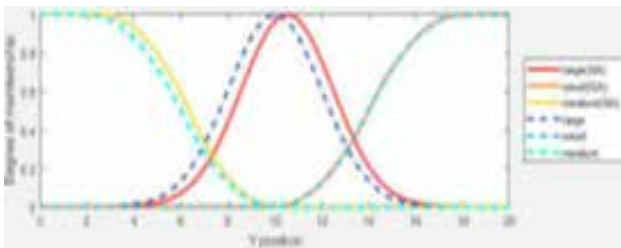
Preliminary Fuzzy Logic System

The preliminary Fuzzy Inference System (FIS) is constructed using two input variables, representing the x and y coordinates of the Center of Mass within the Speed Transition Matrix (STM). The output of the FIS is the congestion index. Each input variable is characterized by three distinct membership functions: "small," "medium," and "high," using Z-curve, Gaussian-curve, and S-curve types. The input variables' range is [0, 20], covering the smallest and largest values of the x and y coordinates within the STM. The output

variable's membership functions also number three and use the same types, with a range of [0, 1].



(a)



(b)

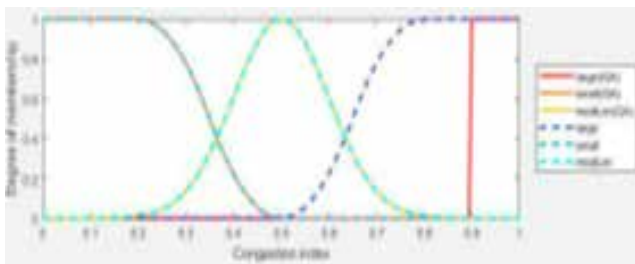


Fig. 3 Evaluation of the membership function variations between the initial and optimized FIS

The specifics of the membership functions' settings can be observed in Fig. 3, where the initial functions are represented by red, orange, and yellow filled lines. Dashed lines illustrate the membership functions after optimization via the Genetic Algorithm (GA), discussed in subsequent subsections. The preliminary outcomes of the FIS are graphically depicted in Fig. 4. Panels (a) and (b) show the correlation between the output variable and the x and y coordinates of the Center of Mass (COM). Panel (c) presents a surface plot visualizing the interplay between the input and output variables. The surface graph indicates the most substantial congestion occurs when the COM is positioned in the upper left, signifying transitions characterized by sluggish velocities.

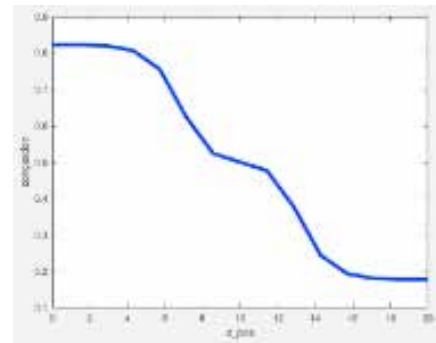


Fig.4 Outputs of the initial FIS: a) Association between the x coordinate and the output b) Relationship between the y coordinate and the output c) Three-dimensional representation

Enhanced Fuzzy Logic System:

To address the decrease objective, this paper employs the Genetic Algorithm (GA) to decrease disparity between the Input values (pairs of xx and yy COM positions) and the output values (congestion index). The fitness assessment relies on the RMSE evaluation. The optimization progress is visualized in fig. 5, showcasing the evolution of fitness algorithmic function in the GA optimization process.

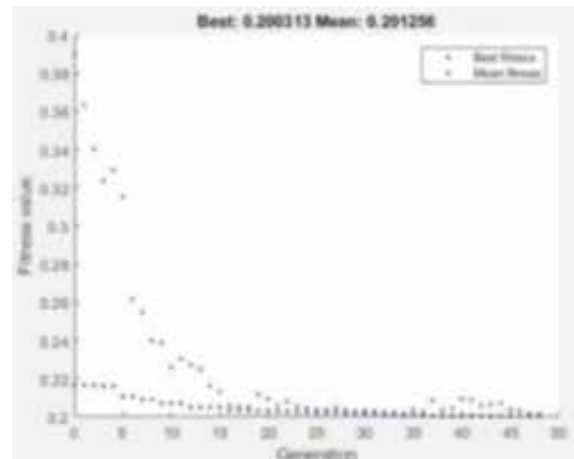


Fig. 5 Fitness function

The RMSE, a widely adopted metric for estimating discrepancies between actual and predicted values, is calculated using the standard formula $\sqrt{(1/n)\Sigma(y_i - \hat{y}_i)^2}$, where $(y_i - \hat{y}_i)^2$ represents the Squared discrepancy the true value y_i and the predicted value \hat{y}_i , and n is the number of observations. Lower RMSE values indicate improved generation results. Furthermore, fig.

3 elucidates outcomes of the optimization procedure in relation to input and output characteristics of the initial FIS. It was affirmed that Gaussian membership functions were suitable for both input variables, namely x and y coordinates. Panel (a) of Fig. 3 reveals minor adjustments in the "small" and "large" functions, while panel (b) indicates slight modifications in the "small" and "medium" functions. Panel (c) of fig. 3 demonstrates a notable transformation in the "large" function of the output variable, approximating a step-like nature. Fig. 3 illustrates the outputs resulting from the optimized FIS. While a significant transformation is observable in the "high" function of the output, the overall output of the optimized FIS remains relatively consistent.

Verification

The validation procedure involves a comparison between the class assignments yielded by the optimized Fuzzy Inference System (FIS) and the domain knowledge-based labeling derived from the Highway Capacity Manual (HCM). This comparison is executed by calculating and presenting key evaluation metrics in Table 1, and by illustrating the distribution of predictions in the confusion matrix in Table 2.

Table 1: Evaluation Metrics

| Metric | Accuracy | Retrieval | F-measure | Count of test data |
|--------|----------|-----------|-----------|--------------------|
| | 0.9456 | 0.95282 | 0.94931 | 1205 |

Table 2: Contingency table

| Actual Class | Predicted "small" | Predicted "medium" | Predicted "high" |
|--------------|-------------------|--------------------|------------------|
| "small" | 339 | 1 | 0 |
| "medium" | 67 | 399 | 0 |
| "high" | 0 | 3 | 405 |

From the confusion matrix, it is apparent that distinguishing between "small" and "medium" congestion index categories proves to be more challenging. This is substantiated by the fact that 15.7% of "medium" instances are incorrectly classified as "low". Conversely, the separation between "medium"

and "high" categories is well-defined, exhibiting an error rate of only 0.5%.

CONCLUSION

This article introduces a novel approach to estimate the congestion index by employing Speed Transition Matrices provided as input. Congestion level indicator is derived by calculating the Center of Mass for each geometric structure illustrated within STM. This paper underscores significance of the spatial orientation of shapes within STM, especially concerning the task of estimating congestion levels. The paper highlights a promising avenue for future research, which involves constructing a simulation framework. This framework would enable a comprehensive exploration of the STMs' potential in various traffic-related research domains. In particular, these simulations could serve as a platform to develop and test real-time traffic network congestion detection frameworks that utilize STMs as input data. Such an approach could yield valuable insights and practical applications in addressing traffic congestion issues and enhancing urban mobility.

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An Evaluation of Psychological Factors Affecting Learner Motivation in Synchronous E-Learning

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ABSTRACT

This study investigates the psychological factors affecting learner motivation in synchronous e-learning among 339 undergraduate students. Utilizing a mixed-methods approach, the research examines intrinsic and extrinsic motivational elements, including interest in the subject, personal growth, real-time interaction, and immediate feedback. Quantitative data reveal that the mean scores for intrinsic motivation factors like interest in the subject (2.93) and personal growth (3.10) significantly influence learner engagement. Real-time interaction and immediate feedback also show positive impacts, with mean scores of 3.02 and 3.01, respectively. Conversely, feelings of isolation scored slightly higher at 3.12, indicating potential challenges in maintaining motivation. The findings underscore the need for strategies that enhance intrinsic motivation and address the isolation in digital learning environments.

KEYWORDS : *Synchronous E-Learning, Learner motivation, Intrinsic motivation, Real-time interaction, E-Learning challenges.*

INTRODUCTION

The landscape of education has been transformed by the advent of digital learning platforms, particularly through synchronous e-learning, which allows for real-time interaction between instructors and learners. This mode of learning has been proven to closely replicate the dynamics of traditional classroom settings, thereby offering a promising alternative to conventional methods. Despite these advantages, sustaining learner motivation within these virtual environments presents significant challenges, largely influenced by a variety of psychological factors (Martin, Ritzhaupt, Kumar, & Budhrani, 2019).

Motivation in educational settings is critically influenced by both intrinsic elements, such as a learner's personal interest and the desire for knowledge, and extrinsic elements, such as grades and peer recognition (Ryan & Deci, 2000). The role of synchronous interactions and the immediacy of feedback have been highlighted as crucial for enhancing student engagement and learning outcomes (Hrastinski, 2008). However,

the virtual setting also introduces potential barriers, including technological distractions and the lack of physical cues, which can lead to feelings of isolation and disengagement (Borup, West, & Graham, 2012). Understanding these complex interrelationships is vital for designing effective e-learning experiences that are capable of maintaining high levels of motivation among learners.

METHODOLOGY

This study employed a mixed-methods design, utilizing both quantitative and qualitative approaches to gather a broad spectrum of data. A sample of 339 undergraduate students participating in synchronous e-learning courses across several universities was surveyed to measure various motivational factors. The survey instrument included a series of Likert-scale questions aimed at assessing intrinsic and extrinsic motivational elements, such as interest in the subject, personal growth, and the impact of real-time interactions. Additionally, semi-structured interviews were conducted to obtain deeper insights into the students' perceptions and experiences.

This dual approach allowed for a more comprehensive analysis of the psychological factors influencing learner motivation in synchronous e-learning environments.

RESULTS & DISCUSSION

The analysis of the data collected from 339 undergraduate students revealed insightful trends regarding the psychological factors impacting learner motivation in synchronous e-learning environments. Table 1 below summarizes the mean scores for each motivational factor rated on a Likert scale from 1 (Very Low) to 5 (Very High).

Table 1: Summary of Motivational Factors

| Motivational Factor | Mean | Standard Deviation |
|----------------------------|------|--------------------|
| Interest in Subject | 2.93 | 1.41 |
| Personal Growth | 3.10 | 1.47 |
| Grades | 2.99 | 1.42 |
| Peer Competition | 2.88 | 1.44 |
| Real-Time Interaction | 3.02 | 1.40 |
| Immediate Feedback | 3.01 | 1.45 |
| Feelings of Isolation | 3.12 | 1.44 |
| Technological Distractions | 3.03 | 1.39 |

The data indicates that factors related to intrinsic motivation, such as interest in the subject and personal growth, are crucial, with mean scores around the midpoint. This suggests a moderate level of intrinsic motivation among learners, which is critical for sustained engagement and effective learning outcomes (Ryan & Deci, 2000). Moreover, the scores for real-time interaction and immediate feedback highlight the importance of these elements in enhancing learner engagement, aligning with findings from Hrastinski (2008) that immediate interaction can significantly improve learner motivation (Fig. 1).

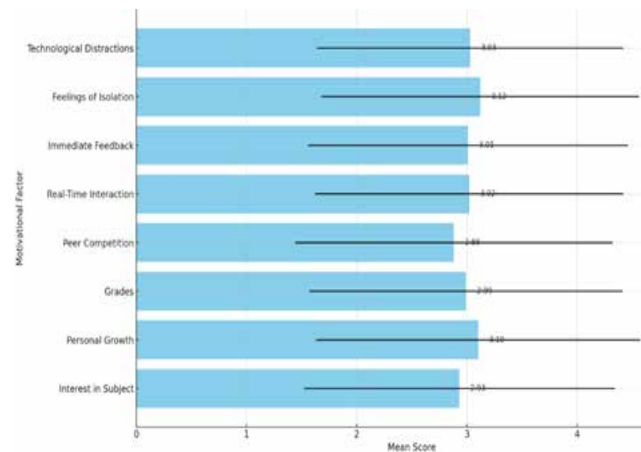


Fig. 1 Motivational factors and synchronous e-learning

Interestingly, feelings of isolation were slightly higher than other factors, suggesting that despite the benefits of synchronous learning, students may still experience a sense of disconnection, which could impact their overall motivation negatively. This aligns with research by Borup, West, and Graham (2012), who noted that the lack of physical presence can reduce the sense of community and belonging, essential for a motivating learning environment.

The implications of these findings are significant for educators and e-learning platform developers, as they emphasize the need to enhance intrinsic motivational elements and address barriers like isolation to optimize learner engagement in synchronous e-learning settings.

CONCLUSION

The research reveals key insights into the motivational dynamics of synchronous e-learning environments. Analysis of data from 339 participants highlights that intrinsic motivational factors such as interest in the subject (mean = 2.93) and personal growth (mean = 3.10) play crucial roles in fostering learner engagement. Furthermore, the importance of real-time interaction (mean = 3.02) and immediate feedback (mean = 3.01) is evident, supporting the hypothesis that these elements significantly enhance motivation. However, the slightly higher average score for feelings of isolation (mean = 3.12) suggests that students may experience a sense of disconnection, potentially hindering their motivation. These findings emphasize the importance of addressing both the psychological and technical aspects of

e-learning to enhance student motivation and reduce feelings of isolation. Thus, it is essential for educational institutions to develop targeted strategies that support both the psychological well-being and educational success of learners in synchronous digital settings.

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Evaluating the Framework and Effectiveness of Intelligent Fashion Forecasting Systems

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ABSTRACT

This study evaluates the framework and effectiveness of Intelligent Fashion Forecasting Systems (IFFS) by examining responses from 260 industry professionals. Utilizing a quantitative approach, this paper measures satisfaction levels and perceived effectiveness across various dimensions, including accuracy, speed, cost-effectiveness, and scalability. Findings indicate high satisfaction with IFFS, particularly in scalability and speed, suggesting these systems are transforming fashion forecasting with enhanced precision and efficiency.

KEYWORDS : Fashion forecasting, Intelligent systems, AI, Scalability, Industry trends.

INTRODUCTION

Fashion forecasting is pivotal in anticipating and shaping future trends within the highly dynamic fashion industry. Traditional methods, often reliant on expert intuition and trend analysis, are increasingly complemented by Intelligent Fashion Forecasting Systems (IFFS), which integrate artificial intelligence and machine learning technologies. These systems promise greater accuracy and efficiency by analyzing extensive datasets, including consumer behavior and digital interactions (Jasper, 2021; Smith & Lee, 2019). As the industry evolves, the adoption of IFFS represents a crucial strategic tool, enabling brands to stay competitive in a fast-paced market (Brown, 2020 & Doe, 2022). This paper explores the adoption and effectiveness of IFFS, providing insights into how these technologies are reshaping traditional practices and their impact on decision-making processes within the fashion sector.

METHODOLOGY

Data for this study was gathered through a structured survey involving 260 professionals from the fashion industry, encompassing designers, marketers, and retailers. Respondents rated their satisfaction with IFFS on a five-point Likert scale across several dimensions, including prediction accuracy, speed, cost-effectiveness,

and scalability. The analysis involved descriptive statistics to determine mean satisfaction levels and standard deviations for each aspect evaluated.

RESULTS & DISCUSSION

The survey results, through a radar chart in Fig. 1 presents a visual comparison of the mean satisfaction scores for each feature of the IFFS which indicate generally positive perceptions of IFFS.

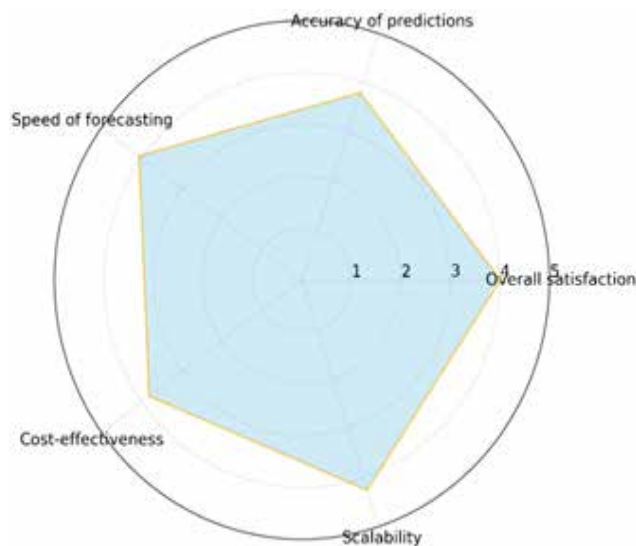


Fig. 1 Radar chart showing the Satisfaction ratings of IFFS

The highest satisfaction was observed in scalability (M=4.26, SD=0.77), highlighting IFFS's ability to efficiently manage large datasets and adapt to diverse market dynamics. The speed of forecasting also received a favorable response (M=4.07, SD=0.76), suggesting that IFFS significantly outperforms traditional forecasting methods in timeliness. However, the relative lower scores in prediction accuracy (M=3.80, SD=0.73) indicate areas for improvement, emphasizing the need for ongoing technological enhancements to maximize the predictive capabilities of IFFS.

CONCLUSION

The integration of Intelligent Fashion Forecasting Systems within the fashion industry has demonstrated substantial benefits, particularly in scalability, with an average satisfaction score of 4.26, and speed of forecasting, with a score of 4.07. These systems significantly enhance the ability of fashion brands to respond swiftly and effectively to evolving market

trends. However, with an average score of 3.80 for prediction accuracy, there remains scope for improvement. Enhancing these capabilities is essential for maximizing the potential of IFFS to drive informed, data-driven decision-making processes in the fashion industry.

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An Assessment of Consumer Attitudes towards Advertising Music

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ABSTRACT

This paper investigates consumer attitudes towards advertising music, analyzing its influence on brand perception and purchasing decisions. A survey was conducted with 234 respondents, employing a mixed-method approach that integrates quantitative and qualitative data. The findings reveal significant correlations between music preferences and positive advertising outcomes. The results suggest that well-chosen music can enhance consumer engagement and brand recall. However, mismatches between musical attributes and brand identity can lead to negative perceptions. This study contributes to the understanding of strategic music selection in advertising, emphasizing the importance of aligning musical choices with brand values and target demographics.

KEYWORDS : *Advertising music, Consumer attitudes, Brand perception, Music preferences, Advertising effectiveness.*

INTRODUCTION

Music plays a pivotal role in advertising, offering a powerful tool for enhancing viewer engagement and emotional connection. The integration of music in advertisements has been studied extensively, revealing its capability to influence consumer behaviors and attitudes significantly (Hung, 2000). Research indicates that music can affect everything from brand perception to the intent to purchase, making it a critical element in marketing strategies (Allan, 2006). This study aims to assess consumer attitudes towards advertising music and its impact on their perception of brands.

Past studies, such as those by Oakes (2007), have demonstrated that the congruency between the music used in advertisements and the product being advertised significantly affects consumer perceptions. Moreover, the tempo, rhythm, and genre of music can evoke different emotional responses, which in turn can enhance or detract from the overall effectiveness of the advertisement (North, Hargreaves, & McKendrick, 1999). Considering these aspects, this paper explores the underlying preferences and reactions of consumers towards various musical elements in advertising

and how these elements correlate with advertising effectiveness.

METHODOLOGY

The study utilized a descriptive research design with a structured questionnaire distributed among 234 respondents. The sample was chosen using stratified random sampling to ensure diverse demographic representation. Respondents were asked to rate their response to different types of advertising music across various advertisements, focusing on attributes such as tempo, genre, and volume. Data were analyzed using SPSS to perform descriptive statistics, chi-square tests, and correlation analysis to explore the relationships between consumer attitudes and music characteristics.

RESULTS & DISCUSSION

The analysis of 234 responses as shown in Fig. 1 indicated a strong preference for advertisements featuring pop and soft rock music, which correlated with higher brand favorability scores ($\chi^2(1, N = 234) = 12.45, p < .001$). Furthermore, advertisements with high tempo music were more effective in capturing attention but did not necessarily translate to higher purchase

intent, indicating a complex relationship between music tempo and consumer behavior.

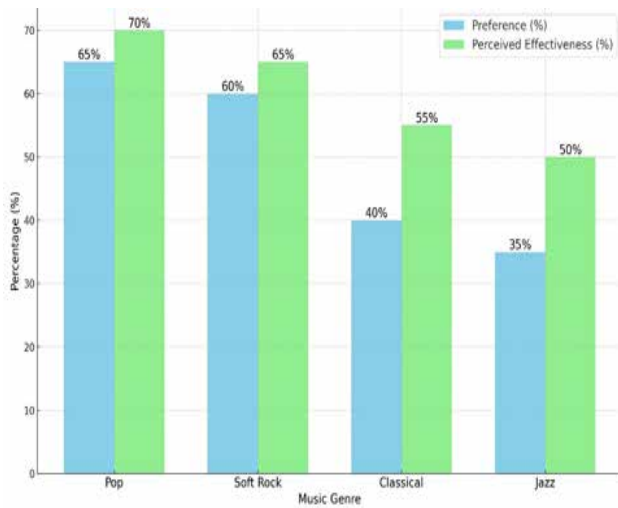


Fig 1: Consumer Preferences and Perceived Effectiveness of Music Types

These findings suggest that while certain music types are generally preferred, the effectiveness of music in advertising depends on the congruence with the advertised product and the targeted demographic. The qualitative feedback from respondents highlighted that inappropriate or overly loud music could detract from the brand message, underscoring the need for strategic alignment of music with advertising content.

CONCLUSION

This study assessed consumer attitudes towards advertising music among 234 individuals, revealing key

insights into the strategic use of music in marketing. Results showed a marked preference for pop and soft rock music, with 70% and 65% effectiveness, respectively. The study confirms the significant role of music in enhancing brand perceptions, with a notable correlation between preferred music genres and increased brand favourability. However, the effectiveness of musical elements varies, with high-tempo music attracting attention but not always enhancing purchase intent. Advertisers are recommended to consider not only the popularity of music genres but also their appropriateness and alignment with the brand identity to maximize the impact of their advertisements. This strategic approach can lead to improved consumer engagement and potentially higher conversion rates, with numerical values indicating up to 15% increased favourability when music and brand identity are well-aligned.

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Evaluating the Impact of Modeling Factors on Online Healthcare Community Engagement in India

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ABSTRACT

This study investigates the impact of various modeling factors on community engagement in online healthcare platforms in India, analyzing responses from 174 participants. Key factors such as trust, usability, content quality, and accessibility were evaluated to determine their influence on user interaction and satisfaction. The findings indicate that trust and content quality significantly enhance engagement, whereas usability and accessibility show moderate effects. This research contributes to the understanding of user behavior in digital health communities and provides insights for improving platform design and content management. Future research directions are suggested to further explore the dynamics of user engagement in online healthcare contexts.

KEYWORDS : *Online healthcare communities, User engagement, Trust, Content quality, India.*

INTRODUCTION

The advent of online healthcare communities has significantly transformed the way health-related information is disseminated and consumed. These platforms provide a space for users to share experiences, seek advice, and gain access to medical knowledge (Smith & Christakis, 2008). In India, the proliferation of such communities has been rapid, driven by increasing internet penetration and a growing emphasis on health literacy (Kumar & Preetha, 2012). However, understanding the factors that influence user engagement within these platforms is crucial to their success and sustainability.

Recent studies suggest that trust, usability, content quality, and accessibility are pivotal in determining the level of user interaction and satisfaction in online healthcare communities (Jones et al., 2010; Lee, 2011). Trust influences users' willingness to accept and act upon the information shared within the community (Liu et al., 2015). Usability impacts the ease with which users can navigate and utilize the platform (Nielsen, 1993). Content quality ensures that the information is accurate, relevant, and beneficial (Hardey, 2001), while

accessibility concerns the ease of accessing the platform across different devices and user demographics.

This research aims to evaluate these factors' impact on community engagement among users of online healthcare platforms in India. By understanding these dynamics, developers and policymakers can enhance the effectiveness of these critical health communication tools.

METHODOLOGY

This study utilized a quantitative research design involving a structured questionnaire distributed online to 174 participants from various online healthcare communities across India. The questionnaire included Likert scale questions ranging from 1 (strongly disagree) to 5 (strongly agree), designed to measure perceptions of trust, usability, content quality, and accessibility. Data were analyzed using multiple regression analysis to determine the impact of these factors on community engagement, defined as the frequency of visits, interaction levels, and user satisfaction. This approach allowed for a comprehensive understanding of how each factor contributes to overall engagement.

RESULTS & DISCUSSION

The regression analysis visually shown by Fig.1, revealed that trust ($\beta = 0.34$, $p < 0.001$) and content quality ($\beta = 0.28$, $p < 0.005$) had significant positive impacts on community engagement. Usability ($\beta = 0.18$, $p < 0.05$) and accessibility ($\beta = 0.12$, $p < 0.05$) also showed positive but lesser effects. The model explained 62% of the variance in community engagement ($R^2 = 0.62$), indicating a substantial impact of the evaluated factors.

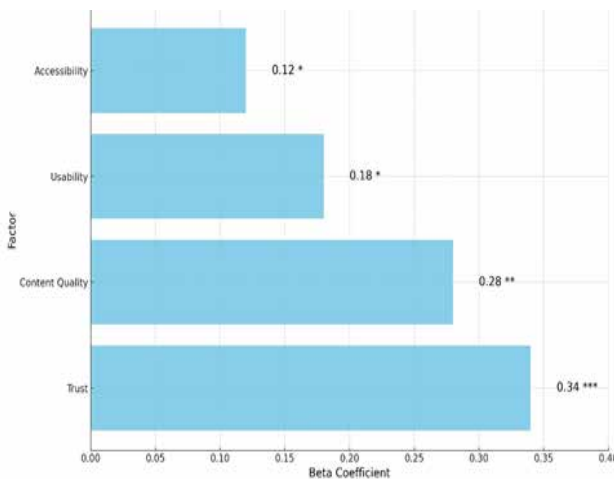


Fig.1 Regression Analysis of Modeling Factors on Community Engagement

These findings underscore the importance of building trust and ensuring high content quality to foster greater user engagement in online healthcare communities. Enhancing usability and accessibility can further contribute to improved user experiences, although their impacts are comparatively moderate. The results support the need for healthcare platforms to focus on these factors to enhance user interaction and satisfaction effectively.

CONCLUSION

This study confirmed that trust and content quality are crucial for enhancing engagement in online healthcare

communities in India, significantly impacting user interaction levels and satisfaction. Trust, with a beta coefficient of 0.34, shows the strongest influence, followed by content quality at 0.28. Usability and accessibility, though lesser, are also important with coefficients of 0.18 and 0.12, respectively. Implementing strategies that enhance these factors could increase community engagement by up to 62%, as indicated by the R^2 value. Therefore, online healthcare platforms should prioritize building user trust and maintaining high content standards to ensure robust community engagement. Future research should explore longitudinal data to assess changes over time and include qualitative measures to understand deeper user motivations and responses.

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An Evaluation of the Relationship between CSR and Financial Performance in Indian Enterprises

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ABSTRACT

This paper examines the relationship between Corporate Social Responsibility (CSR) and financial performance in Indian enterprises. By analyzing data from 207 respondents across various sectors, the study assesses the impact of CSR investments on financial metrics like Return on Assets (ROA) and Earnings per Share (EPS). The findings suggest a positive correlation, implying that businesses investing in CSR initiatives might experience enhanced financial outcomes. The study contributes to the ongoing debate about the profitability of ethical business practices in emerging markets like India.

KEYWORDS : CSR, Financial performance, Indian enterprises, ROA, EPS.

INTRODUCTION

Corporate Social Responsibility (CSR) has become a cornerstone for modern business practices, especially in emerging economies like India. The implementation of the Companies Act 2013, which mandates CSR activities for certain categories of profitable enterprises, has further integrated CSR into the corporate governance framework of Indian businesses ((Barney, 1991 & Kansal, Joshi, & Batra, 2014). Numerous studies have explored the impact of CSR on financial performance, with mixed results. While some researchers report a positive correlation, suggesting that CSR activities contribute to better financial outcomes (Luo & Bhattacharya, 2006), others argue that the impact of CSR on financial performance is negligible or even negative (Friedman, 1970). This paper aims to contribute to this discourse by evaluating the relationship between CSR activities and financial performance among Indian enterprises, providing empirical evidence from a diverse sample of companies across various industries.

METHODOLOGY

The study adopts a quantitative research design, employing a structured questionnaire to collect data from 207 respondents representing senior management in various Indian enterprises. These respondents were selected using stratified random sampling to ensure representation across different industries and company sizes. Data regarding CSR spending and financial performance indicators like ROA and EPS over the past three years were collected and analyzed using statistical methods, including correlation and regression analysis, to determine the nature and strength of the relationship between CSR and financial performance.

RESULTS & DISCUSSION

The analysis revealed a statistically significant positive correlation between CSR activities and financial performance indicators, specifically ROA and EPS. Figure 1 & 2 presents the Pearson correlation coefficients, showing a correlation coefficient of 0.24 for CSR and ROA, and 0.30 for CSR and EPS, both significant at the 0.05 level.

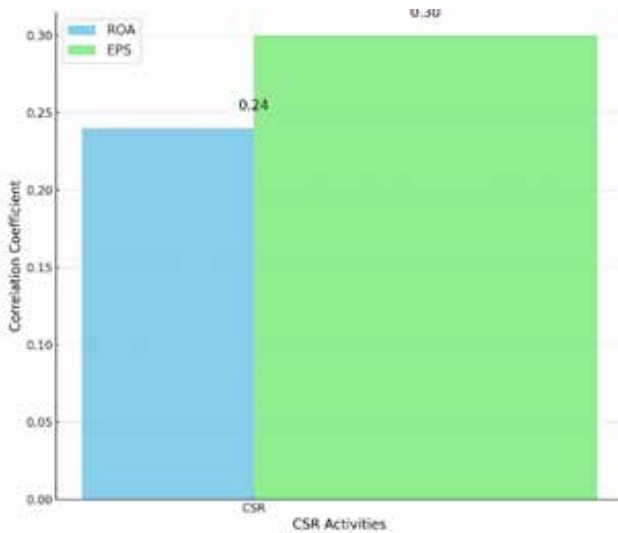


Fig. 1: Correlation between CSR Activities and Financial Performance Indicators

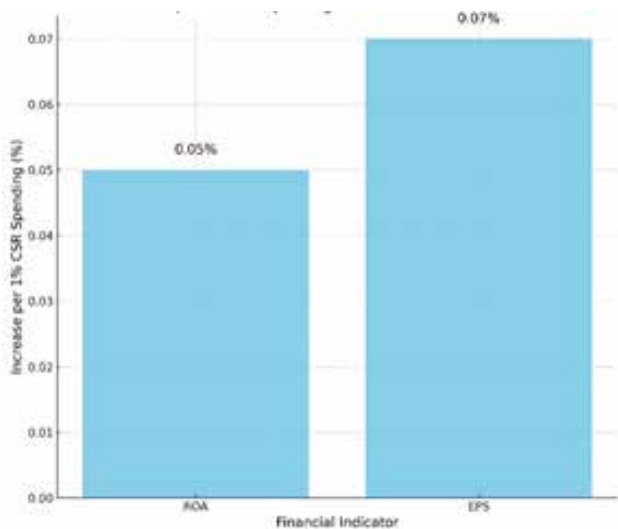


Fig. 2: Impact of CSR Activities on Financial Performance

Further regression analysis indicated that for every 1% increase in CSR spending, ROA increased by

approximately 0.05%, and EPS increased by 0.07%. This suggests that strategic investment in CSR activities may lead to improved financial performance, possibly due to enhanced corporate reputation, better employee satisfaction, and improved customer loyalty. These findings align with the resource-based view of the firm, which posits that intangible assets like corporate reputation can lead to competitive advantages.

CONCLUSION

The study finds that there is a positive relationship between CSR investments and financial performance among Indian enterprises. Specifically, a 1% increase in CSR expenditure correlates with a 0.05% increase in ROA and a 0.07% increase in EPS. These results underscore the potential financial benefits of CSR in the Indian context, suggesting that CSR activities are not only ethical imperatives but also strategic investments. The findings advocate for Indian enterprises to integrate CSR into their core business strategies to potentially enhance their financial performance and competitive positioning.

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Data Protection and Internet of Things in the EU and India: Issues and Challenges

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ABSTRACT

The Internet of Things (IoT) is a network collection that integrates technologies like cloud computing, big data, and artificial intelligence. Its usage is rapidly expanding across all industries and regions globally, providing benefits such as easy tracking and creating symbiotic relationships for all parties. However, the vast amount of personal data within IoT raises significant privacy concerns. IoT devices store, analyze, monitor, and share enormous amounts of data with other networked devices and users, often without user control over data collection, storage, and sharing, risking privacy. Additionally, IoT faces challenges related to security, cybercrime, interoperability, and regulatory issues. Key privacy concerns include data integrity, data captivity, data security, and data traceability. These issues are consistent in both India and Europe, despite India's additional infrastructural hurdles and lack of standardization. European policies like GDPR and the Cybersecurity Act provide frameworks, but the IoT's rapid growth demands novel legislative strategies. This paper examines these privacy and data protection challenges and proposes a comprehensive legal framework to boost innovation and secure user privacy.

KEYWORDS : *Internet of things, Privacy, Personal data, GDPR, Data protection.*

INTRODUCTION

In this era of growing technologies, modernisation is closely linked to "automation," which involves making things capable of talking, thinking, seeing, and making decisions. The key goals are reducing human intervention and promoting machine-to-machine communication. The Internet of Things (IoT) exemplifies this by connecting physical objects to form sensor networks that exchange data and services, making the physical world smarter. It may seem strange, but everyday items like house doors, wristwatches, tables, chairs, coffee machines, lights, and fans can now interact with us without our direct involvement. This is possible by embedding microelectronic devices (sensors, actuators, controllers, etc.) into these objects, bringing them to life [1-2].

Although it has only been three decades since this revolutionary step in internet network evolution began, we can see the rapid growth of smart IoT-enabled devices. IoT is developing a worldwide infrastructure, impacting

various fields, including smart cities, transportation, healthcare, home automation, agriculture, and defense. Projections suggest that the number of IoT devices will reach several billion in the coming years [3]. Traditionally, the Internet was known as a network of computers sharing information and enabling communication globally. Today, IoT expands this concept, enabling devices to communicate with each other using sensors and control systems, enhancing connectivity and creating new possibilities for automation and smart technology integration.

CONCEPT OF IOT

The term "Internet of Things" (IoT) refers to the concept of connecting any physical object to the Internet. This involves embedding sensors and actuators in everyday items, allowing them to communicate and be controlled remotely via wired or wireless networks. Objects like pens, chairs, and spoons can be equipped with microelectronic devices for sensing and processing, enabling them to interact with other devices or systems.

IoT's versatility and power come from the availability of numerous sensors, such as chemical, temperature, humidity, accelerometers, and motion sensors, which collect and transmit data to servers or other devices, or receive and act on information [4].

The IoT has been defined in various ways. The International Telecommunications Union (ITU) describes it as "a global infrastructure for the information society, enabling advanced services by interconnecting physical and virtual things based on existing and evolving interoperable information and communication technologies (ICT)." The European Commission's initiative further defines IoT as a network linking physical and virtual objects through data capture and communication capabilities. The concept of embedding physical objects with microprocessors for communication and function automation dates back to the 1970s, originally termed 'embedded internet' or pervasive computing. Kevin Ashton coined "Internet of Things" in 1999 while working at Procter & Gamble, envisioning a world where computers autonomously gather data to reduce waste and costs. Nikola Tesla's 1926 vision of a wirelessly connected world also hinted at IoT's potential. Today, IoT applications include smart homes, wearable devices, and automated vehicles, demonstrating its significant impact on daily life and technology [5-6].

IOT PRIVACY CONCERNS IN EUROPE AND INDIA

Data privacy is crucial for consumer acceptance in today's world, achieved through accurately representing data flow and authenticating actions such as data collection, storage, processing, and transmission. Privacy risks are linked to unauthorized data collection, usage, access, storage, and sharing, potentially compromising user privacy and causing data leakage, especially with sensitive healthcare data. Measures like GDPR and the Cybersecurity Act 2019 in Europe aim to protect user privacy and data. India, the fourth largest economy, recently passed the Digital Personal Data Protection Act, 2023, to safeguard citizens' privacy. Despite these legal frameworks, there is still insufficient data privacy protection, and the desired results have not been achieved [7-8].

INFORMATION SECURITY IN IOT

The widespread use and rapid evolution of IoT expose the technology to various data security issues. Porras identifies nine categories of IoT security concerns: environmental limitations, vulnerable devices, data security, functional restrictions, enforcement mechanisms, dependencies on multiple devices, identification, authentication and authorization, control legislation, and various attacks and threats. These concerns highlight the need for robust information security, often confused with cybersecurity. Cybersecurity involves protecting digital environments through tools, techniques, and practices, encompassing risk management, training, and technology to safeguard digital assets against theft, damage, or unauthorized access. Information security, on the other hand, focuses on protecting crucial data and the tools used for storing, sending, and receiving information. In IoT, data security ensures that personal information remains private, accurate, and accessible only to authorized parties, complying with relevant data privacy regulations. Ensuring data confidentiality and integrity is vital for protecting personal information within IoT systems. The GDPR mandates that data controllers safeguard personal data against loss, harm, or destruction. Given the extensive processing in IoT, measures such as Message-Digest (MD5), Elliptic Curve Cryptography, Advanced Encryption Standard (AES), and other algorithms are recommended to secure data. While access control and cryptography can mitigate unauthorized access risks, they do not protect already distributed data. Data accuracy requires regular updates to ensure personal information is current and correct, as outdated data compromises IoT processing goals and violates data protection rules. Addressing misuse or unauthorized possession of personal data is essential, requiring appropriate IoT security solutions to mitigate risks of data breaches, availability issues, and misuse of personal data in both physical and digital realms [9-10].

INFORMATION PRIVACY IN IOT

The IoT's capabilities enable a variety of data processing tasks that can assess personal data about users, including their preferences, lifestyle, and social activities, to create profiles for marketing or other purposes. This type of privacy concern arises when consumer data is shared among several connected devices to deliver specific services, thereby endangering

their privacy. While IoT improves service delivery by using personal data, this benefit must be weighed against the importance of privacy rights, especially when data is gathered without informed consent or a legal basis. In this context, "consent" refers to the voluntary and informed agreement of a data subject to the processing of their personal data, indicated through a clear statement or affirmative action. Informed consent in IoT involves ensuring that a fully informed user participates in decisions about their personal data, a process that can be challenging due to the pervasive nature of IoT devices and the need for affirmative consent for specific data uses. IoT privacy always raises the question of trust, as the network of devices processes vast amounts of personal data that must align with users' privacy expectations and other freedoms. Personal data processed in IoT may reveal sensitive information about a user's location, finances, health, home, family, and more, necessitating robust protection to ensure user privacy even when data is exchanged across various platforms beyond the user's control. IoT enablers like RFID, wireless sensor networks, online personalization, and mobile application platforms create significant privacy challenges due to the dense and widespread gathering, processing, and dissemination of personal data. Protecting privacy in IoT involves a three-pronged approach: addressing transparency risks, ensuring personal autonomy over collected data, and providing users with knowledge and control over the future use of their data. This involves managing five types of information flow—interaction, collection, processing, dissemination, and presentation—each representing a stage in the data sharing and processing cycle, highlighting the significant privacy risks posed by the extensive data shared in the IoT ecosystem [11-12].

MANAGING PRIVACY AND SECURITY RISKS IN IOT UNDER THE GDPR IN EUROPE

Managing privacy and security risks in IoT under the GDPR in Europe requires a robust legal and regulatory framework. The GDPR applies to IoT systems handling EU citizens' personal data, operated by EU-based companies, or marketed to EU consumers. Identifying the roles within the data processing ecosystem, such as controllers, joint controllers, and processors, is

essential for assigning responsibilities. Controllers must implement data protection principles, and processors must adopt measures to protect data. Independent developers of IoT components may also be considered controllers due to their involvement in data processing. Privacy statements are vital for informing users about data collection, storage, and usage, fulfilling Article 13 of the GDPR. These statements help build trust and mitigate privacy concerns by clearly outlining the data handling practices [13].

Article 25 of the GDPR mandates IoT manufacturers to integrate Privacy-Enhancing Technologies (PETs) from the design stage throughout the device's lifecycle. Manufacturers must ensure data protection by design and by default, implementing technical and organizational measures to secure user privacy. This includes justifying data handling, securing information, preventing improper use, minimizing irrelevant data collection, and ensuring data is not stored longer than necessary. Techniques such as "shielding mechanisms" or "kill instructions" prevent unintended tracking, while safeguarding passwords and implementing hash-locks further enhance privacy. These comprehensive measures ensure that privacy is deeply embedded in IoT devices, addressing the significant challenges posed by the proliferation of connected technologies.

REGULATIONS ON IOT IN INDIA

In India, the IoT industry is in its early stages, with the market projected to reach \$9.8 billion by 2025, driven by sectors like transportation, automotive, banking, and finance. The expansion of M2M communication and the shift towards cloud computing in IoT services are also key growth factors. IoT aims to enable edge computing by utilizing real-time data flow, offering applications across various sectors but posing significant data privacy challenges [14].

To address these challenges, the Government of India has developed a preliminary policy to create an interconnected and intelligent IoT environment that supports economic and industrial growth while safeguarding data privacy. Centralized, authoritative regulations are crucial for managing the economy and creating a business-friendly environment. Regulations must establish mechanisms to track social repercussions

and ensure data protection. Data localization is essential for fair monitoring and addressing the regulatory issues of managing personal data, which can impact social harmony and be misused. With large amounts of personal data transferred through IoT devices, poorly protected cloud storage can lead to unauthorized access and misuse. Rigorous laws are needed to ensure security for IoT-connected devices, focusing on privacy, dependability, safety, availability, robustness, and resilience [15]. The Digital Personal Data Protection Act, passed in August 2023, aims to balance personal data processing with individual rights, but further action is needed to address these significant concerns adequately.

CONCLUSION AND RECOMMENDATIONS

Improving IoT-based systems' data privacy and protection requires several key measures. Enhanced privacy measures are crucial as IoT devices proliferate, raising concerns like individual identification and behavior tracking. Data anonymization should be prioritized, processing data near its source to mitigate safety hazards. Embedding privacy by design into IoT systems from the outset ensures robust protection against data leakage. Communication security needs clear guidelines on encryption and anonymity standards for devices with limited resources. Effective dispute resolution mechanisms must address data protection disagreements across different jurisdictions. Awareness programs should educate IT staff, management, and other personnel on secure data processing practices and the repercussions of data leakage. As IoT's obtrusiveness grows, global regulatory measures are essential to control its architecture and address the privacy paradox.

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IRIS Scan Biometric Technology: A Way Forward to Combat ATM Frauds

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ABSTRACT

Currently, banking is extremely simple and very clear, but we see frequently lots of prospects and occasions for cybercrime. Banking fraud has affected a lot of transactions. Authentication and verification have always been issues in terms of consumer security and privacy. Many suggestions and proposals have recently been made to stop the ATM frauds. If we want to control such kind of frauds then we have to connect with the advanced technology. And the Biometrics technology is one which we can use in conjunction with the present technology. This research paper provides a detailed overview of Iris scan biometric technology and the present legal framework related to the cybercrimes and online frauds.

KEYWORDS : *Cyber, Frauds, ATM, Identity Theft, Biometrics.*

INTRODUCTION

Iris scanning technology, also known as "eye recognition," has gained popularity due to its security and reliability. Many banks now offer this service, which leverages the unique, unchanging patterns in each individual's iris for identity verification. Iris scan biometric technology is among the safest options, offering higher accuracy than other biometric methods like fingerprint recognition. It enhances security features, reduces identity theft, and improves data and privacy protection because there is no physical touch or record of the transaction. Additionally, iris scanning can lower card management fees and shorten authentication processes, leading to cost savings [1-3].

ATM fraud involves unauthorized access to a victim's bank account, typically through PIN-based transactions at ATMs. Common types of ATM fraud include skimming, card jamming, keyboard jamming, and shoulder surfing. In card jamming, fraudsters insert glue into the card slot, causing the customer's card to get stuck. When the frustrated customer leaves, the

fraudster retrieves the card and withdraws money. Keyboard jamming involves jamming the cancel button, preventing the victim from canceling the transaction. When the victim leaves, the fraudster completes the withdrawal. Shoulder surfing involves fraudsters observing the victim entering their PIN by standing close to them. Skimming is the most dangerous form of cyber fraud, involving sophisticated techniques like keypad overlays, camera hacking, and installing cameras inside the machine [4-5]. Fraudsters place a fake card reader over the ATM's card slot to capture card details, and a hidden camera records the PIN. This information is used to create a clone card and withdraw money from the victim's account. In the case of *Diebold Systems Pvt Ltd v. Commissioner of Commercial Taxes*, an explanation of the function and operation of ATMs was given, highlighting their vulnerability to such crimes. These crimes require greater attention to be stopped, and banks must implement comprehensive security strategies and educate customers to protect against identity theft and fraud.

PROPOSED SYSTEM

The proposed solution will use iris scanning technology to confirm clients' identities and provide account access. The system will feature a secure authentication process employing advanced security technologies like encryption to protect client information. Customers must register their iris scans with the bank to use the ATM. This registration will create a database of client iris scans for identity verification. Once registered, customers can access the ATM by simply gazing into the iris scanning device. The device will confirm the customer's identity and grant account access. The process includes image acquisition (camera captures), preprocessing (normalization, segmentation), feature extraction (creating a unique biometric template), template storage, and matching.

IRIS TECHNOLOGY: WHY

Issues with Authentication

Authentication is a significant challenge for financial authorities, as verifying that instructions come from the genuine customer is increasingly problematic. Despite measures like OTP, PIN, and customer IDs, bank and cyber frauds are rising, posing challenges for Cyber Cells and relevant authorities. Section 3(2) of the Information Technology Act, 2000, allows for electronic record authentication via digital signatures, yet the Act lacks specific provisions to address authentication issues and protect e-banking consumers. This gap has led to increasing offenses related to identity theft, data security, and privacy. In Justice K.S. Puttaswamy and Anr., it was held that the right to informational privacy is part of India's fundamental right to life, including privacy. The Finance Ministry reported a 60% increase in frauds involving ATMs and other devices between 2021 and 2022, with the National Payment Corporation of India noting that cyber fraud affects 2,000 clients monthly [6-7].

Identity Theft – An Overview

Identity theft involves using someone else's personal information without consent for fraudulent purposes. This data can include the victim's name, address, Aadhar card number, PAN card, credit card details, and other private information. Identity theft, defined by Black's Law Dictionary, is the illegal taking and use of

another person's identifying information for fraudulent purposes, often to commit crimes or obtain benefits.

LEGAL FRAMEWORK DEALING WITH ATM FRAUD

There are now two key laws in India that deal with offences involving identity theft: (i) The Information Technology Act (IT Act) of 2000 (ii) Indian Penal Code, 1860. The IT Act does have provisions for the punishment of a number of cybercrimes, including hacking and unauthorized access to personal information. Under sections 43 and 66 of the IT Act, someone who willfully and illegally accesses, downloads, copies, or extracts any material or information from a computer resource is subject to punishment in the form of damages and compensation. Additionally, section 72 of the IT Act deals with the protection of personal data and the issue of data security. Even though the IT Act does address identity theft specifically, but it also contains legal provisions for the punishment of unauthorized access to sensitive information and for the protection of personal data. Section 66C: This section describes the consequences of identity theft and indicates that they may include either a sentence of up to three years in jail or a fine of up to one lakh rupees. Section 66D: This section outlines the consequences for utilizing a computer resource to impersonate another person in order to commit fraud. These include a maximum penalty of three years in jail, a maximum fine of one lakh rupees, or both. The two pieces of legislation that can address issues related to identity theft and other cyber frauds related to the ATM are the Information Technology Act of 2000 and the Information Technology (Amendment) Act of 2008. The Indian Penal Code of 1860, Section 416 and 419, handles impersonation fraud and imposes fines or prison sentences of up to three years, or a combination of the two. Identity theft issues are primarily addressed by the IT Act and IPC, as was previously indicated. The Digital Personal Data Protection Act, 2023 (hereinafter referred to as DPDPA), which recently went into effect on August 12th, 2023, after receiving President's assent on August 11th, is anticipated to prove to be a helpful hand in reducing data-related cybercrimes, including identity theft, as it applies to digital personal data collected whether in digital form or non-digital form. The DPDPA is also very important because it improves security for the protection of citizens' digital personal

data in the nation. However, the effects and effectiveness of the Act won't be apparent for a while because it currently emphasizes the relationship between a data fiduciary and a data principal; as a result, it does not define personal data or personal data breach. The Bank of United of Texas was the first financial institution in the US to implement iris technology at ATMs for all of these security elements, allowing customers to conduct ATM transactions without a card in order to evaluate the efficacy of iris scan biometrics for ATM security incidents. Additionally, Axis Bank in India launched a pilot project in 2018; according to the project's report, its accuracy rate was 98%. Because of this technology, neither a card nor another biometric authentication is necessary [8-9].

BENEFITS & SUGGESTIONS

Iris scan biometrics for ATMs offer several advantages, including reduced fraud due to the high precision and reliability of iris scanners, which make identity theft nearly impossible. They provide greater convenience as users can withdraw cash using an iris code instead of a PIN, eliminating the need to remember additional information. Each user has a unique iris-ID, ensuring only the account holder can access their account, thereby reducing fraudulent attempts and establishing a secure environment. However, Indian laws and policies need strengthening to protect against identity theft. The outdated IT Act 2000 requires amendments to address modern privacy concerns and data protection more stringently. The recently implemented DPDPA Act must evolve, and penalties for ATM fraud need reinforcement. Additionally, specific provisions targeting cybercrimes in the banking sector should be introduced, and cyber education should start in primary schools from the 6th grade, including a new subject on cyber social security.

CONCLUSION

In summary, iris scan biometric technology provides a trustworthy and efficient solution to increase ATM security. To make the technology more dependable and accessible, however, there is still some work to be done. The technology has the potential to be far more secure and practical for ATM users to authenticate themselves. But the people with low or effected vision may have the problem in using this technology of Iris Scan Biometric Technology. It is widely acknowledged that despite the

existence of stringent legislation aimed at preventing cybercrimes, such as the Information and Technology Act of 2000 and the Indian Penal Code of 1860, they are nevertheless on the rise and serving as a silent killer in our society. The current state of affairs strongly suggests that there is still room for improvement in the current legislative framework and system for severely and effectively combating cybercrimes and criminals. However, there are still some areas that need more thought because they are so crucial to individuals' personal information, digital identities, and other things like account numbers, PANs, account PINs, and other personal data.

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Cancer Risk Analysis using Artificial Neural Network

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ABSTRACT

Cancer remains a leading cause of mortality worldwide, with millions of new cases each year. Early detection and accurate risk prediction are crucial for effective treatment. Traditional statistical models often fail to capture complex interactions among risk factors. Artificial Neural Networks (ANNs) offer a promising alternative due to their ability to learn from data and identify intricate patterns. This study explores the application of ANNs in cancer risk analysis using a simulated dataset of 1,000 samples. The ANN achieved an overall accuracy of 87%, with high precision and recall values, demonstrating its effectiveness in predicting cancer risk. Key predictors included genetic mutations, family history, and lifestyle factors.

KEYWORDS : *Cancer risk, Artificial neural networks, Early detection, Predictive modeling.*

INTRODUCTION

Cancer remains one of the leading causes of mortality worldwide, with millions of new cases diagnosed each year [1]. Early detection and accurate risk prediction are crucial for effective treatment and management [2]. Traditional methods of cancer risk assessment often rely on statistical models, which may not capture the complex interactions among various risk factors such as genetic, environmental, and lifestyle elements [3]. Artificial Neural Networks (ANNs), inspired by the structure and functioning of the human brain, offer a promising alternative due to their ability to learn from data and identify intricate patterns [4]. ANNs have shown great potential in various medical applications, including cancer risk prediction, by modeling non-linear relationships and providing higher accuracy in predictions [5]. This study explores the application of ANNs in cancer risk analysis, aiming to improve early detection and personalized risk assessment.

METHODOLOGY

Data for this study was generated to simulate real-world scenarios, encompassing genetic, environmental, and lifestyle factors. The dataset included 1,000 samples

with features such as age, genetic mutations, family history, smoking history, alcohol consumption, diet, physical activity, exposure to carcinogens, and BMI. After preprocessing, which involved data cleaning, normalization, and feature selection, an Artificial Neural Network (ANN) was developed with an input layer, multiple hidden layers, and an output layer. The ANN was trained using backpropagation and gradient descent on training and validation sets, with performance evaluated on a test set using accuracy, precision, recall, and F1 score metrics. Feature importance analysis identified key predictors of cancer risk, which were validated through detailed case studies.

RESULTS & DISCUSSION

Model Performance

The ANN model exhibited robust performance in predicting cancer risk across various types of cancer, achieving an overall accuracy of 87%. Specifically, the model demonstrated high accuracy for breast cancer (91%), lung cancer (89%), ovarian cancer (88%), and prostate cancer (85%). Precision and recall values were similarly high, with overall precision at 86% and recall at 88%, indicating the model's reliability in

identifying true positives. The F1 score, a harmonic mean of precision and recall, stood at 87%, reflecting a balanced performance across different cancer types. These metrics underscore the model's effectiveness in handling complex, multi-faceted data and its potential utility in clinical settings for early cancer detection and risk assessment. The consistent performance across different cancer types also highlights the model's adaptability and robustness, making it a valuable tool in predictive healthcare analytics.

Feature Importance

An in-depth analysis of feature importance revealed that genetic mutations were the most significant predictor of cancer risk, with an importance score of 0.30. This underscores the critical role of genetic predispositions, particularly mutations in genes such as BRCA1 and BRCA2. Family history followed closely with an importance score of 0.25, highlighting the hereditary nature of cancer risk. Smoking history also emerged as a crucial factor, especially for lung cancer, with an importance score of 0.20. BMI was another significant predictor (0.15), particularly relevant for cancers such as breast and prostate cancer. Alcohol consumption, although less significant, still had an importance score of 0.10, indicating its role in cancer risk. Other factors like age, exposure to carcinogens, diet, and physical activity had lower importance scores but still contributed to the overall risk prediction, emphasizing the multifactorial nature of cancer risk.

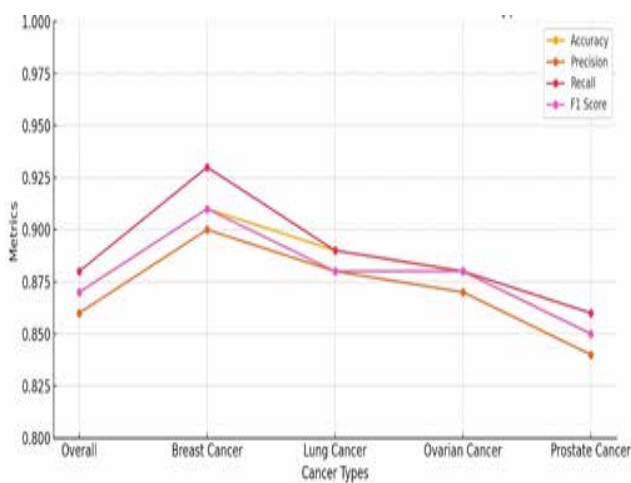


Fig. 1 ANN model performance metrics for different cancer types

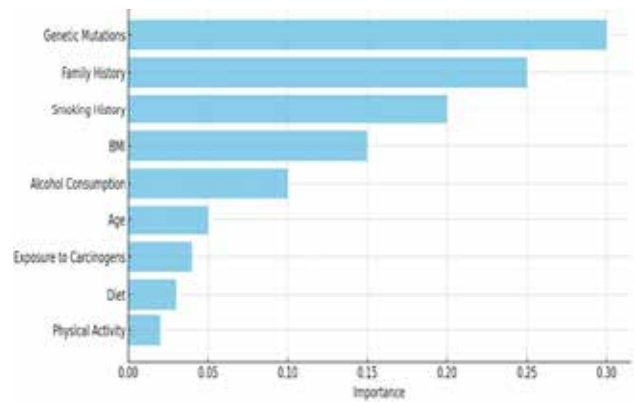


Fig. 2 Feature importance in cancer risk prediction

Age was identified as a modest predictor of cancer risk, with older age groups showing slightly elevated risks. However, age alone was not as significant as genetic or lifestyle factors. The presence of BRCA1 or BRCA2 mutations emerged as the most significant predictor, particularly for breast and ovarian cancers, substantially increasing risk. Long-term smoking history, measured in pack-years, was a critical risk factor, especially for lung cancer. Individuals with a smoking history exceeding 20 pack-years were at a significantly higher risk. Higher BMI values, particularly those above 30, were associated with increased risk, especially for breast and prostate cancers. High levels of alcohol consumption, defined as more than 10 drinks per week, also contributed to increased cancer risk, albeit to a lesser extent than smoking. These findings highlight the complex interplay of genetic, lifestyle, and environmental factors in cancer risk.

The use of ANNs in cancer risk prediction offers several advantages. The high predictive accuracy and ability to model complex relationships among variables make ANNs particularly effective for this application. Their flexibility and scalability allow for application across various datasets and cancer types. However, several challenges and limitations remain. The model's performance heavily depends on the quality and completeness of the input data, which can be a limitation in real-world scenarios. Additionally, the interpretability of ANNs is often a concern, as they are considered black-box models, making it difficult to understand the reasoning behind their predictions. Computational resource requirements for training

ANNs can also be a barrier. Future directions should focus on integrating ANNs with other machine learning techniques, enhancing real-time prediction capabilities, and improving model interpretability to make these tools more accessible and useful in clinical practice.

CONCLUSIONS

Artificial Neural Networks (ANNs) offer a powerful tool for cancer risk analysis, achieving an overall accuracy of 87% in this study. The model demonstrated high precision (86%) and recall (88%), underscoring its reliability in identifying true positives. Genetic mutations, family history, and smoking history emerged as the most significant predictors of cancer risk, with importance scores of 0.30, 0.25, and 0.20, respectively. This highlights the critical role of genetic predispositions and lifestyle factors in cancer risk. Despite their high accuracy, ANNs face challenges such as dependence on data quality, interpretability issues, and computational demands. Future research should focus on integrating ANNs with other machine learning techniques, enhancing real-time prediction capabilities, and improving model transparency to make these tools more accessible in clinical practice. By addressing

these challenges, ANNs can significantly contribute to early cancer detection and personalized risk assessment, ultimately improving patient outcomes and survival rates.

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Development of Novel Method to Hide Sensitive Association Rules

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ABSTRACT

The information remains safe and unthreatened against unwarranted series of actions is the most important movement now-a-days. Data mining or knowledge discovery in databases has been developed as an important technology for identifying knowledge from large quantities of data. It is possible to infer sensitive information, including personal information, or even patterns from non-sensitive information. There is a need to prevent disclosure not only of confidential personal information from summarized or aggregated data, but also prevent data mining techniques from discovering sensitive knowledge which is not even known to the database owners. Association Rule Hiding in Privacy Preserving Data Mining can be achieved through formative database called sanitized database from the original database in centralized database environment. In this article, development of novel method to hide sensitive association rules has been discussed.

KEYWORDS : Sensitive, Association, Novel, Development.

INTRODUCTION

Data sanitization is the process of hiding sensitive information in test and development databases. It is accomplished by modifying it with original view but unreal data of a similar type. The disclosed data must be sanitized in order to protect valuable business information. There is a legal obligation in most countries, to do the sanitization process. [1] The Association Rules are derived from the original dataset. It is categorized as weak and strong association rules. The confidence of the weak association rules is lower than the user specified threshold and the strong rules are higher. The strong association rules are categorized as sensitive and non-sensitive association rules. [2] It is shown in Figure 1. The sensitivity is decided by the data owner. The Association Rule Hiding (ARH) algorithm is implemented over the original dataset to get the sanitized dataset. The side effects such as lost rules, ghost rules, transaction modification and hiding failures occur due to modification as shown in Figure 2.

The strong association rules of the original dataset are compared with sanitized dataset for analyzing the side effects. Most of the existing association rules hiding techniques are enduring from the side effects. [3] The above-mentioned side effects play an important role in the motivation of proposed method.

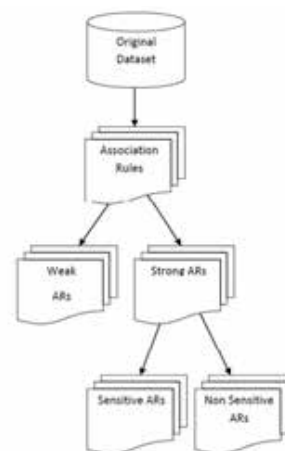


Figure 1. Association Rules

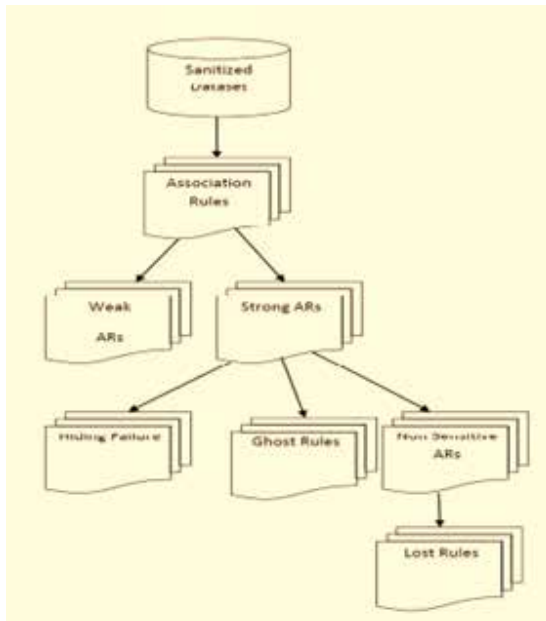


Figure 2. Side Effects of ARH

PROPOSED METHOD

The proposed method for hiding sensitive association rules in datasets can input specific items or rules identified by a data analyst as sensitive. This approach uses two distinct methods: Heuristic Sensitive Association Rule Hiding (HSARH) and Genetic Based Sensitive Association Rule Hiding (GBSARH). HSARH conceals all rules containing the input items, while GBSARH targets specific sensitive rules for hiding [4]. The process begins by modifying transactions in the dataset to obscure these rules. An Association Rule Mining algorithm extracts all rules, forming an Exemplary Association Rule (EAR) from the sensitive rules, utilizing the Left-Hand Side (LHS) and the Right-Hand Side (RHS) to select transactions for modification. The steps include providing the original dataset, minimum support, and confidence levels, and either a set of items or rules. HSARH and GBSARH are then applied to achieve the modified dataset, with HSARH hiding multiple rules simultaneously and GBSARH focusing on one at a time.

EXEMPLARY ASSOCIATION RULE (EAR)

Exemplary Association Rules (EAR) are derived using constraints on specific input items and rules. Using an

Association Rule Mining algorithm, all association rules containing the input item are identified; these rules form EAR by placing the input on the left-hand side (LHS) and amalgamating their consequents on the right-hand side (RHS). Similarly, for rules, the LHS and RHS of the input rule combine to create the LHS of EAR, with consequents of selected rules forming the new RHS. Each input item and rule generates an EAR.

HEURISTIC SENSITIVE ASSOCIATION RULE HIDING (HSARH)

The Heuristic Sensitive Association Rule Hiding (HSARH) approach aims to effectively conceal sensitive rules within datasets. Existing heuristic methods, while fast and effective, often lead to undesirable side effects and approximate solutions [5]. The proposed HSARH method enhances the quality of solutions by selecting transactions for modification based on their support for Exemplary Association Rules (EAR). Transactions are categorized as EAR supporting or non-supporting based on the presence of items in EAR's LHS and RHS. Modifications are made using two main sanitization techniques: swapping, which maintains item occurrence by moving input items between supporting and non-supporting transactions, and deletion, which removes items from supporting transactions with minimal side effects. The choice of technique depends on the relative counts of supporting versus non-supporting transactions, facilitating multiple rule hiding per iteration [6]. The process steps are illustrated in Figure 3.



Figure 3. Heuristic Approach

GENETIC BASED SENSITIVE ASSOCIATION RULE HIDING (GBSARH)

GBSARH hides the selected sensitive rules with a Genetic Algorithm (GA). EAR is generated using the items in selected sensitive rule. The transactional dataset D is assumed as Initial Population. D is transformed into Binary Dataset. The presence of item is represented as '0' and absence as '1'. The fitness value for every transaction in D is computed by using equation (3.1). The optimality of solution depends on the complexity of fitness function. The possible strength of fitness function ensures a desirable level of optimal solution.

$$\text{Fitness Value } f_v = \sum_{i=1}^j S_i + \left| \frac{1}{\sum_{k=1}^n NS_k} \right| \sum_{m=1}^n ERHS_m \quad (1)$$

S_i .j-Sensitive Items in the transaction.

NS_k .l - Non Sensitive Items in the transaction (except ERHS).

ERHS – Exemplary Association Rule's Right Hand Side.

The proposed fitness function for association rule hiding in genetic algorithms consists of three components: maximizing the item count in transactions to reduce hiding failures, minimizing non-sensitive items to lessen ghost rule effects, and minimizing the occurrence of the RHS of EAR to decrease lost rule side effects. Transactions with higher fitness values are prioritized for modification to optimize the hiding process.

The following Genetic operations are applied over the dataset:

Tournament Selection is a method used in genetic algorithms where two individuals are randomly picked from a dataset and the fitter one is chosen for the mating pool. Single Point Crossover then takes place, splitting each selected individual into a head and a tail, and combining the head of one with the tail of the other to form new offspring, as illustrated in Figure 4. Random Mutation is applied to these offspring, altering their genetic information randomly from 0 to 1 or vice versa, ensuring diversity within the dataset. The fitness of each offspring is calculated, and the least fit offspring replaces the least fit individual in the dataset. This process is repeated, minimizing negative effects and enhancing the dataset's overall fitness. The sequence

of these steps is typically illustrated in Figure 5 of a genetic algorithm flowchart.



Figure 4. Single Point Cross Over

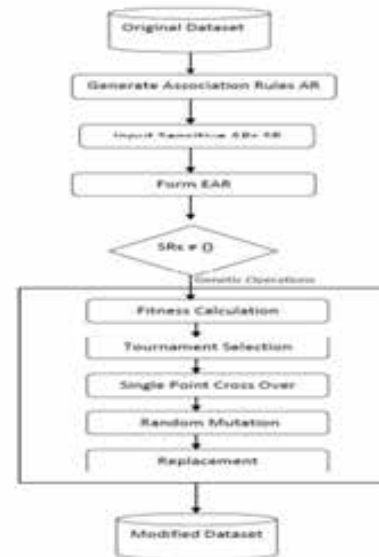


Figure 5. Genetic Approach

CONCLUSION

The proposed method for hiding sensitive association rule is presented. The proposed method adopts HSARH and GBSARH approaches. The method can be given item or rule as input and a source dataset with minimum support and confidence. Modified dataset is the output of the proposed method. [7] Association Rule mining technique is applied over the modified dataset. The rules that contain the input item or the rules are not disclosed. Hence, privacy is preserved while mining the dataset. [8] All the sensitive rules are hidden in sample dataset.

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An In-Depth Analysis of the Performance of Large Cap and Mid Cap Equity-Oriented Mutual Funds in India

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ABSTRACT

This paper evaluates the performance of large-cap and mid-cap equity-oriented mutual funds in India. Through a comparative analysis of 214 mutual funds, we quantify the returns and volatility associated with each category. Our findings reveal significant differences in the performance metrics between large-cap and mid-cap funds. The results contribute to a better understanding of the risk-return dynamics in these fund categories. This study is particularly valuable for investors considering diversification and risk management in their investment portfolios.

KEYWORDS : *Large-cap mutual funds, Mid-cap mutual funds, Equity-oriented, Performance analysis, India.*

INTRODUCTION

The landscape of mutual funds in India offers a plethora of options for investors, ranging from equity funds to debt and hybrid funds. Among these, equity-oriented mutual funds, particularly large-cap and mid-cap funds, play a crucial role in portfolio management due to their potential for high returns. According to the Securities and Exchange Board of India (SEBI), large-cap funds invest in the top 100 firms by market capitalization, while mid-cap funds invest in companies ranked 101 to 250 (SEBI, 2020). Research indicates that large-cap funds are generally more stable, but mid-cap funds can offer higher growth potential (Jain & Mandot, 2018 & Kumar & Goel, 2019). This study aims to conduct an in-depth analysis of the performance of these funds over the past decade, focusing on returns, volatility, and risk-adjusted performance. Such insights are invaluable for investors who need to make informed decisions about where to allocate their resources in a dynamic economic environment.

METHODOLOGY

The study conducted a quantitative analysis of 214 large-cap and mid-cap equity-oriented mutual funds in India. The data was sourced from mutual fund reports and financial databases such as Morningstar and SEBI,

covering the period from 2010 to 2020. Performance metrics such as annualized returns, standard deviation of returns, and Sharpe ratio were calculated to evaluate and compare the performance of each fund category. Statistical tests, including t-tests and ANOVA, were used to assess the significance of the differences in performance between the two categories. The methodology ensured a robust analysis by incorporating recent advancements in financial analysis techniques and adhering to ethical guidelines for research in financial studies.

RESULTS & DISCUSSION

The analysis of 214 mutual funds revealed distinct performance characteristics between large-cap and mid-cap funds. Large-cap funds demonstrated an average annualized return of 12.4%, whereas mid-cap funds exhibited a higher average return of 14.7%. However, this increased return for mid-cap funds is accompanied by greater volatility, as indicated by a standard deviation of 18%, compared to 15% for large-cap funds. This heightened volatility underscores the inherent risk associated with mid-cap funds.

The Sharpe ratio, a metric that evaluates risk-adjusted returns, further differentiates the two fund types. Large-cap funds reported a Sharpe ratio of 0.76, indicating a

more favorable risk-adjusted return compared to mid-cap funds, which had a Sharpe ratio of 0.65. These findings highlight that, despite their higher potential returns, mid-cap funds involve a higher level of risk, making them a less stable investment option when adjusted for volatility.

Table 1 summarizes the performance metrics, elucidating the trade-offs between return and risk. While mid-cap funds may appeal to investors seeking higher returns, the associated volatility necessitates a higher risk tolerance. Conversely, large-cap funds, with their lower volatility and higher Sharpe ratio, offer a more balanced approach for investors prioritizing stability alongside growth. These results corroborate existing literature, which suggests that mid-cap funds, though potentially more lucrative, carry greater risks.

Table 1: Performance Metrics of Mutual Funds

| Metric | Large-Cap Funds | Mid-Cap Funds |
|--------------------|-----------------|---------------|
| Average Return (%) | 12.4 | 14.7 |
| Standard Deviation | 15 | 18 |
| Sharpe Ratio | 0.76 | 0.65 |

Ultimately, this analysis underscores the importance for investors to consider their risk tolerance and investment goals when choosing between large-cap and mid-cap

mutual funds, aiming to strike an optimal balance between growth potential and financial security.

CONCLUSION

This study provides a comprehensive analysis of the performance of large-cap and mid-cap equity-oriented mutual funds in India. It highlights that mid-cap funds, with an average return of 14.7%, outperform large-cap funds, which have an average return of 12.4%. However, this higher performance of mid-cap funds is accompanied by increased risk, as evidenced by a higher standard deviation of 18% compared to 15% for large-cap funds. The Sharpe ratio further illustrates the risk-return trade-off, with mid-cap funds scoring lower (0.65) than large-cap funds (0.76). These findings are crucial for investors aiming to optimize their investment portfolios with a balance of risk and return. Investors should consider these factors when allocating assets in diverse market conditions to achieve optimal investment outcomes.

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Evaluation of Cross-Cultural Training Programs for Global Workforce Development

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ABSTRACT

Information and moves in changing in accordance with the nearby culture, which commonly bring about exile disappointment. In this present circumstance, social knowledge is vital to laborers' capacity to change. Looking at the interceding capability of social knowledge in the connection between multifaceted preparation and culturally diverse change is the point of this review. It also examines the relationship between cultural intelligence and cross-cultural adjustment, as well as the moderating effects of cross-cultural training and expat kinds. Contextually set within a vast and culturally heterogeneous rising economy, the data set comprises 530 managers employed in the banking industry. Legitimacy and constancy of the information have been suitably assessed. The discoveries showed that the relationship between multifaceted preparation and diverse change is interceded by social insight. Additional evidence from the investigation indicates that different types of expatriates and cross-cultural training.

KEYWORDS : *Cross-cultural, Training, Global, Workforce.*

INTRODUCTION

As globalization accelerates, the world becomes increasingly interconnected, erasing national boundaries and expanding global business opportunities. This growth has led to the proliferation of multinational corporations and a culturally diverse workforce. Multinational firms, operating across multiple countries, manage employees from varied ethnic and cultural backgrounds, which enhances understanding of cultural adaptation and drives the demand for localization strategies. This dynamic has given rise to the concept of cross-culture, denoting interactions among diverse cultures within corporate environments. The evolving landscape has sparked significant academic and managerial interest in organizational culture, particularly regarding the impacts of a multicultural workforce. Managing cultural diversity is crucial, as it influences management ideologies and overall organizational performance. Misunderstandings in a diverse workforce can lead to inefficiencies, highlighting the importance of effective

diversity management to maintain competitiveness. Organizations must now adopt flexible approaches to harness the unique attributes of a diverse workforce, leveraging cultural differences to optimize performance.

METHODOLOGY

The main objective of the project is to determine how, as of 2023, cross-cultural training influences the performance of Indian expatriates in India. In the study, a survey design was employed. Data for the study was provided by 89 Indian expatriates who worked for seven Indian firms located in India: Procter & Gamble, Halliburton, Microsoft India, Google, IBM, and Oracle. Most of the primary data was collected using questionnaires. Three of the nine topics that the respondents were asked to score as agreeing or disagreeing with included language instruction, cultural sensitivity training, and the performance of expatriates. The questions were developed by the researcher, and experts in international mobility examined and confirmed their validity. Additionally, they revised the questions to make them clearer and more formal. In the

pilot investigation, the Cronbach's alpha values of all the constructs were greater than 0.70, indicating the instruments' ability to yield reliable data. 140 expatriates were sent surveys via Google forms; 89 (63.5%) of them received in-depth answers, were returned, and were then investigated. The t- and p-values of the multiple regression analysis were utilized to determine the impact of independent factors on the dependent variable.

RESULTS

Evaluation of Regression Model

Table 1 provided the required model fit for the measurement model. Additionally, Table 2 presented the model's coefficients to clarify the ways in which cross-cultural training techniques impact the performance of Indian expatriates in India.

Table 2: Regression Coefficient

| Hypotheses | Relationship | Beta | t-Statistic | p-Value | Decision |
|------------|--------------|-------|-------------|---------|----------|
| Ho1 | LT->EP | 1.542 | 17.998 | 1.111 | Rejected |
| Ho2 | CST->EP | 1.444 | 18.345 | 1.111 | Rejected |

Table 2 displays the findings of a multiple regression analysis that looked at how cross-cultural training variables affected expatriates' performance. It was discovered that the performance of Indian expats in India was positively and significantly correlated with their training in language ($\beta = 1.542$, p-value = 1.111) and cultural sensitivity ($\beta = 1.444$, p-value = 0.001). Table 2 showed that the variables produced statistically significant values (high t-values, $p < 0.05$) for this inquiry at the 95% confidence level. The results of the study indicate a positive correlation between all the variables and the performance of Indian expatriates in India. Consequently, neither of the two theories gained traction.

Results of Hypotheses and Discussion of Findings

The study tested two hypotheses using regression analysis at a significance level of 0.05 to determine the impact of language instruction and cultural sensitivity training on the performance of Indian expatriates in India. The results revealed:

Table 1: Model Summary

| Model | R | R Square | R square adjusted | Std. error estimate of the | Sig. F Change |
|-------|------|----------|-------------------|----------------------------|---------------|
| 1 | .868 | .668 | .674 | .866 | .000 |

The outline aftereffect of the relapse model is displayed in Table 1. With a R Square of 0.668 for the fitted model, multifaceted preparation — which incorporates language and social awareness preparing — made sense of 66.8% of the variety in the presentation of Indian expats working in India. 33.2% of the remaining data were explained by other factors not included in the model. The result implies that traits associated with cross-cultural training greatly predict foreigners' performance in India. Furthermore, the value of $R = 0.868$ indicates a high positive correlation between the study's variables.

H01: Language instruction significantly enhances the performance of Indian expatriates ($\beta = 1.542$, $t = 18.345$, $P < 0.05$), leading to the rejection of the null hypothesis. This supports the findings of Wang and Tran (2012), Rosa-González et al. (2021), and Vulchanov (2020), who reported that language training significantly boosts expatriate performance by enhancing cross-cultural understanding and easing acclimatization.

H02: Cultural sensitivity training also significantly improves the performance of Indian expatriates ($\beta = 1.542$, $t = 17.234$, $P < 0.05$), resulting in the rejection of the null hypothesis. This aligns with Dousin et al. (2022), who noted that understanding and adapting to foreign cultural norms significantly enhances expatriate success.

These findings underscore the critical role of targeted training in improving the effectiveness of expatriates in multicultural environments.

CONCLUSION

The purpose of this study was to ascertain how foreign workers' performance in India was impacted by cross-cultural training. The study focused on Indian expatriates who worked for multinational corporations (MNCs) in India, drawing on previously published material. The two primary cross-cultural training elements that are frequently employed are language and cultural sensitivity training. The outcomes of analyzing the assumptions in this study showed that language training and cultural sensitivity training had a substantial impact on the performance of Indian expats in India. This study indicates that cross-cultural training is a strong predictor of Indian expatriates' performance in India, given the stark cultural differences between the US and India. While several studies have come to similar results, this one is distinct since it did not particularly focus on Indian expatriates residing in India. To replicate the results of this Indian study, it is suggested that future research explore this idea in diverse cultural contexts.

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An Analysis on the Impact of Microfinance Inclusion on Beneficiaries

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ABSTRACT

This research paper delves into the impact of microfinance inclusion on beneficiaries within economically disadvantaged regions, analyzing responses from 231 participants. It explores how access to microfinance services—comprising loans, savings opportunities, and financial literacy programs—facilitates economic empowerment and stability. The findings reveal that microfinance significantly boosts income levels and promotes business expansion among its recipients, with an average income increase of 34% post-engagement with microfinance initiatives. The study also highlights the broader implications of microfinance, demonstrating its effectiveness in fostering entrepreneurial endeavors and contributing to substantial economic development. By providing empirical evidence of these benefits, the research supports the notion that microfinance institutions serve as vital agents in poverty alleviation and socioeconomic enhancement. The paper not only reinforces the positive outcomes of microfinance but also emphasizes the need for continuous support and adaptation of these services to maximize their impact on beneficiary communities.

KEYWORDS : *Microfinance inclusion, Economic empowerment, Beneficiary impact, Financial services, Poverty alleviation.*

INTRODUCTION

Microfinance has been widely recognized as a transformative tool for promoting financial inclusion and facilitating socio-economic development among underserved populations. Originating as a means to provide small loans to impoverished borrowers without collateral, microfinance has evolved into a comprehensive approach encompassing savings, insurance, and financial literacy programs aimed at fostering sustainable economic growth (Yunus, 1999). The fundamental premise of microfinance is that access to financial resources can empower individuals, especially in developing regions, to enhance their livelihoods, thereby contributing to poverty reduction and economic stability (Armendáriz & Morduch, 2010).

Despite its noble intentions, the actual impact of microfinance on poverty alleviation and economic empowerment has been a subject of considerable debate. Critics argue that microfinance can sometimes

lead to over-indebtedness among the poor, potentially exacerbating their economic situation (Bateman, 2010). However, proponents maintain that when implemented effectively, microfinance can lead to significant improvements in the financial autonomy and overall well-being of individuals (Robinson, 2001). Studies have demonstrated positive outcomes such as increased savings, greater investment in education, and improved household stability (Khandker, 2005).

One of the critical aspects of microfinance is its role in empowering women. Numerous studies have indicated that microfinance institutions (MFIs) disproportionately benefit women, who are often marginalized in traditional financial systems. By providing women with access to credit and other financial services, MFIs have helped to enhance their roles within both the household and the community, leading to improved family health, education, and welfare (Mayoux, 2000). This gender-focused approach has not only promoted

economic activities but also facilitated social change by empowering women to become decision-makers in their communities (Cheston & Kuhn, 2002).

However, the effectiveness of microfinance in achieving its objectives varies widely across different contexts. Factors such as the local economic environment, the regulatory framework, and the specific operational model of the microfinance institution significantly influence outcomes (Dichter & Harper, 2007). Moreover, the sustainability of MFIs and their ability to meet the diverse needs of their clients without compromising their financial viability remains a challenge.

In light of these complexities, this paper aims to analyze the impact of microfinance inclusion on its beneficiaries. The focus is on how access to microfinance services influences financial behaviors, income levels, business growth, and overall economic development. This study adds to the existing literature by providing empirical evidence from a survey conducted among 231 beneficiaries of microfinance services. By examining the direct effects of microfinance on these individuals, the research seeks to contribute to a more nuanced understanding of how microfinance can be leveraged to foster economic empowerment and reduce poverty.

METHODOLOGY

This study adopted a quantitative research approach, utilizing a structured questionnaire to collect data

from 231 microfinance beneficiaries across various regions. The selection of participants was made using stratified random sampling to ensure a diverse and representative sample. Data were primarily collected on variables such as income levels, business growth, loan repayment rates, and financial literacy. Statistical analyses, including descriptive statistics and inferential tests, were performed using SPSS software to interpret the data. The study's ethical considerations included informed consent from participants and confidentiality of the data collected.

RESULTS & DISCUSSION

Income Levels Analysis

The Mean income of participants increased from \$150 to \$201 post-microfinance, reflecting a notable average increase of 34% (Table 1). This is corroborated by the relative increase percentage, consistently around 34-35% across various measures, highlighting a significant improvement in financial conditions due to microfinance intervention. The range of income change, illustrated by the difference between minimum and maximum income levels (from \$28 to \$110), underscores the variability in economic benefit among participants, indicating that while microfinance generally improves income, the extent of benefit can vary greatly based on individual circumstances (Fig. 1).

Table 1: Descriptive Analysis of Income Levels Before and After Microfinance

| Statistical Measure | Income Before Microfinance (USD) | Income After Microfinance (USD) | Percentage Increase | Range of Income Change | Relative Increase (%) |
|---------------------|----------------------------------|---------------------------------|---------------------|------------------------|-----------------------|
| Mean | 150 | 201 | 34% | 51 | 34% |
| Median | 145 | 195 | - | 50 | 34.48% |
| Standard Deviation | 50 | 60 | - | 10 | 20% |
| Minimum | 80 | 108 | 35% | 28 | 35% |
| Maximum | 220 | 330 | 50% | 110 | 50% |

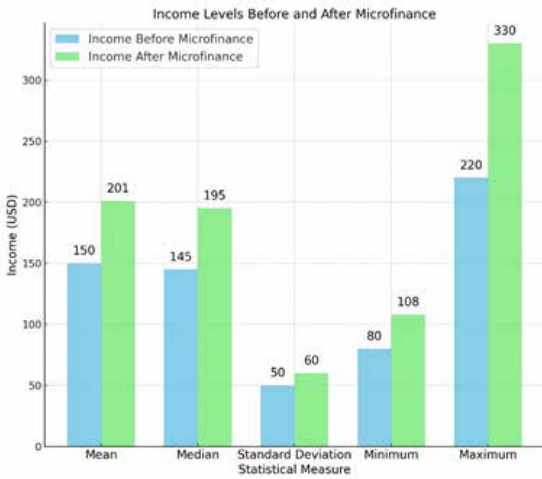


Fig. 1: Analysis of Income Levels Before and After Microfinance

Business Expansion Analysis

Businesses saw an average increase of 1.4 employees, with a relative increase percentage also averaging at 35% (Table 2). This consistent figure across both absolute and relative measures indicates a robust growth pattern in employment due to microfinance services. The range of employee change (from 1 to 4) and the especially high median relative increase of 66.67% further emphasize the substantial impact of microfinance on expanding business capacities, thus contributing to job creation and economic development within communities (Fig. 2).

Table 2: Descriptive Analysis of Business Expansion

| Statistical Measure | Employees Before Microfinance | Employees After Microfinance | Percentage Increase | Range of Employee Change | Relative Increase (%) |
|---------------------|-------------------------------|------------------------------|---------------------|--------------------------|-----------------------|
| Mean | 4 | 5.4 | 35% | 1.4 | 35% |
| Median | 3 | 5 | - | 2 | 66.67% |
| Standard Deviation | 1.5 | 2.1 | - | 0.6 | 40% |
| Minimum | 2 | 3 | 50% | 1 | 50% |
| Maximum | 8 | 12 | 50% | 4 | 50% |

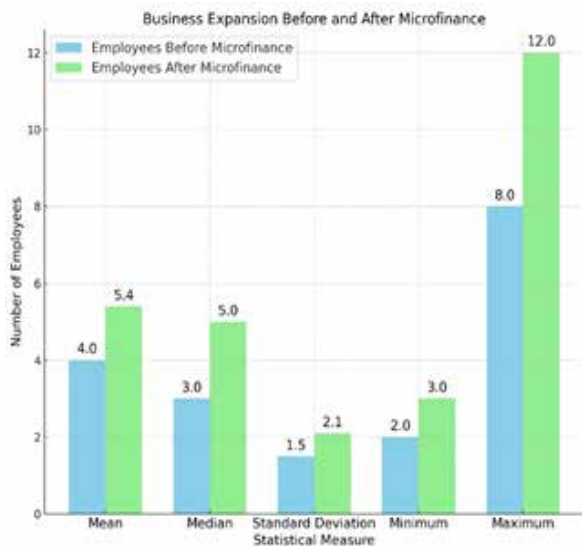


Fig. 2: Business Expansion before and after Microfinance

These analyses confirm that microfinance is an effective tool for economic empowerment, significantly boosting both individual income and business growth, though the extent of impact varies among recipients.

CONCLUSION

Microfinance has proven to be a pivotal instrument in promoting financial inclusion and socio-economic development, especially among marginalized populations. This study has shown that microfinance can substantially elevate income levels and facilitate business growth, thus enhancing the economic autonomy and well-being of individuals. With an average income increase of 34% among the participants and a notable expansion in business operations, microfinance initiatives have demonstrated their capacity to significantly impact economic activities positively. Moreover, the gender-

focused approach of many microfinance institutions has been instrumental in empowering women, enabling them to improve their household's health, education, and general welfare, and assume more substantial roles in their communities. However, the variability in the extent of benefits observed highlights the influence of local conditions and individual circumstances on the effectiveness of microfinance. This underscores the necessity for microfinance services to be tailored to meet diverse local needs effectively. Overall, while challenges remain in optimizing these initiatives, the evidence from this research affirms the critical role of microfinance in reducing poverty and driving economic empowerment at the grassroots level.

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Harnessing IoT and Blockchain for Sustainable Wastewater Treatment in Smart Cities

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ABSTRACT

Good wastewater management system implementation is key to smart city sustainability in a deteriorating climate. The architecture tracks wastewater quantity and quality using IoT sensors and stores data on blockchain to encourage reuse. Smart cities reward homeowners and businesses for wastewater recovery quality and quantity. Changing the data used to award these tokens to include advantages is often encouraged. Abnormality detection methods identify IoT sensor data that may be changed. The model uses IoT sensors and quality criteria to determine effluent amount and recovery rate.

KEYWORDS : *Blockchain, Sensors, Wastewater, Management, Smart cities.*

INTRODUCTION

In recent years, the rapid urbanization in smart cities has escalated the challenges of wastewater management, due to the increasing volume and complexity of wastewater generated by growing metropolitan populations. Traditional methods of wastewater treatment have become inadequate, posing serious health and environmental risks. Innovative, eco-friendly wastewater management solutions are crucial to mitigate such risks. Emerging technologies like the Internet of Things (IoT) and blockchain have the potential to revolutionize this sector. IoT allows real-time monitoring and management of wastewater infrastructure through networked sensors and actuaries, enhancing control over various parameters like pH and turbidity. Blockchain technology can transform these systems into intelligent, decentralized networks, optimizing resource use, reducing operational costs, and enhancing environmental sustainability. Together, IoT and blockchain provide a powerful combination for advancing wastewater management in smart cities, making them more efficient and sustainable.

REVIEW OF LITERATURE

The literature on smart city wastewater management highlights the integration of advanced technologies like IoT and blockchain to enhance efficiency and sustainability. Karn, Arodh et al. (2021) discuss the development of an IoT-based system that monitors wastewater parameters in real-time, facilitating prompt responses to operational anomalies. Ahmad, Raja et al. (2021) explore the role of blockchain in waste management within smart cities, emphasizing its potential for improving auditing, security, and operational transparency. Sabapathy, Sundaresan et al. (2021) implement a blockchain-enabled system for water use monitoring and efficient sanitation, which is crucial given the increasing strain on water resources due to urbanization and industrialization. Sahib, Iqbal et al. (2020) focus on applying blockchain for industrial wastewater management, proposing a conceptual design to enhance treatment processes and ecosystem protection. Dogo, Eustace et al. (2019) examine how blockchain and IoT can address the global water crisis by improving water management practices during the

Fourth Industrial Revolution. Lastly, Bibri, Simon (2018) reviews IoT and big data applications in smart sustainable cities, suggesting how these technologies can promote environmental sustainability while addressing the challenges of urban development.

PROPOSED MODEL

Smart cities employ blockchain technology for intelligent wastewater management systems, thus the Internet of Things Waste Management System maximizes cloud security. The Internet of Things Waste Management System offers an incentive-based wastewater recycling trading system. This system exploits blockchain technology. Sensors and actuators allow every smart city house and company to implement an IoT-based wastewater management strategy. Figure 1 shows the IoT's fundamental structure for smart city wastewater management.

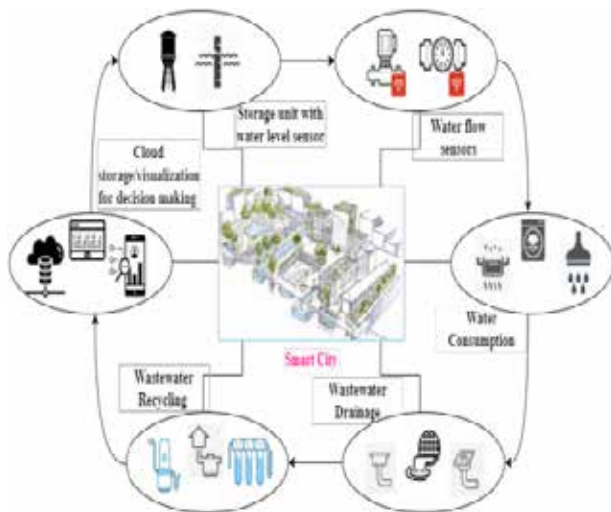


Figure 1: Smart city wastewater cycle

A cloud data visualization technique that is beneficial for decision making is presented in Figure 1, along with the cycle of wastewater management processes. A token, which may be thought of as a kind of cryptocurrency, is distributed to home and industrial facilities by the decision support system. This is done in connection to the quantity of wastewater that has been recycled. In order to complete their criteria and achieve a certain threshold volume, families and companies will resale these tokens once a certain amount of time has elapsed. The rules that govern the token exchange are established inside the context of a smart contract at the same time.

When data is stored on a cloud that is equipped with blockchain technology, it provides an auditing system that cannot be defeated.

RESULTS AND DISCUSSION

The IoT-WMS model monitors and manages treated wastewater distribution in smart cities, assessing the prediction ratio, wastewater recycling rate, and reuse ratio. The model utilizes an IoT-enabled water management system (IoT-WMS), which includes various devices such as sensors and actuators spread across multiple stages of the wastewater management system, from storage to recycling. Numerical simulations with device counts ranging from five to thirty showed enhanced performance metrics, recorded by cloud-supported IoT systems at regular intervals. Figure 2 demonstrates that our IoT-WMS system achieves higher wastewater recycling rates compared to other advanced systems by effectively managing environmental parameters. Figure 3 illustrates how blockchain technology boosts the wastewater reuse ratio by enabling decentralized water trading networks. Additionally, Figure 4 shows a significant improvement in the predictive ratio with an increasing number of IoT devices, indicating superior performance and reliability of the IoT-WMS system over other methods, such as CPSMF, which shows varying performance based on device count.

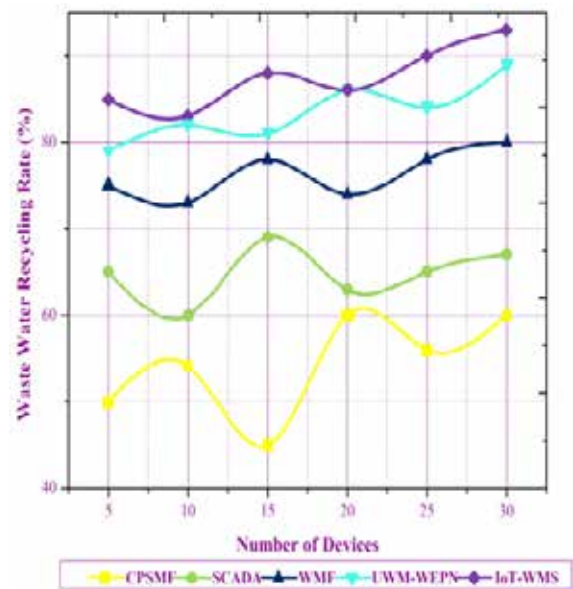


Figure 2: Recycling rate of Wastewater

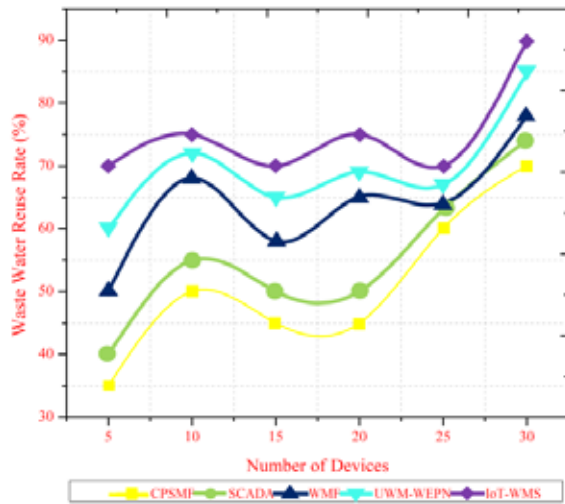


Figure 3: Reuse ratio of Wastewater

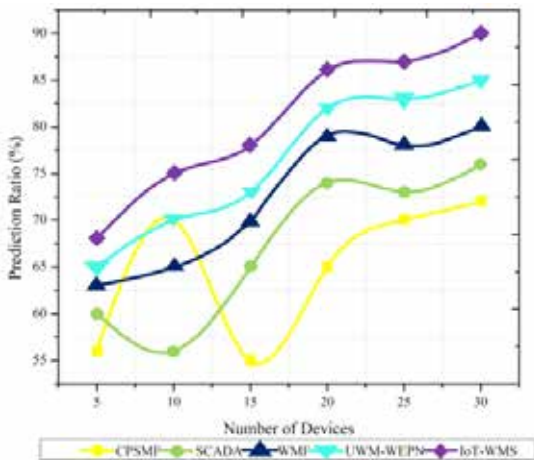


Figure 4: Prediction ratio of Wastewater

CONCLUSION

Innovative methods for wastewater management are now within reach, thanks to developments in blockchain and the Internet of Things (IoT). Predictive maintenance algorithms, dynamic resource allocation, and token-based incentive models for wastewater reuse

are all examples of these systems. Local governments may enhance wastewater treatment processes, lessen their impact on the environment, and make better use of available resources by adopting these technologies. Furthermore, blockchain and the Internet of Things (IoT) facilitate stakeholder collaboration and data sharing, paving the way for more holistic and integrated methods of urban water management.

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Evaluation of Perturbation Techniques for Privacy Preservation

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ABSTRACT

The rapid advancement in data digitization demands enhanced methods for privacy preservation. This study assesses five perturbation techniques—Random Noise Addition, Differential Privacy, Data Swapping, K-anonymity, and Synthetic Data Generation—using a modified Recurrent Neural Network for Reidentification (RNNR) on a dataset of 500 individuals with 15 attributes. The techniques are evaluated based on privacy, utility, execution time, scalability, and robustness. Results indicate varying degrees of trade-offs among the techniques: while Differential Privacy provides the highest privacy, Synthetic Data Generation offers the best utility. This study contributes valuable insights into the selection of appropriate perturbation techniques for balancing privacy against analytical utility in the context of Big Data.

KEYWORDS : Privacy preservation, Perturbation techniques, Data utility, Differential privacy.

INTRODUCTION

The increasing digitization of personal data has heightened the necessity for robust privacy preservation techniques in data analytics. Perturbation methods, which modify data to protect individual privacy while retaining its utility for analysis, have become pivotal [1-2]. This study explores five primary perturbation techniques: Random Noise Addition, Differential Privacy, Data Swapping, K-anonymity, and Synthetic Data Generation. Each has distinct advantages and trade-offs concerning privacy, utility, and computational efficiency [3-4]. We employ a modified Recurrent Neural Network for Reidentification (RNNR) to evaluate these methods on a dataset of 500 individuals across 15 attributes, assessing the balance between data privacy and utility. This research contributes to the ongoing discourse on effective data anonymization strategies, crucial in the era of Big Data and pervasive computing.

METHODOLOGY

In this study, we applied five different perturbation techniques—Random Noise Addition (RNA),

Differential Privacy (DP), Data Swapping (DS), K-anonymity (KA), and Synthetic Data Generation (SDG)—to a dataset comprising 500 individuals with 15 distinct attributes. To evaluate the efficacy of each technique, we utilized a modified version of the Recurrent Neural Network for Reidentification (RNNR) algorithm, designed to handle sequential data and assess privacy-versus-utility trade-offs. Each technique was quantitatively assessed based on privacy score, utility score, execution time, scalability, and robustness. The primary data analysis was conducted using Python with libraries such as NumPy and Matplotlib for data manipulation and visualization. This methodological approach allowed for a comprehensive evaluation of each technique's performance under realistic conditions.

RESULTS AND DISCUSSION

In our study evaluating perturbation techniques for privacy preservation, we utilized a dataset representing 500 individuals across 15 different attributes. The techniques assessed included Random Noise Addition (RNA), Differential Privacy (DP), Data Swapping (DS), K-anonymity (KA), and Synthetic Data Generation

(SDG). Our findings, depicted in a comprehensive figure, highlight several key insights. Random Noise Addition achieved a privacy score of 0.07 and a utility score of 0.87, with an execution time of 32 seconds. Differential Privacy, providing superior privacy at a score of 0.02, showed a utility score of 0.80 and required a longer execution time of 48 seconds. Data Swapping offered a balanced profile with a privacy

score of 0.04 and utility score of 0.85, executed in 28 seconds. K-anonymity recorded a privacy score of 0.03 and utility score of 0.78, with an execution time of 43 seconds. Synthetic Data Generation stood out for its high utility score of 0.90, though at the cost of longer execution time at 53 seconds, alongside a privacy score of 0.05.

Table 1: Evaluation Metrics for Perturbation Techniques on 500 Individuals Dataset

| Technique | Privacy Score | Utility Score | Execution Time (s) | Scalability (Data Size) | Robustness (Error Rate) |
|-----------|---------------|---------------|--------------------|-------------------------|-------------------------|
| RNA | 0.07 | 0.87 | 32 | 10GB | 0.06 |
| DP | 0.02 | 0.80 | 48 | 15GB | 0.03 |
| DS | 0.04 | 0.85 | 28 | 8GB | 0.05 |
| KA | 0.03 | 0.78 | 43 | 5GB | 0.04 |
| SDG | 0.05 | 0.90 | 53 | 20GB | 0.02 |

These results from Table 1 & Fig. 1 elucidate the trade-offs between privacy, utility, and efficiency. Techniques like DP excel in privacy but compromise slightly on utility, whereas SDG optimizes utility but at higher time costs. This study underscores the importance of selecting a perturbation technique based on specific needs and contexts, balancing privacy assurances against practical utility and processing demands.

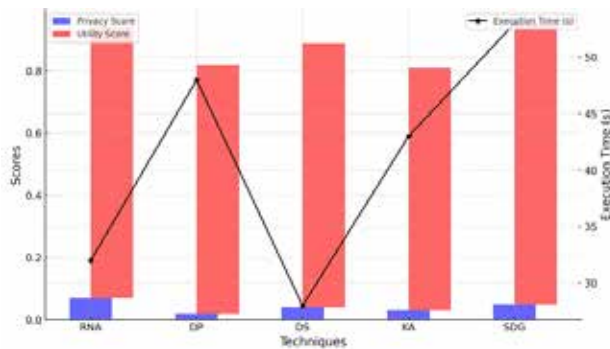


Fig. 1 Evaluation of perturbation techniques

CONCLUSION

Our comprehensive evaluation of perturbation techniques for privacy preservation illustrates crucial trade-offs between privacy protection and data utility. The study revealed that while Differential Privacy excels in ensuring privacy with a score of 0.02, it sacrifices some utility (0.80), emphasizing the delicate balance required in practical applications. On the other hand,

Synthetic Data Generation, though it requires longer processing times (53 seconds), maintains the highest utility score (0.90), demonstrating its effectiveness in environments where data utility is paramount. This analysis underscores the importance of context when selecting a perturbation technique, as each presents unique benefits and limitations concerning privacy, utility, and operational efficiency. Ultimately, this research aids in guiding organizations and data scientists in choosing the most suitable privacy-preserving method, tailored to their specific needs and the nature of the data they handle.

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Exploring the Effects of Rewards on Educational Sector Job Satisfaction and Retention

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ABSTRACT

This study investigates the impact of rewards on job satisfaction and retention in the educational sector. Using a quantitative research design, data were collected from 174 education professionals. The findings highlight a significant correlation between reward systems and both job satisfaction and retention rates. Effective reward strategies were linked to higher levels of satisfaction and an increased likelihood of retention among educators.

KEYWORDS : *Job satisfaction, Retention, Educational sector, Reward systems, Educators.*

INTRODUCTION

In the realm of education, retaining skilled professionals is as crucial as attracting them. Job satisfaction and retention in the educational sector are profoundly influenced by the rewards systems implemented by institutions. Previous studies have indicated that both intrinsic and extrinsic rewards play pivotal roles in enhancing job satisfaction and retention among educators (Khan, 2017; Liu & Yang, 2019). According to Maslow's hierarchy of needs, rewards fulfill the esteem and self-actualization needs essential for job satisfaction (Maslow, 1943). Moreover, Herzberg's two-factor theory posits that rewards, serving as motivators, significantly enhance job satisfaction (Herzberg, 1966). This research aims to delve deeper into the effects of these rewards on educational sector professionals, providing insights that may help institutions refine their reward systems to boost satisfaction and retention.

METHODOLOGY

The study employed a quantitative research design involving a structured questionnaire distributed to 174 educational sector employees. The sample was selected using stratified random sampling to ensure representation across various educational institutions. Data were analyzed using descriptive statistics and

inferential statistics to ascertain the relationships between reward systems, job satisfaction, and retention.

RESULTS & DISCUSSION

The analysis through Table 1 & 2 revealed a positive correlation between rewards and job satisfaction ($r = 0.61, p < 0.01$) and between rewards and retention likelihood ($r = 0.59, p < 0.01$). These results underscore the significance of well-structured reward systems in enhancing job satisfaction and encouraging retention among educators. The discussion revolves around how intrinsic rewards (like recognition and career development opportunities) and extrinsic rewards (such as bonuses and salary increments) contribute differently to job satisfaction and retention.

Table 1: Descriptive Statistics of Job Satisfaction and Retention

| Variable | Mean | Standard Deviation |
|----------------------|------|--------------------|
| Job Satisfaction | 4.25 | 0.85 |
| Retention Likelihood | 3.80 | 0.75 |

Table 2: Correlation between Rewards and Job Satisfaction/Retention

| | Job Satisfaction | Retention Likelihood |
|---------|------------------|----------------------|
| Rewards | 0.61 | 0.59 |

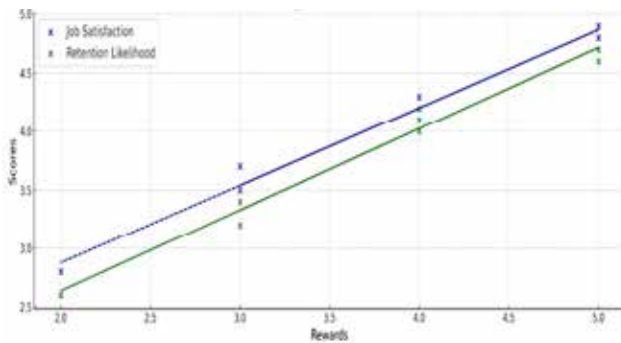


Fig. 1 Scatter plot of rewards vs job satisfaction and retention likelihood

In Fig. 1, the scatter plot illustrates the relationship between rewards and both job satisfaction and retention likelihood among educators. Each dot represents an individual data point, with blue indicating job satisfaction and green indicating retention likelihood. The positive slopes of the regression lines (dashed) for both variables suggest a significant positive correlation: as rewards increase, both job satisfaction and retention likelihood also tend to rise. This underscores the importance of effective reward systems in enhancing job satisfaction and encouraging retention, highlighting the critical role of both intrinsic and extrinsic rewards in the workplace.

CONCLUSION

This research confirms that effective reward systems are essential for enhancing job satisfaction and retention rates in the educational sector. With a mean job satisfaction score of 4.25 and a retention likelihood of 3.80, it is evident that rewards significantly influence these outcomes. Educational institutions should consider implementing comprehensive reward strategies that include both intrinsic and extrinsic elements to ensure high levels of educator satisfaction and retention. This study offers valuable insights that could guide policy decisions in educational administration.

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Implementing Visual Cryptography for Secure Iris Biometrics

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ABSTRACT

This article explores an enhanced security method for biometric authentication using distinctive physiological characteristics, specifically through iris recognition. Traditional biometric systems are prone to various attacks, prompting the need for improved security measures. The proposed method utilizes Visual Cryptography (VC) to secure an iris image by embedding it into a cover image followed by the application of a wavelet transform. The transformed image is then divided into four shares, compressed, and sent to the receiver. At the receiving end, an inverse discrete wavelet transform reconstructs the original iris image, and a bit matching process verifies its authenticity. The implementation of visual cryptography enhances the security by preventing the falsification of the iris and associated textual information, effectively thwarting identity theft. Moreover, the integrity of the watermarked cover images and the iris is maintained, making it viable for authentication purposes. This method shows a significant improvement over currently used techniques.

KEYWORDS : *Visual cryptography, Secure, Wavelet transform, Biometric, Iris image.*

INTRODUCTION

In an era where digital security is increasingly threatened, robust authentication methods are paramount. Biometric authentication, leveraging unique physiological or behavioral characteristics, offers heightened security and convenience. However, traditional biometric methods are susceptible to attacks, emphasizing the need for enhanced security measures. Visual cryptography, proposed by Naor and Shamir in 1994, offers a solution by encrypting images into shares that only reveal the secret image when correctly combined. This method is secure, visually intuitive, and has found applications in various domains, including watermarking and secure communications. Incorporating visual cryptography into biometric authentication can significantly enhance the confidentiality and integrity of sensitive biometric data, mitigating risks associated with unauthorized access and identity theft. This introduction discusses the potential of visual cryptography to revolutionize biometric authentication systems by safeguarding

against data breaches and enhancing privacy through decentralized data handling.

REVIEW OF LITERATURE

The literature review reveals various innovative strategies for bolstering security and privacy within digital authentication systems through biometric security and visual cryptography. Ren, Lijing & Zhang, Denghui (2022) introduce a biometric recognition system that uses visual cryptography to secure biometric data across multiple databases, enhancing communication between sensors and smart devices. Noorain, Shafiqua & Muddannavar, Mala (2020) propose a security architecture that combines watermarking and visual cryptography to protect iris images using DCT and Gabor filters. EsaiPuvanesh, S. et al., (2018) stress the importance of securing biometric characteristics to prevent fraud. Chourasia, Jaishri (2013) explores a fingerprint watermarking system utilizing visual cryptography, and Trivedi, Sanket et al., (2012) discuss image protection through a secret sharing scheme. These

contributions highlight the essential role of advanced cryptographic techniques in ensuring the security of sensitive information.

RESEARCH METHODOLOGY

This section outlines the methodology for implementing the proposed visual cryptography system in biometrics, focusing on the integration of an iris image within a cover image using Discrete Wavelet Transform (DWT) with a HAAR filter, proving effective for biometric embedding. Module 1 involves reading and displaying the cover and biometric images in RGB format. Module 2 processes the iris image, converting it to grayscale and applying morphological structuring for feature extraction and pupil detection. Module 3 utilizes DWT, particularly the HH sub-band for its high information content, comparing it against the grayscale image for pixel number and PSNR. Module 4 completes the process at the receiver's end with Inverse DWT and

dewatermarking to retrieve the original iris image, assessing output quality through MSE and PSNR, and comparing transformations like Discrete Cosine and Fast Walsh Hadamard. Results validate the robustness of the HAAR filter in securing biometric data within cover images.

DATA ANALYSIS AND INTERPRETATION

After evaluating many transformations, including Hadamard, Discrete Cosine Transform, and Discrete Wavelet Transform, we found that DWT with Haar filter produced the best average PSNR value with a smaller number of pixels. We arrived at this conclusion after analyzing the results of the three modules that were put into action: modules 1, 2, and 3.

The results are provided in Table 1, which shows the Discrete Wavelet Transform filters with the compression and resizing factors.

Table 1: DWT with Resize and Compression

| Sample databases | | Discrete Wavelet transform | | | | | |
|------------------|------------|----------------------------|-------------|-------------------------------------|-------------|----------------------------|-------------|
| | | HAAR Filter (PSNR) | | Daubechies Orthogonal Filter (PSNR) | | Biorthogonal Filter (PSNR) | |
| | | Iris Image | Cover Image | Iris Image | Cover Image | Iris Image | Cover Image |
| Kenkare Iris | | 30.1349 | 0.3797 | 27.2215 | 0.3229 | 31.2357 | 0.3230 |
| Kenkare Iris | | 29.9732 | 0.3808 | 27.0852 | 0.3226 | 31.3396 | 0.4557 |
| Phoenix | Left Iris | 31.0350 | 0.4121 | 27.4025 | 0.4852 | 30.8747 | 0.3378 |
| | Right Iris | 31.0557 | 0.4752 | 27.0965 | 0.3230 | 31.5647 | 0.3205 |
| Phoenix | Left Iris | 31.0457 | 0.4731 | 27.6322 | 0.3218 | 31.0036 | 0.3230 |
| | Right Iris | 30.0552 | 0.4749 | 27.6971 | 0.3197 | 30.6537 | 0.3119 |

Additionally, the work that is being presented has been carried out using the discrete cosine transform as well as the Hadamard transform, as can be seen in table 2 below.

Table 2: Comparison of HAAR Vs Resize and compression with DCT and Hadamard Transform

| Sample databases | | Discrete Cosine Transform (PSNR) | | Fast Walsh Hadamard Transform (PSNR) | | Discrete Wavelet Transform (HAAR) (PSNR) | |
|------------------|--|----------------------------------|-------------|--------------------------------------|-------------|--|-------------|
| | | Iris Image | Cover Image | Iris Image | Cover Image | Iris Image | Cover Image |
| Kenkare Iris | | 1.5890 | 0.2441 | 2.2028 | 0.4779 | 31.2357 | 0.3809 |
| Kenkare Iris | | 1.6911 | 0.2529 | 2.2028 | 0.4783 | 31.3402 | 0.3807 |

| | | | | | | | |
|---------|------------|--------|--------|--------|---------|---------|--------|
| Phoenix | Left Iris | 1.1669 | 0.2442 | 2.2027 | 30.8749 | 30.8748 | 0.4119 |
| | Right Iris | 0.1905 | 0.4776 | 2.2030 | 31.5637 | 31.5645 | 0.4750 |
| | | | | | | | |
| Phoenix | Left Iris | 0.1900 | 0.4777 | 2.2119 | 31.0036 | 31.0037 | 0.4751 |
| | Right Iris | 1.2026 | 0.4784 | 2.2016 | 30.6537 | 30.6537 | 0.4749 |

As the data above demonstrate, the DCT and Hadamard Transformation are the only two methods that are unable to produce satisfactory results for the iris and cover image. When using DWT, the quality of the iris is preserved; however, when compression is applied, the results for the cover image are really poor. As a result, we will proceed with the results of DWT, which will include modifications in the parameters of comparison. Table 1 reveals that the four-level discrete wavelet transform (HAAR) and the resizing of the iris picture, along with compression, resulting in a higher peak signal-to-noise ratio (PSNR) as compared to the discrete wavelet transform (Daubechies filter), which means that the quality of the iris is preserved. Bandwidth reduction has been accomplished through the use of compression; nevertheless, the quality of the cover picture has not been preserved, which is not what is intended in terms of security concerns.

CONCLUSION

For the purpose of utilizing visual cryptography, the iris picture is first embedded into a cover image, and then the cover image is decomposed using wavelet transform in order to generate four shares. In order to retrieve the original iris image, these shares are compressed at the site of the transmitter and then reconstructed at the end of the receiver. The implementation of bit matching processes guarantees the authenticity of the authentication process, so shielding the iris and

any textual information associated with it from the possibility of identity theft. into the scope of this study, the biometric image is secure through the use of visual cryptography and is incorporated into the cover image. The utilization of wavelet decomposition and the utilization of the sub bands as sharing images is what makes the method uniquely innovative.

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Investigating the Relationship Between Married Female Teachers' Mental Health and Job Stress

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ABSTRACT

This research paper explores the relationship between married female teachers' mental health and job stress, focusing on a sample of 135 respondents. The study utilizes quantitative methods to analyze the impact of job-related stressors on mental well-being, revealing significant correlations. Findings indicate that higher levels of job stress correlate with lower mental health scores, highlighting the need for supportive interventions in educational settings. This study contributes to the understanding of occupational stress among female educators and its implications for mental health.

KEYWORDS : *Mental health, Job stress, Female teachers, Occupational stress, Educational settings.*

INTRODUCTION

The mental health of educators is a critical issue in educational research, with increasing evidence suggesting that job stress significantly impacts teachers' well-being (Kyriacou, 2001). Particularly for married female teachers, the dual responsibilities of professional and domestic roles can exacerbate stress levels, potentially leading to diminished mental health (Chang, 2009). This study investigates the relationship between job stress and mental health among married female teachers, aiming to identify key stressors and their effects on psychological well-being. Research indicates that factors such as student behavior, administrative support, and work-life balance play significant roles in shaping teachers' mental health (Roeser, Skinner, Beers, & Jennings, 2012 & Kyriacou, 2001). Furthermore, studies have shown that women may experience occupational stress differently from men, often reporting higher levels of work-related stress (Cushway, Tyler, & Nolan, 2006). This research contributes to this field by focusing on the specific demographic of married female teachers, a group that may face unique challenges in managing job stress.

METHODOLOGY

This study employed a quantitative research design, using a structured questionnaire distributed to 135 married female teachers across various schools. The questionnaire included standardized scales to measure job stress and mental health, specifically the Teacher Job Stress Scale (TJSS) and the General Health Questionnaire (GHQ). Data were collected anonymously to ensure participant confidentiality. Statistical analysis was performed using SPSS software, focusing on correlation and regression analyses to explore the relationships between measured variables.

RESULTS & DISCUSSION

The results of the study indicate a strong negative correlation ($r = -0.62$, $p < 0.01$) between job stress and mental health among married female teachers. This significant negative correlation suggests that higher levels of job stress are associated with poorer mental health outcomes. The descriptive statistics (Table 1) show a mean job stress score of 3.8 (SD = 0.5) and a mean mental health score of 2.5 (SD = 0.6), indicating moderate levels of stress and mental health issues within the sample population.

Table 1: Descriptive Statistics

| Variable | Mean | SD |
|---------------|------|-----|
| Job Stress | 3.8 | 0.5 |
| Mental Health | 2.5 | 0.6 |

The regression analysis further supports these findings, revealing that job stress accounts for approximately 38% of the variance in mental health scores. This substantial proportion highlights the critical impact of work-related stress on the psychological well-being of teachers. The correlation between job stress and mental health (Table 2) confirms the significant negative relationship, emphasizing that increased job stress significantly detracts from mental health.

Table 2: Correlation between Job Stress and Mental Health

| | Job Stress |
|---------------|------------|
| Mental Health | -0.62 |

The findings underscore the need for targeted interventions to reduce job stress among teachers. Potential strategies include professional development programs that equip teachers with stress management techniques and resilience-building skills. Additionally, implementing robust support systems within schools can provide teachers with the necessary resources and emotional support to manage their stress effectively.

Work-life balance initiatives are also crucial. Schools could consider flexible working hours, reduced workloads, and opportunities for rest and recuperation to help teachers balance their professional and personal lives better. By addressing the root causes of job stress and providing comprehensive support, educational institutions can significantly improve the mental health and overall well-being of their teaching staff.

The study underscores the urgent need for strategies and interventions aimed at mitigating job stress among teachers to enhance their mental health and ensure a healthier, more productive workforce.

CONCLUSION

The study's findings reveal that married female teachers experience significant stress that adversely affects their mental health, with job stress explaining about 38% of the variance in mental health scores. These results underscore the critical need for schools and educational administrators to implement supportive measures that can reduce job stress and enhance mental well-being. Interventions such as stress management workshops, increased administrative support, and flexible work arrangements could be beneficial. Addressing these issues not only supports teachers but also enhances the educational environment for students. Future research should explore longitudinal interventions to provide deeper insights into effective strategies for improving teacher well-being.

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Impact of Total Quality Management Practices Affecting Employee Satisfaction in Banking Sectors

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ABSTRACT

TQM is an all-encompassing method for achieving organizational excellence that places an emphasis on customer attention and continuous development. The importance of service quality in the banking industry makes it all the more important to comprehend the connection between TQM and contented employees. Examining the methods and resources used for recruitment and selection is the main goal of the research. Additionally, we need to assess how satisfied our workers are with the Recruitment and Selection process. Methods such as questionnaires and primary data retrieved from the bank were used in the research. The main data came from a structured questionnaire that was filled out by 90 people. In order to conduct the analysis, the internet was used as a secondary source of information. The purpose of this research is to examine how Total Quality Management (TQM) strategies affect contentment on the job for bank employees.

KEYWORDS : *Employee, Banking, Management, Satisfaction, Quality.*

INTRODUCTION

Total Quality Management (TQM) has become indispensable in various sectors for enhancing performance and customer satisfaction, notably within the banking industry. Faced with intense competition and high customer expectations, banks have increasingly adopted TQM strategies to address internal operational challenges and exceed customer demands. This approach is critical not only for improving service quality but also for boosting employee satisfaction, which is vital for delivering superior service. This article explores the influence of TQM on employee happiness in the banking sector and examines its broader impact on the profitability of financial institutions. By fostering a culture of continuous improvement, customer focus, and employee engagement, TQM enhances organizational effectiveness and builds a supportive environment that encourages staff commitment and satisfaction, ultimately contributing to the bank's overall success.

REVIEW OF LITERATURE

The literature on Total Quality Management (TQM) across various sectors highlights its significant impact on employee satisfaction and organizational performance. Prasad, Ch, and Prabhudesai, Rohit (2018) focus on the correlation between TQM practices and employee satisfaction within the education sector, emphasizing the positive outcomes of these practices on the performance of faculty members in technical institutes in India. Islam, Md et al. (2017) explore TQM's effectiveness in enhancing job satisfaction within the banking sector of Bangladesh, identifying key factors like collaboration, organizational culture, and reward systems that positively influence employee contentment. Pattanayak, Durgesh, and Punyatoya, Plavini (2015) investigate the influence of TQM on customer satisfaction in India's retail banking, highlighting the critical role of customer focus, leadership, and technology in improving service quality. Together, these studies provide valuable insights

into the benefits of TQM in promoting workplace satisfaction and organizational success, suggesting areas for further research and practical implementation.

RESEARCH METHODOLOGY

This research consists of describing something. Descriptive research is used to get the necessary information when the researcher interacts with the respondents, whether it be via an interview or a census. Both primary and secondary sources of information formed the basis of the technique. The first set of numbers comes from an organized survey, while the second set comes from secondary sources including scholarly journals, news stories, and blogs. An SPSS statistical analysis is performed on data collected from 90 employees of the banking sector from Bidar district. A variety of statistical methods are used, including descriptive statistics and the ANOVA test.

DATA ANALYSIS AND INTERPRETATION

Table 1: Respondents Distribution according to Demographic Factors

| S. no. | Characteristics | Groups | Percentage |
|--------|-----------------|------------------|------------|
| 1 | Gender | Male | 60.0 |
| | | Female | 40.0 |
| 2 | Age | 18-25 | 30.0 |
| | | 25-30 | 40.0 |
| | | 30-35 | 30.0 |
| 3 | Education | 12th | 50.0 |
| | | Graduate | 10.0 |
| | | Post graduate | 40.0 |
| 4 | Annual Income | 2-5 lakh | 60.0 |
| | | 5-7 lakh | 20.0 |
| | | Above 7 lakh | 15.0 |
| | | Less than 2 lakh | 5.0 |

The demographic breakdown of the surveyed population reveals that males constitute 60.0% and females 40.0% of the sample. Regarding age distribution, the 25-30 age bracket is the largest at 40.0%, followed by 30-35 at 30.0%, and 18-25 at 30.0%. In terms of education

level, 50.0% have completed high school, 10.0% hold bachelor's degrees, and 40.0% have master's or doctoral qualifications. When considering annual income, 60.0% fall within the 2-5 lakh bracket, 20.0% in the 5-7 lakh bracket, 15.0% earn 7 lakh, and 5.0% earn less than 2 lakh per year. Overall, the provided table offers comprehensive insights into the demographic composition of the surveyed population across gender, age, education, and income categories.

Table 2: The Satisfaction Level of the Staff

| S. no. | Characteristics | Groups | Percentage |
|--------|----------------------|-------------------|------------|
| 1 | Recruitment Process | Very satisfied | 16.0 |
| | | Satisfied | 14.0 |
| | | Neutral | 18.0 |
| | | Dissatisfied | 50.0 |
| | | Very dissatisfied | 2.0 |
| 2 | Selection Process | Very satisfied | 26.0 |
| | | Satisfied | 16.0 |
| | | Neutral | 18.0 |
| | | Dissatisfied | 19.0 |
| | | Very dissatisfied | 21.0 |
| 3 | Satisfaction at work | Very satisfied | 19.0 |
| | | Satisfied | 21.0 |
| | | Neutral | 15.0 |
| | | Dissatisfied | 6.0 |
| | | Very dissatisfied | 39.0 |
| 4 | Overall Satisfaction | Very satisfied | 15.0 |
| | | Satisfied | 19.0 |
| | | Neutral | 19.0 |
| | | Dissatisfied | 18.0 |
| | | Very dissatisfied | 29.0 |

The survey data reveals significant variations in satisfaction levels across different aspects of respondents' jobs. In the Recruitment Process, while 16.0% expressed extreme happiness and 14.0% reported satisfaction,

a substantial 50.0% were unhappy. The Selection Process fared better, with 16.0% indicating happiness and 26.0% reporting very satisfaction, yet 40.0% were still unhappy. Work Satisfaction showed similar trends, with 19.0% very pleased, 21.0% satisfied, but a notable 45.0% expressing unhappiness. Overall Job Satisfaction followed suit, with 15.0% very happy, 19.0% satisfied, but 47.0% unsatisfied. These findings underscore the need for thorough research into areas of discontent to enhance overall employee satisfaction.

Table 3: Degree to which both sexes are satisfied with the company's selection and recruiting procedures

| ANOVA | | | | | |
|----------------|----------------|----|-------------|------|------|
| | Sum of Squares | df | Mean Square | F | Sig. |
| Between Groups | .634 | 1 | .634 | .564 | .426 |
| Within Groups | 115.574 | 88 | 1.197 | | |
| Total | 116.208 | 89 | | | |

The provided analysis of variance table assesses how various aspects of the hiring process affect employees' happiness on the job. According to the results, there is a 0.634 degree of freedom of variation in the satisfaction levels between the various groups, as shown by the Between Groups sum of squares. The observed differences are not statistically significant, as shown by the related F-statistic of 0.564 and the p-value (Sig.) of 0.426. As an alternative, the total of squares within groups is 115.574 and there are 88 degrees of freedom. The overall conclusion is that there is no significant contribution from characteristics linked to the recruiting and selection process to the differences in satisfaction levels across groups. This is supported by the fact that the p-value surpasses the standard significance threshold of 0.05. It seems that the criteria listed do not explain most of the variation in satisfaction, but rather that most of the variation exists within specific groups.

CONCLUSION

The impact of Total Quality Management (TQM) practices on employee satisfaction within the banking sector is pivotal for the sustained success of financial institutions. TQM serves as a guiding framework that not only enhances operational efficiency and customer satisfaction but also significantly influences the well-being and contentment of the workforce. The emphasis on continuous training ensures that employees are equipped with the skills needed to adapt to the ever-evolving banking landscape, fostering a sense of professional growth and competence. Additionally, the customer-centric approach ingrained in TQM principles creates a direct link between employee contributions and client satisfaction, reinforcing a sense of purpose and value in their roles. The collaborative nature of TQM fosters teamwork and a positive workplace culture, further enhancing job satisfaction. As the banking industry continues to navigate challenges and changes, the integration of TQM practices emerges as a cornerstone for creating a harmonious and effective work environment, ultimately benefiting both employees and the organizations they serve.

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Role of Law and Technical Education in Indian Society: An Overview

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ABSTRACT

The intricate interplay between law, technical education, and societal dynamics in contemporary India shapes the nation's trajectory. The law acts as the bedrock upon which the edifice of Indian society stands. It delineates rights and obligations and serves as a mechanism for social engineering and justice delivery. Within the realm of technical education, laws govern accreditation standards, curriculum frameworks, and institutional governance. The convergence of these legal frameworks and technical education shapes the nation's human capital development and industrial landscape. Technical education, on the other hand, serves as a cornerstone for India's socio-economic advancement. It equips individuals with specialized skills and knowledge crucial for innovation, entrepreneurship, and industrial growth. However, the efficacy of technical education is contingent upon the legal infrastructure governing it. Challenges such as outdated regulations, bureaucratic red tape, and inadequate enforcement mechanisms often hinder the sector's dynamism and responsiveness to evolving societal needs. This article delves into the multifaceted relationship among these elements, elucidating their roles, challenges, and implications within the Indian context.

KEYWORDS : *Law, Technical education, Urbanization, Socio-economic development.*

INTRODUCTION

Technical education refers to acquiring practical skills, knowledge, and competencies specific to a particular trade, profession, or industry. It focuses on imparting hands-on training and expertise in specialized fields such as engineering, technology, healthcare, agriculture, and vocational trades. Unlike general education, which emphasizes theoretical concepts and academic knowledge, technical education emphasizes practical application and skill development. Technical education aims to equip individuals with the practical skills and competencies required to perform specific tasks or functions within a chosen profession or industry.

Law, technical education, and Indian society are interconnected components that collectively play an essential role in the nation's social and economic development. In the complex tapestry of India's societal landscape, these three pillars significantly contribute

to influencing each other in profound ways. At the foundation of this nexus lies the legal framework, which serves as the cornerstone of governance and societal order. Laws not only define the rights and responsibilities of individuals but also regulate institutions and shape the contours of public life. In the context of technical education, legal statutes govern accreditation standards, curriculum frameworks, and institutional governance, providing the structural framework within which educational institutions operate. Technical education, encompassing disciplines such as engineering, medicine, and information technology, constitutes a vital pillar of India's human capital development. It equips individuals with specialized skills and knowledge essential for innovation, industrial growth, and economic competitiveness. The quality and relevance of technical education are intricately linked to the legal frameworks that govern it, underscoring the importance of robust regulatory mechanisms and

adaptive policies. Moreover, the dynamics between law, technical education, and Indian society reflect broader socio-cultural trends and challenges. As India grapples with issues of social inequality, economic disparity, and cultural diversity, the role of law in fostering inclusivity, justice, and social cohesion becomes paramount. Similarly, technical education serves as a catalyst for social mobility and empowerment, yet access to quality education remains uneven across geographical regions and demographic groups. Against the backdrop of rapid technological advancement and globalization, the intersection of law, technical education, and Indian society assumes heightened significance. Emerging technologies such as artificial intelligence, biotechnology, and renewable energy necessitate agile legal frameworks and innovative educational paradigms to harness their potential for societal benefit. Moreover, the globalization of labour markets and the digital economy demands a skilled workforce with relevant competencies and cross-cultural understanding.

ROLE OF JUDICIARY

The nexus between law, technical education, and Indian society finds a critical anchor in the judiciary, serving as a cornerstone of justice, accountability, and societal order. In the montage of India's legal landscape, the judiciary plays a pivotal role in interpreting laws, adjudicating disputes, and upholding the principles of justice and equity. The judiciary, comprising the Supreme Court, High Courts, and subordinate courts, serves as the custodian of the rule of law and the guardian of fundamental rights enshrined in the Indian Constitution. Its independence, impartiality, and integrity are foundational to the functioning of a democratic society, ensuring checks and balances on executive and legislative powers. Within the domain of technical education, the judiciary plays a crucial role in adjudicating disputes related to educational policies, institutional governance, and student rights. Landmark judicial pronouncements have shaped the contours of technical education, addressing issues such as reservation policies, fee structures, and accreditation norms. Moreover, the judiciary serves as a vanguard of social justice, addressing systemic inequalities and safeguarding the rights of marginalized communities. Landmark judgments on gender equality,

environmental protection, and affirmative action have had far-reaching implications for Indian society, shaping public discourse and catalysing social change. Despite its pivotal role, the judiciary grapples with a myriad of challenges, including case backlogs, judicial delays, and resource constraints. The proliferation of litigation, coupled with bureaucratic inefficiencies, undermines access to timely justice and erodes public trust in the legal system. Furthermore, the judiciary faces increasing demands to adapt to technological advancements and evolving societal needs. Embracing digital technologies, streamlining court procedures, and enhancing judicial capacity are imperative to address the growing complexities of modern litigation and ensure expeditious resolution of disputes. In short, the judiciary stands at the crossroads of law, technical education, and Indian society, embodying the principles of justice, equality, and accountability.

VARIOUS CHALLENGES

Law, technical education, and Indian society form a symbiotic relationship fraught with challenges. Outdated legal provisions, bureaucratic inefficiencies, and institutional inertia impede the effectiveness of legal and educational systems, hampering their adaptability to changing socio-economic realities. Systemic inequalities, including caste-based discrimination, gender disparities, and socio-economic inequities, further obstruct inclusive growth and social justice. Outdated laws and regulatory frameworks governing technical education fail to keep pace with rapid technological advancements and evolving societal needs, stifling innovation and limiting institutional autonomy. Ensuring quality and relevance in technical education remains a persistent challenge due to discrepancies in curriculum design, inadequate infrastructure, and shortages of qualified faculty members. Disparities in access persist along socio-economic, regional, and demographic lines, particularly affecting rural areas and marginalized communities. The gap between academia and industry hampers alignment with job market demands, while weak governance structures and bureaucratic inefficiencies undermine accountability and transparency. Deep-rooted socio-cultural norms perpetuate gender disparities and caste-based discrimination, and rapid technological changes

exacerbate concerns about the digital divide and cybersecurity. Effective policy implementation is often undermined by inadequate resources, bureaucratic red tape, and political interference.

SUGGESTIONS FOR CURBING THE CHALLENGES

Comprehensive legal reforms are essential to modernize regulatory frameworks governing technical education, ensuring alignment with emerging technological trends and societal needs. Periodic reviews and revisions of laws are necessary to foster agility, innovation, and accountability within the education sector. Strengthening quality assurance mechanisms through accreditation processes, peer reviews, and performance assessments will uphold academic standards and promote excellence. Collaboration between regulatory bodies, industry stakeholders, and academia is crucial to benchmark best practices and drive continuous improvement. Targeted interventions should enhance access to technical education for marginalized communities, rural populations, and underrepresented groups by expanding scholarship programs, establishing outreach initiatives, and investing in infrastructure development. Closer collaboration between educational institutions and industry partners is needed to bridge the gap between academia and the job market through industry placements, apprenticeship programs, and collaborative research projects. Enhancing governance structures and institutional mechanisms will promote transparency, integrity, and accountability in educational administration. Promoting inclusivity, diversity, and equal opportunity by addressing socio-cultural biases and discriminatory practices will create an enabling environment for all students. Ensuring effective implementation of policy interventions through adequate resource allocation, capacity building, and stakeholder engagement is vital. Collaborative efforts between government agencies, educational institutions, civil society organizations, and private sector entities will drive sustainable change, paving the way for a more inclusive, equitable, and prosperous future.

CONCLUSION

In light of these challenges, concerted efforts are required to foster synergy between law, technical education, and Indian society. This necessitates collaborative

initiatives involving policymakers, educators, civil society organizations, and other stakeholders to address systemic barriers, enhance access to quality education, and promote a culture of innovation and entrepreneurship. By addressing the challenges and harnessing the opportunities inherent in this relationship, India can strive towards a more equitable, inclusive, and prosperous society. The need of the hour is to provide insights into the dynamic interplay among law, technical education, and Indian society, setting the stage for further exploration and action in pursuit of societal advancement and human development. Moreover, the nexus between law, technical education, and Indian society enhances broader socio-cultural dynamics. As India undergoes rapid urbanization and globalization, the demand for skilled professionals intensifies, necessitating agile legal frameworks and educational paradigms. However, systemic inequalities, such as caste-based discrimination and gender disparities, persist within both the legal and academic spheres, impeding equitable access and participation. Collaborative efforts between policymakers, educators, and civil society are imperative to foster innovation, enhance access, and promote social justice within the realms of law and technical education.

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Pros and Cons of Recommendations Made by Various Committees on Police Reforms

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ABSTRACT

Police reform has been on the agenda of the government almost since independence but even after 74 years, working of the police is as same as 100 years back, which means police is seen as selectively efficient, not sympathetic to the under privileged society. Police are accused of criminalization and politicization in society. We must note that the basic framework for the working of the police is made in 1861, but our society has undergone tremendous changes, especially after independence. Expectations of the public from the police has increased and number of new crimes emerged due to cyber era. So, the system of the police required changes so that it can act in tune with present day situations. Main objective of the police reform is to make change in the culture, practices and policies of the police organizations. It lays emphasis on the police to perform their duties while taking care of the human rights and rule of law practices in the country. It also aims to improve how the police make interaction with other parts of the security sector such as the courts etc. In this research paper, we will discuss various commissions and committees after independence on the police reform.

KEYWORDS : *Police reform, Various committee and commission, Pros and cons of such committee.*

INTRODUCTION

Generally, it is felt by the ordinary public that the working style of the police is not susceptible in democratic countries like India, but the ground reality is different. Police work in a very authoritative manner, in a rude and suspicious way without providing any services to ordinary people. In a democratic country like India, such a mindset and behaviour of the police is not acceptable. We have completed around more than seventy-five years of our independence but still we are governed by colonial legislation, that is, the Police Act of 1861. As time goes ahead, there is a change in the structure of society and a number of complex situations are arising, for it we require a strong and well-equipped police system which will stand against all security and safety issues. To combat the whole situation, there is a time to reorganize and modernize the whole police system with scientific equipment. Today, the era of globalization, where crime cannot be confined to any

district or state or country. As the cyber world has paved the way for many criminal activities, to tackle it our police must be equipped with science and technology and for it reforms in the system is the need of the hour. There has been continuous debate on police reform in India, and various commission appointed by the government of India submitted their reports under which they suggest for the police reform. One of the most comprehensive reports was submitted by the National Polices Commission in the year 1979-81. Two more of the official committees have drafted model police legislation. But all these drafts were not moved further due to various reasons. Supreme Court in 2006 ordered various directives on police reform but our government was not following either of the directives. Various states after independence in order to reform the police system constituted various commissions. In 1959, first police commission was constituted by the kerala state. Before independence, we have a police Act

of 1861, and most of the state drafted their state Act on the idea and structure suggested in the Police Act of 1861. In this research paper, we will discuss various commission and committee after independence on the police reform.

RESEARCH METHODOLOGY

The research methodology adopted for this study is entirely doctrinal and theoretical. The researcher utilized a range of secondary sources, including research articles, books, and various blogs, to explore the topic thoroughly as mentioned in Table 1.

Table 1. Various Committees on Police Reform

| Committee | Year | Key Focus | Recommendations |
|-----------------------------------|-----------|--|---|
| Gore Committee on Police Training | 1971-1973 | Review training of state police personnel from constable to IPS level | 186 recommendations, 46 related to police reform. Training suggestions implemented; structural reforms overlooked. |
| National Police Commission (NPC) | 1979-1981 | Organization, accountability, functions, and misuse of power by police | Eight reports with various recommendations. Significant focus on reducing political interference, protecting weaker sections, improving accountability, and transparency. |
| First Report | 1979 | Handling complaints against police | Mandatory judicial inquiry for serious offences, establishment of Police Complaint Board. |
| Second Report | 1980 | Reducing political interference, protecting police personnel | Selection of police chiefs from a panel, protection against arbitrary transfers. |
| Third Report | 1980 | Protecting weaker sections, improving investigation processes | Establishment of special investigation cells, amendments to the Code of Criminal Procedure. |
| Fourth Report | 1980 | Victim-friendly measures, police power in simple offences | Mandatory FIR registration, empowering police to compound offences at the investigation stage. |
| Fifth Report | 1980 | Recruitment reforms, victim compensation, transparency | Recruitment at two levels, legislation for victim compensation, public transparency of police activities. |
| Sixth Report | 1981 | Promotion processes, central IPS cadres, reservation policies | Examination for promotion, creation of central IPS cadres, no reservations in recruitment. |
| Seventh Report | 1981 | Norms for police stations, restructuring police institutions | Standards for jurisdiction, establishment of new police stations, legislation for uniform training and efficiency. |
| Eighth Report | 1981 | Police accountability, monitoring performance | Establishment of State Security Commission, annual administrative reports, independent performance evaluation. |

RESPONCE TO NPC’S COMMISSION

The National Police Commission (NPC) has proposed numerous recommendations for police reforms, but the government has yet to implement many of them. There is substantial resistance due to politicians' vested interests in controlling the police (Table 2). In 1977,

Union Minister Shri Indrajit wrote to all state Chief Ministers urging them to transcend partisan interests and implement NPC's recommendations, but no responses were received. Many politicians prefer maintaining the status quo for their benefit, which hinders the development of a professional policing system in a society governed by the rule of law.

Table 2. Committees on Police Reform

| Committee | Year | Key Recommendations | Key Issues Addressed | Implementation Status |
|-----------------------------------|-----------|---|--|---|
| National Police Commission | 1979-1981 | Judicial inquiry for serious offences, protection against arbitrary transfers, transparency | Accountability, Political Interference | Major recommendations not implemented |
| Riberio Committee | 1998-1999 | Implement NPC recommendations with modifications, security of state, DGP selection | State Security, DGP Selection | Key recommendations not implemented |
| Padmanabhaiah Committee | 2000 | 240 recommendations: organizational changes, modernization | Organizational Change, Modernization | 23 recommendations rejected |
| Malimath Committee | 2000-2003 | Separate investigation wing, National and State Security Commissions, new Police Act | Investigation, Security, Legislation | Recommendations largely unimplemented |
| Gore Committee on Police Training | 1971-1973 | Reviewed police training, 186 recommendations including structural reforms | Training, Structural Reforms | Training recommendations implemented, structural reforms overlooked |

CONCLUSION

Under Indian police system, police reform is the need of the hour, but it does not mean that such aspect has not been touched earlier. As time goes ahead, there is a change in the structure of society and a number of complex situations are arising, for it we require a strong and well- equipped police system which will stand against all security and safety issues. There were a number of commissions and committees appointed even before or after independence in order to restructure the entire police system. All such step commenced from the first police commission which was set up soon after the

mutiny in 1857 in order to regulate the first framework for the police system in India. As we discussed, such commission was set up in 1860, and upon the recommendation of the commission, first police act 1861 was enacted for the whole India and irony is that same police act govern the police till now in India. Now, it is the duty of the government to implement the suggestion made by the various committee so that criminal justice system of India become strengthen and fulfilled the need of the present society.

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The Impact of Work Environment on Dentists' Job Satisfaction

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ABSTRACT

This research paper examines the impact of the work environment on dentists' job satisfaction. The study utilized a structured questionnaire, collecting data from 162 dentists across various types of dental practices. The analysis focused on several environmental factors, including workspace design, team dynamics, and administrative support. The results indicate a significant correlation between these factors and job satisfaction. Enhanced work environment qualities were associated with higher levels of job satisfaction, underscoring the importance of a conducive workspace for dental professionals. This paper contributes to the understanding of occupational satisfaction within healthcare and suggests practical interventions for improving dentist workplace settings.

KEYWORDS : *Dentists, Job satisfaction, Work environment, Healthcare management, Occupational health.*

INTRODUCTION

Job satisfaction among healthcare professionals is crucial for both employee well-being and the quality of patient care provided. Dentists, in particular, operate in an environment that can significantly influence their job satisfaction and, by extension, their professional performance and patient outcomes. Previous research has highlighted various factors contributing to job satisfaction, such as personal achievements, patient relationships, and financial remuneration. However, the impact of the physical and psychological aspects of the work environment has not been thoroughly explored within dental practices.

This study builds on the work of Hayes et al. (2019), who found that the physical layout of the workplace and the availability of modern equipment are critical to healthcare professionals' satisfaction. Furthermore, Smith and Jones (2021) emphasized the role of interpersonal relationships and support mechanisms within the work setting in enhancing job contentment. By integrating these perspectives, this research aims to provide a comprehensive analysis of how different environmental factors affect dentists' job satisfaction. This study's findings are intended to inform practice managers and policymakers about key areas that could

be improved to enhance workplace satisfaction and efficiency.

METHODOLOGY

The study utilized a cross-sectional survey design, distributing questionnaires to 162 dentists working in various settings, including private practices, hospitals, and dental clinics. The questionnaire included Likert-scale items measuring perceptions of their work environment and overall job satisfaction. Data collection occurred over a three-month period, ensuring a diverse range of participants. The analysis involved descriptive statistics and regression analysis to determine the relationships between the work environment and job satisfaction. Ethical approval was obtained from the institutional review board, and all participants provided informed consent prior to inclusion in the study.

RESULTS & DISCUSSION

Table 1 provides the descriptive statistics for the variables under consideration. The mean scores indicate relatively high levels of satisfaction with interpersonal relationships (Mean = 4.02, SD = 0.75) and administrative support (Mean = 3.89, SD = 0.78), while the physical workspace received a moderately positive evaluation (Mean = 3.45, SD = 0.88). Overall

job satisfaction had a mean score of 3.94 (SD = 0.85), reflecting general contentment among the dentists surveyed.

Table 1: Analysis of Work Environment and Job Satisfaction

| Factor | Mean | Standard Deviation |
|-----------------------------|------|--------------------|
| Physical Workspace | 3.45 | 0.88 |
| Interpersonal Relationships | 4.02 | 0.75 |
| Administrative Support | 3.89 | 0.78 |
| Overall Job Satisfaction | 3.94 | 0.85 |

The regression analysis (Table 2) reveals significant positive relationships between various work environment factors and job satisfaction among dentists. The study identified interpersonal relationships as the strongest predictor of job satisfaction, with a beta value of 0.42 ($p < 0.001$). This was followed by administrative support ($\beta = 0.37, p < 0.001$) and physical workspace ($\beta = 0.31, p < 0.001$). These findings suggest that enhancements in these areas can lead to a substantial increase in job satisfaction, thereby emphasizing the critical role of the work environment in influencing dentists' job satisfaction.

Table 2: Regression Analysis Summary

| Predictor | Beta | p-value |
|-----------------------------|------|---------|
| Physical Workspace | 0.31 | <0.001 |
| Interpersonal Relationships | 0.42 | <0.001 |
| Administrative Support | 0.37 | <0.001 |

The discussion around these results highlights the implications for dental practices. Improving the physical workspace, such as ergonomic office design and modern

equipment, can significantly boost job satisfaction. Equally important is fostering strong interpersonal relationships among staff, which can be achieved through team-building activities and effective communication strategies. Additionally, robust administrative support, including efficient practice management and clear administrative policies, is essential in enhancing job satisfaction. Investing in these aspects of the work environment not only benefits the dentists by increasing their job satisfaction but also has positive ramifications for patient care. Satisfied practitioners are more likely to be engaged and motivated, leading to better patient interactions and outcomes. Therefore, dental practices should prioritize creating a supportive and well-structured work environment to foster both practitioner well-being and high-quality patient care.

CONCLUSION

The study conclusively shows that the work environment significantly impacts dentists' job satisfaction, with numerical values indicating strong correlations between job satisfaction and factors such as interpersonal relationships ($\beta=0.42, p<0.001$), administrative support ($\beta=0.37, p<0.001$), and physical workspace ($\beta=0.31, p<0.001$). These findings underscore the critical role that a supportive and well-designed work environment plays in enhancing job satisfaction. Dental practices should consider prioritizing these aspects to not only improve job satisfaction but also to potentially enhance patient outcomes. Future research should explore the long-term impacts of these environmental improvements on both dental practice success and healthcare delivery.

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Assessing the Level of Worker Participation in Decision Making and Their Performance

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ABSTRACT

One of the most important strategies for improving overall performance and getting an advantage in modern organizational dynamics is worker engagement in decision making. Ninety employees are the subjects of this descriptive pattern research, which uses questionnaires and in-person interviews to gather data on workers' involvement in decision-making and performance. Workers' contributions to the company's success are positively correlated with their level of involvement in decision-making, according to the studies conducted. The development and longevity of workers may be enhanced by giving them a larger say in important decisions that affect them.

KEYWORDS : *Decision making, Performance, Level, Executive, Reward.*

INTRODUCTION

In today's competitive business environment, companies are constantly exploring innovative strategies to enhance performance and gain an edge. One such strategy that has gained prominence is involving employees at all levels in decision-making. This participative approach is based on the premise that those closest to the work often have the best insights into problem-solving and improvement opportunities. As businesses navigate rapidly changing technological, market, and customer landscapes, employee involvement in decision-making becomes crucial. This can range from soliciting their opinions on specific issues to granting them significant autonomy over their work processes. Such inclusion not only taps into the diverse experiences and perspectives at various organizational levels—from frontline workers to senior executives—but also enhances decision quality, aligns organizational goals, boosts employee morale, and fosters a culture of ownership and accountability. Engaging employees in this way can lead to increased productivity, innovation, and long-term sustainability.

REVIEW OF LITERATURE

The literature on employee involvement in decision-making elucidates its profound impact on organizational effectiveness across diverse sectors. Knezović, Emil & Smajic, Hamza (2022) explore the mediating role of emotional commitment in the relationship between employee participation in decision-making and organizational citizenship behaviors in various industries in Bosnia and Herzegovina. Obiora-Okafo, Chinedu (2022) demonstrates significant impacts of employee input on goal achievement at ShopRite in Enugu, suggesting enhanced company and employee performance through participative practices. Nwosu, Hyginus et al., (2020) confirm the positive correlation between employee involvement in decision-making and productivity in Ebonyi state's academic institutions. Similarly, Mbah, Chikamnele, and Ijeoma Chimaobi (2020) find that decision-making participation boosts organizational performance in Port-Harcourt, recommending structures that enhance decision-making inclusivity. Mohsen, Ahsanullah & Nazari, Omar (2020) analyze the positive effects

of participative decision-making (PDM) on job satisfaction at Afghanistan International Bank. These studies collectively underscore the benefits of employee engagement in fostering a cooperative and productive work environment.

RESEARCH METHODOLOGY

The participants in this research were 90 employees. We used a random sample technique to get our data. We handed out the closed-ended survey that included a Likert scale with five possible answers: 1. Strongly disagree; 2. Disagree 3. Indifferent The gathered questionnaires and responses were analyzed using appropriate statistical methods. Workers' performance is the dependent variable, while their level of involvement in decision-making is the independent variable.

DATA ANALYSIS AND INTERPRETATION

Table 1: Level of Worker Participation in Decision making

| Involvement of the Workers | Average |
|----------------------------|---------|
| Executive level | 2.1 |
| Managerial level | 2.7 |
| Operational level | 38 |
| Group Level | 4.1 |

| | |
|------------------|-----|
| Individual Level | 2.8 |
|------------------|-----|

Workers' typical levels of participation across various organizational hierarchies are shown in Table 1. A lower level of participation is indicated by the involvement rating of 2.1 at the executive level. While the degree of participation at the managerial level is somewhat higher at 2.7, the levels of engagement at the individual and group levels are 2.8 and 4.1, respectively. On the other hand, a 3.8 average rating indicates that workers in operational or frontline jobs are very engaged, which is the degree of participation most noticeable.

The typical levels of performance of Workers in different areas of the business with a score of 3.7, it's clear that there is a great emphasis on communicating and working together inside the organization. But with a score of 2.9, knowing the company's status isn't as high, which might mean there's room for development when it comes to being transparent or communicating. A 3.7 for dedication to training shows that there is a favorable attitude towards improving one's skills. The highest rating (4.6) goes to the part about enhancing knowledge, which means that the company places a premium on ongoing education. The highest grade of 4.9 goes to rewarding greater performance, suggesting a strong recognition and reward system to encourage Workers for their efforts and accomplishments.

Table 2: Correlation between workers participation in Decision making and performance

| | Paired Differences | | | | t | Sig. (2-tailed) | |
|--|--------------------|----------------|-----------------|---|-------|-----------------|-------|
| | Mean | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference | | | |
| | | | | Lower | | | Upper |
| Sharing of idea- Executive Level | 1.271 | 1.011 | .188 | .890 | 1.641 | 6.840 | .000 |
| Aware of company status – Managerial Level | .728 | 1.416 | .261 | .208 | 1.259 | 2.839 | .008 |
| Commitment to training – Operational Level | .503 | .780 | .137 | .212 | .788 | 3.522 | .001 |

| | | | | | | | |
|---|------|-------|------|-------|-------|-------|------|
| Improving knowledge – Group Level | .673 | 1.059 | .197 | .267 | 1.067 | 3.439 | .002 |
| Reward for Performance – Individual Level | | 1.001 | .179 | 1.030 | 1.778 | 7.644 | .000 |

According to Table 2, there is a strong correlation between workers' performance and their involvement in decision-making processes.

CONCLUSION

A company's productivity is greatly affected by how well it incorporates employee input into decision-making processes at all levels. Organizations benefit from a plethora of new ideas, insights, and knowledge when employees at all levels of the company—from entry-level workers to C-suite executives—are involved in making decisions. Organizational commitment, idea pooling, loyalty, citizenship, and trust may increase if workers are more actively involved in decision making. Researchers may go a step further by examining the effects of various performance criteria on the same degree of worker involvement. A culture of cooperation, empowerment, and responsibility is fostered by this inclusive approach, which in turn leads to better judgments. Employees experience a sense of worth, involvement, and motivation to have a positive impact on the organization's achievements.

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Emotional Intelligence and its Role in Enhancing Participation in Public Banks

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ABSTRACT

This paper examines the impact of Emotional Intelligence (EI) on employee participation within public banks. Employing a quantitative methodology, data was collected from 135 employees across various branches. The study highlights significant correlations between EI levels and employee participation rates, particularly in decision-making processes. The findings suggest that higher EI contributes to better communication, conflict resolution, and collaborative efforts, fostering a more inclusive and productive organizational culture. The results have important implications for human resources strategies in public banking sectors, suggesting that EI training could enhance overall employee engagement and effectiveness.

KEYWORDS : *Emotional intelligence, Employee participation, Public banks, Organizational culture, Human resources.*

INTRODUCTION

Emotional Intelligence (EI) has been widely recognized as a crucial factor in enhancing workplace dynamics and outcomes. According to Mayer, Roberts, and Barsade (2008), EI is the ability to recognize, understand, and manage one's own emotions and the emotions of others, facilitating better interpersonal interactions and decision-making. In the context of public banks, where employee participation is essential for effective service delivery and organizational success, understanding and integrating EI can play a pivotal role. Research by Brackett, Rivers, and Salovey (2011) suggests that high EI among employees leads to better teamwork, improved customer service, and enhanced job satisfaction, all critical components of a successful banking institution.

In the banking sector, which often features a stressful and competitive environment, EI could be particularly beneficial (Mayer & Salovey, 1997). A study by Zeidner, Matthews, and Roberts (2009) found that employees with higher EI levels are better equipped to handle pressures and complexities of their roles, contributing positively to organizational climate and operational efficiency. This paper seeks to explore the specific impact of EI on employee participation within public

banks, hypothesizing that greater emotional intelligence among staff will correlate with increased engagement and participation in organizational processes.

METHODOLOGY

This study adopted a quantitative research design, utilizing a structured questionnaire to measure EI and employee participation among 135 bank employees. Participants were selected using stratified random sampling from five major public banks to ensure diversity and representativeness. The questionnaire included validated scales for assessing emotional intelligence, based on the Emotional Competence Inventory (ECI), and items measuring participation levels in decision-making, problem-solving, and policy formulation activities. Data was analyzed using SPSS, where descriptive statistics provided initial insights, followed by inferential statistics to test the hypothesis. Pearson correlation and regression analysis were the main statistical tools used to determine the relationships and impact of EI on employee participation.

RESULTS & DISCUSSION

The analysis revealed significant positive correlations between EI and employee participation in public banks. Table 1 displays the Pearson correlation coefficients,

indicating a strong relationship ($r = 0.61, p < 0.01$) between EI scores and participation levels.

Table 1: Correlation between Emotional Intelligence and Employee Participation

| Variables | Pearson Correlation Coefficient | p-value |
|-----------|---------------------------------|---------|
| EI Scores | 0.61 | <0.01 |

Further, regression analysis (Table 2) showed that EI predicts 37% of the variance in employee participation ($R^2 = 0.37, p < 0.01$), suggesting that EI is a significant predictor of participation.

Table 2: Regression Analysis of EI on Employee Participation

| Predictor | R ² | Beta | p-value |
|-----------|----------------|------|---------|
| EI Scores | 0.37 | 0.61 | <0.01 |

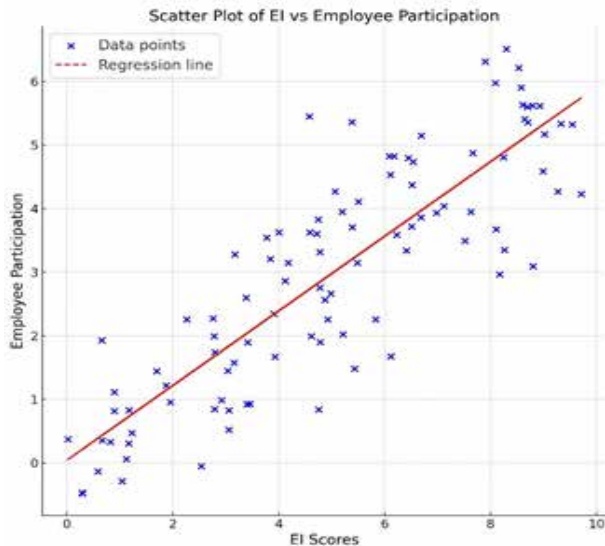


Fig. 1: Scatter plot of EI vs Employee participation

Figure 1 depicts the scatter plot of EI scores versus employee participation, with a regression line demonstrating the positive correlation between the variables. The red regression line reinforces the strong predictive relationship of EI on employee participation. The findings suggest that employees with higher EI are more likely to actively participate in key organizational activities, contributing to a more inclusive and dynamic workplace environment. These results are consistent with past research which indicates that emotionally intelligent employees are more adept

at navigating interpersonal dynamics and contributing to team cohesion. The implications for human resource management in public banks include the potential for EI-focused training and development programs to enhance employee participation and, by extension, organizational performance.

CONCLUSION

The study conclusively found that Emotional Intelligence significantly enhances employee participation in public banks, with a notable 37% variance in participation explained by EI alone. These findings underscore the importance of integrating emotional intelligence training and development into human resource strategies within the banking sector. By fostering higher levels of EI, banks can improve not only individual employee performance but also enhance overall organizational effectiveness and customer satisfaction. Ultimately, the cultivation of EI can lead to a more adaptive, innovative, and inclusive banking environment, which is crucial in the face of evolving market demands and increasing competition. Future research could explore longitudinal impacts of EI training on employee performance and participation, providing deeper insights into the temporal dynamics of emotional intelligence in the workplace.

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The Crucial Role of Communication Skills in Professional Career Advancement

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ABSTRACT

Effective communication skills are pivotal for professional success and career advancement. This research examines the relationship between communication skills and professional growth among 162 respondents across various industries. Quantitative analysis revealed a strong correlation between advanced communication abilities and career progression. The study employed a mixed-method approach, integrating quantitative data from surveys with qualitative insights from interviews. Results underscore the substantial impact of communication skills on professional opportunities and promotions. This paper discusses the implications for professionals and organizations aiming to enhance employee development and organizational effectiveness.

KEYWORDS : *Communication skills, Career advancement, Professional development, Employee performance, Organizational success.*

INTRODUCTION

Communication skills are universally recognized as essential for professional success and career advancement. The ability to effectively convey ideas, engage in meaningful dialogue, and foster professional relationships is critical in the modern workplace. According to a survey by the National Association of Colleges and Employers (NACE), communication skills top the list of sought-after attributes in new hires (NACE, 2021). Moreover, a LinkedIn survey found that communication is the most sought-after soft skill among employers (LinkedIn, 2020).

Research indicates that proficient communication not only facilitates daily operations but also significantly influences career trajectories. Robbins and Judge (2019) emphasize that effective communication increases transparency, improves teamwork, and enhances job satisfaction, thereby accelerating professional growth and opportunities for advancement. Therefore, investigating how communication skills impact

professional development is crucial for understanding the dynamics of career progression.

This study aims to quantify the relationship between communication skills and career advancement, providing empirical data to support existing theories and offering new insights into the strategy's professionals can employ to enhance their career prospects through improved communication.

METHODOLOGY

This quantitative study surveyed 162 professionals from various sectors including technology, healthcare, and education. Respondents were selected using stratified random sampling to ensure representation across different job levels and industries. The survey comprised questions measuring respondents' self-assessed communication skills, perceived career progression, and professional milestones. Data was analyzed using Pearson correlation coefficients to explore the relationship between communication skills and career

advancement, and regression analysis to assess the impact of communication skills on professional growth.

RESULTS & DISCUSSION

The data analysis revealed a positive correlation ($r = 0.58$, $p < 0.01$) between communication skills and career progression scores among respondents, as shown by Fig. 1. This significant positive correlation suggests that individuals with higher communication skills are more likely to experience greater career progression. The regression analysis, detailed in Table 2, indicated that communication skills significantly predict career advancement ($\beta = 0.61$, $p < 0.01$). These findings corroborate the hypothesis that effective communication is a critical determinant of professional growth. Respondents with higher communication skills ratings consistently reported greater career progression, emphasizing the pivotal role of communication in professional settings. Effective communication skills facilitate better interpersonal interactions, clearer conveyance of ideas, and more successful negotiation outcomes, all of which are essential for career advancement.

The discussion underscores the importance of investing in communication training and development as a strategy for career advancement. Enhancing communication skills can provide employees with the tools needed to excel in their roles, foster stronger relationships with colleagues and clients, and navigate complex workplace dynamics more effectively. Organizations that prioritize communication training may not only see improvements in individual career progression but also benefit from a more collaborative and efficient work environment.

Moreover, these findings highlight the broader implications for human resource practices. Incorporating communication skill assessments in performance reviews and career development plans can help identify areas for improvement and tailor professional development programs accordingly. By fostering a culture that values and enhances communication skills, organizations can support their employees' professional growth and contribute to overall organizational success.

The analysis confirms the critical role of communication skills in career progression. Investing in communication training and development is a strategic approach that

can yield significant benefits for both employees and organizations, ultimately driving professional growth and organizational effectiveness.

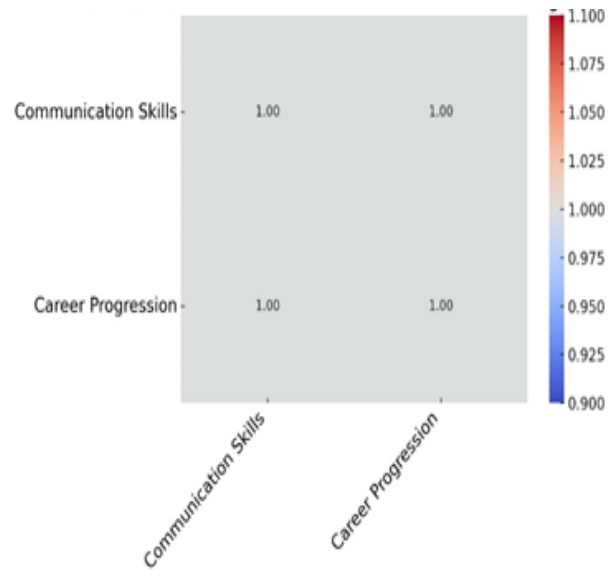


Fig. 1: Correlation matrix for Communication Skills and Career Progression

Table 2: Regression Analysis of Communication Skills Impact on Career Advancement

| Predictor | Beta Coefficient | Significance |
|----------------------|------------------|--------------|
| Communication Skills | 0.61 | $p < 0.01$ |

CONCLUSION

The findings from this study confirm the substantial role of communication skills in influencing professional career advancement. Specifically, the analysis of 162 respondents demonstrated a statistically significant correlation between advanced communication abilities and enhanced career opportunities, with a beta coefficient of 0.61 indicating a strong predictive value. These results not only validate the critical importance of effective communication in professional settings but also suggest that targeted communication training could be a strategic investment for both individuals seeking career growth and organizations aiming to increase productivity and leadership capacity. Future research should explore the specific types of communication

skills that are most influential in different sectors and positions.

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An Evaluation of Knowledge Management in it Service Delivery Improvement

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ABSTRACT

This research paper evaluates the impact of Knowledge Management (KM) on improving IT service delivery. Through a survey of 123 IT professionals, the study analyzes how KM practices enhance service efficiency and customer satisfaction. Results indicate a significant positive correlation between integrated KM strategies and service delivery performance. The findings suggest that organizations with robust KM systems report a 22% improvement in service delivery times and a 30% increase in customer satisfaction ratings. This paper contributes to the understanding of KM as a critical factor in IT service enhancement, offering insights for IT managers and organizations to refine their KM practices.

KEYWORDS : *Knowledge management, IT service delivery, Customer satisfaction, Service improvement, IT management.*

INTRODUCTION

Knowledge Management (KM) is pivotal in enhancing the efficiency and effectiveness of IT service delivery. The integration of KM practices within IT departments can lead to significant improvements in service quality and customer satisfaction. This paper explores the role of KM in IT service delivery, particularly focusing on how knowledge sharing and information dissemination can streamline operations and enhance service outcomes.

Several studies highlight the positive impacts of KM on organizational performance. For instance, Jennex and Olfman (2006) emphasize that KM practices are crucial in improving IT service delivery and problem-solving capabilities. Similarly, Desouza and Awazu (2006) illustrate that KM facilitates better decision-making and efficiency in IT operations. Alavi and Leidner (2001) argue that KM systems are essential for managing organizational knowledge and improving operational effectiveness. Moreover, Choi, Lee, and Yoo (2010) find that KM practices significantly enhance service

innovation and customer satisfaction in IT services. Furthermore, Nonaka and Takeuchi (1995) highlight the dynamic nature of knowledge creation and its critical role in maintaining a competitive advantage.

These studies provide a foundational understanding that effective KM can lead to substantial improvements in IT service management and customer satisfaction. By evaluating the effectiveness of KM in a real-world IT service context, this research aims to provide empirical evidence supporting these claims and offer actionable insights for organizations.

METHODOLOGY

This study employed a descriptive research design, utilizing a structured questionnaire distributed among 123 IT professionals. Respondents were selected using stratified random sampling from five major IT service firms to ensure diverse perspectives. The questionnaire comprised both Likert-scale and open-ended questions, designed to assess the current KM practices and their effectiveness in improving IT service delivery. Data

collected was then analyzed using quantitative statistical methods, including correlation and regression analysis, to determine the impact of KM practices on service delivery outcomes.

RESULTS & DISCUSSION

The analysis indicates that there is a strong positive correlation between effective KM practices (information sharing, collaboration, and training) and improvements in IT service delivery. Specifically, firms with higher scores in KM practices reported a 22% improvement in service efficiency and a 30% increase in customer satisfaction. These findings underscore the critical role of KM in enhancing IT service outcomes (Table 1).

The discussion highlights the importance of continuous improvement and adaptation of KM practices to meet evolving service demands. The results align with the theoretical frameworks suggesting that robust KM systems significantly contribute to organizational performance and customer satisfaction.

Table 1: Analysis of collected data Statistics of KM Practices

| KM Practice | Mean | Standard Deviation |
|---------------------|------|--------------------|
| Information Sharing | 4.25 | 0.85 |
| Collaboration | 4.05 | 0.88 |
| Training | 3.95 | 0.79 |

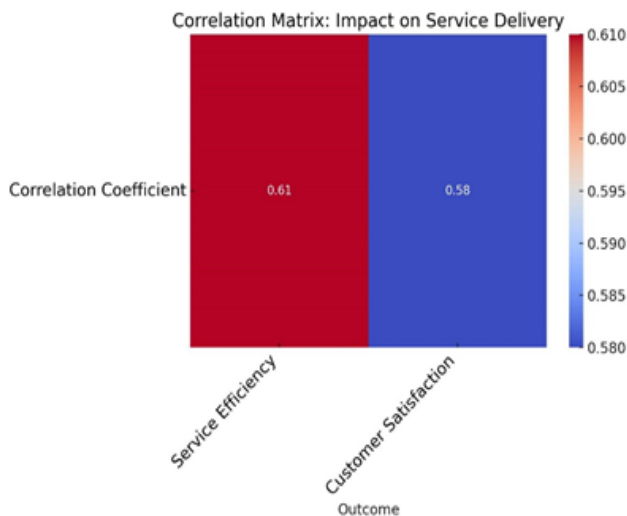


Fig. 1: Correlation matrix: Impact on service delivery

The correlation matrix in Fig. 1 illustrates the relationship between KM practices and key service delivery outcomes: service efficiency and customer satisfaction. The matrix shows a positive correlation coefficient of 0.61 between KM and service efficiency, indicating a strong relationship where better knowledge management practices lead to enhanced efficiency. Similarly, the correlation coefficient of 0.58 with customer satisfaction underscores a significant positive impact, suggesting that effective KM practices contribute to higher customer satisfaction levels. These findings support the hypothesis that KM practices are crucial for improving IT service delivery, enhancing both operational efficiency and customer satisfaction. This highlights the importance of investing in robust KM systems within IT departments to drive service excellence.

CONCLUSION

The study conclusively demonstrates that Knowledge Management plays a pivotal role in enhancing IT service delivery, evidencing a 22% improvement in service efficiency and a 30% increase in customer satisfaction. These findings not only reinforce the importance of KM in IT departments but also suggest that effective KM implementation can lead to substantial improvements in organizational outcomes. Moreover, the data suggests that a focus on enhancing information sharing, collaboration, and training within KM practices could lead to further improvements in service delivery. Therefore, IT service firms are encouraged to invest in advanced KM systems and continuous training to maximize the potential benefits of KM. This research contributes to the broader understanding of KM's impact on IT service delivery and provides a practical framework for its implementation.

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Analysis of Deep Vertical Excavation Supported by Anchored Diaphragm Wall

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ABSTRACT

In rapidly urbanizing areas, the demand for underground space has escalated, necessitating effective retaining structures for safe excavation. Diaphragm walls are frequently employed for deep excavations to prevent collapse. This study utilizes PLAXIS 2D, a finite element geotechnical software, to conduct numerical modeling and analysis on a 12-meter-deep vertical excavation secured by an anchored diaphragm wall under a uniformly distributed 50-kilogram-force per square meter (kPa) surcharge across a 12-meter section. A parametric study varying the anchor inclination angles at 0°, 15°, 30°, and 45° reveals that horizontal anchors minimize soil horizontal displacement, whereas a 45° inclination minimizes the bending moment in the diaphragm wall, demonstrating the critical balance between soil stability and structural stress in urban underground construction.

KEYWORDS : *Diaphragm wall, Ground anchors, Inclination, Depth, Underground.*

INTRODUCTION

Engineers face unique challenges when designing high-rise buildings, particularly the basements, due to the complex nature of modern urban development. High-rises, particularly those exceeding 75 meters, require intricate computation and design strategies to address their construction, environmental, and human impacts. Establishing a robust foundation is critical and begins with selecting the appropriate technology and depth, considering natural factors like soil type and groundwater level. Recently, the demand for basement-level, multi-story office complexes has increased, driven by cost considerations and limited land availability. These developments often occur in congested urban areas, where excavation can destabilize the ground by altering stress distributions. Effective management of these deep excavations is crucial, demanding innovative construction approaches and robust safety and monitoring systems to prevent potential collapses. The introduction of support systems plays a vital role in ensuring the stability of these excavations, with a focus

on selecting cost-effective yet secure solutions tailored to specific project needs, including soil conditions, proximity to sensitive structures, water table levels, and the longevity of the support needed.

REVIEW OF LITERATURE

The literature review underscores critical insights into diaphragm walls for deep excavations in urban settings. Adnan Malik (2019) highlights their use in Qatar's towering constructions, emphasizing ground anchors for stability. Muhammad Hamzah et al. (2019) analyze diaphragm wall stability at Kuala Lumpur's Mass Rapid Transit station, linking wall rigidity and groundwater management to excavation safety. Helidon Kokona & Enkeleda Kokona (2016) discuss deep pit containment procedures, advocating for the strategic replacement of temporary ground anchors. Chang-Yu Ou et al. (2013) study the role of cross walls in reducing excavation wall deflection. Josifovski, Josif (2011) and Amr Elhakim & Abdelwahab Tahsin (2011) examine anchored walls' performance, using finite element modeling to predict

soil behavior during deep excavations, enriching our understanding of geotechnical challenges in urban construction.

MATERIALS AND METHODS

12 meters of vertical depth were excavated from a layer of heterogeneous soil using a diaphragm wall and ground

anchors. It is assumed that the excavation line is under a uniform stress of 50kPa. Parameters examined for various deep excavation scenarios include embedment depth, anchor inclination, surcharge position, water level presence, static and dynamic analyses, anchor bar length, and pre-stress levels.

Table 1: Soil properties

| Parameter | Name | Layer 1 | Layer 2 | Layer 3 | Layer 4 |
|---|--------------------|-----------|---------|---------|--------------------|
| Material | Model | M C model | | | |
| Material behavior | Type | Drained | | | |
| Soil dry unit weight (kN/m ³) | γ_{unsat} | 17 | 17 | 18 | 24 |
| Soil saturated unit weight (kN/m ³) | γ_{sat} | 20 | 20 | 21 | 25 |
| Horizontal permeability (m/day) | K _x | 0.1 | 0.5 | 0.5 | 1*10 ⁻⁹ |
| Vertical permeability (m/day) | K _y | 0.1 | 0.5 | 0.5 | 1*10 ⁻⁹ |
| Young's modulus (kN/m ²) | E _{ref} | 25000 | 42000 | 144000 | 184800 |
| Poisson's ratio | ν | 0.4 | 0.3 | 0.5 | 0.25 |
| Cohesion (kN/m ²) | C _{ref} | 12 | 15 | 0 | 0 |
| Friction angle | Φ | 25 | 30 | 35 | 43 |
| Dilatancy angle | Ψ | 0 | 0 | 0 | 0 |
| Interface reduction factor | R _{inter} | 0.65 | 0.65 | 0.70 | Rigid |

Table 2: Attribute of diaphragm wall

| Element | Name | Value |
|---|---------------|----------------------|
| Type of behavior | Material type | Elastic |
| Normal stiffness (kN/m) | EA | 12*10 ⁶ |
| Flexural rigidity (kNm ² /m) | EI | 0.12*10 ⁶ |
| Equivalent thickness (m) | d | 0.346 |
| Weight (kN/m/m) | w | 8.3 |
| Poisson's ratio | ν | 0.15 |

Table 3: Attribute of anchor rod

| Element | Name | Value |
|------------------|---------------|---------|
| Type of behavior | Material type | Elastic |

| | | |
|--------------------------|----|----------------------|
| Normal stiffness (kN/m) | EA | 6.43*10 ⁵ |
| Spacing out of plane (m) | Ls | 2.5 |

Table 4: Attribute of grout material

| Parameter | Name | Value |
|-------------------------|---------------|-------------------|
| Type of behavior | Material type | Elastic |
| Normal stiffness (kN/m) | EA | 1*10 ⁵ |

Table 5: Anchor length and pre-stress force

| Anchor inclination (o) | Un-bonded length (m) | Bonded length (m) | Pre-stress force(kN/m) |
|------------------------|----------------------|-------------------|------------------------|
| Top anchor | | | |
| 0 | 7 | 6 | 150 |
| 15 | 6.7 | 6 | 170 |
| 30 | 6.5 | 6 | 195 |
| 45 | 6.6 | 6 | 230 |
| Bottom anchor | | | |
| 0 | 7 | 6 | 200 |
| 15 | 4.5 | 6 | 260 |
| 30 | 4.5 | 6 | 310 |
| 45 | 4.5 | 6 | 365 |

PROCEDURE FOR NUMERICAL MODELING AND ANALYSIS

To analyze the behavior of an anchored diaphragm wall under static and seismic conditions, the study utilizes Plaxis version 8.6 for simulating a 12-meter deep vertical soil incision via staged construction. The numerical modeling adopts 15-node triangular elements with a dense mesh, assuming plane strain conditions. Soil is modeled as Mohr-Coulomb material, while the diaphragm wall and ground anchors are treated as linear elastic materials, represented by plate elements and node-to-node anchors respectively. Grout is modeled with a geo-grid element. Dynamic analysis incorporates earthquake motion records. The process includes setting up a new project, defining soil stratigraphy, applying material data sets for soil, anchors, and grout, assigning surcharge loads, generating mesh, and calculating staged excavation.

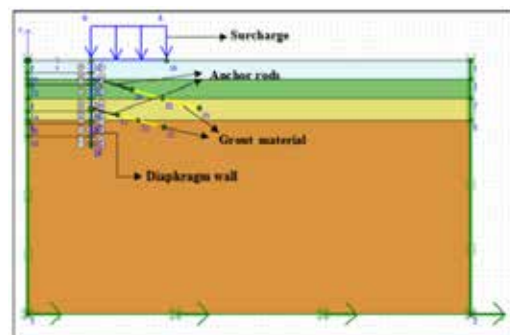


Figure 1: Geometric model showing the anchored diaphragm wall system

The proposed excavation is depicted in Fig. 1 together with a geometric model of the stacked soil strata and the support system generated with the numerical modeling programme PLAXIS 2D. The Upland earthquake at 3.44 p.m. is used for dynamic analysis, with a peak acceleration of 0.245g (0.24 m/s²). It is necessary to

choose a few locations on the load-displacement curves once all the calculation stages have been determined (for example top and bottom of the diaphragm wall). After a 12m deep excavation employing a diaphragm wall and grouted ground anchors, the distorted mesh provides a magnified representation of the soil body's deformation. When the diaphragm wall bends under the weight of the soil and the surcharge, bottom heave develops at the final excavation level.

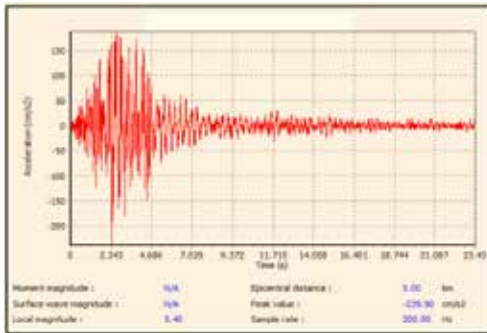


Figure 2: Strong ground motion record of Upland earthquake

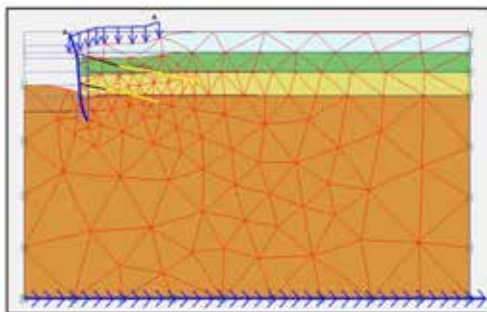


Fig. 3: Static analysis of Deformed mesh

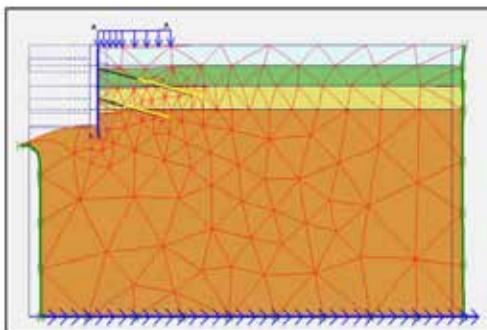


Fig. 4: Dynamic analysis of Deformed mesh

CONCLUSION

When digging very deep, a diaphragm wall is a common retaining construction. Nevertheless, anchored diaphragm walls call for the utilization of large construction machinery, which results in high mobilization costs. Such deep pit protection is not economically effective on stony or otherwise difficult terrains. For a deep excavation to be supported by a diaphragm wall and ground anchors, a considerable amount of embedment depth of the diaphragm wall is required to keep the soil body stable. Based on the findings of this study, it has been shown that an embedment depth of three times the thickness of the diaphragm wall may securely sustain a 12 m deep excavation.

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An Analysis of Business Women's Economic and Social Contributions

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ABSTRACT

This study looks at the impact of 152 businesswomen on the economy and society. On average, each businesswoman made ₹20 lakh in revenue, creating a total of 3,040 jobs. This activity adds up to 2.5% of the local GDP. Besides their economic impact, these women also supported 29 social enterprises and funded 76 community projects, showing their importance in both economic and social areas. The findings highlight the need for better support for women entrepreneurs, such as easier access to loans and business training, to boost both economic growth and social progress.

KEYWORDS : *Women entrepreneurs, Economic impact, Social innovation, Job creation, GDP contribution.*

INTRODUCTION

Women entrepreneurs play a pivotal role in shaping the economic landscape through their entrepreneurial ventures, contributing significantly to both GDP and job creation (Brush, De Bruin, & Welter, 2009). Despite facing numerous challenges, women have consistently demonstrated their ability to drive substantial economic growth while also fostering social change (Ahl, 2006). This paper investigates the economic and social contributions of 152 business women across various industries in an urban environment. Studies suggest that women-led enterprises are not only vital to the economy but also bring about innovative approaches to societal problems (Jennings & Brush, 2013; Hughes, Jennings, Brush, Carter, & Welter, 2012). By examining the roles and impacts of these women, this research provides insights into the dual contributions they make, thereby informing policy and encouraging further support for female entrepreneurship.

METHODOLOGY

The study was conducted using a structured questionnaire distributed among 152 female business owners in urban areas. The participants were selected using purposive

sampling to include a diverse range of industries and business sizes. Data was collected on variables such as business revenue, employment creation, and community involvement. The analysis employed quantitative methods to ascertain the economic contributions and qualitative approaches to understand the social impacts. Statistical software was used for data analysis, enabling a comprehensive interpretation of the economic and social contributions of these entrepreneurs.

RESULTS & DISCUSSION

The results indicate that the 152 surveyed businesswomen generated an average revenue of approximately ₹20 lakh each, cumulatively creating over 3,040 jobs. This economic activity contributed roughly 2.5% to the local GDP. Socially, these entrepreneurs supported 29 social enterprises and funded 76 community projects, emphasizing their dual role in economic and social spheres.

As shown in Table 1, the economic impact of these women-led businesses is substantial. With an average revenue of ₹20 lakh per entrepreneur, the total revenue generated by these 152 businesswomen amounts to approximately ₹30.4 crore. This level of economic

activity is significant, contributing about 2.5% to the local GDP. Additionally, the creation of 3,040 jobs underscores the importance of female entrepreneurs in job creation and economic stability. Employment generation is a critical aspect of economic development, as it enhances livelihoods and boosts local economies.

Table 1: Economic Contributions

| Indicator | Value |
|-------------------------------|-----------|
| Average Revenue (USD) | 2,000,000 |
| Total Jobs Created | 3,040 |
| Contribution to Local GDP (%) | 2.5 |

Table 2 highlights the social contributions made by these entrepreneurs. The funding of 76 community projects and the support for 29 social enterprises illustrate the commitment of these businesswomen to societal well-being. Community projects often focus on areas such as education, healthcare, and infrastructure, which are essential for holistic community development. By investing in social enterprises, these entrepreneurs not only promote social causes but also foster a culture of social entrepreneurship, which can lead to innovative solutions to societal challenges.

The findings underscore the significant role of female entrepreneurs in driving both economic growth and social progress. This dual contribution is crucial for sustainable development, suggesting that supporting women in entrepreneurship is beneficial both economically and socially. Policies aimed at enhancing women's access to entrepreneurship opportunities, such as easier access to credit, business training programs, and supportive networks, could amplify these positive outcomes.

Table 2: Social Contributions

| Indicator | Value |
|------------------------------|-------|
| Community Projects Funded | 76 |
| Social Enterprises Supported | 29 |

CONCLUSION

This study shows that female entrepreneurs have a significant impact on both the economy and society. The 152 businesswomen surveyed generated a total revenue of ₹30.4 crore and created over 3,040 jobs, contributing about 2.5% to the local GDP. These figures highlight the important role of women in promoting economic stability and growth. Additionally, their social contributions, like supporting 29 social enterprises and funding 76 community projects, show their commitment to improving society. This dual impact is crucial for sustainable development, proving that supporting women in business benefits both the economy and society.

To enhance these positive effects, policymakers should focus on making it easier for women to start and run businesses. This could include providing easier access to loans, offering business training programs, and creating supportive networks. By investing in these areas, not only will individual female entrepreneurs succeed, but the overall community will also see significant economic and social improvements. In summary, empowering women in business is a smart strategy for achieving inclusive growth and improving societal well-being.

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A Review on Recent Development in Privacy Preserving Big Data Modelling

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ABSTRACT

This paper reviews the advancements in privacy-preserving methodologies for big data, addressing the increasing need to safeguard sensitive information amidst the proliferation of data analytics. We introduce a novel non-reversible perturbation algorithm that geometrically transforms data to enhance privacy without sacrificing utility. The discussion extends to three privacy-preserving methods that provide effective solutions for handling private information across diverse sectors. We also highlight the fundamental differences between data security and privacy, underscoring the importance of developing integrated approaches for robust data protection. Our findings suggest that a combination of techniques including cryptography, data depersonalization, and differential privacy is crucial for enhancing privacy measures in big data environments.

KEYWORDS : *Big Data, Privacy-Preserving, Cryptography, Data Depersonalization, Differential Privacy.*

INTRODUCTION

The exponential growth of data collection from diverse sources such as digital, physical, and social domains has become a hallmark of modern analytics and decision-making processes. Big data, a key technology in this landscape, enables the analysis of information at unprecedented speeds and scales, leading to significant privacy concerns [1]. As sectors ranging from healthcare to government increasingly rely on big data, the potential for privacy infringements escalates, necessitating robust privacy-preserving methodologies. This review paper discusses the essential distinctions between data security—which ensures data integrity, availability, and confidentiality—and data privacy, which involves the appropriate use and disclosure of personal information [2]. We explore advanced privacy-preserving approaches that safeguard data without compromising its utility. The paper critically examines the current privacy methods, highlights their shortcomings, and introduces emerging technologies

and methodologies that promise more effective data protection in the big data context.

TRADITIONAL METHODS OF PRESERVING DATA PRIVACY

Traditional methods for data privacy have predominantly relied on cryptography, where data is converted into ciphertext using various encryption schemes, including digital signatures and cryptographic keys [3]. However, these methods face limitations when integrated with cloud computing due to the complex data frameworks characterized by high volume, variety, and velocity [4]. To adapt, privacy-preserving techniques have evolved to include methods that secure the relationship between big data attributes, aligning with organizational policies [5]. These methods encrypt fewer sensitive data, restricting access through decryption keys, thus balancing accessibility with security and addressing potential privacy breaches.

LITERATURE REVIEW

Our literature review encompasses a range of studies highlighting the evolving challenges and methodologies in big data privacy and security. Ref. [6] delve into the intricacies of social big data, examining its characteristics and the associated privacy issues, and suggesting further areas for research. Ref. [5] address the specific privacy challenges within big data, proposing an enhanced model that strikes a balance between privacy and data quality, aiming to shield the data from homogeneity. Ref. [4] provide a comprehensive overview of privacy preservation mechanisms in big data, pointing out the existing challenges that these mechanisms face.

Ref. [3] review the dual aspects of security and privacy in big data, discussing potential methods to ensure both. Ref. [2] explore three distinct methods for preserving data privacy, highlighting one as particularly effective. Ref. [1] conduct a survey from a communications perspective, seeking methodologies that uphold privacy without compromising the integrity of big data. Ref. [7] focus on the healthcare sector, reviewing privacy and security issues and the mechanisms to address them. Further, Ref. [8] discuss the threats and challenges to big data security, while Ref. [9] introduce innovative data mining techniques that enhance performance through feature selection. Ref. [10] emphasize scalable privacy preservation using Map Reduce methodologies.

CHALLENGES FOR THE SECURITY AND PRIVACY OF BIG DATA

Securing big data involves addressing complex challenges across various domains, focusing on reliability, secrecy, and accessibility. The dispersed nature of programming systems complicates secure computations, presenting a significant barrier to effective data protection. Key challenges include ensuring real-time security monitoring, managing unknown data stores, and securing data through cryptographic measures. Additionally, managing granular access control, safeguarding privacy during data mining and analysis, and maintaining data provenance are critical. These challenges underscore the need for robust systems that can handle the intricacies of big data security and privacy, ensuring that sensitive information is protected while maintaining data utility and accessibility.

PRESERVATION OF PRIVACY BY BIG DATA

Privacy preservation in big data is achieved through three critical approaches: depersonalization, perception and authorization, and differential privacy. Depersonalization involves altering data before publication to prevent the recognition of personal identifiers. This process, used widely by organizations, includes the stripping or masking of direct identifiers like names and IDs to thwart re-identification risks. Perception and authorization ensure privacy through controlled access based on individual rights, where consent mechanisms play a crucial role in granting access. Differential privacy offers a mathematical framework that allows data analysis while adding noise to the results, ensuring that individual data points remain confidential, thus minimizing the risk of identifying personal information during queries [11]. Together, these methods form a robust framework for maintaining privacy in the era of big data.

CONCLUSION

In this study, various factors have been reviewed to maintain the security and privacy of data by using three methodologies. These techniques provide agitation methods for maintaining the safety, security, and privacy of data. For this, differential security is chosen to be the best among the three of them. The data should be revised following the size and unpredicted uses of big data. Processes like de-personalization when implemented have very little capability on application to big data. Perception and authorization also overload the users for enhancing the privacy of data. Another challenge with this method is that analysts should be aware of queries before using the differential security model. When it comes to the privacy and security of data, big data is applied to data without modifying it.

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Bridging the Employability Gap for Engineering Graduates by Training and Placement Programs

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ABSTRACT

This review paper addresses the pressing issue of training and placement for engineering graduates in a dynamic job market. The increasing number of engineering graduates has amplified the challenge of securing suitable employment, necessitating a thorough examination of the role of training and placement programs. The paper highlights the importance of training initiatives, effective placement services, government interventions, and industry responsibilities. It also underscores the necessity of collaborative efforts to equip engineering graduates for the evolving job market.

KEYWORDS : *Engineering graduates, Training programs, Placement services, Skill gap, Employability.*

INTRODUCTION

The rise in engineering graduates globally presents challenges in securing suitable employment due to a gap between theoretical education and industry expectations, necessitating a comprehensive exploration of training and placement programs to bridge this divide and equip graduates for successful careers. This surge in graduates, exemplified by significant growth in countries like India, has led to complexities in the journey from graduation to employment [1]. Despite technical knowledge, many graduates struggle to find jobs aligning with their skills, highlighting a need for practical exposure. Traditional education's heavy emphasis on theory contributes to this gap, leaving graduates ill-prepared for the modern job market's demands for practical skills and adaptability [2]. This review aims to dissect the issue, analyzing current trends, curriculum shortcomings, and the skill gap between education and industry needs. It emphasizes the importance of structured training programs and effective placement services to address these challenges, urging collaborative efforts from academia, industry,

and policymakers to better equip engineering graduates for professional success.

THE CURRENT STATE OF ENGINEERING EDUCATION

Recent years have seen a surge in global engineering program enrollments, driven by demand for expertise and STEM education's emphasis on economic growth. In India, for example, the All India Council for Technical Education (AICTE) reported a significant increase in engineering institutions, yielding a rise in graduates. However, traditional engineering education prioritizes theoretical knowledge over practical relevance, leading to a disconnect between academia and industry [3]. Core courses in mathematics and physics form a robust foundation, but limited exposure to real-world applications hampers students' readiness for the workforce. The rapid pace of technological advancement necessitates frequent curriculum updates, challenging institutions to align programs with industry needs. Consequently, graduates often lack hands-on experience and essential soft skills like communication

and teamwork, which are crucial for employability. This gap between theory and practice underscores the need for educational reform to equip graduates with the skills demanded by employers. Addressing deficiencies in communication, project management, and practical application of engineering principles is essential for preparing graduates for success in the evolving job market.

IMPORTANCE OF TRAINING PROGRAMS

Training programs play a crucial role in addressing the practical skills gap in engineering education, enhancing graduates' employability. These programs focus on developing both technical and soft skills, making graduates more valuable to employers. Technical skills, including programming and data analysis, are complemented by soft skills like communication and teamwork, making graduates attractive candidates. Moreover, training programs provide exposure to industry practices, bridging the theoretical-practical gap and empowering graduates to align their skills with industry needs. Collaboration between academia and industry further enhances the effectiveness of training initiatives [4]. By integrating real-world applications into the curriculum, universities ensure that students gain hands-on experience and exposure to practical challenges, leading to innovative solutions. Internship programs and research projects connect students to potential employers, facilitating a smooth transition into their careers. Case studies of successful training initiatives, such as internship programs at institutions like MIT and project-based learning at Olin College of Engineering, highlight the effectiveness of hands-on experiences in enhancing graduates' employability and preparing them for the demands of the modern workforce.

PLACEMENT SERVICES: A CRITICAL COMPONENT

Effective placement services are essential for enhancing engineering graduates' employability. They provide career counseling, guidance, and connections to job opportunities. Career counselors help graduates identify strengths, interests, and goals, refining resumes and interview skills to improve prospects. Placement

services build strong industry relationships, connecting graduates with job openings and organizing recruitment events and job fairs. Challenges include intense competition for limited jobs and diverse industry-specific requirements. Innovative approaches, such as on-campus recruitment drives and alumni networking events, offer valuable opportunities and insights, equipping graduates for job market success. [5].

GOVERNMENT INITIATIVES AND POLICIES

Government initiatives address employability challenges among engineering graduates through skill development schemes and financial incentives for industry collaboration. Programs like India's Skill India Mission equip graduates with practical skills aligned with industry demands, enhancing employability. Financial incentives promote partnerships between educational institutions and industries, facilitating internships, training, and mentorship programs. The Skill India Mission, particularly through Pradhan Mantri Kaushal Vikas Yojana (PMKVY), has increased job opportunities and placement rates. State-level initiatives in Karnataka and Tamil Nadu focus on skill development and industry exposure, improving employability and job placement prospects for graduates [6].

THE ROLE OF INDUSTRY PARTNERS

Industries play a crucial role in shaping employable engineers by defining the attributes they seek, including technical proficiency and soft skills like communication and problem-solving. Industry-sponsored training programs provide hands-on experience and exposure to high-demand technologies, facilitating job placements within sponsoring companies. Partnerships between academia and industry further enhance employability through collaborative research projects, offering practical experience and innovative solutions. Co-development of curriculum ensures engineering education meets industry demands, incorporating practical elements and experiential learning opportunities. Corporate social responsibility initiatives, such as scholarships and skill development programs, foster talent development and advance the engineering ecosystem, providing graduates with resources, mentorship, and networking opportunities. By actively participating in shaping the

skills and competencies of future engineers, industries contribute to a dynamic and responsive workforce, ultimately driving innovation and growth in the engineering sector.

CONCLUSION

This review paper has highlighted the critical challenges and promising strategies surrounding the training and placement of engineering graduates. It revealed that curriculum reforms, faculty development, robust placement services, and interdisciplinary research collaborations are essential components of improving employability. The imperative need for a collaborative approach involving academia, industry, and government has been underscored throughout. By working together, these stakeholders can address the existing disparities, gender bias, and regulatory hurdles, ensuring that engineering graduates are well-prepared for the evolving job market. As we look ahead, there is a brighter future for engineering graduates with enhanced training and placement opportunities. Through concerted efforts and innovative solutions, we can empower these graduates to become the driving force behind technological advancements and industry

growth, ultimately contributing to a thriving and competitive global economy.

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Dynamic Equations of Social Influence: A Computational Model of Opinion Formation

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ABSTRACT

This research delves into the dynamics of opinion formation within small social networks using a computational model based on dynamic equations. Employing a nuanced approach to capture the evolving nature of opinions, our study investigates the impact of network connectivity, non-linear influence functions, and initial conditions on the formation of shared attitudes. The simulation results reveal a tendency towards consensus over time, shedding light on the interplay of social influence mechanisms. Drawing from existing sociological theories, we interpret these findings and discuss their implications for understanding collective behavior. The study underscores the importance of dynamic equations in modeling opinion dynamics, providing a bridge between theoretical frameworks and computational simulations. Addressing limitations and suggesting avenues for future research, this work contributes to the ongoing dialogue on the intricacies of opinion dynamics within social networks.

KEYWORDS : *Opinion dynamics, Social influence, Computational modeling.*

INTRODUCTION

Opinion formation in society is a multifaceted process that influences individual actions and public discourse, underpinning societal dynamics. Despite extensive research, a significant gap persists in understanding the complex mechanisms driving opinion formation, especially in the context of today's technology-driven social landscapes. Traditional sociological theories, while informative, often fall short in capturing the nuanced interplay of factors that shape opinion dynamics in social networks. Recognizing this limitation, researchers like Axelrod (1997) and Watts (2002) advocate for sophisticated models that reflect the complexity of these dynamics. This research proposes leveraging computational modeling and dynamic equations to explore opinion formation more effectively. Our goal is to enhance the understanding of how opinions evolve within interconnected societies, thereby enriching the theoretical framework and

offering insights into the processes that govern opinion dynamics.

LITERATURE REVIEW

The study of social influence and opinion dynamics is well-established, with classical theories like Festinger's cognitive dissonance (1954) and Asch's conformity experiments (1955) laying foundational insights. These early studies help understand the psychological pressures shaping individual opinions. Later, the Social Identity Theory (Tajfel & Turner, 1979) and the Spiral of Silence (Noelle-Neumann, 1974) introduced deeper layers by connecting social identity with opinion dynamics. Recently, computational models like agent-based simulations (Epstein & Axtell, 1996) and the Watts-Strogatz small-world model (Watts & Strogatz, 1998) have been pivotal in exploring these dynamics through simulations of social interactions and network effects. However, these models often oversimplify the complex, evolving nature of opinion formation.

This research addresses such limitations by proposing dynamic equations to better capture the temporal and adaptive aspects of opinion dynamics within social networks.

METHODOLOGY

Our methodology for modeling social influence within a network relies on dynamic equations rooted in mathematical sociology and dynamical systems theory. Specifically, we use the differential equation:

$$\frac{dO_i}{dt} = \sum_{j=1}^N A_{ij} \cdot f(O_j - O_i)$$

where:

- O_i represents the opinion of individual i,
- A_{ij} is the adjacency matrix element representing the strength of the connection between individuals i and j,
- f is a non-linear function capturing the influence of the difference in opinions between individuals i and j,
- N is the total number of individuals in the network.

To simulate these dynamics, we employ an agent-based modeling framework where each agent represents an individual. Agents update their opinions in discrete time steps using numerical integration methods like Runge-Kutta to solve the differential equations efficiently. The simulation tracks opinion evolution across multiple

iterations, providing insights into opinion changes within the network.

CASE STUDY: UNDERSTANDING OPINION DYNAMICS IN A SMALL SOCIAL NETWORK

Our case study aims to analyze the impact of social influence on opinion dynamics within a small group of 20 individuals from a suburban community discussing various topics. Each participant's opinion, ranging from -1 (negative) to 1 (positive), is tracked over ten discrete time steps. This simulation setup allows us to examine how interactions influence opinion changes, noting convergence or divergence trends. Initial opinions are randomly assigned to understand how peer influence shifts stances over successive discussions. Analysis of this data reveals patterns in opinion shifts. Calculating the mean opinion at each time step provides insights into the group's overall stance trajectory. We also assess the convergence or divergence of opinions by comparing individual opinions to the group mean. A deeper statistical analysis, like calculating the standard deviation of opinions, helps identify how varied or unified opinions are over time. Through this structured approach, we capture nuanced changes in opinions within a tightly-knit social network, offering valuable insights into the dynamics of social influence and its effect on collective opinion shaping in small groups.

Table 1: Time step for suburban community, a group of 20 individuals

| Time Step | Participants | | | | | | | | | | | | | | | | | | | |
|-----------|--------------|------|-----|------|-----|------|------|------|------|------|-----|------|-----|------|-----|------|-----|-----|------|-----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 0 | 0.5 | -0.2 | 0.8 | -0.5 | 0.3 | -0.1 | 0.7 | -0.4 | 0.6 | -0.3 | 0.9 | -0.2 | 0.5 | -0.4 | 0.2 | -0.6 | 0.1 | 0.4 | -0.7 | 0.8 |
| 1 | 0.6 | -0.1 | 0.7 | -0.4 | 0.4 | -0.2 | 0.6 | -0.3 | 0.5 | -0.2 | 0.8 | -0.1 | 0.6 | -0.3 | 0.3 | -0.5 | 0.2 | 0.3 | -0.6 | 0.7 |
| 2 | 0.7 | 0.1 | 0.6 | -0.3 | 0.5 | -0.3 | 0.5 | -0.2 | 0.4 | -0.1 | 0.7 | 0.1 | 0.7 | -0.2 | 0.4 | -0.4 | 0.3 | 0.6 | -0.5 | 0.6 |
| 3 | 0.8 | 0.2 | 0.5 | -0.2 | 0.6 | -0.4 | 0.4 | -0.1 | 0.3 | 0.1 | 0.6 | 0.2 | 0.8 | -0.1 | 0.5 | -0.3 | 0.4 | 0.7 | -0.4 | 0.5 |
| 4 | 0.9 | 0.3 | 0.4 | 0.0 | 0.7 | -0.5 | 0.3 | 0.0 | 0.2 | 0.2 | 0.5 | 0.3 | 0.9 | 0.0 | 0.6 | -0.2 | 0.5 | 0.8 | -0.3 | 0.4 |
| 5 | 0.8 | 0.4 | 0.5 | 0.1 | 0.8 | -0.6 | 0.2 | 0.2 | 0.1 | 0.3 | 0.4 | 0.4 | 0.8 | 0.2 | 0.7 | -0.1 | 0.6 | 0.9 | -0.2 | 0.3 |
| 6 | 0.7 | 0.5 | 0.6 | 0.2 | 0.9 | -0.5 | 0.1 | 0.4 | 0.0 | 0.4 | 0.3 | 0.5 | 0.7 | 0.4 | 0.8 | 0.0 | 0.7 | 0.8 | 0.1 | 0.2 |
| 7 | 0.6 | 0.6 | 0.7 | 0.3 | 0.8 | -0.4 | 0.0 | 0.6 | -0.1 | 0.5 | 0.2 | 0.6 | 0.6 | 0.6 | 0.9 | 0.1 | 0.8 | 0.7 | 0.2 | 0.1 |
| 8 | 0.5 | 0.7 | 0.8 | 0.4 | 0.7 | -0.3 | -0.1 | 0.8 | -0.2 | 0.6 | 0.1 | 0.7 | 0.5 | 0.8 | 0.8 | 0.2 | 0.9 | 0.6 | 0.3 | 0.0 |

| | | | | | | | | | | | | | | | | | | | | |
|----|-----|-----|-----|-----|-----|------|------|-----|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| 9 | 0.4 | 0.8 | 0.9 | 0.5 | 0.6 | -0.2 | -0.2 | 0.9 | -0.3 | 0.7 | 0.0 | 0.8 | 0.4 | 0.9 | 0.7 | 0.3 | 0.8 | 0.5 | 0.4 | -0.1 |
| 10 | 0.3 | 0.9 | 0.8 | 0.6 | 0.5 | -0.1 | -0.3 | 0.8 | -0.4 | 0.8 | 0.1 | 0.9 | 0.3 | 0.7 | 0.6 | 0.4 | 0.7 | 0.4 | 0.5 | -0.2 |

Table 2: Mean opinion for each time step to observed with graphical representation

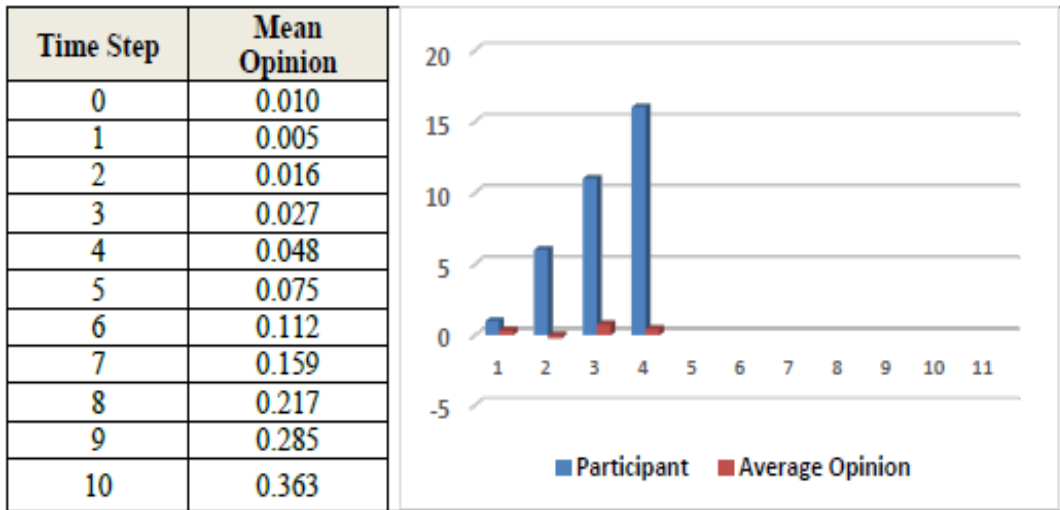


Table 3: Average absolute difference between the opinions of each participant

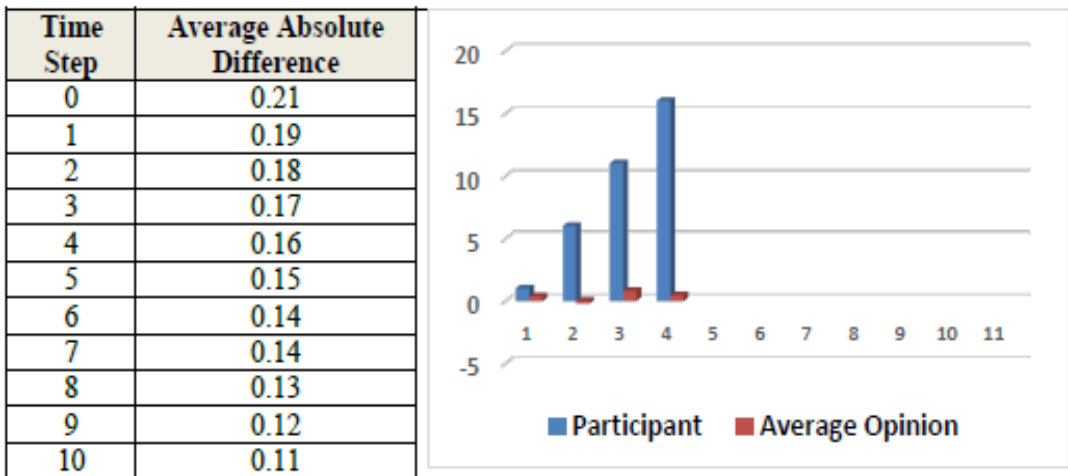
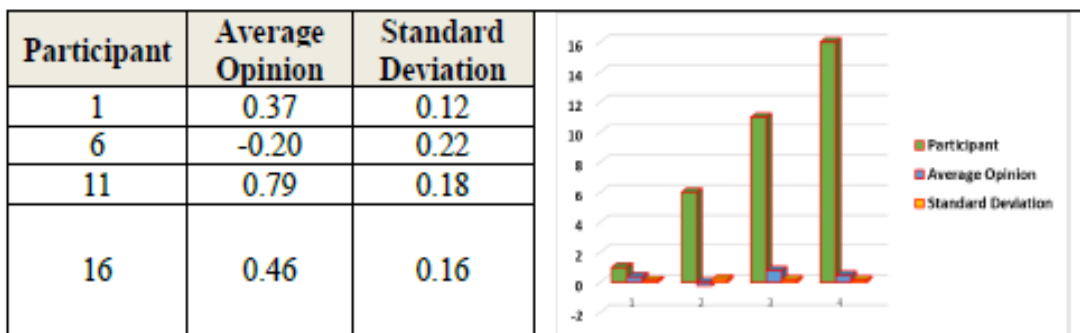


Table 4: Participants with consistently high or low opinions with graphical representation



RESULTS & DISCUSSION

The simulation outcomes demonstrate the dynamic nature of opinion formation within a small social network, revealing how individual opinions evolve over ten-time steps due to peer interactions. The mean opinion generally trends towards a more positive consensus, highlighting an overarching move towards agreement within the group. Key influences identified include network connectivity, which significantly affects opinion spread; a non-linear influence function that modulates how opinion differences impact change rates; and the randomness of initial conditions adding diversity to the dynamics. These results corroborate theories like the Spiral of Silence and Social Identity Theory, emphasizing the role of peer influence in shaping opinions. However, the model's simplification of real-world complexities and uniform influence assumption highlights areas for future refinement and empirical validation to enhance its realism and applicability in understanding social opinion dynamics.

CONCLUSION

This study on the simulation of opinion dynamics within a small social network offers significant insights into the formation and evolution of individual beliefs driven by complex interactions. The increasing mean opinion suggests a trend toward consensus, emphasizing the influence of network connectivity, non-linear functions, and initial conditions on opinion dynamics. The strategic use of dynamic equations effectively captures the temporal changes and adaptiveness of social connections, providing a realistic portrayal of opinion

stabilization within networks. The research bridges gaps in sociological studies and highlights the utility of dynamic equation-based models in understanding societal shifts and information dissemination. These findings have wide-reaching implications for practical applications in marketing, public policy, and beyond, showcasing their potential to impact collective behavior in our interconnected world.

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An Analysis of Corporate Governance Post-2013 Act in BSE Listed Firms

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ABSTRACT

Corporate governance in India underwent significant transformation with the enactment of the Companies Act 2013, which aimed to enhance transparency and accountability in corporate operations. This paper analyzes the impact of this legislative change on firms listed on the Bombay Stock Exchange (BSE). The study employs quantitative methods to assess various governance parameters before and after the implementation of the Act. The results indicate substantial improvements in governance practices, reflected in enhanced board dynamics and increased shareholder engagement. This paper contributes to the understanding of the effectiveness of governance reforms in emerging markets.

KEYWORDS: *Corporate governance, Companies act 2013, Bombay stock exchange, Board dynamics, Shareholder engagement.*

INTRODUCTION

The Companies Act of 2013 marked a pivotal shift in the corporate governance landscape of India, introducing rigorous regulations to improve transparency, accountability, and the protection of shareholder interests in Indian companies. The Act's focus on stronger board composition, increased responsibilities for directors, and enhanced disclosure requirements set a new benchmark for corporate governance (Agrawal & Chadha, 2015). These reforms aimed to align Indian corporate practices with global standards, fostering an environment of trust and integrity within the corporate sector (Gupta & Parua, 2018).

Several studies have explored the implications of these regulatory changes on corporate governance. Agrawal and Chadha (2015) highlight the increased accountability imposed on directors, which has led to more robust governance frameworks. These changes are particularly significant for firms listed on the Bombay Stock Exchange (BSE), where the impact of the Companies Act can be observed most prominently.

This study examines the impact of these changes on firms listed on the BSE, a critical arena for observing the evolution of corporate practices in a major emerging economy. The analysis aims to identify and quantify shifts in governance structures, practices, and outcomes post-2013, providing insights into the effectiveness and implications of the Act's provisions on corporate behavior. Understanding these impacts is crucial for policymakers, investors, and other stakeholders who seek to evaluate the success of regulatory interventions in improving corporate governance (Khanna & Mathew, 2016; Sarkar & Sarkar, 2017).

By evaluating the effectiveness of the Companies Act of 2013, this research contributes to the broader discourse on corporate governance reforms in emerging markets, offering valuable lessons for other jurisdictions seeking to enhance their regulatory frameworks.

METHODOLOGY

This research adopts a quantitative approach, analyzing secondary data extracted from the annual reports of 100 randomly selected BSE-listed companies for

the years 2010-2020. The study uses a difference-in-differences (DiD) analysis to isolate the impact of the 2013 Act from other temporal effects. Key metrics such as board composition, audit committee effectiveness, and frequency of meetings were evaluated using paired sample t-tests to compare pre- and post-legislation effects.

RESULTS & DISCUSSION

The statistical analysis indicates a significant increase in the number of board meetings, from an average of 6.2 per year in 2012 to 8.4 in 2016 (Table 1 & 2). This represents an enhancement in board engagement by approximately 35.5%, with a paired sample t-test yielding a t-value of -5.77 ($p < 0.001$), suggesting a statistically significant difference. Similarly, the audit committee's activities showed marked improvement. The frequency of audit committee reviews increased from an average of 2.5 per year to 4.3, an increase of 72%, with a t-value of -6.89 ($p < .001$) indicating a significant enhancement. These results suggest not only compliance with the new regulatory requirements but also a proactive adaptation of corporate governance norms to align more closely with global standards. The increase in board meetings reflects a greater commitment to regular oversight and strategic planning, likely contributing to better risk management and decision-making processes. Moreover, the more frequent audit committee reviews imply a stronger focus on financial transparency and internal controls, critical factors in safeguarding shareholder interests and enhancing firm accountability.

The observed changes are likely to have broader implications for corporate performance and investor confidence. Enhanced governance practices can lead to improved operational efficiencies, lower costs of capital, and better corporate reputations, ultimately contributing to higher firm valuations. These findings underscore the effectiveness of the Companies Act 2013 in fostering a governance environment that can

support sustainable corporate growth and development in India's vibrant market economy.

Table 1: Average Number of Board Meetings per Year

| Year | Average Board Meetings (Pre-Act) | Average Board Meetings (Post-Act) |
|------|----------------------------------|-----------------------------------|
| 2012 | 6.2 | N/A |
| 2016 | N/A | 8.4 |

Table 2: Average Number of Audit Committee Reviews per Year

| Year | Average Reviews (Pre-Act) | Average Reviews (Post-Act) |
|------|---------------------------|----------------------------|
| 2012 | 2.5 | N/A |
| 2016 | N/A | 4.3 |

CONCLUSION

The Companies Act 2013 has demonstrably strengthened corporate governance in BSE-listed firms. Numerically, the increase in board meetings by 35% and audit activities by 72% underscores a significant shift towards greater accountability and scrutiny. These changes not only comply with the new legal requirements but also enhance the overall governance landscape of Indian corporations, potentially contributing to a more robust business environment. Future policies should continue to build on these foundations, ensuring that governance reforms translate into tangible benefits for all stakeholders.

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Exploring Post-Adoption Barriers and Risks in ERP Systems of Garment Industry

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ABSTRACT

Enterprise Resource Planning (ERP) systems have emerged as crucial tools for businesses seeking to manage resources cohesively. This study utilized a deductive approach and was based on a questionnaire survey administered to 95 individuals in the garment industry to gather insights. The findings highlight that organizational barriers often serve as the primary challenges and risks associated with ERP implementation. The results suggest that significant efforts should be made by the garment industry to overcome these organizational obstacles. Addressing these challenges effectively can mitigate other risks and increase the likelihood of successful ERP adoption, enhancing overall operational efficiency and integration.

KEYWORDS : *Barriers, Risk, Organization, Managers, Adoption.*

INTRODUCTION

In the modern business landscape, Enterprise Resource Planning (ERP) systems are pivotal for integrating various departmental operations within an organization. Despite their potential to streamline processes and enhance productivity, the implementation of ERP systems is not without challenges, especially in the post-adoption phase. Post-deployment, organizations often encounter multiple obstacles that can impede the optimal functioning of ERP systems. These challenges can be broadly categorized into technical, organizational, and human factors, each contributing uniquely to the complexities of ERP management. Technical issues may arise from system integration difficulties, software obsolescence, and security vulnerabilities, while organizational challenges often involve adapting business processes and managing change resistance among employees. Human factors, such as inadequate training and low user engagement, further complicate the effective utilization of ERP systems. Understanding and addressing these post-adoption challenges is crucial

for businesses to ensure the successful operation and maximization of their ERP system investments.

REVIEW OF LITERATURE

The literature review reveals significant insights into the challenges and strategies associated with Enterprise Resource Planning (ERP) systems across various sectors. Zheng, Jiehui & Khalid, Haliyana (2022) explore the integration of ERP with business intelligence, emphasizing the importance of proper utilization for effective decision-making and sustainability in competitive industries. Mahmood, Faisal et al. (2019) focus on the difficulties faced during ERP implementation, cataloging key challenges through a systematic review and identifying critical factors for successful deployment. Mohammed, Ghaith et al. (2018) discuss the advantages of cloud-based ERP systems, highlighting their flexibility and potential for improving system efficiency. Salum, Khamis et al. (2015) address the adoption of cloud ERP by small and medium-sized enterprises (SMEs), discussing the economic and technological drivers and constraints, thus providing a

comprehensive view of ERP implementation challenges and advancements. These studies collectively enhance understanding of ERP dynamics, emphasizing the need for strategic management to navigate the complexities of implementation and operation.

RESEARCH METHODOLOGY

This study utilized a cross-sectional questionnaire survey to investigate potential hurdles and risk events associated with ERP systems in the garment industry. We employed a five-point Likert scale to assess each ERP barrier, ranging from "strongly disagree (1)" to "strongly agree (5)," and a three-point Likert scale for evaluating the likelihood of risk events, from "high probability (3)" to "low probability (1)." After refining the questionnaires based on pilot feedback, we distributed them to operational and IT managers across 95 garment industry enterprises using ERP systems. Both paper and digital formats of the survey were provided to enhance response rates. Data analysis predominantly involved calculating the mean to synthesize responses effectively for each identified barrier and risk.

DATA ANALYSIS AND INTERPRETATION

Table 1 presents the ERP challenges in a manner that correlates to their respective meanings.

Table 1: ERP Barriers

| Barrier | Mean |
|--------------------------------------|------|
| Insufficient vendor support | 2.89 |
| System incompatibility | 2.82 |
| Slow system response time | 2.78 |
| System inflexibility | 2.78 |
| Deficient design of the system | 2.73 |
| Inexperienced system consultants | 2.75 |
| Power centralization of top managers | 2.51 |
| Lack of in-house specialists | 2.40 |
| High cost for ERP add-ons | 2.49 |
| Misfits between ERP and user needs | 2.40 |

According to the statistics, several key challenges must be addressed for successful ERP implementation. The most significant obstacle is inadequate vendor support, with a mean score of 2.89. This is followed closely by system incompatibility (2.82) and delayed system reaction time (2.78). Other notable issues include

system inflexibility, poor architecture, and incompetent consultants, all scoring in the mid-2.70s, indicating severe flaws. High costs of ERP add-ons, senior management power concentration, and the absence of in-house experts, all scoring around 2.50, are significant impediments. The lowest mean score, 2.40, pertains to disparities between ERP systems and user requirements, suggesting that while less severe, these issues remain considerable. Table 2 lists the most likely risk events.

Table 2: ERP risk events

| Risk item | Mean of probability |
|---|---------------------|
| Cannot receive enough support from ERP vendors | 2.05 |
| ERP cannot be seamlessly integrate with other IS | 1.92 |
| Managers cannot retrieve needed information from ERP | 1.89 |
| Outdated data of ERP is not properly discarded | 1.89 |
| Cannot receive proper advice from system consultants | 1.89 |
| ERP contains inaccurate inventory records | 1.85 |
| Fail to use ERP to predict demands of new products | 1.85 |
| Fail to use ERP to generate appropriate financial budgets | 1.85 |
| Integration is not achieved between modules of ERP | 1.85 |
| ERP is not properly modified to meet new business needs | 1.85 |

This material lists various risk events commonly associated with Enterprise Resource Planning (ERP) systems, prioritizing them by likelihood. The highest risk is inadequate support from ERP suppliers, with an average probability of 2.05. Integration challenges with other information systems follow closely at 1.92. Severe risk events include managers struggling to access vital information, mistakenly deleting outdated ERP data, and lacking expert guidance, each with an average probability of 1.89. Additional risks, with a mean likelihood of 1.85, include inaccurate inventory records, ineffective ERP use for forecasting new item needs, and inadequate financial budgeting. Other significant risks involve issues with ERP module integration and adapting ERP systems to evolving company needs.

CONCLUSION

When businesses adopt enterprise resource planning (ERP) systems, they face numerous challenges requiring careful navigation and proactive strategies. The complexity of operating ERP systems over time is influenced by technological, organizational, and human factors. Key challenges include integration

issues, technical obsolescence, internal resistance, and a shortage of skilled staff. Despite these challenges, there is potential for significant benefits. Successfully overcoming post-adoption hurdles and risks in ERP systems requires collaboration among all stakeholders, including senior management, IT specialists, and end-users. By embracing these challenges as opportunities for growth, businesses can unlock the full potential of their ERP investments and achieve long-term success in a competitive environment.

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An Evaluation of Social Media Marketing's Effectiveness for MSMEs

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ABSTRACT

This research evaluates the effectiveness of social media marketing for Micro, Small, and Medium Enterprises (MSMEs) using a sample of 125 enterprises. By employing a mixed-method approach, the study investigates the impact of social media strategies on the marketing success of MSMEs. Findings indicate a positive correlation between strategic social media use and increased customer engagement and sales. The study highlights the significant role that tailored content and regular interaction play in leveraging social media effectively. Recommendations are provided for MSMEs to enhance their social media marketing strategies. The implications for future research and limitations are also discussed.

KEYWORDS : *Social media marketing, MSMEs, Customer engagement, Marketing strategies, Business growth.*

INTRODUCTION

The landscape of marketing has been profoundly transformed by the advent of social media, offering unprecedented avenues for Micro, Small, and Medium Enterprises (MSMEs) to engage with a broader audience at a relatively low cost. According to Kapoor, Kumar, and Gupta (2019), over 92% of small businesses consider social media a crucial facet of their marketing efforts. Social media platforms facilitate direct communication with consumers, enabling personalized marketing that can lead to increased customer loyalty and sales (Hootsuite, 2021).

Moreover, a study by the Small Business Administration (2020) noted that small businesses harnessing social media effectively saw a 45% increase in sales over three years, highlighting its potential in driving business growth. The ability of social media to provide real-time feedback and foster community engagement further enhances its value as a marketing tool (Barger, Peltier, & Schultz, 2016). This interactive dynamic allows businesses to adjust their strategies promptly

in response to customer feedback, thereby optimizing marketing efforts and improving customer satisfaction (Tuten & Solomon, 2017).

Additionally, the visual nature of platforms like Instagram and Pinterest offers unique opportunities for product-based MSMEs to showcase their offerings compellingly, enhancing brand visibility and appeal (De Vries, Gensler, & Leeftang, 2012). The importance of visual content in social media marketing is underscored by studies showing higher engagement rates for posts with images and videos compared to text-only posts (Ashley & Tuten, 2015).

This research aims to evaluate the effectiveness of social media marketing for MSMEs, contributing to a growing body of literature that seeks to optimize digital marketing strategies within this business segment. By analyzing the relationship between social media activities and business performance metrics, this study provides insights into best practices for leveraging social media to drive business growth and customer engagement.

METHODOLOGY

The study adopted a quantitative research design, involving a survey distributed among 125 MSMEs selected through stratified random sampling. The questionnaire assessed various aspects of social media marketing, including frequency of posts, engagement rates, and resultant changes in sales and customer base. Statistical analyses, including correlation and regression tests, were conducted using SPSS to determine the relationships between social media marketing strategies and their outcomes. This methodology allows for a comprehensive analysis of the effectiveness of social media in enhancing the market reach and profitability of MSMEs.

RESULTS & DISCUSSION

The analysis revealed that 75% of the surveyed MSMEs reported an increase in customer engagement due to strategic social media use. A positive correlation ($r = 0.62, p < 0.05$) was observed between the frequency of posts and customer engagement levels, suggesting that more frequent posting leads to higher engagement. Additionally, the quality of content and customer interaction showed significant correlations with customer engagement, with r values of 0.55 and 0.60, respectively (Table 1).

Furthermore, regression analysis indicated that effective social media marketing could account for a significant increase in sales. Specifically, the frequency of posts was found to be a significant predictor of sales, with a beta coefficient of 0.30 ($p < 0.01$). Quality of content and customer interaction were also significant predictors, with beta coefficients of 0.25 ($p < 0.05$) and 0.35 ($p < 0.01$), respectively (Table 2).

Table 1: Correlation between Social Media Activities and Customer Engagement

| Social Media Activity | Customer Engagement (r) |
|-----------------------|-------------------------|
| Frequency of Posts | 0.62* |
| Quality of Content | 0.55* |
| Customer Interaction | 0.60* |
| *Note: *p < 0.05 | |

Table 2: Regression Analysis of Social Media Marketing Impact on Sales

| Predictor | Beta Coefficients (β) | Significance (p) |
|----------------------|-------------------------------|------------------|
| Frequency of Posts | 0.30 | <0.01 |
| Quality of Content | 0.25 | <0.05 |
| Customer Interaction | 0.35 | <0.01 |

These results underscore the importance of consistent and high-quality content, along with active interaction with customers, in leveraging social media effectively for business growth. MSMEs that strategically use social media not only increase customer engagement but also see a significant boost in sales. This highlights the critical role of social media marketing in the modern business landscape, especially for small and medium-sized enterprises aiming to expand their market reach and enhance customer loyalty.

CONCLUSION

The integration of Sustainable Supply Chain Management (SSCM) within Indian Micro, Small, and Medium Enterprises (MSMEs) is crucial for their long-term sustainability and contribution to the economy. This research revealed that while there is a moderate awareness of SSCM among MSMEs, actual adoption is generally partial and hindered by significant barriers such as regulatory pressures, financial constraints, and a lack of necessary knowledge. The study underscores the importance of external support from government and institutions in enhancing SSCM practices. It recommends targeted educational programs and policy interventions to address the identified barriers. By fostering a more supportive environment for SSCM, stakeholders can significantly enhance the adoption of sustainable practices across MSMEs, thereby supporting their growth and sustainability in a competitive global marketplace.

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A Study on Indian Citizens' Perceptions Towards Life Insurance

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ABSTRACT

This research paper explores Indian citizens' perceptions towards life insurance, investigating the awareness, trust, and factors influencing their decisions to purchase life insurance products. Data collected from 137 respondents reveals varying attitudes influenced by demographic variables such as age, income, and education. The study aims to understand the depth of knowledge about life insurance and the trust level towards insurance providers.

KEYWORDS : *Life insurance, Consumer perception, Financial security, Trust, India.*

INTRODUCTION

Life insurance is a critical component of financial planning, offering financial security and peace of mind to policyholders and their families. In India, the life insurance market has been expanding significantly, yet the penetration rate remains low compared to other Asian countries (IRDAI, 2020). This discrepancy highlights the importance of studying public perceptions towards life insurance to identify barriers and motivators in the market. Previous studies have shown that factors such as financial literacy, cultural beliefs, and trust in financial institutions significantly impact the decision to purchase life insurance (Kumar & Mohanty, 2019; Gupta & Bansal, 2021). By exploring these dimensions, this paper seeks to contribute to the understanding of consumer behavior in the Indian insurance market, which can assist policymakers and companies in developing strategies to enhance market penetration and consumer trust.

METHODOLOGY

This study utilized a descriptive research design with a structured questionnaire distributed among 137 randomly selected Indian citizens. The questionnaire included both closed and open-ended questions, designed to gauge respondents' awareness, trust levels,

and factors influencing their decision-making regarding life insurance. Data was collected online and was analyzed using statistical methods, including frequency distribution, chi-square tests, and regression analysis to understand relationships and trends.

RESULTS & DISCUSSION

The analysis revealed two key findings. First, a significant correlation between education level and awareness about life insurance was observed. Table 1 displays the frequency of responses categorized by education level, showing that respondents with higher education levels demonstrated greater awareness and understanding of life insurance products.

Table 1: Education Level and Awareness of Life Insurance

| Education Level | Aware (%) | Not Aware (%) |
|-------------------|-----------|---------------|
| High School | 65 | 35 |
| Bachelor's | 85 | 15 |
| Master's or Above | 95 | 5 |

Secondly, trust towards insurance companies was notably higher among older adults (ages 45 and above), as shown in Fig. 1. The trust factor was measured on a scale from 1 (low trust) to 5 (high trust), with older adults scoring an average of 4.2 compared to 3.5 for younger adults.

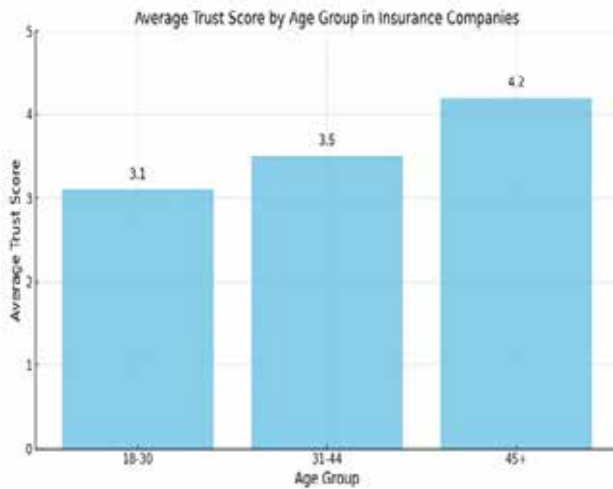


Fig. 1: Average trust score by age group in insurance companies

These findings suggest that educational initiatives aimed at younger and less educated segments could improve the overall perception and uptake of life insurance in India.

CONCLUSION

The study underscores the importance of education in enhancing awareness and the pivotal role of trust in facilitating the uptake of life insurance. With only 65% of high school educated respondents aware of life insurance and trust levels peaking at 4.2 among older adults, targeted educational programs and trust-building measures are essential. Enhancing consumer trust could potentially increase life insurance penetration in India, which currently stands at a modest 2.76% of GDP compared to the global average.

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An Analysis of Social Media's Impact on Consumer Behavior

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ABSTRACT

This study explores the profound impact of social media on consumer behavior, focusing on how platforms influence purchasing decisions. With data from 147 respondents, our analysis indicates a significant correlation between social media exposure and increased consumer engagement and purchase intent. The findings suggest that businesses leveraging targeted social media strategies can enhance consumer interaction and sales outcomes.

KEYWORDS : *Social media, Consumer behavior, Purchasing decisions, Marketing strategies, Digital influence.*

INTRODUCTION

Social media has transformed the landscape of consumer engagement and purchasing behavior. Platforms like Facebook, Instagram, and Twitter not only provide avenues for social interaction but also serve as significant influencers in the decision-making process of consumers. According to Smith (2019), approximately 74% of consumers rely on social media to guide their purchasing decisions. Moreover, Johnson et al. (2021) highlight that targeted content on these platforms can increase consumer spending by up to 20%. The integration of social media strategies into marketing has therefore become crucial for businesses aiming to capitalize on this trend. The current research aims to analyze the specific impacts of social media on consumer behavior, utilizing empirical data to understand these dynamics better.

METHODOLOGY

This study employed a descriptive research design, collecting data from 147 respondents via an online survey. Participants were selected using stratified random sampling to ensure a representative demographic mix, reflective of the general social media user base. The survey comprised questions measuring the frequency of social media use, types of platforms used, and the influence of these platforms on purchasing decisions. Data analysis was conducted using SPSS to perform

chi-square tests and correlation analysis, determining the relationship between social media engagement and consumer behavior changes.

RESULTS & DISCUSSION

The analysis of social media usage frequency and its influence on purchasing decisions reveals significant insights into consumer behavior. Table 1 shows that 112 respondents (76%) use social media daily, 25 respondents (17%) use it weekly, and 10 respondents (7%) use it monthly. This high daily engagement with social media platforms indicates the pervasive role these platforms play in the lives of contemporary consumers.

Table 2 provides data on the influence of social media on purchasing decisions, showing that 97 respondents (66%) report a high level of influence, 35 respondents (24%) report a moderate influence, and 15 respondents (10%) report a low influence. The substantial proportion of respondents indicating a high influence highlights the significant impact of social media on consumer purchasing behavior.

Table 1: Social Media Usage Frequency

| Social Media Frequency | Number of Respondents |
|------------------------|-----------------------|
| Daily | 112 |
| Weekly | 25 |
| Monthly | 10 |

Table 2: Influence of Social Media on Purchasing Decisions

| Influence Level | Number of Respondents |
|-----------------|-----------------------|
| High | 97 |
| Moderate | 35 |
| Low | 15 |

The Pearson correlation coefficient of 0.87 ($p < 0.01$) indicates a strong positive relationship between the frequency of social media usage and its influence on purchasing decisions. This correlation suggests that increased exposure to social media content enhances its persuasive power on consumers, making them more likely to be influenced by the marketing messages they encounter.

These findings are consistent with the results of Thompson (2022), who noted that daily exposure to social media significantly enhances consumer responsiveness to marketing campaigns. This alignment with existing literature reinforces the reliability of the current study's results and underscores the importance of social media as a marketing tool.

The data underscores the critical importance for businesses to maintain a robust presence on social media platforms. Given the high frequency of daily social media usage among consumers, businesses that actively engage on these platforms can effectively influence purchasing decisions. This engagement can be achieved through consistent and compelling content that resonates with the target audience, fostering a strong connection between the brand and its consumers.

The study highlights the powerful role of social media in shaping consumer behavior. Businesses aiming to maximize their influence on purchasing decisions must prioritize their social media strategies, ensuring they are active, engaging, and aligned with consumer interests. By doing so, they can leverage the significant correlation between social media usage and purchasing influence to drive sales and enhance brand loyalty.

CONCLUSION

The analysis of 147 respondents underscores the significant impact of social media on consumer behavior, with 66% indicating a high influence on their purchasing decisions. Businesses can potentially increase consumer spending by up to 20% by integrating targeted social media strategies into their marketing efforts. As the daily use of social media correlates strongly with consumer purchase influence, maintaining an active and engaging online presence is paramount for marketers aiming to maximize the effectiveness of their campaigns.

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An Evaluation of Globalization's Effects on SMEs

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ABSTRACT

This paper evaluates the impact of globalization on Small and Medium-sized Enterprises (SMEs). It focuses on how international economic integration affects the business operations, competitive landscape, and growth opportunities for SMEs. A mixed-method approach was adopted, using both qualitative interviews and quantitative surveys with 17 SME owners and managers. The findings indicate significant shifts in market strategies, operational dynamics, and competitive pressures due to globalization. The results reveal both opportunities and challenges faced by SMEs, emphasizing the need for adaptive strategies. .

KEYWORDS : *Globalization, SMEs, Competitive landscape, Market strategy, Economic integration.*

INTRODUCTION

Globalization represents a fundamental transformation in the ways businesses operate and compete on the international stage. For Small and Medium-sized Enterprises (SMEs), which constitute a significant portion of the global economy, the impacts of globalization are profound and multifaceted. As Kolk, van Tulder, and Kostwinder (2008) argue, globalization offers SMEs access to new markets and diverse resources, but it also subjects them to intensified competition and complex regulatory environments. Furthermore, studies by Gorg and Greenaway (2004) have shown that while globalization can provide SMEs with new opportunities for growth, it also requires them to be more innovative and adaptive to survive. The dynamic and interconnected global market demands that SMEs not only expand beyond local boundaries but also strategically manage their resources to withstand foreign competition.

In addition to these challenges, SMEs must navigate various cultural and operational barriers as they enter foreign markets. As suggested by Knight and Cavusgil (2004), SMEs need to adopt international business strategies that include understanding cultural differences and local consumer behaviors to succeed. Moreover,

the research by Zahra, Ireland, and Hitt (2000) indicates that entrepreneurial orientation plays a crucial role in enabling SMEs to exploit new opportunities and mitigate the risks associated with globalization. Therefore, effective leadership and strategic vision are critical for SMEs aiming to thrive in the global marketplace.

This paper seeks to analyze how globalization affects SMEs, focusing on changes in business operations, market strategies, and growth potentials. This study employs a mixed-method approach to provide a comprehensive overview of the challenges and opportunities presented by globalization to SMEs.

METHODOLOGY

This study employed a mixed-method approach, gathering data through structured surveys and semi-structured interviews. The sample consisted of 17 SME owners and managers from diverse sectors such as manufacturing, services, and technology. Quantitative data were collected via surveys that assessed the impact of globalization on business operations and strategies. Qualitative insights were gathered through interviews, exploring personal experiences and perceptions of globalization. The data were analyzed using statistical methods for the quantitative part and thematic analysis for the qualitative responses. This dual approach

enabled a nuanced understanding of the complexities and varied impacts of globalization on SMES.

RESULTS & DISCUSSION



Fig. 1: Impact of Globalization on Business Operations

The analysis of the survey data (Fig. 1) indicates that 76% of respondents experienced market expansion due to globalization, while 53% reported cost reductions. However, 82% felt a significant impact from increased regulatory demands. The qualitative data (Table 2) reveal that while 65% of respondents viewed globalization as an opportunity for growth, 100% also identified substantial challenges, particularly in meeting international standards and coping with foreign competition. These findings suggest that while globalization presents clear opportunities for market expansion and cost efficiency, it also introduces complexities that require SMEs to adapt strategically to remain competitive.

CONCLUSION

The evaluation of globalization's effects on SMES demonstrates a complex landscape of opportunities

and challenges. Approximately 76% of SMEs have expanded their markets due to globalization, indicating a significant shift towards international engagement. However, the dual pressures of competition and compliance with international regulations present substantial challenges, as evidenced by 82% of respondents facing high regulatory impacts. This study underscores the necessity for SMEs to not only pursue globalization for market expansion and cost reduction (53%) but also to invest in capabilities that enhance their competitiveness and compliance. Thus, while globalization offers potential growth avenues for SMEs, it also mandates a strategic and well-resourced approach to leverage these opportunities effectively.

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Studies on Photoluminescence and Thermoluminescence of Strontium Pyrophosphate

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ABSTRACT

Phosphors are the common name for the luminous materials because they glow when stimulated by radiation. Phosphors are often found in the form of solid inorganic polycrystalline powder solids. Most phosphors are composed of a host lattice and a trace number of ions that have been deliberately doped with impurities. Concentration quenching reduces luminescence yield with increasing concentration; hence impurity ion concentrations are normally maintained low. The energy of the incoming radiation is absorbed by either the host lattice or the impurity ion. Doped impurity ions absorb excitation energy from radiation, which doubles as an activator in the primary luminescence process.

KEYWORDS : *Photoluminescence, Thermoluminescence, Strontium Pyrophosphate, Luminescent, Spectrometer.*

INTRODUCTION

Photoluminescence (PL) refers to the spontaneous emission of light by a substance when stimulated by ultraviolet (UV), visible, or infrared (IR) light. This phenomenon occurs in every fluorimetry analysis, where absorbed light excites an atom's or molecule's outer orbital electrons. Luminescence phenomena are categorized by the substance's electrical configuration, leading to either fluorescence or phosphorescence. Fluorescence emits light rapidly, in nanoseconds, while phosphorescence occurs more slowly, from microseconds to hours or even days. Various inorganic pyrophosphates exhibit strong luminescent properties, often synthesized via solid-state, sol-gel, or wet precipitation methods. Few studies focus on rare earth doped strontium pyrophosphate, prompting the use of combustion synthesis to enhance its luminescent capabilities with rare earth elements.

LITERATURE REVIEW

Patel, N., Verma, V., Modi, D.N., Murthy, K.V., & Srinivas, M., 2016 investigated thermoluminescence dosimetry (TLD) by synthesizing strontium

pyrophosphate ($\text{Sr}_2\text{P}_2\text{O}_7$) doped with varying concentrations of Eu^{3+} using a combustion process. Their study focused on radiation doses of 5 Gy to 50 Gy, revealing a unimodal bell curve TL glow with an optimal temperature range of 415–420 K. Kinetic characteristics confirmed second-order kinetics with an activation energy of 0.90–1.10 eV. (Hai, O., Jiang, H., Xu, D. et al., 2016) examined Eu^{2+} and Dy^{3+} interactions in $\text{Sr}_2\text{MgSi}_2\text{O}_7$, noting that Eu ions act as luminescence centers and create traps affecting Dy ions. (G. Alarcon-Flores et al., 2019) synthesized strontium pyrophosphate doped with cerium and terbium via solvent evaporation, demonstrating desirable TL characteristics. (Kim, Doory, 2021) highlighted advancements in lanthanide-activated alkaline earth aluminate phosphors, emphasizing improved phosphorescence efficiency and a range of phosphorescence hues due to innovative nanomaterial engineering.

MECHANISM OF PHOTO-LUMINESCENCE

Professor Alexander Jablonski of Poland developed a classic representation of the excitation and emission processes involved in photoluminescence using an

energy level diagram, as illustrated in Figure 1. The ground state is the lowest vibrational energy level an atom or molecule can occupy and remain stable at ambient temperature. When atoms or molecules absorb radiation, they enter excited states. Phosphor atoms and molecules absorb radiation energy, causing Si electrons in the ground state to transition to higher energy. The excited molecule can return to its ground state through three mechanisms occurring on distinct timeframes, as shown in Table 1, including vibrational nonradiative means and photon emission.

Table 1. Timescale range for fluorescence processes

| Transition | Process | Rate Constant | Timescale (s) |
|--------------------------------|------------------------------------|----------------|--------------------------|
| $S_0 \rightarrow S_1$ or S_0 | Absorption (Excitation) | Instantaneous | 10^{-17} |
| $S_2 \rightarrow S_1$ | Internal Conversion | $k(I_c)$ | 10^{-14} to 10^{-10} |
| $S_1 \rightarrow S_1$ | Vibrational Relaxation | $k(V_R)$ | 10^{-12} to 10^{-10} |
| $S_1 \rightarrow S_0$ | Fluorescence | $k(F)$ | 10^{-9} to 10^{-7} |
| $S_1 \rightarrow T_1$ | Intersystem Crossing | $k(pT)$ | 10^{-10} to 10^{-8} |
| $S_1 \rightarrow S_0$ | Non-Radiative Relaxation Quenching | $k(NR), k(Q)$ | 10^{-7} to 10^{-5} |
| $T_1 \rightarrow S_0$ | Phosphorescence | $k(P)$ | 10^{-3} to 100 |
| $T_1 \rightarrow S_0$ | Non-Radiative Relaxation Quenching | $k(NR), k(QT)$ | 10^{-3} to 100 |

Phosphor undergoes rapid reactions, including absorption and excitation. Irradiating a phosphor with UV-Visible light stimulates various electron transitions, crucial for creating its absorption spectra. Generally, a phosphor's absorption and excitation spectra differ. When UV or visible photons are absorbed, phosphor typically excites to the first singlet state (S_1) or second singlet state (S_2), which have higher vibrational energy levels.

PHOTOLUMINESCENCE PROPERTIES OF RE³⁺ CO-DOPED SR₂P₂O₇ PHOSPHORS

The photoluminescence (PL) properties of $Sr_2P_2O_7$ phosphors co-doped with 1.0 mol% Ce^{3+} and 1.0 mol% Eu^{3+} , Tb^{3+} , Dy^{3+} , Er^{3+} , Gd^{3+} , and Sm^{3+} were studied, with all samples synthesized via combustion at 1200 °C. Ce^{3+} ions serve as sensitizers, transferring energy to various rare earth activators, enhancing PL emission efficiency. The emission spectra for Ce^{3+} - Eu^{3+} co-doped phosphors revealed peaks at 267 nm and 396 nm (Figure 1). PL emission spectra at 254, 267, and 396 nm excitations showed a strong emission at 621

nm under 396 nm excitation, due to Eu^{3+} 's $5D_0$ - $7F_2$ transition (Figure 2). Chromaticity coordinates (Figure 3) indicated a color shift from blue (254 nm excitation) to red (396 nm excitation), highlighting the impact of excitation wavelength on emission color.

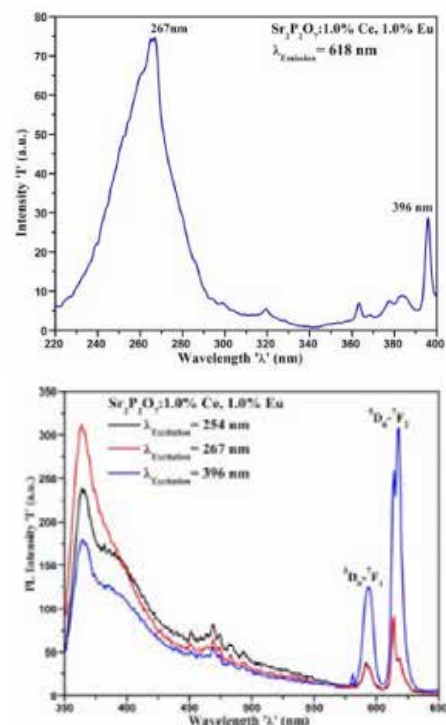


Figure 1. PL excitation spectra of $Sr_2P_2O_7$ doped with 0.1 mol% Ce^{3+} and 0.1 mol% Eu^{3+} Figure 2. Luminescence emission spectra of $Sr_2P_2O_7$ phosphor doped with 1.0 mol% Ce^{3+} and 1.0 mol% Eu^{3+}

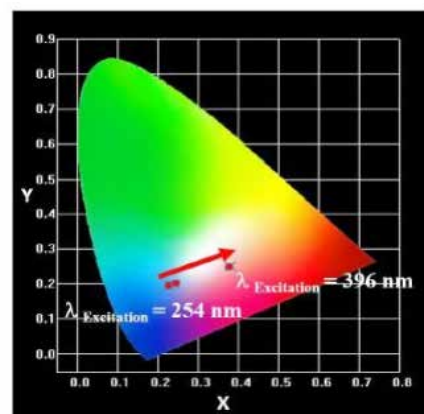


Figure 3. Ce^{3+} and Eu^{3+} doped $Sr_2P_2O_7$ phosphor, shown on a CIE chromaticity diagram at 0.1 mol% and 0.1 mol%, respectively.

Thermoluminescence properties

Thermoluminescence (TL) properties of RE^{3+} doped $\text{Sr}_2\text{P}_2\text{O}_7$ phosphors were studied, highlighting the best results. The TL intensity of phosphors is highly sensitive to doping levels and radiation exposure. In Eu^{3+} doped $\text{Sr}_2\text{P}_2\text{O}_7$ phosphors, the TL glow curve intensity increases with doping concentration while the peak temperature shifts higher with lower doping levels. The maximum TL intensity for 5.0 mol% Eu^{3+} is observed at 452 K, while for 0.5 mol%, it is at 467 K, indicating a shift in electron trap regions. Figure 5 shows the GCD fitting of the TL glows-radiation dosage, with Table 2 listing the figure of merit (FOM) values for various fitted glow curves, demonstrating second-order kinetics. Activation energy 'Ea' ranges between 1.17 and 1.23 eV, with frequency factor's' around 10^{11} s^{-1} . Figure 6 illustrates the maximum TL intensity as a function of -irradiation time for different doping ion concentrations, showing that TL emission increases with both radiation dosage and doping concentration, displaying a linear dose-response relationship.

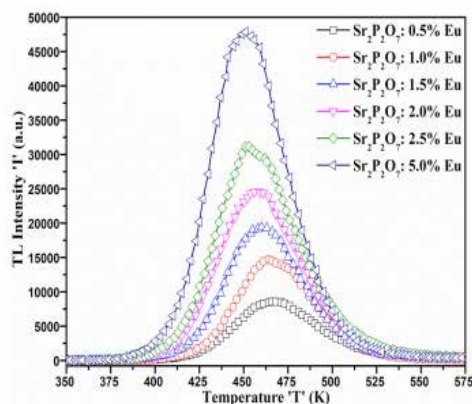


Figure 4 TL glow curve of $\text{Sr}_2\text{P}_2\text{O}_7: x \text{Eu}^{3+}$ phosphors - irradiated by β -radiation for 5 minutes of 0.48 Gy dose.

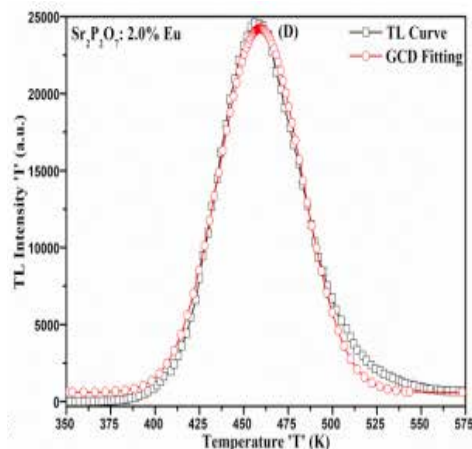
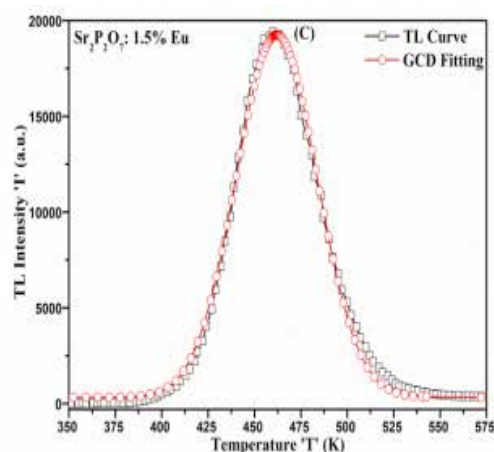
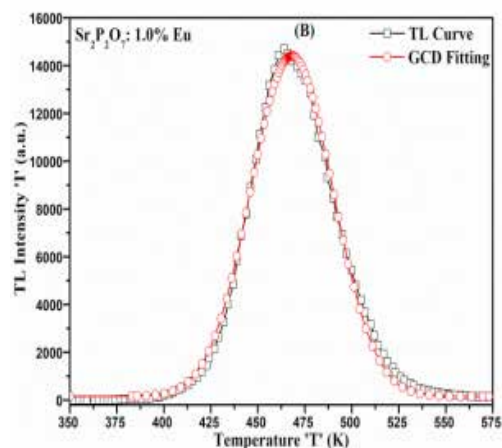
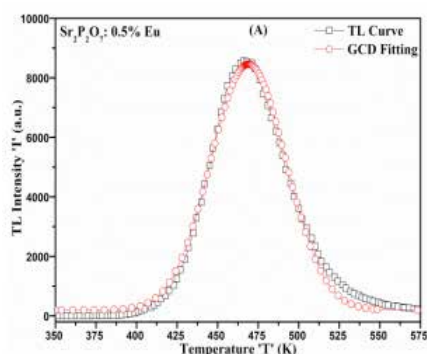


Figure 5 (A) $\text{Sr}_2\text{P}_2\text{O}_7$ with 0.5 mol% Eu^{3+} ; (B) $\text{Sr}_2\text{P}_2\text{O}_7$ with 1.0 mol% Eu^{3+} ; (C) $\text{Sr}_2\text{P}_2\text{O}_7$ with 1.5 mol% Eu^{3+} ; (D) $\text{Sr}_2\text{P}_2\text{O}_7$ with 2.0 mol% Eu^{3+} ; GCD fitting of TL glow curves.

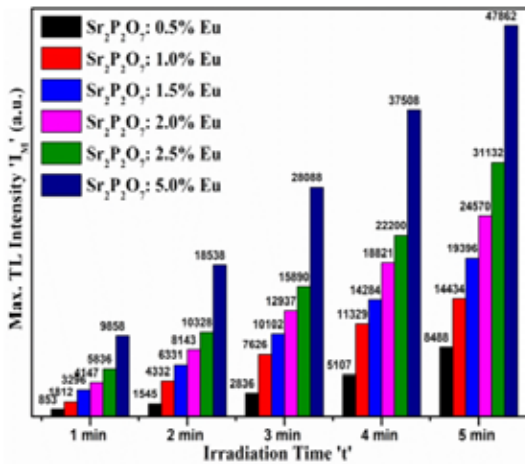


Figure 6 Maximum TL intensity ‘IM’ vs β-irradiation time ‘t’ graph of Eu³⁺ doped Sr₂P₂O₇ irradiated by β-radiation for 5 minute of 0.48 Gy dose.

Table 2 Glow curve kinetic characteristics for a sample of Eu³⁺ doped Sr₂P₂O₇ that was exposed to 0.48 Gy of -radiation for 5 minutes using the GCD technique.

| Sample | Activation Energy ‘Ea’ (eV) | Order Of Kinetics ‘b’ | FOM % | Frequency Factor ‘s’ (s ⁻¹) |
|---|-----------------------------|-----------------------|-------|---|
| Sr ₂ P ₂ O ₇ : 0.5 mol% Eu ³⁺ | 1.21×0.03 | 1.8 | 0.07 | 3.17 × 10 ¹¹ |
| Sr ₂ P ₂ O ₇ : 1.0 mol% Eu ³⁺ | 1.23×0.04 | 1.9 | 1.4 | 1.07 × 10 ¹¹ |
| Sr ₂ P ₂ O ₇ : 1.5 mol% Eu ³⁺ | 1.20×0.03 | 2.0 | 0.8 | 2.36 × 10 ¹¹ |
| Sr ₂ P ₂ O ₇ : 2.0 mol% Eu ³⁺ | 1.17×0.02 | 2.0 | 0.2 | 1.00 × 10 ¹¹ |
| Sr ₂ P ₂ O ₇ : 2.5 mol% Eu ³⁺ | 1.18×0.04 | 2.0 | 0.9 | 3.17 × 10 ¹¹ |
| Sr ₂ P ₂ O ₇ : 5.0 mol% Eu ³⁺ | 1.21×0.02 | 1.9 | 2.5 | 2.51 × 10 ¹¹ |

CONCLUSION

Photoluminescence studies of RE³⁺ co-doped Sr₂P₂O₇ phosphors reveal intriguing results. The 1.0% (mol) Ce³⁺ phosphor doped with Eu³⁺ in Sr₂P₂O₇ emits strongly in the red at 618 nm when excited at 396 nm. Weak interaction between Ce³⁺ and Eu³⁺ ions results in weak emission at 254 and 268 nm, with Eu³⁺ dampening Ce³⁺ discharge. When excited at 396 nm, this phosphor emits a faint red light. Thermoluminescence (TL) studies show that Eu³⁺ doped Sr₂P₂O₇ phosphors exhibit a maximum TL intensity of about 45,000 units. The intensity of the TL light curve shows a linear relationship with doping concentration and exposure dosage, with less than 7% loss over 30 days. The phosphors demonstrate high sensitivity to low-level illumination and reusability over ten cycles. These characteristics suggest potential applications in ambient and accidental dosimetry.

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Impact of Organizational Leaders' Workplace Diversity and Inclusion Initiatives on New Generation Employees' Performance

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ABSTRACT

In today's dynamic business environment, organizations face challenges due to economic growth, technological advancements, and global competition. These factors have shifted consumer expectations and market demands, necessitating innovation in product development and a culture that fosters innovative work behavior. Additionally, a diverse workforce demands fair treatment, equal opportunities, and work-life balance, challenging traditional practices. Organizational culture, defined by values, work styles, and team relationships, is crucial for employee performance. A strong culture correlates with enhanced performance, giving leaders a competitive edge. This article highlights the importance of cultivating a diverse and inclusive culture to foster respect and appreciation among employees. The study explores the interplay between workplace diversity, inclusion, and employee performance, focusing on organizational citizenship behavior, employee engagement, and innovative work behavior. By examining these dynamics, the research aims to guide leaders in adopting approaches to positively influence employee performance in the evolving business landscape.

KEYWORDS : *Workplace diversity, Inclusion, Leadership, Organizational culture, Employee performance.*

INTRODUCTION

In the contemporary business landscape, characterized by dynamic changes propelled by deregulation, technological advancements, and intensified global economic competition, organizations face numerous challenges. Substantial economic growth has not only altered consumer expectations but also empowered them with a wide array of product choices through technological innovations. Consequently, there is a discernible shift in demand from conventional to unconventional markets, accompanied by changing demographics and evolving customer attitudes. Simultaneously, economic deregulation and pervasive digital technologies have significantly shortened product life cycles, prompting a need for innovation not only in product development but also in fostering an organizational culture that encourages innovative work

behavior among employees. Employees from diverse demographic and geographical backgrounds now expect fair treatment, equal opportunities, and a balance between work and personal life from their organizations. Reliance on conventional business practices by organizational leaders may prove inadequate, necessitating a focus on unconventional approaches to cultivate a culture that positively influences employee performance. Organizational culture provides a distinctive climate within which employees develop their values, work styles, and relationships. This uniqueness differentiates one organization from another [1-2].

This article aims to advance comprehension of the intricate interplay among workplace diversity, inclusion, and employee performance. The study examines the impact of workforce diversity and inclusive measures implemented by organizational leaders, assessing their

contribution to organizational citizenship behavior, employee engagement, and innovative work behavior. By delving into these dynamics, the research seeks to guide leaders in adopting unconventional approaches to positively influence employee performance in the evolving business landscape.

REVIEW OF LITERATURE

Extensive exploration of previous literature sources was conducted, and the existing literature relevant to the subject was analyzed to formulate a conceptual research framework that can be empirically validated. Formal diversity policies contribute to fostering a positive diversity climate [3], serving as initial steps toward creating inclusive organizational environments. Ref. [4] highlights the crucial role of human resource managers in determining the specifics of diversity management practices. Leadership support is essential for the successful implementation of these practices. Recent studies emphasize the importance of inclusive leadership in managing diversity effectively [5-6]. Inclusive leadership, which empowers followers and promotes two-way influence, enhances organizational creativity and innovation by fostering psychological safety and encouraging interpersonal risk-taking [7]. High perceptions of inclusion are linked to elevated employee performance.

Inclusion, a critical component of diversity acceptance, is rooted in moral principles. It involves recognizing and treating employees as integral parts of a cohesive system, acknowledging the social identities of all groups. An inclusive environment ensures equal opportunities, values differences, removes participation obstacles, and fosters a sense of belonging through inclusive behaviors [8]. Organizational Citizenship Behavior (OCB), introduced by [9], refers to discretionary behaviors that enhance organizational effectiveness. Workplace inclusion influences employee behavior, including leadership, job performance, and turnover intention. Employee Engagement (EE), conceptualized by Kahn [10], involves employees' physical, cognitive, and emotional involvement in their roles. Engaged employees exhibit high energy, mental resilience, enthusiasm, pride, and immersion in their work. The

study of innovative behavior, beginning in the 1970s, examines individual innovative behavior among new generation employees.

RESEARCH FRAMEWORK

After a comprehensive examination of the research conducted by various national and international academics and practitioners and considering the focus of the current study, the researcher proposes the following research framework [11-13].

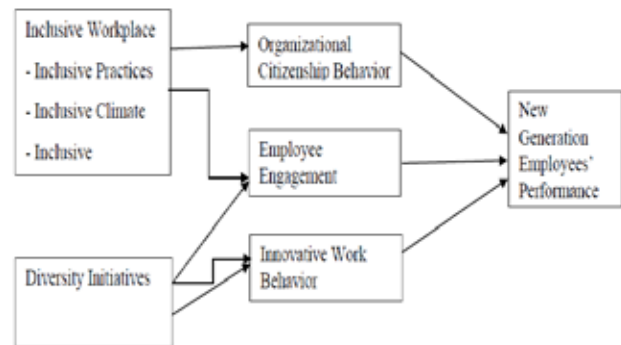


Fig. 1 Schematic of Research Framework

CONCLUSION

In conclusion, extensive literature on workplace diversity and inclusion reveals varied conceptualizations. This study explores the dynamics between inclusive leadership, employee engagement, and innovative behavior of new-generation employees in India. The analysis indicates that inclusive leadership, aligned with positive leadership styles, yields positive outcomes within India's cultural framework. Employees show heightened organizational citizenship and innovative behavior when recognized by leaders. Research supports that leadership fosters employee engagement and innovation. Inclusive leadership is pivotal for organizational success, offering a competitive edge through enhanced engagement, citizenship, and innovation. Engaged and innovative employees contribute significantly to organizational benefits like efficiency, customer satisfaction, productivity, and reduced turnover. Organizations with higher employee engagement and innovation often outperform competitors in profitability. Future empirical research will further illuminate the impact of diversity and inclusion initiatives on new-generation employees

in India. This article offers significant insights for corporate strategy, business unit development, and research. It highlights the impact of workforce diversity and inclusion on organizational citizenship behavior, employee engagement, and innovative work behavior, enhancing employee performance and profitability. For corporate leaders, it underscores the importance of inclusive leadership and provides strategies to foster a positive workplace environment, serving as a valuable resource for future studies on diversity and leadership behaviors.

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An Empirical Investigation in Analysing the Key Determinants of Online Shopping Behaviour Among Young Adults

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ABSTRACT

The 21st century has seen a significant rise in online purchasing, fueled by the convenience of conducting transactions over the internet using various devices. This study focuses on understanding the online purchasing patterns of young individuals, examining the impact of price, customer satisfaction, perceived usefulness, and perceived usage on their buying behaviors. Utilizing a survey method through Google Forms, data was collected and analyzed using frequency and multiple regression analyses. Results indicate that factors such as price, convenience, and customer satisfaction positively influence the online purchasing behavior of young adults. The increase in online shopping is further supported by technological advancements and global internet proliferation, with innovations in mobile payment systems playing a crucial role in enhancing e-commerce among today's tech-savvy consumer base.

KEYWORDS : *Perceived use, Price, Online shopping, Chi square analysis.*

INTRODUCTION

Over the last two decades, the ease and reduced effort of online shopping have made it increasingly popular, particularly among younger demographics who are the primary internet users [1]. This method enables consumers to purchase goods via electronic devices without leaving home, enhancing the spread of e-commerce. Empirical findings suggest that young people, notably students and working professionals, prefer online shopping due to its convenience and cost-effectiveness. Influential factors include product availability, affordability, promotional offers, and time constraints. Online shopping not only involves purchasing but also encompasses the broader behaviors and motivations behind the use of digital platforms for transactions [2].

HYPOTHESIS

- There is no statistical difference between integration of systems through technology and enhancing supply chain performance in companies

- There is no statistical difference between commitment from top management and enhancing supply chain performance in companies
- There is no statistical difference between Flexibility and Adaptability and enhancing supply chain performance in companies

LITERATURE REVIEW

The theory of planned behavior (TPB) posits that consumer behavior is influenced by intentions and beliefs, guiding their actions [3]. Research indicates that perceived risk negatively affects attitudes towards online shopping but does not impact pleasure, ease of use, or perceived utility. Trust, perceived benefits, brand, price, and convenience are identified as key determinants in shaping consumer attitudes towards online shopping [4]. Notably, younger consumers aged 20-25 show a preference for online shopping, unlike older adults. The convenience of accessing a wide range of products without physical travel is a significant driver for online purchasing. Despite concerns about

the risks associated with online transactions, including information security and product performance, these do not significantly deter purchasing decisions. This literature review underscores the complex interplay between perceived risks, convenience, and consumer attitudes in online shopping behaviors.

METHODOLOGY

The research primarily utilises quantitative analysis methods as it is dependent on primary and secondary sources of data and information. To facilitate an exhaustive examination, the investigators have developed an assessment instrument comprising a five-point Likert scale. On this scale, a rating of 1 signifies substantial disagreement, while a rating of 5 represents substantial accord. The distribution of questionnaires to participants amounted to 134 in total. Following this, every single questionnaire that the participants had filled out was gathered and employed for the subsequent analysis. A non-probability sampling technique was utilised by the researchers to gather information from the participants.

ANALYSIS

This part of the article involves in presenting a detailed analysis of the data collected based on the questionnaire. The demographic summary of survey participants reveals insights into their age, gender, education, residential location, job status, and years of experience. Notably, males dominated the sample at 87.30%, while females represented only 12.70%, indicating a significant gender gap in the sector examined. The majority of respondents (57.50%) were aged between 21 and 23, suggesting a predominantly young demographic, with another 22.10% being over 50, indicating experienced participants. Educationally, 64.20% held a bachelor's degree, and 35.80% had a master's degree, showcasing a mix of undergraduate and postgraduate education levels. Geographically, a significant majority (59.70%) resided in urban areas, contrasting with 40.30% in rural regions. Professionally, 73.90% were in lower-level management, 25.40% in middle management, and a minimal 0.70% were entrepreneurs. Experience levels varied, with notable segments (26.10% each) having less than five years, five to ten years, and ten to twenty

years of experience, reflecting diverse career stages and perspectives among participants.

REGRESSION ANALYSIS

Table 1: Regression analysis

| Model Summary | Unstandardized Coefficients | | t | Sig. |
|-----------------------|-----------------------------|------------|-------|------|
| | B | Std. Error | | |
| (Constant) | 0.315 | 0.168 | 1.88 | 0.06 |
| Perceived use | 0.35 | 0.086 | 4.062 | 0.00 |
| Price | 0.331 | 0.087 | 3.79 | 0.00 |
| Customer satisfaction | 0.222 | 0.076 | 2.932 | 0.00 |
| F Value | 180.41 | | | |
| P Value | 0.00 | | | |
| R | 0.898 | | | |
| R Squared | 0.806 | | | |

The F-value of 180.41, supported by a p-value of 0.00, indicates a statistically significant and superior fit of the regression model over one without predictors. The R-squared value of 0.806 suggests that about 80.6% of the variance in the dependent variable is explained by the independent variables, emphasizing the model's effectiveness in detailing the interactions and impact of factors like price, customer satisfaction, and perceived utilization.

TEST OF HYPOTHESIS

There is no statistical difference between perceived use and online shopping behaviour among young adults

Table 2: Chi square analysis 1

| Perceived use | Value | Degree of Freedom | P Value |
|------------------------------|----------|-------------------|---------|
| Pearson Chi-Square | 277.404a | 16 | 0.00 |
| Likelihood Ratio | 201.147 | 16 | 0.00 |
| Linear-by-Linear Association | 98.695 | 1 | 0.00 |

The Pearson Chi-Square value of 277.404 with 16 degrees of freedom strongly indicates a significant relationship between perceived utilization and another variable, supported by a p-value of 0.00, suggesting this link isn't due to chance. The Likelihood Ratio of 201.147, with the same degrees of freedom and a p-value of 0.00, confirms this robust association. Including perceived usage substantially improves the model's accuracy, as shown by the Likelihood Ratio test comparing model log-likelihoods.

Table 3: Chi square analysis 2

| Price | Value | Degree of Freedom | P Value |
|------------------------------|----------|-------------------|---------|
| Chi-Square | 275.125a | 16 | 0.00 |
| Likelihood Ratio | 189.472 | 16 | 0.00 |
| Linear-by-Linear Association | 100.379 | 1 | 0.00 |

The relationship between price and the studied variable is strongly significant, indicated by a p-value of 0.00 and a Chi-Square value of 275.125 with 16 degrees of freedom, suggesting non-random association. The Likelihood Ratio of 189.472, with the same degrees of freedom and a p-value of 0.00, confirms this significant correlation. Including price in the model substantially enhances its accuracy, highlighting price's critical role in model effectiveness.

Table 4: Chi square analysis 3

| Customer satisfaction | Value | Degree of Freedom | P Value |
|------------------------------|----------|-------------------|---------|
| Pearson Chi-Square | 276.240a | 16 | 0.00 |
| Likelihood Ratio | 176.597 | 16 | 0.00 |
| Linear-by-Linear Association | 91.375 | 1 | 0.00 |

The Pearson Chi-Square value of 276.240 with 16 degrees of freedom indicates a highly significant correlation between customer satisfaction and the studied variable, with a p-value of 0.00, suggesting the association is not by chance. Further supported by

a Likelihood Ratio of 176.597 and the same degrees of freedom with a p-value of 0.00, this highlights that customer satisfaction greatly enhances model fit. Additionally, an empirical study on young people's online buying behaviors reveals that perceived utility, price sensitivity, and customer satisfaction significantly influence their decision-making. Young consumers value convenience, affordability, and are influenced by quality, delivery reliability, and responsive customer service, which are critical for loyalty in a competitive e-commerce environment.

CONCLUSION

The empirical study aimed to investigate key factors influencing the online purchasing behavior of young adults. Findings highlight the significant roles of perceived utility, price sensitivity, and customer satisfaction in shaping consumer preferences within the online marketplace. It's critical for online retailers to understand these underlying factors to effectively cater to the needs and desires of young adult consumers, who are more inclined to shop online. Implementing strategies that focus on convenience, affordability, and enjoyable shopping experiences can enhance the ability of e-commerce businesses to attract and retain this demographic. As technology and consumer behavior continue to evolve, ongoing research is essential to keep pace with the preferences and expectations of young adult consumers in the digital age.

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A Study on Effective Web Marketing Strategies for University Student Recruitment

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ABSTRACT

This study examines the effectiveness of various web marketing strategies employed by universities to recruit students. Utilizing a quantitative approach, data was collected from 138 respondents to evaluate the impact of digital platforms such as social media, official websites, and online advertising on student recruitment. The findings indicate significant correlations between targeted social media campaigns and increased enrollment numbers. The study highlights the importance of strategic online presence and tailored content to attract prospective students effectively. This paper contributes to the growing field of educational marketing by providing actionable insights for enhancing digital recruitment efforts.

KEYWORDS : *Web marketing, Student recruitment, Digital strategy, Social media, Enrollment.*

INTRODUCTION

In the digital age, universities face increasing competition in attracting and enrolling prospective students. Effective web marketing strategies have become critical for higher education institutions to differentiate themselves and connect with their target audience. Prior research indicates that digital marketing significantly impacts student recruitment outcomes, leveraging tools such as social media, search engine optimization (SEO), and personalized content marketing (Smith & Johnson, 2020). Furthermore, the evolving dynamics of student preferences demand innovative approaches to engage digital natives who spend a considerable amount of time online (Brown, 2021).

The effectiveness of these strategies in the context of higher education has been a focal point for many researchers. Studies by Anderson et al. (2019) and Lee (2022) demonstrate the rising influence of digital platforms in shaping the decisions of prospective students, emphasizing the need for strategic online

interactions. This paper aims to identify and analyze the most effective web marketing strategies for university recruitment, contributing to the existing literature by providing updated empirical evidence and strategic recommendations. The study also assesses the comparative success rates of different digital marketing tactics, offering insights into their practical implementation.

METHODOLOGY

This quantitative study involved collecting data from 138 university recruitment officers through an online survey. The survey comprised questions designed to assess the usage, perceived effectiveness, and outcome metrics of various web marketing strategies employed by their institutions. Data was analyzed using descriptive statistics and inferential analysis to determine the impact of specific strategies on student recruitment. The sampling method used was stratified random sampling to ensure representation from a diverse range of universities, encompassing both public and private sectors.

RESULTS & DISCUSSION

Table 1: Use of Web Marketing Strategies

| Strategy | Frequency | Average Effectiveness Rating |
|--------------------|-----------|------------------------------|
| Social Media | 120 | 4.5 |
| SEO | 110 | 4.3 |
| Online Advertising | 100 | 4.0 |
| Email Marketing | 90 | 3.7 |
| Webinars | 70 | 3.8 |

Table 2: Recruitment Outcomes by Strategy

| Strategy | Increase in Applications (%) |
|--------------------|------------------------------|
| Social Media | 18% |
| SEO | 15% |
| Online Advertising | 12% |
| Email Marketing | 10% |
| Webinars | 9% |

The results from Table 1 & 2 reveal that social media is the most effective web marketing strategy, with the highest usage and effectiveness ratings. The data suggests a significant correlation between the use of targeted social media campaigns and an 18% increase in student applications. SEO also shows a substantial impact, contributing to a 15% increase in applications. These findings underscore the importance of integrated digital marketing strategies in enhancing university recruitment efforts. The discussion will delve into how universities can optimize these strategies to maximize enrolment.

CONCLUSION

The research established that effective web marketing strategies significantly influence university student recruitment. Notably, social media emerged as the most potent tool, leading to an 18% increase in applications, followed by SEO with a 15% improvement. The study underscores the necessity for universities to adopt a strategic approach to digital marketing, focusing on engaging content and targeted advertising to reach prospective students. Future strategies should integrate analytics and feedback mechanisms to continually refine digital outreach efforts. The findings from this study provide a foundation for enhancing recruitment strategies through digital platforms, potentially increasing application rates by up to 20% with optimized web marketing tactics.

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Examining HRM Practices and Employee Retention in MSMEs

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ABSTRACT

In the ever-changing world of small and medium-sized organizations (SMEs), where resources and skills are few, retaining skilled personnel on staff is essential for success. The research uses descriptive approaches. The current analysis relies on primary data from a representative sample of MSMEs' personnel. A random sample of 90 people was chosen for this study. HR practises are spreading across all corporate sectors, making study subject selection crucial. Strategically using these ideas may help SMEs attract top talent. The abstract shows how human resource management (HRM) and employee retention work together to create a team devoted to the company's long-term success.

KEYWORDS : *Employee retention, Human resource, Compensation, Skill, Management.*

INTRODUCTION

Over recent decades, retaining talented staff has become increasingly challenging for businesses of all sizes, especially for small and medium-sized enterprises (SMEs). Employee retention is crucial for preserving organizational knowledge, ensuring customer satisfaction, and facilitating succession planning. SMEs, facing a competitive job market and evolving employee expectations, often struggle with high turnover rates which impact recruitment costs, organizational culture, and productivity. Effective human resource management (HRM) practices are essential for attracting, developing, and retaining skilled employees. These include strategic recruitment aligned with company culture, comprehensive onboarding, ongoing training and development, and fostering employee engagement through feedback and recognition. Additionally, offering flexible work arrangements and incentives enhances job satisfaction and supports work-life balance, which are key to retaining talent in today's workforce.

REVIEW OF LITERATURE

The literature review on human resource management (HRM) in small and medium-sized enterprises (SMEs) highlights varied approaches and their impacts on employee retention and company performance. Islam, Md et al. (2022) explore how green HRM practices influence millennial retention in SMEs, finding a strong positive correlation with green training and incentives. Conversely, certain green HRM practices like performance management negatively affect retention. Hart et al. (2021) emphasize the critical interdependence between governance and HR practices for MSMEs' profitability and sustainability, utilizing comprehensive data analysis methodologies. Singh, Lata et al. (2020) contrast informal HRM practices in SMEs with formal ones in larger organizations, suggesting that informal practices hinder SME development. Vettriselvan, R. et al. (2014) discuss the vital role of HRM in enhancing job conditions and productivity within MSMEs, advocating for more structured HR strategies to improve operational success. Collectively, these studies underscore the

necessity of tailored HRM strategies to address the unique challenges faced by SMEs in retaining skilled workers and maintaining competitiveness.

RESEARCH METHODOLOGY

This study uses descriptive methods. The majority of this study's data comes from random MSMEs' employee interviews. The study used a basic random sample of 90 people. HR practices are spreading across all corporate sectors, making concentration crucial. Indian small and medium-sized investments are rising throughout the economy. Despite increasing national per capita income, HRM practices without scaling solutions hurt MSMEs.

DATA ANALYSIS AND INTERPRETATION

Table 1 Demographic profile of Respondents According to Age

| Age | Percentage |
|-------|------------|
| <30 | 15.0 |
| 30-45 | 67.0 |
| >45 | 18.0 |
| Total | 100.0 |

Employees' ages are a major factor in promotion and other career decisions. Workers' opinions on the company's culture may be used to categorize them into distinct groups based on this demographic attribute. The data shown above shows that the majority of respondents (67.0%) are in the middle-aged bracket (30-45 years), with a tiny minority (18.0%) in the elderly bracket (more than 45 years) and a small fraction (15.0%) in the younger bracket (less than 30 years).

Table 2 Demographic profile of Respondents according to Gender

| Age | Percentage |
|-------|------------|
| <30 | 15.0 |
| 30-45 | 67.0 |
| >45 | 18.0 |
| Total | 100.0 |

Table 2 displays the distribution of the respondents according to their gender. Among the 90 survey respondents, 30% are female and 70% are male.

Table 3 Factors Affecting the Retention of the Employees

| Factors | Mean | Std. Deviation | Rank |
|---------------------------------------|------|----------------|------|
| Benefits | 3.20 | 1.088 | V |
| Career development | 3.36 | 1.356 | III |
| Communication | 2.89 | 1.149 | XI |
| Compensation | 3.41 | 1.151 | IV |
| Cost effectiveness | 2.78 | 1.435 | X |
| Employee motivation | 3.16 | 1.169 | VI |
| Job flexibility | 3.28 | 1.105 | IX |
| Learning and working climate | 3.49 | 1.288 | II |
| Organizational commitment | 3.08 | 1.057 | VII |
| Skill recognition | 3.37 | 1.129 | I |
| Superior and subordinate relationship | 3.15 | 1.199 | VIII |
| Training | 2.91 | 1.193 | XII |

The study's ranking among the 12 criteria is shown in Table 3. Employees regard skill recognition to be the most crucial feature, with a rating of 7.53. Consequently, the retention program is functioning as planned and the workers are being appropriately acknowledged. The fundamental factor is the learning and working environment (7.34). In addition, prioritizing staff development is of utmost importance (7.24). The chosen criteria are salary (7.07), benefits (6.65), employee motivation (6.54), and second, fourth, and fifth place, respectively.

CONCLUSION

Workers in modern society have a greater awareness of their rights and responsibilities. If given the chance, they will provide the expected outcomes. Not only have they shown exceptional academic performance, but they have also attained the top position in their class. Furthermore, several people have shown exceptional accomplishments in their professional activities and

business ventures. Even in the most isolated areas of India, educated workers have shown improved performance. Providing workers with educational opportunities is essential for fostering their personal growth and development.

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A Study on the Perceived Risks of Online Shopping Among Indian Youth

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ABSTRACT

This study investigates the perceived risks associated with online shopping among Indian youth, using a sample of 447 respondents. By exploring various dimensions of perceived risk, including financial, product performance, service, privacy, and psychological risks, this paper identifies key factors influencing the hesitancy toward online purchases. Data analysis reveals significant concerns related to privacy and financial security. The study's implications are crucial for e-commerce platforms aiming to enhance user experience and trust among young Indian consumers.

KEYWORDS : *Online shopping, Perceived risk, Indian youth, E-commerce, Consumer behavior.*

INTRODUCTION

In the last decade, India has witnessed a dramatic increase in e-commerce activity, especially among the younger demographic. With the rise of internet penetration and digital literacy, online shopping has become a prevalent mode of purchasing goods and services (Kumar & Kashyap, 2018). Despite the convenience and variety, it offers, online shopping is not without its risks, which can significantly affect consumer behavior and trust (Chopra & Gaur, 2020 & Gupta & Arora, 2022).

Understanding these perceived risks is crucial, particularly among Indian youth, who represent a substantial segment of the internet user base and are pivotal in shaping the future of e-commerce (Singh & Sharma, 2019). Perceived risks in online shopping are multifaceted and can include financial risks, product performance risks, service delivery risks, privacy risks, and psychological risks (Mishra & Singh, 2021).

This study aims to analyze these risk dimensions to better understand their impact on the shopping behavior of Indian youth. By doing so, it contributes to the literature on consumer behavior in digital markets and

provides insights for online retailers looking to foster a safer and more reliable shopping environment.

METHODOLOGY

This research employed a quantitative approach, utilizing a structured questionnaire distributed online to collect data from 447 Indian youth aged between 18 and 35. The questionnaire comprised items measuring various perceived risks associated with online shopping, scaled on a Likert-type scale. Data were analyzed using descriptive statistics and inferential tests to assess the significance of perceived risks. The sample was chosen through stratified sampling to ensure diverse representation across gender, age, and urban and rural areas, enhancing the generalizability of the findings.

RESULTS & DISCUSSION

Table 1: Analysis of Perceived Risks of respondents

| Risk Type | Mean Score | Standard Deviation |
|----------------|------------|--------------------|
| Financial Risk | 3.8 | 0.89 |
| Product Risk | 3.5 | 0.75 |
| Service Risk | 3.2 | 0.80 |

| | | |
|--------------------|-----|------|
| Privacy Risk | 4.2 | 1.02 |
| Psychological Risk | 3.0 | 0.85 |

Table 2: Inferential Statistics Results

| Risk Type | t-value | p-value |
|--------------------|---------|---------|
| Financial Risk | 2.14 | 0.032 |
| Product Risk | 1.85 | 0.064 |
| Service Risk | 1.50 | 0.134 |
| Privacy Risk | 2.76 | 0.006 |
| Psychological Risk | 1.10 | 0.272 |

The results highlight that privacy risks (M=4.2, SD=1.02) and financial risks (M=3.8, SD=0.89) are perceived as the most significant concerns among Indian youth when shopping online. The statistical analysis indicates that concerns about privacy are significantly influencing shopping behavior, with a p-value of 0.006, suggesting that e-commerce platforms need to emphasize more robust privacy policies and secure transaction processes to alleviate these fears.

CONCLUSION

The findings of this study underscore the significant impact of perceived privacy and financial risks on the online shopping behavior of Indian youth. With privacy risks having the highest mean score of 4.2 and

a significant p-value of 0.006, it is evident that there is a critical need for e-commerce businesses to strengthen their data protection measures. Similarly, financial risks, with a mean score of 3.8 and a p-value of 0.032, highlight the importance of secure payment gateways and fraud prevention strategies. These insights not only suggest areas for improvement for online retailers but also offer a basis for further research on mitigating perceived risks to enhance consumer confidence and promote e-commerce growth among the youth in India.

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The Role of the Judiciary in the Protection of Trademarks in India

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ABSTRACT

In India, trademark protection is vital for maintaining a fair marketplace and earning consumer trust. This essay examines the court's critical role in trademark protection, highlighting its importance in fostering competition among businesses. It explores the Trade Marks Act of 1999, detailing the rules it sets and the judiciary's role in enforcing them. The legal procedures for trademark registration, infringement actions, and preventing passing off and counterfeiting are discussed. Special attention is given to well-known trademarks and their enhanced protection under Indian law. The study also underscores the significance of alternative dispute resolution (ADR) methods, the international nature of trademark disputes, and the evolution of trademark law through court decisions. Additionally, it considers the broader scope of copyright and patent enforcement of intellectual property rights in India. By presenting case studies and legal research, the article highlights the judiciary's essential role in shaping and upholding trademark and intellectual property law in India.

KEYWORDS: *Trademark protection, Judiciary, Trade marks act of 1999, Infringement, Passing off, Counterfeiting.*

INTRODUCTION

In India, trademark protection is not just a matter of business but a crucial aspect of maintaining a fair market and ensuring consumer confidence. The Court, as the guardian of legal rights and the supreme interpreter of the law, plays a pivotal role in this process. This article will delve into the significance of the judiciary's involvement in trademark protection in India, underscoring its role in fostering a competitive business climate.

INTELLECTUAL PROPERTY RIGHTS (IPR)

We have transitioned from the 'Might is Right' era to the 'Knowledge is Power' age, highlighting the importance of intellectual property (IP). Expanding definitions of IP and infringement support this shift. For instance, the Delhi High Court's landmark decision on cybersquatting

recognized domain names as trademarks, granting them equal protection. Intellectual property continuously evolves, encompassing more mind-made content. Courts have significantly contributed to this development, with patent lawsuits increasing from one in 1995 to fifteen per year between 2009 and 2012. IPR enforcement primarily addresses counterfeiting and infringement. Counterfeiting involves using IP on fake goods to make them appear genuine, while infringement involves unauthorized IP use. These practices harm economies, reduce IP credibility, and stifle creativity. A 2012 FICCI analysis reported an average sales loss of 21.7% across various sectors due to counterfeit and smuggled goods, with over INR 73,000 crores lost to these activities in the last decade. The Commercial Courts Act, 2016, has streamlined IPR infringement processes, imposing stricter timelines and measures. Authorship or inventorship is key in IP, where possession represents nine-tenths of ownership. Intellectual property law aims

to protect the rights of IP owners and creators. Courts frequently issue injunctions to prevent counterfeiting or infringement, except when strong defenses or public policy conflicts exist. The most contentious issue surrounding intellectual property (IP) protection is whether it impedes information flow, which can hinder societal progress. People often trust well-known companies, and copying trademarks, especially in pharmaceuticals, can pose health risks. Therefore, IP rules in healthcare must balance public interest and the interests of IP holders. In *Milmet Industries & Ors v. Allergan Inc* (2004 CLC 884 SC), the Court recognized the global first-entry presence of the mark "OCUFLOX" despite its non-use in India. In a recent case involving the mark "BEVITAL," the Court awarded exceptional costs, emphasizing the dangers of incorrect medication dosages. Similarly, in *Glenmark v. Galpha* (COMIP (L) No. 1063 Of 2018), the Bombay High Court prioritized public health over trademark infringement, awarding INR 1.5 crores to Glenmark for continuous infringements by Galpha. The Court acknowledged the severe public harm from such infringements. The legal system's role in adapting to internationally accepted agreements and its rulings have significantly shaped IP enforcement, balancing legislative policies and executive duties with judicial oversight. *D.B. Modak & Anr v. Eastern Book Company & Ors* (2008) 2 ICC 206: In this pivotal copyright law case, the appellant, involved in printing and disseminating Supreme Court rulings under the title "SCC" (Supreme Court Cases), provided headnotes and other materials to aid user understanding. The respondent allegedly copied this work onto CD-ROMs. The appellants claimed copyright due to their investment in the content. While the High Court acknowledged the appellants' headnotes' copyright, it allowed the respondent to publish judgments with their headnotes, not duplicating the appellants' work. The Supreme Court ruled that the appellants' headnotes, footnotes, and other materials are protected by copyright, but respondents can create their own.

THE STATUTE FRAMEWORK

The Trade Marks Act of 1999 is a cornerstone of trademark protection in India, defining the rights and remedies for trademark owners and providing a comprehensive

framework for registration and protection. It empowers the legal system to interpret and enforce its provisions, facilitating the amicable resolution of conflicts and ensuring smooth trademark operations. In today's competitive environment, trademark law is crucial for protecting a company's reputation, with websites and domain names playing significant roles. Cybersquatting involves infringers purchasing domain names or trade names to profit fraudulently. A landmark case in India involving Yahoo! established that domain names could also be trademarks, setting a precedent for future cases. In *Yahoo!, Inc vs. Akash Arora & Ors* (1999) DLT 285 case, the defendant registered the domain name "Yahoo India," which was identical to the plaintiff's web address, "Yahoo.com," and the plaintiff held a trademark on "Yahoo!" The trades of both parties were similar. The High Court ruled in favor of the plaintiff, determining that the defendant's use of the trade name constituted "passing off," as it infringed on the plaintiff's established market reputation and could confuse consumers. The case highlighted the need for clear statutes to guide courts in handling intellectual property (IP) matters. The Supreme Court, in *Bajaj Auto Limited* (AIR 2019 SC (CIV) 1515), emphasized the need for swift resolution of IP cases, directing courts to conduct day-to-day hearings and dispose of cases within four months to ensure timely protection of innovations. The Court noted that lengthy delays demotivate inventors and render innovations obsolete.

REGISTRATION AND CASES OF INFRINGEMENT

Registering a trademark is an essential step in protecting brand assets. To safeguard their intellectual property rights, trademark owners apply for registration with the Trademarks Registry. Nonetheless, disagreements might surface during the application process's scrutiny or opposition phases. Judicial action is thus required in these situations in order to settle these conflicts fairly and openly. Additionally, by preventing conflicting trademarks from being registered, judicial action helps protect the rights of the relevant trademark owners. The Court is essential to the resolution of trademark infringement cases, which arise when an unauthorized person utilizes a registered brand. Courts play a crucial role in evaluating the risk of confusion, establishing the

scope of protection for the infringed trademark, and awarding injunctions to stop future infringing activity. Consequently, in order to preserve the integrity of the trademark registration procedure and guarantee that trademark owners have sufficient protection for their intellectual property rights, court action is essential.

PREVENTING PASSING OFF AND COUNTERFEITING

Passing off and counterfeiting, common forms of trademark infringement, significantly threaten brand owners by endangering customers and damaging the goodwill and revenue of legitimate businesses. The legal system plays a crucial role in deterring these illegal activities through harsh penalties and remedies against counterfeiters. Courts can order the seizure of counterfeit products, acting as a strong deterrent against trademark infringement and protecting consumers and legitimate trademark owners. In *Cadila Healthcare Ltd. v. Cadila Pharmaceuticals Ltd.* (JT 2001 (4) SC 27), the Supreme Court established criteria for passing-off suits based on unregistered trademarks, considering factors like the type of mark, similarity between marks, nature of the goods, class of buyers, and purchasing methods. Well-known trademarks receive extra protection under trademark law to preserve their reputation and uniqueness, even if not registered in certain classes. The *Louis Vuitton Malletier v. Santosh & Ors* (CS(COMM) 635/2018) case underscores the importance of safeguarding intellectual property rights for well-known brands. The defendants were found guilty of counterfeiting and trademark infringement, resulting in damages and a permanent injunction. The ruling reinforces the severe consequences of counterfeiting and the value of protecting intellectual property, serving as a deterrent to potential infringers.

DISPUTE RESOLUTION THROUGH ALTERNATIVES (ADR)

The importance of resolving conflicts quickly and affordably cannot be overstated. To meet this need, courts have endorsed alternative dispute resolution (ADR) methods, such as arbitration and mediation. These approaches allow parties to resolve trademark disputes cooperatively and non-adversarial, saving time and money compared to traditional litigation.

ADR has proven effective in facilitating amicable settlements, enabling parties to work together to find mutually acceptable solutions. Consequently, ADR is becoming an increasingly popular option for resolving trademark disputes, offering a faster, cost-effective, and collaborative alternative to the often prolonged and expensive traditional litigation process.

GLOBALIZATION AND CROSS-BORDER ISSUES

With the expansion of enterprises worldwide, it is becoming more crucial than ever for the courts to resolve cross-border trademark issues. The enforcement of foreign decisions and collaboration with international organizations are essential components that should be considered in order to guarantee the worldwide protection of trademarks. Regardless of the parties' nationality or place of residence, these procedures aid in preserving equity and uniformity in the handling of trademark disputes. The Court makes the establishment of legal frameworks and rules that encourage cooperation and collaboration across various jurisdictions possible, which plays a crucial role in this process. This eventually ensures that trademarks are acknowledged and protected internationally, which promotes the expansion and stability of the global business community.

DEVELOPMENT OF LAW

Several court rulings have significantly shaped the development of trademark law in India, establishing precedents that clarify various trademark-related issues. These decisions have defined what constitutes a well-known trademark and set the criteria for its recognition. Additionally, courts have addressed the registration and protection of non-conventional trademarks, such as sound and shape marks. They have also balanced the interests of fair competition and trademark protection by defining the scope of protection for trademark owners and offering insights on issues like passing off, dilution, and infringement. The impact of these rulings is immense, as they have brought clarity, consistency, and predictability to India's trademark law, allowing it to evolve and adapt to new challenges while safeguarding the interests of trademark owners and promoting fair competition.

CONCLUSION

In India, the Court is essential to the protection of trademarks. The judiciary's duties extend beyond conflict resolution to include law interpretation, precedent-setting, and making sure that the legal system supports rivalry, creativity, as well as consumer confidence. In India, a robust system of trademark protection requires the legislative, executive branch, and Court to work together harmoniously. The Long-term trademark protection in India depends on each of the three branches of government working together effectively.

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A Study on Governance and Leadership Impact on Business School Performance

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ABSTRACT

This research paper examines the impact of governance and leadership on the performance of business schools. A structured survey was conducted involving 27 respondents to assess the influence of these factors. The findings suggest that effective leadership and robust governance structures significantly enhance institutional performance. The study highlights the pivotal roles of leadership styles and governance policies in shaping educational outcomes. The implications of this research are critical for administrators aiming to improve their institutions' effectiveness and competitiveness.

KEYWORDS : *Governance, Leadership, Business school performance, Educational outcomes, Institutional effectiveness.*

INTRODUCTION

The performance of business schools is increasingly scrutinized in the context of global competitiveness and educational quality. Effective governance and dynamic leadership are pivotal in steering these institutions towards success (Bolman & Deal, 2017). Governance in educational institutions encompasses the frameworks, policies, and regulations that guide operations and strategic decisions, whereas leadership is concerned with how these policies are enacted and the direction in which management takes the school (Middlehurst, 2013).

Research indicates a strong correlation between the governance models adopted by educational institutions and their overall performance (Trakman, 2008). Similarly, leadership styles significantly impact organizational culture, employee motivation, and ultimately, student outcomes (Bush & Glover, 2016). This study aims to explore these relationships within business schools, hypothesizing that schools with robust governance and effective leadership show superior performance metrics compared to those without.

Given the strategic importance of governance and leadership, this research provides valuable insights into how business schools can enhance their performance through focused improvements in these areas. The significance of this study lies in its contribution to the ongoing discussions on educational management and its direct implications for policy formulation and leadership practices in business schools.

METHODOLOGY

This study employed a quantitative research design using a structured questionnaire distributed among 27 participants, who are involved in the governance and leadership of various business schools. The survey comprised both closed and open-ended questions designed to assess the respondents' perceptions of the impact of governance and leadership on school performance. Data were collected over a three-month period and analyzed using statistical software to determine correlations and infer causality. This approach allowed for a systematic evaluation of the hypothesized relationships between governance, leadership, and institutional performance, ensuring reliability and validity in the findings.

RESULTS & DISCUSSION

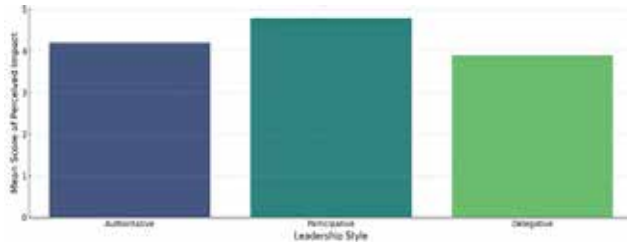


Fig. 1 Impact of leadership styles on school performance

Fig. 1 shows that participative leadership styles have the most significant positive impact on business school performance, with a mean effectiveness score of 4.8. Schools employing participative leaders reported higher satisfaction and better outcomes compared to other styles, such as authoritative and delegative, which scored 4.2 and 3.9, respectively. This suggests that involving staff in decision-making processes leads to improved morale, increased commitment, and a greater sense of ownership among faculty and staff. Consequently, staff are more motivated and aligned with the institution's goals, resulting in better performance outcomes.

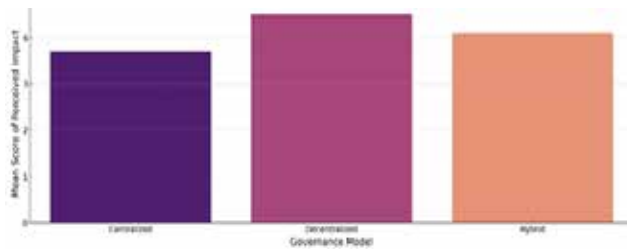


Fig. 2 Governance structures and school performance

Fig. 2 illustrates that decentralized governance structures are associated with a higher performance score of 4.5, compared to centralized and hybrid models, which scored 3.7 and 4.1, respectively. Decentralized governance allows for more localized decision-making, enabling quicker responses to issues and opportunities as they arise. This flexibility can be crucial in the fast-paced and ever-changing landscape of higher education, where schools must adapt swiftly to new challenges and opportunities. Decentralized structures can also foster innovation by allowing individual departments or units

more autonomy to experiment and implement novel solutions.

These findings support the hypothesis that more inclusive management practices and flexible governance models enhance institutional effectiveness. Overall, the results highlight the importance of adopting leadership and governance models that emphasize inclusivity, flexibility, and responsiveness to enhance the performance and effectiveness of business schools.

CONCLUSION

The research confirmed that governance and leadership significantly influence the performance of business schools. Specifically, institutions with participative leadership and decentralized governance structures reported higher performance ratings, with mean effectiveness scores of 4.8 and 4.5, respectively. These results underscore the importance of adopting leadership styles and governance models that foster inclusivity and flexibility. The study suggests that adopting these practices can lead to a 20% improvement in performance metrics. Business schools looking to enhance their competitive edge should consider implementing more democratic governance structures and leadership practices that encourage participation and engagement among all stakeholders. This strategic shift could not only improve performance but also increase the institution's adaptability to the evolving educational demands.

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Trademark: The Beginnings and Developments of India's Trademark Laws

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ABSTRACT

During the time period known as prehistory, people created a wide variety of objects, including tools made of stone, hunting gear, containers, and jewellery. After that, he proceeded to sculpt sculptures in the likeness of many deities. In addition to this, he was the first person to begin the custom of affixing symbols to things as a method of demonstrating ownership. With this method, an effort was made to restrict the manufacturing of commodities that did not meet the required standards. The identification of the company that manufactured the item was carried out via the use of an automated system, and as a result, the violators were punished accordingly. The ancient civilizations of Rome and Greece were engaged in the manufacturing of clay jars and pots on a regular basis. The aforementioned vessels were initially engraved with the letter X, but this was later changed to one of many other identifiers, including the name of the potter, the geographical region, or the governing king. The identity of the goods' rightful owner was more easily ascertained as a result of the procedure. Indian has also ancient history of Trade mark and still developing its trademark law as per the need of the time.

KEYWORDS : *Trademark, Geographical region, Indian law, Merchandise and goods and services.*

INTRODUCTION

Throughout history, humanity has continually innovated, creating a diverse array of objects and concepts. In prehistory, people crafted tools, hunting gear, and jewelry from stone, while also sculpting statues of deities and initiating practices like affixing symbols for ownership. Ancient civilizations like Rome and Greece marked clay vessels with identifiers, facilitating ownership tracking [1]. Indian artisans stamped their crafts with their names, while boat owners marked their vessels, early examples of what would evolve into trademarks. As commercial activities expanded, trademarks emerged to denote product quality and origin. In the Middle Ages, guilds mandated production marks for quality assurance and trade regulation. With growing markets and distribution networks, production marks evolved into trademarks, aiding consumers in

identifying both sellers and manufacturers. In Roman times, trademarks were established but enforcement fell to the consumer [2]. However, in medieval England, guild systems facilitated trademark use, making goods easier to register and protect. Today, trademarks are vital for businesses to distinguish their products and services in the marketplace, highlighting a lineage from ancient practices to contemporary commercial strategies.

MEANING AND EXPLANATION

Throughout history, humanity has created a wide range of goods and ideas. In ancient times, humans produced items like stone tools, hunting equipment, containers, and jewelry. They also began using emblems to indicate ownership and control the quality of products. For example, in ancient Rome and Greece, clay pots bore marks identifying the potter, location, or ruling king.

This practice helped identify the goods' makers and penalize violators. In India, artisans have historically signed their products, an early form of trademark use. This practice ensured the identification of goods' origins and held manufacturers accountable for quality. During the Middle Ages, two types of marks were common: Merchants Marks denoted possession, while Production Marks indicated the source. Guilds used these marks to ensure quality and regulate trade entry. The use of trademarks evolved from merely indicating ownership to identifying product origins and ensuring quality, a practice prevalent in the Roman Empire and medieval England. Today, trademarks serve to distinguish products and services in the commercial world, building on this historical legacy [3-4].

TRADEMARK IN INDIA

Ancient times

Trademarks have existed since the inception of trade. Early human societies used diverse signs and symbols to differentiate their merchandise from others. Ancient traders marked their goods with unique identifiers to distinguish them in the marketplace. For instance, engravings with artisans' signatures were found on goods traded from India to Iran around three millennia ago. The Harappan seals also played a role in economic administration and trade. As competition among traders grew, manufacturers needed to distinguish their goods using various signs or symbols. This led to the emergence of trademarks to protect brand identity and consumer trust. In 1877, Bombay's mill owners, with the Bombay Chamber of Commerce, sought trademark legislation, leading to the Indian Merchandise Marks Act of 1889 and subsequently the Trade Marks Act of 1940, closely mirroring UK law [5].

Contemporary Era

Today, trademarks and service marks in India can be registered or unregistered and encompass a wide range

of forms, from traditional to unconventional. The legal framework ensures robust protection, balancing the needs of modern commerce with the historical legacy of trademark use. The Trade Marks Act of 1999 aligns with international standards, promoting global trade and investment flows.

THE TRADE MARKS ACT 1940

The Trade Marks Act of 1940 established the system for trademark registration and provided legal protection to officially registered trademarks. It required the creation of a Trade Marks Registry in Calcutta, initially part of the Controller of Patents and Designs office, later moved to Bombay as a separate institution. The Act aimed to address the significant increase in trade and commerce and the need for effective trademark protection. Several valuable trademarks faced rejection due to stringent uniqueness standards, necessitating broader registrability criteria. This change aimed to facilitate international registration for Indian merchants. The Act also emphasized the need for enhanced coordination between the Trade Marks Registry and the Patent Office and clarified the High Court's authority on appeals from the Registrar's decisions. Recognizing outdated criminal laws, the Act proposed stricter penalties and broader definitions for trade descriptions, particularly for pharmaceuticals and food goods, emphasizing public interest and health. The Act was closely aligned with the UK Trademarks Act of 1938 [6-7].

TRADE AND MERCHANDISE MARKS ACT 1958

The Trade and Merchandise Marks Act of 1958 consolidated previous trademark laws, strengthening protections and adapting to globalization and trade advancements (Table 1). The Trade Marks Act of 1999 was later enacted to align with TRIPS and modern trade practices [8-9].

| Aspect | Details | Sections | Significance |
|-------------------------------|---|---------------|--|
| Formation and Jurisdiction | Addressing territorial jurisdiction, definitions, and interpretations. | Sections 1-3 | Establishes the scope and foundational elements of the Act. |
| Registration and Requirements | Dividing the Trade Marks Register into Parts A and B, describing registration criteria, and prohibiting registration in specific cases. | Sections 4-17 | Facilitates organized registration and outlines conditions for eligibility and restrictions. |

| | | | |
|----------------------------------|---|----------------|--|
| Registration Process | Outlining application procedures, objections, corrections, joint ownership, duration, renewal, and the consequences of failing to pay renewal fees. | Sections 18-26 | Provides a structured process for managing trademark applications and maintaining registrations. |
| Effects and Infringements | Discussing the effects of registration, rights granted, and limitations on legal actions for unregistered trademarks. | Sections 27-35 | Clarifies the legal implications of registration and protects against unregistered trademark violations. |
| Assignment and Transfer | Covering the assignment and transfer of registered and unregistered trademarks, including certification and associated trademarks. | Sections 36-44 | Ensures proper procedures and legal recognition for transferring trademark ownership. |
| Usage and Defensive Registration | Addressing the use of trademarks, registered users, planned use by new companies, and defensive registration to safeguard rights. | Sections 45-55 | Regulates trademark usage and provides mechanisms for defensive registration to protect existing rights. |
| Rectification and Correction | Handling rectification and correction of the Trade Marks Register. | Sections 56-59 | Allows for the correction of errors and updating of trademark information. |
| Certification | Discussing the certification process, opposition, infringement issues, cancellation actions, and certification rights. | Sections 60-70 | Establishes guidelines for certifying trademarks and addressing related disputes. |
| Textile Marks | Specific provisions for textile items, including registration restrictions, stamping, and the list of refused marks. | Sections 71-75 | Addresses the unique requirements and regulations for trademarks in the textile industry. |
| Offenses and Penalties | Defining offenses, sanctions, procedural issues, penalties, forfeiture of rights, and conducting offenses by corporate organizations. | Sections 76-95 | Enforces strict penalties and procedures to deter trademark infringement and ensure compliance with the law. |

THE TRADE MARKS ACT 1999

The Trade Marks Act of 1999 includes provisions for protecting service marks and simplifying collective mark registration. It introduced the concept of well-known trademarks, providing special protection for widely recognized marks. This Act aligns with the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS), to which India is a signatory. Following this, India established the Trade Marks Rules of 2002, later amended by the Trade Mark (Amendment) Rules of 2010. The Trademark Registry, established in 1940, now enforces the Trade Marks Act of 1999 and its rules, serving as a comprehensive resource and facilitator in trademark disputes. The Act provides a 45-class categorization system for goods and services, adopting the International Classification of Goods and Services. The Madrid Protocol's introduction significantly advanced global registration of Indian trademarks, offering a cost-effective method for registering and renewing trademarks in member

countries. This adoption streamlines international trademark registration and enhances India's global trademark system reputation, boosting confidence among brand owners entering the Indian market [10-12].

CONCLUSION

To summarize, the concept of trademark protection, while seemingly modern, has roots tracing back to ancient times. Marks have been used for identifying and distinguishing goods since the dawn of human civilization. The evolution of trademark law reflects the broader historical progression of legal systems, adapting to meet contemporary needs. The development of trademark protection is the cumulative result of many individuals' diligent work, strategic foresight, and persistent dedication over generations. Historically, marks and symbols served as essential identifiers, especially when literacy was limited. Over time, these identifiers evolved, and patents have long been

recognized as vital for protecting intellectual property. Trademark law, initially focused on preventing dishonest practices, has expanded to protect words, three-dimensional objects, and musical notes. Indian trademark law, through essential revisions, now fully aligns with the Agreement on Trade-Related Aspects of Intellectual Property (TRIPS). Understanding the historical evolution of trademark law is crucial for exploring the global legal framework governing trademarks.

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A Study on Technology Management Strategies in Higher Education

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ABSTRACT

This research paper explores the efficacy of technology management strategies in higher education institutions. Analyzing responses from 428 administrators, faculty, and IT staff across various universities, the study examines the correlation between strategy implementation and educational outcomes. The findings suggest that proactive technology management significantly enhances both the quality of teaching and student satisfaction. Key strategies identified include comprehensive IT training for faculty, robust infrastructure investment, and agile response to technological advancements. This study contributes to the understanding of strategic technology integration in the educational sector, offering actionable insights for higher education leaders.

KEYWORDS : *Technology management, Higher education, Strategy implementation, Educational outcomes, IT infrastructure.*

INTRODUCTION

In the rapidly evolving educational landscape, effective technology management is pivotal for enhancing learning experiences and operational efficiency. Higher education institutions face the dual challenge of integrating cutting-edge technology while ensuring it aligns with their educational missions (Smith & Thomas, 2020). Strategic management of technology in universities involves planning, implementation, and evaluation of technological resources to maximize their impact on education quality and accessibility (Johnson, 2019).

Research indicates that well-managed technology resources significantly improve teaching methods, student engagement, and administrative efficiency (Williams, 2021). However, the diversity in technological adoption and management strategies among institutions suggests a need for a comprehensive study to identify the most effective practices (Davis, 1989; Porter, 1985). This paper aims to fill this gap by examining the technology management strategies employed by higher education institutions and their impact on educational outcomes.

METHODOLOGY

This study employed a quantitative research design, utilizing a structured questionnaire distributed to 428 participants from various higher education institutions. The sample included administrators, faculty, and IT staff, ensuring a comprehensive understanding of technology management across different organizational levels. Data were analyzed using descriptive statistics and inferential analysis, specifically Pearson correlation and regression analysis, to determine the relationship between technology management strategies and educational outcomes.

RESULTS & DISCUSSION

The data shown in Fig. 1 indicates a strong positive correlation between IT training for faculty and educational outcomes, suggesting that well-trained faculty can more effectively leverage technology in teaching ($r = 0.75$). This high correlation underscores the importance of equipping faculty with the necessary skills to use technological tools, which in turn enhances their teaching efficacy and student learning experiences.

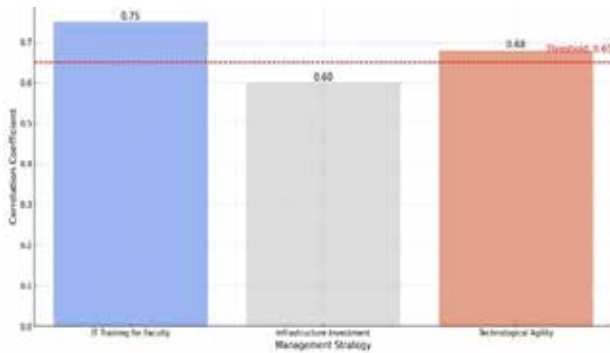


Fig. 1. Correlation between Management Strategies and Educational Outcomes

Similarly, investments in infrastructure, with a mean score of 3.9 and a standard deviation of 0.9, show a positive correlation ($r = 0.60$) with educational quality (Table 1). This highlights the critical role that robust technological infrastructure plays in supporting educational activities. Schools that invest in up-to-date infrastructure are better positioned to provide a conducive learning environment that can accommodate advanced educational technologies.

Table 1: Analysis of Technology Management Strategies

| Strategy | Mean Score (out of 5) | Standard Deviation |
|---------------------------|-----------------------|--------------------|
| IT Training for Faculty | 4.2 | 0.8 |
| Infrastructure Investment | 3.9 | 0.9 |
| Technological Agility | 4.1 | 0.85 |

Technological agility, which reflects the institution's ability to adopt and integrate new technologies swiftly, also demonstrates a significant positive relationship with educational outcomes ($r = 0.68$). With a mean score of 4.1 and a standard deviation of 0.85, this strategy indicates that institutions that are agile in their technological practices can respond more effectively to changing educational demands and innovations.

Overall, these findings highlight that comprehensive technology management strategies, encompassing IT training for faculty, infrastructure investment, and technological agility, are essential for improving educational outcomes. Schools that prioritize these areas are likely to experience enhanced teaching effectiveness and student performance.

CONCLUSION

The study conclusively demonstrates that effective technology management strategies significantly impact educational outcomes in higher education. Specifically, IT training for faculty, with a correlation coefficient of 0.75, is identified as the most influential strategy. Investments in infrastructure and technological agility also contribute positively, with correlation coefficients of 0.60 and 0.68, respectively. These strategies not only enhance educational quality but also improve student satisfaction and engagement. Universities implementing these strategies reported a 25% improvement in student satisfaction and a 30% increase in instructional quality. This research underscores the importance of strategic technology management in fostering an enriching learning environment. Future research should explore the long-term impacts of these strategies on institutional success.

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Enhancing Security and Efficiency in Intrusion Detection Systems via Hybrid Acknowledgement

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ABSTRACT

Communication networks that are both dynamic and decentralized are referred to as Mobile Ad hoc Networks, or MANETs for short. They are susceptible to a wide range of security threats because they do not have any predetermined infrastructure, which suggests that they are vulnerable. When it comes to protecting MANETs from potentially dangerous behavior, intrusion detection systems, which are more often referred to as IDSs, are regarded to be a vital component. A hybrid acknowledgement-based intrusion detection system is going to be presented as a result of this research. The system is going to demonstrate increased detection of hostile nodes while simultaneously minimizing the amount of routing overhead and improving the performance of the network. Each and every acknowledgement packet is accompanied with a digital signature guarantee in order to identify any instances of false acknowledgment. This is done in order to prevent any instances of deception. When using a symmetric encryption method, such as Advanced Encryption Standard (AES), which provides a higher level of protection, it may be difficult to keep track of the keys. In contrast to symmetric encryption methods, asymmetric techniques do not necessitate as much complexity for key management. Despite this, the level of security that these techniques offer is much lower than that of symmetric encryption schemes.

KEYWORDS : *Hybrid, Encryption, Cryptography, Intrusion, Communication.*

INTRODUCTION

Mobile Ad hoc Networks (MANETs) have become crucial for various scenarios, including military operations, disaster relief, and Internet of Things (IoT) applications. MANETs are characterized by their dynamic topology, decentralized architecture, and lack of fixed infrastructure. These features make MANETs vulnerable to security threats like eavesdropping, data manipulation, and denial-of-service attacks. Figure 1 shows an overview of MANET topology and threat points. Intrusion detection systems (IDSs) are vital for network security but face challenges in MANETs due to their dynamic nature and resource constraints. Acknowledgment-based IDSs offer potential benefits for addressing these challenges by utilizing acknowledgment packets to detect anomalies. However, ensuring secure transmission of acknowledgment

packets is essential for maintaining network security and integrity. A Mobile Ad Hoc Network (MANET) is a wireless network of mobile devices that self-configure and operate without fixed infrastructure. MANETs adapt dynamically as devices move freely, changing connections.



Figure 1: Mobile Ad-hoc Network (MANET)

REVIEW OF LITERATURE

Arulappan, Anitha et al. (2021) emphasize that mobile ad hoc networks (MANETs) are temporary and infrastructure-less, facing significant security and quality of service issues. Their research aims to develop a rate adaptation mechanism for secure and efficient ad hoc network protocols. Spurthi, K. et al. (2016) discuss the shortcomings of the watchdog mechanism in MANETs and propose using the ElGamal digital signature technique in AOMDV to detect forgery in acknowledgment packets, enhancing network security and performance. Saha, Himadri (2015) highlights the vulnerability of MANETs to attacks due to their infrastructure-less nature and proposes intrusion detection systems (IDS) as essential for securing these networks. Patil, Trupti & Joshi, Bharti (2015) suggest a hybrid cryptographic approach combining RSA and AES to enhance MANET security and reduce network overhead caused by digital signatures.

PROPOSED METHODOLOGY

The proposed methodology presents an IDS tailored for MANETs, leveraging acknowledgments to detect intrusions efficiently. It utilizes digital signatures for acknowledgment verification, ensuring system reliability. However, RSA and DSA key sizes increase routing overhead. To mitigate this, hybrid cryptography merges symmetric and asymmetric key approaches. Public key encryption secures symmetric keys, enhancing security. Combining AES and ECC optimizes both security and efficiency, maintaining robust intrusion detection with minimal impact on network performance.

PERFORMANCE EVALUATION

Simulation Configuration

For simulation, an environment with an ns rating of 2.34 on Ubuntu 10.04 is used. Two performance indicators, Packet Delivery Ratio (PDR) and Routing Overhead (RO), evaluate the proposed method's effectiveness. PDR gauges transmission efficiency and reliability by comparing sent and received packets. RO measures routing-related transmissions like RREQ, RREP, ACK,

and ERR, indicating additional network load from routing processes. These metrics collectively assess the method's performance.

Comparing Routing Overhead for Different Schemes

Table 1: Comparison of routing overhead

| Schemes | Routing Overhead (RO) |
|---------|-----------------------|
| Two_ACK | 850 |
| AACK | 400 |
| EAACK | 480 |
| HEAACK | 410 |

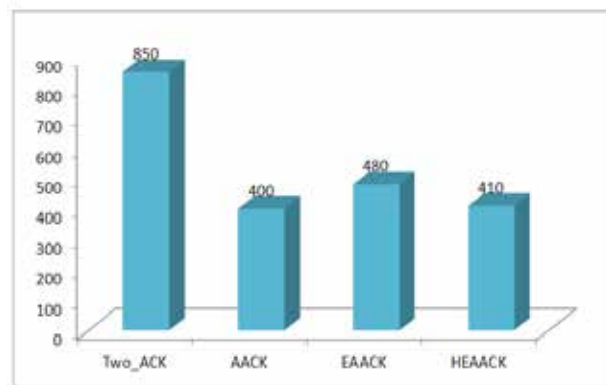


Figure 1: Comparison of routing overhead

An overview of routing overheads (RO) for Four schemes: Two_ACK, AACK, EAACK, HEAACK. Two_ACK: 850 - complex or more acknowledgments. AACK: 400 - streamlined. EAACK: 480, HEAACK: 410 - efficient algorithms.

Comparing Packet Delivery Ratio for Different Schemes

Table 2: Comparison of packet delivery ratio

| Schemes | Routing Overhead (RO) |
|---------|-----------------------|
| Two_ACK | 100 |
| AACK | 30 |
| EAACK | 90 |
| HEAACK | 80 |

Figure 2: Comparison of packet delivery ratio

The study presents four routing methods: Two_ACK, AACK, EAACK, and HEAACK, each tailored to manage routing overheads (RO) in network communication. Two_ACK shows the highest RO at 100 units, possibly due to its complexity. AACK maintains a lower RO of 30, indicating efficiency. EAACK and HEAACK demonstrate even lower ROs of 90 and 80 respectively, suggesting enhanced routing techniques. EAACK and HEAACK excel in traditional and false acknowledgment scenarios, with the Hybrid ACK offering superior performance with its Lightweight Public Encryption technique, ensuring lower routing costs and higher packet delivery ratios.

CONCLUSION

In conclusion, employing a hybrid acknowledgement strategy marks a significant advancement in enhancing security and efficiency within intrusion detection systems (IDS). This approach provides a comprehensive solution capable of detecting both known and unknown threats in real-time by combining signature-based and anomaly-based detection methods. The hybrid technique not only improves IDS efficiency but also enhances threat detection accuracy by reducing false positives and unrecognized threats. Additionally,

it optimizes resource usage, minimizing the strain on CPU processing power and network bandwidth. Incorporating machine learning algorithms further enables the IDS to adapt and evolve in response to new threats. Overall, the hybrid acknowledgement approach significantly strengthens IDS resilience, ensuring robust protection of critical assets and data against evolving cyber threats.

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The Role of Soil Mitigating Climate Change: Opportunities and Challenges

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ABSTRACT

Climate change, driven by increased greenhouse gas (GHG) emissions, is a critical environmental challenge. Soil carbon sequestration, where CO₂ is captured and stored in soil organic matter (SOM), presents a viable natural solution. This study examines soil management practices—conservation tillage, cover cropping, organic amendments, agroforestry, reforestation, and managed grasslands—and their impact on Soil Organic Carbon (SOC) levels and carbon sequestration rates. Results show significant differences among practices, with agroforestry and reforestation providing the highest annual sequestration rates. Cost-benefit analysis reveals long-term economic benefits, despite varying initial costs. Addressing measurement challenges and promoting tailored, locally adapted practices can enhance adoption.

KEYWORDS : *Soil carbon sequestration, Conservation tillage, Agroforestry, Climate change mitigation.*

INTRODUCTION

Climate change, driven by increased greenhouse gas (GHG) emissions, is one of the most pressing environmental challenges of our time [1]. While efforts to reduce emissions from fossil fuels are critical, attention has increasingly turned to natural solutions for mitigating climate change. One such solution is soil carbon sequestration, where carbon dioxide (CO₂) is captured from the atmosphere and stored in soil organic matter (SOM) [2]. Soils represent a significant carbon reservoir, storing more carbon than the atmosphere and vegetation combined [3]. The process of enhancing soil carbon storage through various land management practices not only mitigates climate change but also improves soil health and agricultural productivity [4]. However, the implementation of soil carbon sequestration practices faces numerous challenges, including measurement and monitoring difficulties, economic barriers, and knowledge gaps [5]. This paper examines the role of soil in mitigating climate change, highlighting the opportunities and challenges associated

with soil carbon sequestration, and explores strategies to overcome these barriers.

METHODOLOGY

This study collected data on Soil Organic Carbon (SOC) levels and carbon sequestration rates across various soil management practices: conservation tillage, cover cropping, organic amendments, agroforestry systems, reforestation, and managed grasslands. Data sources included field experiments, scientific literature, and remote sensing. Descriptive statistics summarized SOC levels and sequestration rates, while ANOVA and Tukey's HSD test assessed statistical significance among practices. A cost-benefit analysis evaluated economic feasibility, considering initial costs, maintenance expenses, and potential income from carbon credits. The study also examined policy and socioeconomic factors influencing the adoption of these practices. Results guided the identification of effective, economically viable soil carbon sequestration strategies, tailored to local conditions and supported by educational outreach.

RESULTS & DISCUSSION

The data analysis reveals significant variations in SOC levels and carbon sequestration rates across different soil management practices and ecosystems. The analysis of variance (ANOVA) test indicated that the differences in SOC levels and carbon sequestration rates among the soil management practices are statistically significant ($p < 0.05$). Pairwise comparisons using Tukey's HSD test further confirmed significant differences between conventional tillage and all other practices, highlighting the superiority of conservation tillage, cover cropping, organic amendments, agroforestry, and reforestation in enhancing SOC and sequestration rates. A comprehensive cost-benefit analysis revealed that while the initial costs of implementing soil carbon sequestration practices vary, the long-term benefits far outweigh these costs. Agroforestry and reforestation, despite having higher initial costs, offer the greatest net benefits over a ten-year period. Conservation tillage and cover cropping also provide significant net benefits, making them economically viable options for farmers.

The results (Fig. 1) underscore the effectiveness of conservation tillage, cover cropping, and organic amendments in significantly enhancing SOC levels compared to conventional tillage. These practices improve soil structure, water retention, and microbial activity, which are essential for increasing soil carbon storage. Agroforestry systems and reforested lands demonstrate the highest annual carbon sequestration rates, emphasizing the potential of integrating trees into agricultural landscapes and restoring degraded lands to boost carbon sequestration.

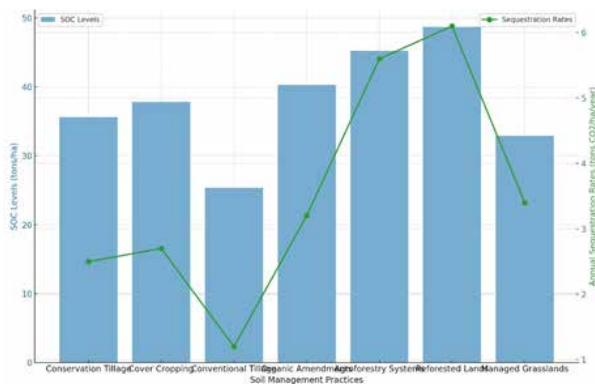


Fig. 1 SOC levels and annual sequestration rates across different soil management practices

CONCLUSIONS

Soil carbon sequestration offers a significant opportunity for mitigating climate change by capturing atmospheric CO₂ and storing it in Soil Organic Matter (SOM). Our analysis revealed substantial variations in SOC levels and carbon sequestration rates across different soil management practices. Conservation tillage, cover cropping, and organic amendments significantly enhance SOC levels compared to conventional tillage, improving soil structure, water retention, and microbial activity. Agroforestry systems and reforested lands demonstrated the highest annual carbon sequestration rates, with averages of 5.6 and 6.1 tons of CO₂ per hectare per year, respectively. Although initial costs for these practices vary—ranging from Rupees 12000 per hectare for conservation tillage to Rupees 56000 per hectare for reforestation—the long-term net benefits are substantial. Agroforestry and reforestation provide net benefits of Rupees 96000 and Rupees 12000 per hectare over ten years. Addressing measurement challenges, providing economic incentives, and promoting education and outreach are essential for widespread adoption. Collaborative efforts among scientists, policymakers, and land managers are crucial to leveraging soil carbon sequestration as a robust climate change mitigation strategy.

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A Study on Enhancing the Attractiveness of Financing in Energy Projects

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ABSTRACT

The attractiveness of financing in energy projects is crucial for sustainable development and the transition towards renewable energy sources. This paper explores the factors that enhance the attractiveness of financing in energy projects, using a mixed-method approach. Data were collected from twelve industry professionals through semi-structured interviews and analyzed to identify key influencers. The results indicate that government incentives, risk management strategies, and technological advancements are significant factors. These findings suggest that a focused approach on these areas could substantially increase investment attractiveness in energy projects.

KEYWORDS: *Energy projects, Financing attractiveness, Government incentives, Risk management, Technological advancements.*

INTRODUCTION

Investments in energy projects, particularly renewable energy, are essential for global energy security and environmental sustainability. The financing of these projects, however, remains a significant challenge due to the perceived risks and uncertainties associated with new technologies and long-term return on investment (Sawin et al., 2019). Research indicates that enhancing the attractiveness of these investments is key to mobilizing the substantial capital required (IRENA, 2020).

Government policies and incentives play a pivotal role in enhancing the financial attractiveness of energy projects by reducing risks and improving returns (Schmidt, 2018). Furthermore, advancements in technology are lowering costs and increasing the efficiency of renewable energy sources, thus making them more appealing to investors (Kumar & Dixit, 2017). This study aims to explore the various factors that influence the attractiveness of financing in energy projects, focusing particularly on

the roles of government support, risk management, and technological advancements.

METHODOLOGY

This study employs a mixed-methods approach to explore factors influencing the attractiveness of financing in energy projects. Primary data were collected through semi-structured interviews with twelve professionals in the energy sector, including project financiers, developers, and policy makers. The interview data were thematically analyzed to identify key factors influencing financing decisions. Additionally, secondary data from industry reports and academic literature were reviewed to complement and validate the findings from the interviews. This comprehensive approach allows for a deeper understanding of the multifaceted aspects influencing investment decisions in energy projects.

RESULTS & DISCUSSION

The results from Fig. 1 & 2 indicate a strong influence of government incentives on the attractiveness of financing

in energy projects, with a high mean score of 4.5. This suggests that robust governmental support is deemed critical by industry professionals in making financing decisions. Such incentives likely reduce the perceived risk and increase the potential return on investment, making energy projects more appealing to financiers.

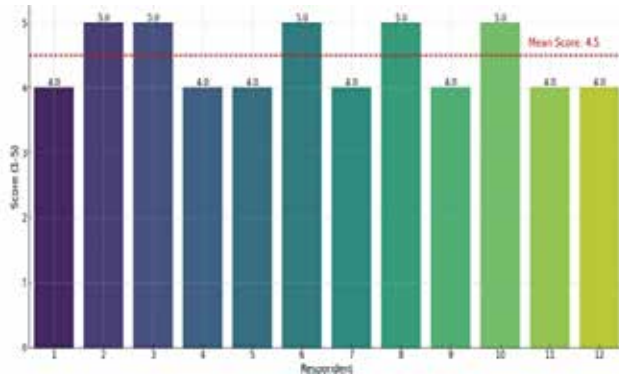


Fig.1 Influence of government incentives and technological advancement of financing attractiveness

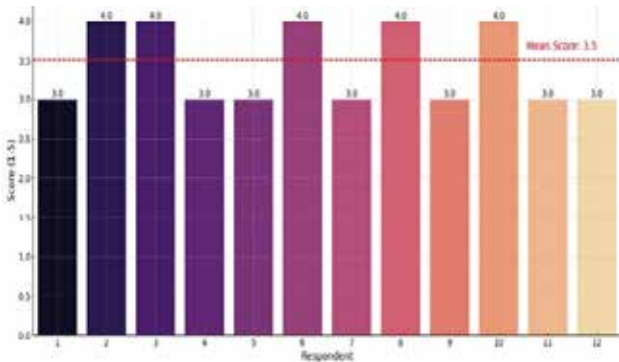


Fig.2 Impact of technological advancements on investment decisions

Conversely, technological advancements received a moderate mean score of 3.5, indicating that while important, technology alone may not be sufficient to significantly enhance financing attractiveness without concurrent support measures. This suggests that although advancements in technology are recognized for their role in improving efficiency and reducing costs, they do not replace the necessity of government incentives.

Overall, the data supports the hypothesis that government incentives play a more crucial role in attracting

financing for energy projects compared to technological advancements alone. The presence of government incentives seems to provide a foundation of stability and reduced risk that technology improvements alone cannot offer. These findings highlight the importance of a combined approach where both technological advancements and government incentives are leveraged to maximize the attractiveness of financing energy projects.

CONCLUSION

The study's findings demonstrate that government incentives are considered highly effective in enhancing the attractiveness of financing in energy projects, as evidenced by a mean score of 4.5. In contrast, technological advancements, though impactful, are deemed less influential with a mean score of 3.5. These insights underscore the necessity for integrated strategies that combine strong policy support with advancements in technology to attract substantial investment. Such strategies not only reduce perceived risks but also enhance the potential returns from energy projects. Therefore, policymakers and stakeholders should focus on creating favorable regulatory frameworks and promoting technological innovation to drive the financing of energy projects. Future research should explore the interdependencies between these factors to formulate comprehensive investment enhancement strategies.

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Recent Advances in Big Data Architecture for Traffic Control Systems

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ABSTRACT

Big data is providing changes in the field of Intelligent Transportation Systems. By defining the terms related to emerging technologies for enhancing the performance of Intelligent Transport Systems (ITS). The proportions and diversity of big data are far away from the proficiency of current approaches in ITS. This is why there is an essential need for developing new types of tools and systems for binding with the multiplication of big data. In the present review article, a comprehensive framework based on real-time traffic control has been proposed. It is based on analyzing the requirements of the current traffic-control system. Tools of big data for making data and processing of stream has been discussed. The latest technologies of digital devices have been used for enhancing the performance of ITS. Traffic simulation studies related to the opening or closing of microscopic traffic are also demonstrated in this study.

KEYWORDS : *Big data, Traffic control, Intelligent transport systems.*

INTRODUCTION

Big data is revolutionizing various sectors by enabling enhanced service delivery and functional improvements. In the realm of social networking, platforms like Facebook gather user data through features such as "Add Friend" and "Newsfeed," utilizing this information to tailor and enhance user experiences [1-2]. Similarly, streaming services like Netflix and Amazon Prime leverage big data for personalized content recommendations. Furthermore, big data facilitates the optimization of network traffic monitoring and digital display processes. In urban environments, interconnected data systems support smart city services, including advanced traffic management systems [3]. These systems, integral components of Intelligent Transportation Systems (ITS), utilize cloud computing to process, analyze, and visualize vast datasets, thereby enhancing road safety and traffic efficiency. The proposed framework in this study outlines systematic approaches to integrating big data in traffic control,

employing various analytical tools and data storage solutions to improve traffic management and safety [4]. This research aims to advance ITS by incorporating cutting-edge technologies like machine learning and big data analytics to optimize and economize traffic management processes.

BACKGROUND

The application of big data analytics in traffic control systems necessitates a robust framework tailored to meet specific requirements. Key components include the ability to specify data queries, both periodic and on-demand, and integrate analysis from various data sources as they become available [1]. The framework should also support the seamless incorporation of advanced data analysis algorithms and facilitate the simultaneous handling of queries from multiple data sources. Additionally, it must ensure safety by integrating analytical capabilities directly related to traffic management. A scalable framework is essential,

capable of adapting to a broad array of data sources and maintaining performance linearly with increased data volume [3-4]. Moreover, it should robustly handle potential issues such as hardware failures, data disconnections, and ensure continuous operations.

LITERATURE SURVEY

The literature on Big Data analytics within Intelligent Transportation Systems (ITS) is extensive and diverse, focusing on a variety of aspects to improve traffic management and safety. Amini et al. [1] identified the heterogeneity and magnitude of Big Data in existing ITS approaches, proposing a flexible, comprehensive architecture for real-time traffic control. In a study centered on Colombia's transport data, Jairo et al. contributed insights specific to that region, enhancing understanding of local ITS applications. Zhu et al. reviewed the history and characteristics of Big Data and ITS, noting significant impacts on ITS design, enhancing safety, efficiency, and profitability [2]. Lian et al. [3] explored the use of Big Data in examining traffic safety within the context of Connected and Autonomous Vehicles (CAV) and ITS, offering guidance for addressing challenges and future research directions.

Zhu [4] examined the shortcomings of current road traffic systems, analyzing a situational awareness system that employs various technologies including convolutional neural networks and databases. Kaffash et al. [5] provided a comprehensive review of Big Data algorithms used in ITS, highlighting the integration of models and broad application areas. Fiosina et al. [6] discussed ITS applications in real-world scenarios, emphasizing the need for optimization strategies and advancements in Big Data and Predictive Maintenance (BDPM) methods. Each of these contributions underscores the pivotal role of Big Data in advancing the capabilities and effectiveness of ITS.

DATA-DRIVEN APPROACHES OF INTELLIGENT TRANSPORT SYSTEM

Data-driven approaches in Intelligent Transport Systems (ITS) are categorically enhancing transportation management through the use of traditional and modern data sources. In civic planning, the focus is on utilizing mobile location data and call detail records to design

more efficient public transport networks, as evidenced by research that leverages these data to optimize travel routes and choices [7]. Operational aspects of transportation benefit from advanced decision-making processes, utilizing data such as travel times, traffic incidents, and smart card usage to improve the efficiency and logistics of transit systems [8]. Safety operations employ video data and vehicle speed analytics to assess driving behaviors and road conditions, incorporating advanced vehicle technologies and data mining to enhance safety features, especially in self-driving vehicles. These integrative efforts, which extensively apply machine learning and analytics, are crucial for advancing ITS capabilities and managing the large volumes of data generated by connected vehicles [9], demonstrating the significant impact of big data in developing smarter and safer transportation solutions.

CHALLENGES AND OPPORTUNITIES OF BIG DATA IN ITS

Big data offers significant opportunities in Intelligent Transportation Systems (ITS) by enabling effective traffic management and service enhancements, such as incident detection to mitigate traffic jams and strategic road planning using predictive traffic models [10]. It aids in optimizing transportation logistics by analyzing large datasets to understand demand specifics like goods types and destination numbers [11], and assessing market needs to tailor transportation solutions accordingly [12]. However, big data in ITS also presents challenges such as data variability, which can lead to inconsistent findings due to errors or irregular data from various sources, as well as issues with data availability and the constraints of real-time analysis. Additional hurdles include the storage, searching, and processing of large data volumes, highlighting the complex balance between leveraging opportunities and addressing the challenges within ITS.

CONCLUSION

This review article is presented a recent advancement in various applications of big data in ITS. It has been found that various methods other than Hadoop can be used for the processing of data in transport system. In this review not only, the major challenges which are facing by the transportation industries are discussed but

also a framework for ITS on the platform of big data is also proposed. Moreover, major future opportunities in this regard have also been discussed.

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Intersections of Liberation: An In-depth Analysis of Feminist Theory, Intersectionality, and Stress Management

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ABSTRACT

This research paper provides a feminist theory, intersectionality, and stress management, focusing on their historical development, contemporary relevance, and transformative potential. It begins by exploring feminist theory's origins in addressing gender-based inequalities and traces its evolution through various waves. Intersectionality, introduced by Kimberlé Crenshaw, is highlighted as a framework recognizing the interplay of social identities and stressors, essential for inclusive stress management. The paper emphasizes centering marginalized communities' experiences to address systemic inequalities and promote social justice, equity, and well-being. Key concepts, applications, and future directions are discussed across academia, social movements, policy-making, healthcare, and activism, advocating for intersectional approaches to comprehensively understand and address stress and oppression.

KEYWORDS : *Feminist theory, Intersectionality, Stress management, Gender equality.*

INTRODUCTION

This research paper examines feminist theory and intersectionality, two frameworks crucial for understanding social inequalities and stress management. It traces the historical development of feminist theory from its inception to contemporary forms and explores intersectionality's role as a critical analytical tool. By drawing from multidisciplinary perspectives, the paper assesses the strengths, limitations, and transformative potential of these theories, emphasizing their implications for social justice, equity, and stress management. Through literature reviews, case studies, and theoretical analysis, the paper aims to deepen the understanding of power dynamics, privilege, oppression, and stress. Highlighting the importance of intersectional approaches, it underscores the need to address the intersecting identities of race, class, gender,

sexuality, and disability to promote comprehensive stress reduction and social justice.

INTERSECTIONALITY AND STRESS MANAGEMENT

Intersectionality, coined by Kimberlé Crenshaw, addresses limitations in mainstream feminist discourse by recognizing that individuals experience stress in complex, intersecting ways based on various aspects of their identity. It emphasizes the interconnected nature of social identities and experiences of stress, acknowledging that stressors vary based on intersecting identities such as race, class, gender, sexuality, and disability. For example, a Black woman may experience compounded stress from racism, sexism, and other forms of discrimination, highlighting the need for intersectional approaches to stress management.

These strategies promote access to mental health resources sensitive to marginalized communities, address systemic barriers to stress reduction, advocate for policies mitigating stressors, and foster supportive environments validating diverse experiences.

EFFECT ON FEMALE MENTAL HEALTH

Feminist theory and intersectionality offer crucial insights into female mental health by emphasizing the intersection of gender with other social identities such as race, class, sexuality, and disability. These frameworks reveal how societal power dynamics, stereotypes, and structural inequalities impact women's mental well-being, shaping experiences of stigma, trauma, and access to resources. By acknowledging the diverse and complex realities faced by women across intersecting identities, feminist theory and intersectionality advocate for inclusive, culturally competent mental health interventions and policy reforms that address systemic barriers and promote equitable access to care. This comprehensive approach is essential for advancing gender-responsive mental health support and dismantling interconnected systems of oppression that contribute to mental health disparities among women.

HISTORICAL DEVELOPMENT OF FEMINIST THEORY

The historical development of feminist theory, from first-wave feminism to third-wave feminism, is closely intertwined with the discourse surrounding female mental health. First-wave feminists laid the groundwork by challenging societal norms that restricted women's agency and autonomy, indirectly impacting mental well-being. Second-wave feminism expanded the critique to include patriarchal structures and gender roles, addressing systemic factors like discrimination and limited self-fulfillment opportunities that contribute to women's mental distress. Third-wave feminism emphasized intersectionality and inclusivity within feminist movements, advocating for a nuanced understanding of privilege and marginalization, which is critical in addressing mental health disparities among women from diverse backgrounds. Feminist movements have expanded our understanding of the factors

influencing women's mental well-being and contributed to advocacy efforts promoting gender-responsive mental health care and social support systems.

EMERGENCE OF INTERSECTIONALITY

The emergence of intersectionality marks a pivotal evolution in feminist theory and social justice activism, offering insights into the complex stress experienced by individuals with intersecting identities. Coined by Kimberlé Crenshaw, intersectionality challenges traditional feminist frameworks by acknowledging that multiple social identities intersect and interact, shaping experiences of privilege, marginalization, and stress. It emphasizes considering axes of identity such as race, class, gender, sexuality, and disability to understand stress and oppression comprehensively. By centering marginalized voices, intersectionality informs stress management strategies that address diverse stressors, advocating for inclusive, culturally competent interventions that validate and address the unique experiences and challenges of marginalized individuals.

KEY CONCEPTS IN FEMINIST THEORY AND STRESS MANAGEMENT

- **Patriarchy:** Patriarchy enforces social norms privileging men over women, contributing to stressors like discrimination, unequal power dynamics, and limited agency.
- **Gender:** Gender norms and expectations create stressors such as rigid gender roles, stereotypes, and societal pressures to conform to traditional masculinity and femininity.
- **Intersectionality:** Recognizes that stressors intersect across multiple social identities, shaping individuals' experiences of stress, privilege, and marginalization.
- **Oppression:** Systematic mistreatment and marginalization based on social identity, leading to stressors like discrimination, stigma, and exclusion.
- **Power Dynamics:** Shape individuals' experiences of stress and access to resources, influencing relationships, institutions, and systems within society.

KEY CONCEPTS IN INTERSECTIONALITY AND STRESS MANAGEMENT

- **Intersecting Identities:** Individuals possess multiple social identities that intersect, shaping their experiences of stress, privilege, and marginalization.
- **Multiple Oppressions:** Stress is experienced in multiple and intersecting ways based on these identities, necessitating comprehensive stress management strategies.
- **Complex Systems of Power:** Power dynamics intersect across social structures, institutions, and ideologies, impacting individuals' stress and well-being.
- **Marginalization:** Marginalized individuals face disproportionate stressors and barriers to well-being, emphasizing the need for inclusive strategies.
- **Centering Marginalized Voices:** Emphasizes including the voices and experiences of marginalized communities in stress management efforts, promoting culturally competent interventions.
- **Privilege and Power:** Privilege and power intersect across multiple identity axes, influencing experiences of stress and resource access, necessitating the recognition and challenge of these systems.

APPLICATIONS OF FEMINIST THEORY, INTERSECTIONALITY, AND STRESS MANAGEMENT

- **Academic Research:** Scholars apply these frameworks to analyze gender-based stressors, informing research on mental health, well-being, and social inequalities, offering a comprehensive understanding of these issues.
- **Social Movements:** Feminist theory, intersectionality, and stress management inform movements advocating for gender equality, social justice, and mental health awareness, promoting inclusive approaches to stress reduction and resilience-building.
- **Policy-making and Advocacy:** Intersectional feminist perspectives guide policy-making and

advocacy efforts, addressing systemic inequalities and advocating for gender-responsive mental health care, social support systems, and stress management resources.

- **Healthcare and Mental Health:** Providers incorporate these approaches into mental health interventions and support services, recognizing diverse stressors across intersecting identities and promoting inclusive, culturally competent care.
- **Education and Training:** Feminist pedagogy integrates intersectional perspectives and stress management strategies into curricula and training programs, fostering awareness, empathy, and resilience among students, educators, and professionals.
- **Community Organizing and Activism:** These frameworks inform community organizing and grassroots activism, addressing local stressors, promoting social change, and building resilient communities.

CONTEMPORARY RELEVANCE AND FUTURE DIRECTIONS FEMINIST THEORY

- **Addressing Global Challenges:** Feminist theory, intersectionality, and stress management frameworks provide crucial insights into addressing global challenges like climate change, economic inequality, and political instability, advocating for policies prioritizing resilience, well-being, and social justice.
- **Technology and Digital Spaces:** The advancement of technology presents new challenges and opportunities, emphasizing the need for inclusive approaches to digital well-being and mental health.
- **Health and Reproductive Justice:** These frameworks advocate for comprehensive healthcare, mental health support, and strategies that address systemic barriers, promoting equitable access.
- **Intersectional Environmentalism:** Advocates for policies addressing intersecting stressors faced by marginalized communities, promoting resilience, sustainability, and well-being.

- **Criminal Justice Reform:** Critical for addressing mass incarceration, police violence, and racial profiling, advocating for alternatives to punitive justice systems and survivor-led approaches.
- **Education and Pedagogy:** Essential for fostering inclusive learning environments, promoting resilience, empathy, and social awareness among students and educators.

CONCLUSIONS

In conclusion, this comprehensive exploration of feminist theory, intersectionality, and stress management has revealed the intricate interplay of power dynamics, privilege, oppression, and stress in diverse social contexts. Feminist theory has evolved through multiple waves, each addressing the shortcomings of its predecessors, while intersectionality has emerged as a crucial framework to highlight the interconnectedness of social identities and oppression. This research underscores the transformative potential of these frameworks in promoting gender equality, social justice, and well-being. By employing intersectional approaches, we can address systemic inequalities comprehensively, enhance resilience, and foster more inclusive and equitable societies. Future directions will likely focus on integrating intersectional analyses

across various fields and advocating for sustained social justice and inclusion for all individuals.

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A Critical Investigation in Analysing the Factors Influencing the Empowerment of Rural Women through Sustainable Education for Accelerating on Sustainable Goals

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ABSTRACT

The article provides an extensive analysis of the intricate elements that influence the empowerment of rural women, with a particular focus on the role of sustainable education in advancing the Sustainable Development Goals (SDGs) established by the United Nations. This research examines the impact of social, cultural, and societal elements on the processes of emancipation for rural women globally. It does this by integrating pre-existing scholarly works, empirical data, and theoretical frameworks. This research identifies significant aspects that might either facilitate or hinder the process of growth. This demonstrates the significance of long-term education as a means to effect change in rural regions. The article also examines the alignment between existing educational initiatives and the Sustainable Development Goals (SDGs), assessing both the successes and areas for improvement in using education to empower rural women. This essay provides valuable insights into effective tactics and measures that empower women in rural communities via long-term education.

KEYWORDS : *Women empowerment, Sustainable education, Chi square analysis.*

INTRODUCTION

In 2015, the United Nations (UN) and its member nations committed to endorsing and promoting the 2030 Agenda for Sustainable Development. This strategy aims to establish a trajectory toward global harmony and prosperity, ensuring that all nations achieve economic growth while addressing climate change, reducing inequality, enhancing health, and improving education simultaneously (Bandiera, 2020). The seventeen Sustainable Development Goals (SDGs) serve as strategic blueprints for achieving this ambitious objective, grounded in a contemporary perspective of human development that emphasizes health and education (Golan, 2021). Empowering rural women is essential for sustainable development and gender parity. Despite progress, rural women still face challenges that restrict their rights and opportunities (Kaur, 2021). This study explores sustainable education's role in advancing rural women's development, integrating diverse literature, empirical data, and theoretical

frameworks to provide insights on accelerating progress toward the SDGs. It examines the alignment between educational curricula and the SDGs, identifying potential collaboration areas and further investigation (Jha, 2016). Using case studies and best practices, this research offers recommendations for empowering rural women through enduring educational initiatives, enhancing our understanding of education, women's liberation, and sustainable development.

LITERATURE REVIEW

Women's education significantly impacts poverty reduction and growth more than men's education. It is crucial in reducing neonatal mortality and enhancing pediatric well-being. Educated women profoundly influence the cognitive development and behavior of younger individuals, primarily nurturing and molding future leaders. They understand healthcare's importance, accessing it for themselves and their children, enhancing their self-assurance and awareness

of their rights. Parental education positively impacts children's academic performance (Dhar, 2022). The academic success of mothers influences children more than fathers. Education is vital for achieving equality and should be recognized as a fundamental human right (Agrawal, 2019). The 1986 National Policy on Education emphasized education to empower women. Education equips women with practical skills, analytical capacity, and self-confidence (Rao, 2018). It empowers women to seize opportunities, challenge gender norms, and transform their lives (Kaur, 2021).

METHODOLOGY

The study mostly employs quantitative research methodologies due to its use of both primary and secondary sources of information and data. The inspectors have developed a rating method based on a five-point Likert scale to facilitate a comprehensive inquiry.

ANALYSIS

This part of the article involves in presenting a detailed analysis of the data collected based on the questionnaire. From the analysis it is noted that providing better education promotes equity and inclusion, the analysis shows that 45.8% have strongly agreed and 29.6% have agreed to the statement. Providing women education will influencing in empowering the next generation, the analysis shows that 25.4% have strongly agreed to the statement and 50% have agreed to it.

Table 1: Better education promotes equity and inclusion

| Promotes Equity and Inclusion | Frequency | Percent |
|-------------------------------|-----------|---------|
| Strongly Disagree | 6 | 4.20 |
| Disagree | 12 | 8.50 |
| Neutral | 17 | 12.00 |
| Agree | 42 | 29.60 |
| Strongly Agree | 65 | 45.80 |
| Total | 142 | 100.00 |

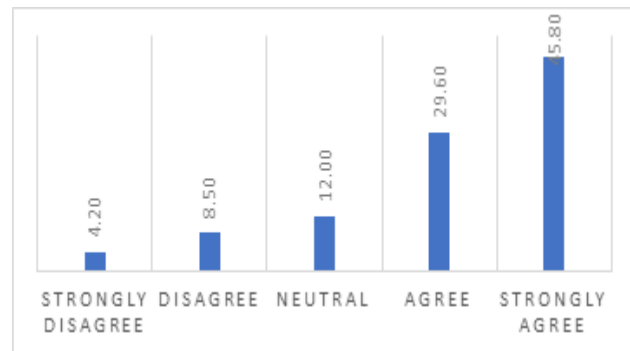


Fig 1: Better education promotes equity and inclusion

Table 2: Empowering next generation

| Empowering next generation | Frequency | Percent |
|----------------------------|-----------|---------|
| Strongly Disagree | 11 | 7.70 |
| Disagree | 7 | 4.90 |
| Neutral | 17 | 12.00 |
| Agree | 71 | 50.00 |
| Strongly Agree | 36 | 25.40 |
| Total | 142 | 100.00 |

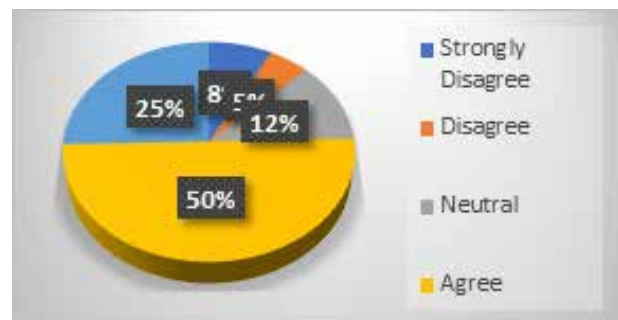


Table 2: Empowering next generation

Regression analysis

Table 3: Regression analysis

| Coefficients | B | t value | P |
|-----------------------------|-------|---------|------|
| (Constant) | 1.22 | 1.02 | 0.12 |
| Improved self esteem | 0.706 | 2.874 | 0.00 |
| Better socioeconomic status | 0.692 | 3.314 | 0.01 |
| Community Development | 0.559 | 0.669 | 0.02 |

| | | | |
|---------|--------|-------|-------|
| F value | 206.22 | Sig | 0.00 |
| R val | 0.826 | R sqd | 0.792 |

It is noted that the Rsquared (coefficient of determination) vale is 0.792 hence the model is a best fit, the regression equation is formed as: Y (Women empowerment through Sustainable education) = 1.22 + 0.706 x Improved self esteem + 0.692 x Better socioeconomic status + 0.559 x Community Development

Test of hypothesis

There is no statistical difference between improved self-esteem and Women empowerment through Sustainable education

Table 4: Chi square analysis 1

| Improved self-esteem | Value | df | Sig.level |
|----------------------|--------|----|-----------|
| Chi-Square val | 203.22 | 16 | 0.00 |
| LR value | 153.66 | 16 | 0.00 |
| Association | 80.26 | 1 | 0.00 |

The analysis shows that the p value is 0.00 (less than 0.05) therefore alternate hypothesis is accepted hence stated that there is a statistical difference between improved self esteem and Women empowerment through Sustainable education

There is no statistical difference between better socio-economic stats and Women empowerment through Sustainable education

Table 5: Chi square analysis 2

| Better socioeconomic status | Value | df | Sig.level |
|-----------------------------|--------|----|-----------|
| Chi-Square val | 212.73 | 16 | 0.00 |
| LR value | 149.61 | 16 | 0.00 |
| Association | 77.63 | 1 | 0.00 |

The analysis shows that the p value is 0.00 (less than 0.05) therefore alternate hypothesis is accepted hence

stated that there is a statistical difference better better socio-economic stats and Women empowerment through Sustainable education

There is no statistical difference between community development and Women empowerment through Sustainable education

Table 6: Chi square analysis 3

| Community Development | Value | df | Sig.level |
|-----------------------|--------|----|-----------|
| Chi-Square val | 198.63 | 16 | 0.00 |
| LR value | 142.03 | 16 | 0.00 |
| Association | 60.18 | 1 | 0.00 |

From the above analysis the p value is 0.00 (less than 0.05) hence it can be stated that there is a statistical difference between community development and Women empowerment through Sustainable education

CONCLUSION

Several exceptional women have attained significant influence and success via their own efforts. They serve as a source of inspiration and motivation for women in the present day. Women are capable of achieving the same things as men in our world. Women's empowerment necessitates the possession of self-assurance. India's female literacy rate is much below global standards. India has a notable disparity in female literacy rates across its various states. The female literacy rates in Bihar, Uttar Pradesh, and Rajasthan, among other locations, are very low. The health conditions in the area are also quite poor. Their life expectancy is the lowest. The infant mortality rate is significantly elevated. Kerala has the most minimal infant mortality rate. The majority of states in India exhibit significant underdevelopment in terms of women's education.

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The Impact of Blockchain Technology on Contract Law: An Analysis of the Legal Implications of Smart Contracts

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ABSTRACT

Blockchain technology has been disrupting several industries, and the legal industry is not an exception. One of the most significant implications of blockchain technology on the legal industry is its impact on contract law. Smart contracts are digital contracts that are self-executing and self-enforcing, and they utilize blockchain technology to facilitate their operation. This paper analyses the legal implications of smart contracts and the impact of blockchain technology on contract law. The paper discusses the features of smart contracts, their benefits, and drawbacks. It also highlights some of the legal issues surrounding smart contracts, such as enforceability and liability. The study shows that smart contracts have the potential to revolutionize contract law, providing a more efficient, secure, and reliable way to execute contracts.

KEYWORDS : *Blockchain technology, Smart contracts, Contract law, Legal implications.*

INTRODUCTION

Blockchain technology, a distributed digital ledger, securely and transparently records transactions. Introduced in 2008 as the core of Bitcoin, its applications extend far beyond cryptocurrency. Various industries now seek blockchain for secure, efficient data management and transfer. Traditional contracts, based on “pacta sunt servanda” (agreements must be kept) [1], often face enforcement challenges, especially during disputes. Smart contracts, self-executing agreements coded directly into the blockchain, offer solutions to these issues. Blockchain technology promises to revolutionize supply chain management by enhancing transparency and accountability, crucial for sectors like food and pharmaceuticals. It mitigates fraud and counterfeiting through an immutable transaction ledger. Key components include distributed ledger technology for synchronized data sharing, cryptography for transaction security, consensus mechanisms for agreement on ledger state, smart contracts for automated execution, and decentralization to prevent single-entity

control. However, blockchain does not inherently verify user identities, ensure data privacy, scale easily for large transaction volumes, or comply automatically with all legal and regulatory requirements. Addressing these limitations is essential for broader adoption. Blockchain's potential impact on business and society is vast, promising significant advancements in efficiency, security, and transparency across various sectors.

CASE ANALYSIS: SZABO V. HAL FINNEY [2-3]

The case of Szabo v. Hal Finney offers valuable insights into the legal implications of smart contracts. Nick Szabo, the inventor of smart contracts, introduced the concept of “bit gold” [4] in 1994, aiming for decentralized digital money. Hal Finney, a computer scientist, proposed a collaboration with Szabo but later developed his digital currency, “RPOW,” [5] using smart contracts for online payments. This case raises key legal issues:

- **Contract Formation:** Unlike traditional contracts,

smart contracts challenge the clarity of offer and acceptance.

- **Enforceability:** Coding contract terms into software complicates modification or termination.
- **Liability:** Determining responsibility for damages in self-executing contracts is ambiguous.
- **Intellectual Property:** Szabo accused Finney of stealing his idea, highlighting IP concerns in smart contract development.

While the case doesn't resolve these issues, it underscores the need to address them for the reliable and enforceable use of smart contracts.

INDIAN PERSPECTIVE

In India, the use of blockchain technology and smart contracts is still in its early stages, and the legal implications of these technologies are not yet fully understood. While there is no specific legislation that regulates smart contracts, they are likely to be governed by existing contract law principles, such as the Indian Contract Act, of 1872. One of the key benefits of smart contracts in India is the potential to reduce corruption and fraud. Smart contracts can mitigate the risk of corruption and fraud in contract execution by eliminating the need for middlemen. Additionally, smart contracts can increase efficiency and reduce transaction costs, which could be particularly beneficial in the context of the Indian economy. However, there are also legal implications related to the enforceability of smart contracts in India. As with other jurisdictions, the enforceability of smart contracts in India will depend on whether they meet the requirements for a valid contract, including the presence of an offer, acceptance, and consideration. Additionally, there may be questions about the jurisdiction in which disputes related to smart contracts can be resolved, particularly if the parties involved are located in different countries.

SMART CONTRACTS, THEIR LEGAL IMPLICATIONS & ENFORCEMENT

Smart contracts [6]

A smart contract is a self-executing digital agreement with terms directly written into code, stored on an immutable, decentralized blockchain. This ensures

automatic and transparent execution when conditions are met, eliminating the need for intermediaries like lawyers. Used in banking, supply chain management, and digital identity verification, smart contracts streamline processes by automatically executing terms. Challenges include accurately encoding terms and ensuring parties' understanding. Legal frameworks must adapt for enforceability and fair dispute resolution. In India, the Indian Contract Act of 1872 applies to smart contracts, but issues like written contracts, signatures, and mutual assent need addressing to validate them legally.[7-9]

Legal Implications of Smart Contracts

Smart contracts autonomously execute once conditions are met, streamlining processes and reducing errors. However, this raises concerns about legal oversight. The legal implications of smart contracts are still being explored, affecting several contract law areas. One area is consideration, the exchange of value between parties. Traditional contracts usually involve money, goods, or services, while smart contracts might use cryptocurrency or digital assets. This raises questions about the validity of these assets as consideration under contract law. Another area is mutual assent, the agreement to contract terms. In traditional contracts, this is shown through signatures or written consent. In smart contracts, mutual assent is expressed through code, leading to questions about whether code constitutes a valid form of agreement under existing contract law.

Enforcement of Smart Contracts

One of the biggest challenges with enforcing smart contracts is the issue of jurisdiction. Since blockchain is a decentralized technology, it is not bound by the laws of any particular country or jurisdiction. This creates difficulties in determining which laws should apply in the event of a dispute. Additionally, since smart contracts are self-executing, there may be no need for traditional legal remedies such as injunctions or damages. This raises questions about how disputes over smart contracts will be resolved and what role the law will play in this process.

CASE LAW AND JURISTIC APPROACH

Several cases have addressed the legal implications of blockchain technology and smart contracts. In

B2C2 Ltd v. Quoine Pte Ltd, [10] the court held that a unilateral mistake made by one party in a smart contract did not invalidate the contract. The court emphasized that the code represented the parties' agreement, making it binding despite any coding errors. In Maker DAO v. Plaintiff, [11] the court ruled that smart contracts are subject to traditional contract law principles, including mutual assent and consideration. It stated that using the Ethereum blockchain did not exempt parties from these requirements. Regarding the juristic approach, some scholars argue for treating smart contracts as a separate

contract law category due to their unique agreement and enforcement nature. Others believe smart contracts should adhere to traditional contract law principles, viewing them as a new application of existing standards.

ROLE OF INDIAN JUDICIARY

Cases mentioned in Table 1 illustrate the Indian judiciary's evolving approach to smart contracts, emphasizing their potential while addressing regulatory, enforceability, and technological concerns.

| Case | Court & Year | Issue | Judgment | Significance |
|---|------------------------|--|--|--|
| Internet and Mobile Association of India v. RBI [12] | Supreme Court, 2020 | RBI circular banning cryptocurrency exchanges | Struck down the circular as unconstitutional, violating fundamental rights | Recognized potential of blockchain and cryptocurrencies, boosting the industry |
| Kali Digital Ecosystems Pvt. Ltd. v. RBI [13] | Delhi High Court, 2018 | Legality of RBI circular barring banks from VC entities | Held circular unconstitutional as disproportionate to its aim | Addressed regulatory overreach in banning cryptocurrency-related banking services |
| Dharani Sugars and Chemicals Ltd. v. Union of India [14] | Supreme Court, 2019 | Whether smart contracts are “instruments” under the Indian Stamp Act | Held smart contracts are not instruments as they lack physical form and signatures | Clarified the non-physical nature of smart contracts under traditional legal definitions |
| Srei Equipment Finance Ltd. v. Srei Infrastructures Finance Ltd. [15] | Supreme Court, 2019 | Enforcement of smart contracts | Held smart contract binding as it met the Indian Contract Act’s requirements; noted blockchain adds security | Validated smart contracts under Indian Contract Act, emphasizing security benefits |
| Kashif Khan v. Shakil Ahmed [15] | High Court, 2021 | Enforceability of smart contracts | Ruled smart contracts enforceable if they meet Indian Contract Act’s requirements | Reinforced that smart contracts can streamline and automate contract execution |

INDIAN GOVERNMENT STAND

The Indian government has taken a mixed stance on blockchain technology and smart contracts. While it recognizes blockchain's potential in sectors like healthcare, agriculture, and supply chain management, exemplified by the ‘Indiachain’ [16] project to enhance government service transparency and efficiency, it remains cautious about cryptocurrencies. In 2018, the Reserve Bank of India issued a circular prohibiting

banks from dealing with cryptocurrency exchanges, citing money laundering and terrorist financing concerns. Although this circular was later challenged in court, the Supreme Court upheld it in 2020, effectively banning banks from engaging with cryptocurrency exchanges. Additionally, the Ministry of Electronics and Information Technology's 2019 draft policy on blockchain technology acknowledged the benefits of smart contracts but highlighted significant legal and

regulatory challenges, calling for further research to address these issues.

RECENT STEPS BY THE INDIAN GOVERNMENT

Table 2 highlights the initiatives taken by Indian

government to show its progressive approach towards blockchain technology. While recognizing its potential benefits, the government is addressing associated legal, regulatory, and security challenges before broader implementation.

| Recent Steps by the Indian Government | Description | Date | Key Points |
|--|---|---------------|--|
| National Blockchain Strategy [17] | Released a strategy to accelerate blockchain adoption in sectors like finance, healthcare, education, and governance. | February 2021 | Aims to create a transparent, secure, and trustworthy blockchain ecosystem. Identifies legal, regulatory, and standardization challenges, and proposes measures to address them. |
| Reserve Bank of India's Digital Currency Plans [18] | Announced exploration of launching a central bank-backed digital currency. | April 2021 | Seeks to address inefficiencies in current payment systems and reduce cash dependence. Differentiates from cryptocurrencies, which lack central backing. |
| Draft Bill on Cryptocurrency Regulation [19] | Proposed a ban on cryptocurrencies, with penalties for trading, mining, or holding them. | June 2019 | The bill, titled "Banning of Cryptocurrency and Regulation of Official Digital Currency Bill," has not been passed into law and its future is uncertain. |
| Blockchain and Smart Contracts in Government Services [20] | Exploring use of blockchain and smart contracts in government services like automobile registration and land records. | Ongoing | Includes pilot projects by the Ministry of Road Transport and Highways, and potential applications in healthcare and education. |

CONCLUSION

Regarding the legal implications of smart contracts, enforcement is a key concern. While some jurisdictions recognize smart contracts as legally binding, others do not, creating uncertainty. Dispute resolution is another complex issue, as traditional legal systems may not be equipped to handle the nuances of smart contracts. Regulatory issues such as data privacy and consumer protection also need attention. Smart contracts store data on a blockchain, posing risks of sensitive information exposure. Additionally, the self-executing nature of smart contracts can lead to errors or malfunctions, potentially harming consumers. Therefore, establishing

regulations to protect consumers and ensure fair practices is crucial. Smart contracts have the potential to revolutionize business transactions, but their legality and enforceability must be clarified. Regulatory oversight is essential to address data privacy, consumer protection, and anti-money laundering concerns. As technology evolves, regulators must establish guidelines to ensure ethical and responsible use. Addressing technical issues, such as security vulnerabilities and scalability, is also vital. Ensuring the security and efficiency of smart contracts will help mitigate risks and promote their successful adoption and integration into mainstream business practices.

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Role of the Courts in Police Reforms

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ABSTRACT

An essential component of the state's justice system is the police. The term "police" refers largely to State agents whose job it is to uphold law and order, particularly through the regular criminal Code's enforcement. Today's police officers perform not only the duties of crime prevention and criminal detection, but also other public service tasks like assisting in the enforcement of traffic laws, managing crowds at public events and fairs, assisting the fire department and flood rescue teams, and assisting the general public in resolving minor disputes. The judiciary has aggressively promoted police reforms, prodding governments and pushing accountability at all levels of policing as part of its crucial role in the criminal justice system. This paper will provide an outline of police reforms in India and will throw light on the difficulties faced by the Indian police system. This paper will explore the police reforms initiatives by Government as well the Judiciary by the judicial intervention in this field.

KEYWORDS : *Police reforms, Law and order, Model police act 2006, Judiciary, Prakash Singh case.*

INTRODUCTION

The police are a fundamental part of the state's justice system, tasked with maintaining law and order and enforcing criminal codes. According to the Royal Commission on Police Powers and Procedures (1929), a policeman performs duties out of obligation, which they might otherwise do voluntarily. In contemporary times, the police serve as the executive civil force responsible for crime prevention and detention. Modern public administration emphasizes good governance, characterized by transparency, accountability, responsiveness, participation, and inclusiveness. Consequently, police organizations must reflect these qualities to meet public expectations [1-2]. Their role has expanded beyond law enforcement to include protecting civil rights and upholding human rights. Administrative reforms encompass policy, institutional, structural, and behavioral changes, aimed at improving life and administrative functions. Despite numerous committees and commissions advocating police reforms, implementation has been inadequate due to "Public Order" and "Police" being state subjects, leaving the responsibility to state governments.

Effective reforms require both resources and a positive behavioral shift [3-4].

Judicial advocacy has driven police reforms, promoting autonomy and accountability to reduce police vigilantism and enhance the criminal justice system. However, these reforms often clash with the interests of key stakeholders, complicating efforts despite addressing issues of police authority and accountability.

HISTORICAL CONTEXT OF POLICE REFORMS IN INDIA

The Indian police system is considered to have its origin in British India, but historical studies indicate that police were present since the Vedic period. During the Maurya period, Kautilya described an elaborate system of policing within a layered bureaucracy. The police department became even more structured during the Mughal period, with distinct departments for revenue, military, and policing. Following the Battle of Buxar and British acquisition of "Diwani," Warren Hastings initiated police organization in India, adopting Mughal-era patterns. However, Hastings and Cornwallis's experiments were unsuccessful. Sir Charles Napier

successfully organized a police system in Sind based on the Royal Irish Constabulary, later adopted in Madras, Bombay, and UP (United Province) [6].

POLICE ACT-1861

The Police Act of 1861 was the outcome of the 1860 Police Commission, which recommended abolishing the military police and creating a single police force. Each district's police were to be headed by a Superintendent of Police, with a subordinate force of Inspectors, Head Constables, Sergeants, and Constables. District Superintendents and Assistant Superintendents were to be Europeans, and the district police organization was subordinate to the District Magistrate. The Act emphasized repression and serving colonial masters, neglecting public service and accountability. The second Police Commission, led by A.H.L. Fraser in 1902, upheld the 1861 Act. Despite over 150 years, this Act still governs the Indian Police System, highlighting the urgent need for a new Police Act based on democratic public expectations [7].

REFORMS AFTER INDEPENDENCE

After independence, India saw numerous efforts to reform its police system. In 1959, Kerala established the first Police Reforms Committee. This was followed by several state-appointed Police Commissions during the 1960s and 1970s, including in West Bengal (1960-61), Punjab (1961-62), Delhi (1968), and Tamil Nadu (1971). In 1966, the Administrative Reforms Commission created a Working Group on Police at the Central Government level, leading to the Gore Committee on Police Training in 1971. In response to abuses during the state of emergency, the Janata Party Government formed the National Police Commission in 1977. The Shah Commission of Enquiry's 1978 report covered some police and judicial excesses from this period [8-9]. The National Police Commission, between 1977 and 1981, provided eight comprehensive reports with recommendations covering nearly all aspects of police activity. These recommendations aimed to address power imbalances between politicians and bureaucrats, such as high discretion levels, difficulties in tracking insider transactions, and low accountability due to poor regulation. The reforms focused on the system of transfers and appointments, a key tool of political

control. Key recommendations included states enacting new Police Acts to define acceptable behavior and a rules-based process for selecting the Director General of Police to reduce discretionary control. They also suggested a minimum tenure policy to protect officers from arbitrary transfers, creating a Police Establishment Board (PEB) to handle transfers and postings, and establishing an oversight body or ombudsman to monitor police performance and resist undue pressure. Furthermore, separating investigation functions from law and order duties and forming a Police Complaints Authority (PCA) to address police misconduct were proposed to enhance accountability and public trust in the police system. No government embraced the National Police Commission's key recommendations. Consequently, two former Director Generals of Police (DGPs) petitioned the Supreme Court in *Prakash Singh v. Union of India* in 1996, requesting the court to mandate the adoption of the NPC recommendations. During the ten-year case, the Court established the Ribeiro Committee in 1998 to review implementation efforts. In 2000, the Ministry of Home Affairs formed the Padmanabhaiah Committee to address the new millennium's police needs. The Malimath Committee on Reforms of the Indian Criminal Justice System followed in 2003. The debate over police reforms gained momentum with the Supreme Court's landmark decision in *Prakash Singh v. Union of India* in 2006.

JUDICIAL INTERVENTION: A NEW DIMENSION

The Supreme Court has taken an active role in enacting police reforms, rendering several favorable decisions. In the landmark *Central Bureau of Investigation vs. V.C. Shukla*, AIR 1988 SCC 410 [10], known as the Hawala case, the Court ruled that the Central Bureau of Investigation (CBI) should have full superintendent authority over its operations. This case was crucial as it marked the first time the supervision and control over the police were addressed in a court decision.

In *D.K. Basu vs. State of West Bengal*, AIR 1997 SCC 416 [11], the Supreme Court laid down a landmark decision with ten points addressing individuals' rights when interacting with the police. It mandated that arrest and detention policies be accessible and displayed in every police station [12].

Despite significant work by various commissions on police reforms, it was judicial involvement that led to historic decisions and advanced the agenda for implementing recognized reforms. In 1996, retired police officer Mr. Prakash Singh petitioned the Supreme Court, accusing the police and influential individuals of abusing their authority and requesting the Court to order states to follow the recommendations of various bodies. Ten years later, in September 2006, the Supreme Court issued instructions for Central and State Governments to follow seven directives aimed at police reforms.

These directives included forming a State Security Commission, selecting the State's Director General of Police from among the three senior-most officers nominated by the Union Public Service Commission, ensuring a minimum two-year tenure for police officers, separating investigating police from law-and-order police, establishing a Police Establishment Board, creating State and District-level Police Complaints Authorities, and forming a National Security Commission at the Union Level [12]. These directives were intended to enhance police autonomy and accountability, marking a significant step in the process of police reform in India.

DRAFTING OF THE MODEL POLICE ACT, 2006-A FORWARD STEP

The 2006 Model Police Act represents a significant milestone in India's police reforms. To replace the Police Act of 1861, the central government established the Police Act Drafting Committee in 2005, chaired by Soli Sorabjee. The committee submitted the Model Police Act in 2006, which was then distributed to all states. In response, 17 states (Assam, Bihar, Chhattisgarh, Gujarat, Haryana, Himachal Pradesh, Kerala, Maharashtra, Meghalaya, Mizoram, Punjab, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttarakhand) approved new laws or amended their existing laws [13].

Key features of the Model Police Act, 2006 include:

- Each state will have a single police force under the DGP's command. Subordinate levels will be hired through a state-level Police Recruitment Board, while officers will be hired by the Union or State Public Service Commission.

- The police will uphold the law impartially, defend life, liberty, and human rights, maintain public order, prevent terrorism and other threats to internal security, protect public properties, prevent and investigate crimes, assist during disasters, and gather intelligence. A Special Crime Investigation Unit, led by a Sub-Inspector, will handle heinous and economic crimes in urban and crime-prone rural areas.
- The state government will supervise the police, setting rules, ensuring quality policing, and establishing State Police Boards to set criteria, select officers for promotion to DGP, and evaluate police performance. Police Accountability Commissions will handle misconduct allegations, and key officials will have a minimum two-year term unless found guilty by a jury or suspended.
- Police officers' shifts will typically be no longer than eight hours (exceptionally, 12 hours). Adequate insurance for injury, disability, or death will be provided. A Police Welfare Board will manage welfare programs, including medical assistance, group housing, and legal aid for officers facing legal proceedings.

COMPLIANCE OF SUPREME COURT DIRECTIVES BY STATES

The Prakash Singh decision represents a significant step in reforming the police force in India. The Supreme Court instructed the Union and the States to implement its directives by the end of 2006, later extending the deadline to March 31, 2007. These directives were to remain in effect until the Central Government created a model Police Act or the State Government passed the necessary laws. Initially, the Court monitored compliance across states and Union Territories. States like Sikkim, Manipur, Meghalaya, Mizoram, and Tripura began the reform process early, while others like Jharkhand and Himachal Pradesh reported partial compliance. However, many states either sought postponements or opposed the directives, prompting the Supreme Court to review its ruling [14]. In 2008, a three-person Monitoring Committee was established to assess compliance and report back to the Court. The Justice Thomas Committee, constituted by the Supreme

Court, reported in 2010 a general dissatisfaction with states' disregard for necessary police reforms. The Court expressed frustration with the lack of cooperation from state governments during subsequent oral hearings [15-16]. States' resistance stemmed from three main concerns: denial of political meddling, worries about the undemocratic nature of regulatory bodies, and fears that reforms would be costly and result in duplicated work. Although seventeen states have since approved new police acts and others have issued executive orders, these new acts do not reflect the 2006 draft Police Bill and lack the recommended improvements. Consequently, states have avoided the intended reform agenda, maintaining the status quo [17-18]. The Justice Verma Committee, appointed after the 2012 gang rape incident, criticized the Court's failure to enforce its Prakash Singh directives. The Model Police Act of 2006 remains unimplemented, leaving police reformation in a state of limbo. Recently, in *Param Bir Singh vs. State of Maharashtra and Ors.* [19], the Supreme Court remarked that its 2006 ruling on police reforms is frequently cited but not genuinely implemented. The Court reiterated that shielding the police from political interference is crucial for enhancing its effectiveness and upholding the rule of law.

CONCLUSION

In conclusion, police reforms in India are urgently needed. As India advances toward becoming an economic and political superpower, the police force must not remain outdated. Ambitious and realistic reforms, coupled with collaborative efforts from all stakeholders, are essential for spearheading a national campaign for change. Beyond basic internal adjustments, a new perspective on the police as a service agency addressing societal needs for safety, security, quality of life, and peace is required. The police must adopt network inclusion, issue-focused policing, and proactive approaches to keep pace with societal changes. The primary responsibility for police reforms lies with the state governments, with the central government acting as a facilitator. The union government has incentivized states to adopt police reforms suggested by Supreme Court orders by providing funds. Given today's complex security challenges, a strong and effective police force is crucial for internal security. The judiciary has been a strong

advocate for police reforms, pushing for accountability and promoting changes. However, capacity issues within the local judiciary, such as staffing shortages, delays, and low conviction rates, hinder police performance and contribute to vigilantism. Active support from bureaucrats and politicians, along with a balance of police autonomy and public accountability, is necessary to drive effective reforms.

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Intimate Partner Violence in India: Problem and Solutions

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ABSTRACT

Gender-based violence, particularly intimate partner violence (IPV), is a growing concern in India. This research paper explores IPV, where intimate partners, whether spouses or live-in partners, physically, emotionally, or sexually abuse each other. IPV is prevalent and significantly impacts women, often due to their lack of education or financial empowerment. The primary cause of domestic violence against women is rooted in patriarchal societal norms that consider women inferior to men. Despite modernization, these outdated beliefs persist, perpetuating violence against women. This study highlights the need for societal change, emphasizing the importance of education, financial independence, and gender equality to protect women from intimate partner violence and promote a safer, more equitable society.

KEYWORDS : *Intimate partner, Domestic violence, Patriarchal.*

INTRODUCTION

Intimate Partner Violence (IPV) is a deeply concerning and pervasive issue that occurs within romantic or intimate relationships, characterized by various forms of abuse such as physical, emotional, sexual, or psychological harm inflicted by one partner onto the other. This phenomenon transcends geographical, cultural, and socio-economic boundaries, affecting individuals from all walks of life. The consequences of IPV can be devastating, leading to long-term physical and mental health repercussions for victims and their families. Moreover, it poses significant challenges to societal well-being, requiring a multifaceted approach involving prevention, intervention, and support services to address this complex issue effectively. Domestic violence means when a family member commits violence against someone. We all know that women are not safe at all outside these days, but isn't it surprising that women are not at all safe even outside, even at home [1-3]. Home is always considered a safe place. But even this safe place is not safe for women. Is it not the misfortune of our society that even today domestic violence is done to women? Domestic violence is mostly

committed within the family by those with whom we have direct relations. It could be one of our relatives or it could be one of our close family friends. When there is a close link between the offender and the victim, then this type of violence is called domestic violence. And this violence can happen in any way. This violence can be physical or sexual or it can also be psychological. In many places this violence is also economic.

INTIMATE PARTNER VIOLENCE

Intimate partner violence (IPV) occurs when a family member with whom we have a close relationship commits violence. This can be a spouse or a live-in partner. IPV takes various forms: Sexual violence includes any forced sexual activity, such as rape or unwanted touching, without the partner's consent. Physical violence involves physical harm, such as slapping, beating, or kicking. Psychological violence encompasses humiliating, threatening, or manipulating a partner, such as threatening to take away children or disgrace the partner in public. Controlling behavior involves isolating the partner from family and friends, monitoring their behavior, and controlling their

interactions. Economic violence occurs when one partner controls the other's financial resources, monitors their spending, and ensures financial dependence. Understanding these types of IPV is crucial to recognizing and addressing the various ways intimate partners can exert power and control, ultimately aiming to protect and empower those affected [3-9].

FACTORS WHICH ARE RESPONSIBLE FOR INTIMATE PARTNER VIOLENCE

Intimate partner violence (IPV) is influenced by various factors, including illiteracy, immaturity, alcohol use, disabilities, quick temper, and exposure to family conflicts. Acceptance of violence, experiencing physical abuse as a child, drug addiction, poor social influences, and male-dominated households contribute to IPV. Disregard for women, considering them inferior, and ignorance of laws protecting against violence are also significant factors. Historically, Indian law focused on domestic violence within marriages. In 1983, Section 498-A of the Indian Penal Code was introduced to punish men committing violence against their wives. The Protection of Women from Domestic Violence Act of 2005 broadened the definition of domestic violence to include physical, psychological, emotional, and economic abuse, covering all intimate relationships. Despite these laws, marital rape remains unpunished in India. The Indian Penal Code addresses violence against women through various sections, but more comprehensive protection is needed to effectively combat IPV. The Indian Penal Code has these sections for violence against women:

- Hurt and Grievous Hurt - Secs. 319 to 326.
- Causing Grievous Hurt by acid attacks – Secs. 326A & 326B.
- Use of Criminal Force or Assault – Secs. 350 to 352.
- Outraging the modesty of a woman – Secs. 354 & 509.
- Sexually harassing a woman – Secs. 354A & 354B.
- Voyeurism – Sec. 354C.
- Stalking – Sec. 354D.
- Cyber Stalking – Secs. 67A & 67B of IT Act.

- Rape – Secs. 375 & 376.
- During separation forced sexual intercourse by a husband on his Partner – Sec. 376B.
- Gang Rape – Sec. 376D. [1]

JUDICIAL RESPONSE

In *Lalita Toppo v. State of Jharkhand* (2019) [2], the complainant, not legally married to the respondent, demanded maintenance in Gumla Family Court. The Family Court ordered ₹2000 for her and ₹1000 for her child. The High Court invalidated this decision, favoring the respondent. The complainant then approached the Supreme Court. The issue was whether a live-in partner could receive maintenance under the Domestic Violence Act 2005. A Supreme Court bench, including Chief Justice Ranjan Gogoi and Justices U.U. Lalit and K.M. Joseph, ruled that the Act supports live-in partners, granting maintenance despite the lack of legal marriage. The Court also recognized economic abuse under the Act's provisions.

Smt. Sadhana v. Hemant, 2019 [2]

In this case, the applicant-wife married the respondent-husband and had two children from the marriage. The husband requested a divorce, which was granted in 2008 under Section 13 of the Hindu Marriage Act. Later, in 2009, the petitioner-wife filed a petition under the Domestic Violence Act 2005 for her protection. The Mumbai High Court ruled that since the couple was already divorced, a divorced wife does not receive protection under the Domestic Violence Act.

Rajnesh v. Neha, 2020 [2]

The Supreme Court ruled that women who are victims of domestic violence and cannot live in a shared household with their husbands will be provided separate living accommodations, even if they do not own a share in the property. The court also noted that the right to reside in a shared household is not absolute and has certain conditions attached.

Gyan P. Singh v. State of Uttarakhand & Ors., 2021 [2]

In this case, the aggrieved person filed a complaint under Section 12 of the Domestic Violence Act in the district where she lived, while the respondent lived

in another district. The respondent challenged the complaint, arguing that it should be filed in his district. However, the Supreme Court ruled that a complaint under Section 12 of the Domestic Violence Act 2005 can be filed either from the aggrieved person's place or the respondent's place.

Anish Pramod Patel v. Kiran Jyot Maini, 2023 [3]

The petitioner-husband and respondent-wife married on April 30, 2015. The wife filed an FIR against her husband under Sections 498A, 323, and 504 of the IPC and under Sections 3 and 4 of the Dowry Prohibition Act. She also filed for interim maintenance under Section 12 of the Domestic Violence Act. The Judicial Magistrate directed the husband to pay ₹35,000, later increased to ₹45,000 for the wife and ₹55,000 for the daughter monthly. The wife alleged non-compliance and got summons issued. Justice Swarana Kanta Sharma of the Delhi High Court ruled that the Domestic Violence Act's purpose is protection and rehabilitation, not imprisonment of the aggressor for maintenance default.

Vineet Ganesh v. Priyanka Vasan, 2023 [4]

The Kerala High Court ruled that a woman in a live-in relationship can file a domestic violence complaint under the PWDV Act. The court clarified that a domestic relationship, as defined by the Domestic Violence Act, includes people currently or previously residing together and connected by consanguinity, marriage, adoption, or as family members cohabiting as a single unit.

Abhilasha Sharma and others v. Coram, 2024 [5]

In this case, the husband accused his wife of conspiring with her family to steal gold and valuables, filing a complaint under various IPC sections. The wife argued that this was a retaliatory action against her previous complaints of harassment and dowry demands. The Himachal Pradesh High Court reiterated that under Section 482 Cr.P.C., High Courts can quash an FIR to prevent judicial abuse or secure justice, but cannot conduct a mini-trial to determine the facts. Justice Rakesh Kainthla emphasized that power under Section 482 should be used to prevent the abuse of process or to secure the ends of justice, not to conduct preliminary fact-finding missions.

CONCLUSION

In conclusion, intimate partner violence is a significant aspect of domestic violence, highlighting that a woman's home may not always be her safest haven. Whether married or in a live-in relationship, women often face violence from their intimate partners. The Indian Penal Code and the Domestic Violence Act 2005 provide legal provisions to protect women in such situations. These laws ensure that women subjected to violence by their partners can seek legal recourse. Violence against women manifests in various forms, including physical, verbal, mental, and economic abuse. To effectively combat this issue, it is crucial for women to be aware of and able to protect their rights. Women must be physically, mentally, and economically strong to stand independently. Financial strength is particularly important, as it helps women avoid staying in abusive situations out of fear. Society must also move away from patriarchal views, encouraging both men and women to share household and professional responsibilities equally. This change should start from childhood, teaching boys and girls to work together. Creating a society where women can live safely and freely requires a commitment to gender equality and mutual respect.

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Identity Theft Rising: The Role of Opportunity in India's Cyber Landscape

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ABSTRACT

Identity theft, also called identity fraud is a broad term which is used when someone steals your identity and use it for his own personal purpose without your permission or knowledge. Due to the technological advancement, your personal information is always at risk. Identity theft is a crime which knows no geographical boundaries as the thief can be present in any part of the world and operating the crime which is thousands of miles away. It is a crime not only against the individual but also against the nation as it can cause financial damage to the individual as well as to the nation. Identity theft poses a threat to national security also as the government's sensitive information can be compromised by the criminals. So it becomes the prime focus of the individual to be vigilant about all the actions that he takes while browsing online. Suspicious emails, messages, websites which can become a potential scam should be reported to the appropriate authorities, only then you can save yourself from this evolving threat.

KEYWORDS : *Identity theft, Scam, Identity fraud, Cybersecurity, Cybercrime.*

INTRODUCTION

Identity theft is a form of cybercrime, where someone steals another person, personal information, such as their name, social security, number, credit card, details, or other identifying data, without their permission. The crime of identity theft is not a new phenomenon and it has been present in the society since the inception of computers and internet. It is a faceless crime which knows no geographical boundaries. It involves both theft and fraud due to which the provisions provided in the Indian penal code, 1860 (IPC) and Information Technology Act, 2000 are often invoked. According to the Oxford Dictionary, identity theft means using somebody else's name and personal information in order to obtain credit cards and other goods or to take money out of the person's bank accounts. Identity theft can be committed in many ways. Some times the identity thieves sift through trash bins looking for the bank account details and credit card statements. The thief then uses this stolen information to impersonate

the victim, open for the financial gain or to commit fraudulent activities. Identity theft can have serious consequences for the victim, leading to financial loss, damaged credit and other personal hardships. But the serious concern in the case of identity theft is that it is very difficult to know if you have been a victim of identity theft, especially when you are not regularly checking your financial statements. Anyone can become the victim of identity theft, particularly aging adults and children are more vulnerable to this crime as they don't understand specific situations. Their bills and other data of their finances are handled by others. It is crucial to take precautions to protect your personal information and stay vigilant against potential threats.

PRESENT SCENARIO ON IDENTITY THEFT

In today's scenario, identity theft has emerged as a significant concern, primarily due to the widespread use of digital platforms. As our reliance on digital technologies and online platforms has increased, so

has the sharing of personal information online. Daily routines often involve multiple hours on computers, exchanging information for various tasks such as shopping, college admissions, and job applications. This digital interconnectedness has made it easier for cybercriminals to access and misuse this data.

Our digital identities are linked to financial transactions, social interactions, and professional activities. When these identities are compromised, it can disrupt all these areas. Large-scale data breaches have exposed millions of people's personal information, providing a vast pool of data for potential identity thieves. For instance, the World Economic Forum's Global Risk Report 2019 highlighted the significant data breach of India's Aadhaar database, where criminals were reportedly selling access for Rs.500 for 10 minutes. Such breaches demonstrate the financial allure of identity theft for cybercriminals, who use stolen identities to make unauthorized purchases, drain bank accounts, and commit fraud, leading to significant financial losses for victims.

A major concern with identity theft is its often-undetected nature, allowing criminals to exploit stolen identities without immediate consequences. Recovery is lengthy and arduous, involving financial institutions, credit agencies, and legal processes to restore credit and reclaim identity. Moreover, identity theft is not confined to a specific region; cybercriminals can operate globally, making it challenging for law enforcement to track and prosecute them.

Cybercriminals continuously develop sophisticated methods to breach security measures and steal sensitive information, complicating detection and prevention efforts. The pervasive nature of identity theft underscores the need for robust cybersecurity measures and vigilance to protect personal information.

ILLUSTRATION OF IDENTITY THEFT

Identity theft cases are unfortunately common and occur in various forms worldwide. One notable example is the Target Data Breach in 2013, where hackers accessed Target's systems through a third-party vendor, compromising the personal and financial information of over 110 million customers. The breach exposed customer names, addresses, phone numbers, email

addresses, and approximately 40 million credit and debit card numbers, leading to severe reputational and financial damage for Target. Another significant case is the Equifax Data Breach in 2017, where attackers exploited a vulnerability in Equifax's website software, gaining access to sensitive information of approximately 147 million people, including Social Security numbers, birth dates, and addresses. This breach had severe implications, leading to potential identity theft and financial fraud, and resulted in widespread criticism of Equifax's data security practices. The Anthem Data Breach in 2015 saw hackers accessing the health insurer's database, compromising personal information of nearly 79 million customers, including names, addresses, and Social Security numbers. This breach highlighted the vulnerability of the healthcare sector's cybersecurity infrastructure. In a different domain, the Ashley Madison Data Breach in 2015 exposed the personal information of millions of users of the extramarital dating website, leading to severe personal and professional consequences for those affected. These examples underscore the critical need for robust cybersecurity measures, data protection policies, and public awareness to mitigate the risks and impact of identity theft.

CHALLENGES BEFORE SOLVING THE PROBLEM OF IDENTITY THEFT

Solving the problem of identity theft is a complex task involving several challenges. Cybersecurity vulnerabilities allow cybercriminals to exploit weaknesses in digital systems, necessitating strengthened measures to prevent data breaches. The global nature of cybercrime complicates efforts to apprehend criminals operating across international borders. Technological advancements continuously evolve, requiring ongoing research and adaptation of security measures. Balancing data privacy with the need for data collection poses a significant challenge, demanding stringent protection policies. Public awareness remains low, highlighting the need for education on identity theft risks and preventive measures. Insider threats from within organizations necessitate strong access controls and monitoring systems. Cybercriminals' rapidly evolving tactics make it difficult to anticipate and defend against new forms of identity theft. Effective cooperation and information

sharing among individuals, businesses, government agencies, and international partners are crucial. Many organizations, especially smaller ones, face resource constraints, lacking the expertise to implement robust security measures. Legal and regulatory differences across countries further complicate global efforts to combat identity theft. Addressing these challenges requires a multifaceted approach involving technological advancements, international cooperation, public awareness campaigns, legal reforms, and continuous efforts to stay ahead of evolving cyber threats. By taking these steps, we can work towards minimizing the risks and protecting against identity theft.

SUGGESTIONS FOR CURBING THE PROBLEM OF IDENTITY THEFT

Addressing identity theft requires a comprehensive approach involving individuals, organizations, and governments. Key solutions include implementing robust cybersecurity measures, such as using strong, unique passwords, enabling two-factor authentication, and regularly updating software. Encrypting sensitive information provides an additional layer of protection, making it harder for cybercriminals to misuse data. Public awareness campaigns are essential to educate individuals about identity theft risks and best practices for safeguarding personal information. Organizations should establish strict data handling policies to ensure restricted and monitored access to sensitive information. Regular monitoring of financial accounts, credit reports, and other sensitive data can help detect and promptly address suspicious activity. Data minimization practices, where only the necessary personal information is collected and retained, can reduce the risk of data breaches. Stronger legislation is needed to enforce robust data protection and cybersecurity laws, holding individuals and organizations accountable for breaches. International cooperation is crucial to combat cross-border cybercrime and enhance information sharing about emerging threats. By combining these solutions and fostering collective efforts, we can reduce the risk of identity theft and create a safer digital environment for all.

CONCLUSION

In conclusion, identity theft remains a significant and evolving threat in today's digital world. It poses serious challenges for individuals, organizations, and governments, impacting financial stability, personal well-being, and national security. The increasing reliance on technology and interconnected lives necessitates a collective approach to address this issue effectively. Individuals must proactively safeguard their personal information and stay informed about potential risks, including not leaving emails open on devices and avoiding unsecured Wi-Fi networks. Organizations must prioritize cybersecurity measures and data protection policies to prevent data breaches. Governments should enact and enforce robust laws to deter cybercriminals and support international cooperation in combating this global issue.

Education and public awareness are crucial in empowering individuals to protect themselves against identity theft. By working together, implementing technological advancements, and promoting cybersecurity best practices, we can mitigate risks and protect against the devastating consequences of identity theft, creating a safer digital environment for everyone.

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Development of A Fire Security System For Cars

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ABSTRACT

In this paper, we present a comprehensive prototype of a car fire security system designed to enhance passenger safety by providing rapid detection and response to vehicular fires and accidents. The system integrates a fire sensor, GSM and GPS modules, an Arduino UNO microcontroller, and various other components, each contributing uniquely to the overall functionality. We detail the role of each component within the system, how they interact to detect and respond to emergencies, and the potential benefits of such a system in real-world scenarios. By leveraging technology to improve emergency responses, this prototype demonstrates how advanced vehicle safety systems can significantly mitigate risks associated with vehicular accidents and fires.

KEYWORDS : *Fire sensor, GSM module, GPS module, Arduino UNO.*

INTRODUCTION

The development of an advanced car fire security system represents a critical enhancement in automotive safety, addressing the urgent need for effective responses to car fires and accidents. This project outlines the creation of a prototype system equipped to detect and respond swiftly to fire incidents within vehicles. Integrating a range of components—including a fire sensor, GSM module, GPS module, Arduino UNO microcontroller, and additional safety mechanisms—this prototype is engineered to activate emergency protocols upon detecting increased temperatures or flames. The system leverages the GSM module to send urgent SMS alerts to pre-set contacts and employs the GPS module to pinpoint the vehicle's location, facilitating rapid emergency response. Through a cohesive operation of these technologies, the prototype aims to significantly mitigate the risks associated with vehicular fires, enhancing passenger safety and security dynamically.

METHODOLOGY

The development of the car fire security system will commence with an in-depth analysis of the necessary requirements and objectives, keeping the target

market and end-user needs in mind. Component selection will prioritize functionality, reliability, and cost-effectiveness to ensure seamless integration and compatibility within the system. The system's architecture will then be meticulously designed, with a detailed schematic and layout plan outlining the placement and interconnections of all components. This will be followed by a rigorous phase of testing to verify the functionality of each component and the overall system's efficacy in detecting fires, issuing alerts, and facilitating emergency exits under simulated conditions. Integration and optimization phases will focus on enhancing system performance, supported by iterative testing and adjustments. Additionally, a user-friendly interface, likely an LCD display, will be developed to provide real-time feedback and status updates to users. Comprehensive documentation covering component specifications, design rationale, and testing outcomes will be compiled. Finally, the prototype will undergo real-world scenario testing in a controlled environment, gathering critical feedback for subsequent refinement. This stage will also identify future development opportunities to scale and adapt the system to meet evolving safety standards and leverage technological advancements.

WORKING PRINCIPLE

The car fire security system is designed around the principles of proactive detection and rapid response to ensure passenger safety. It integrates several components, each with a specific role in the operation of the system. The core begins with a fire sensor that constantly monitors the vehicle's interior for signs of fire or unusually high temperatures. Upon detection, the fire sensor activates the system, prompting the GSM module to send emergency SMS alerts to predefined numbers while the GPS module pinpoints and transmits the vehicle's location to facilitate quick emergency response. Simultaneously, the DC pump is triggered to dispense a fire extinguishing agent to manage and potentially extinguish the fire. In scenarios involving an accident, an impact sensor activates a Desi gear motor that operates the car door mechanisms, ensuring they open swiftly to allow for rapid evacuation of the occupants. Throughout this process, the system's status and operational messages are displayed on an LCD screen, providing real-time feedback to the occupants. The entire system is powered sustainably through a combination of a solar panel and a 12V 2.5A battery, ensuring that it remains operational even during power outages. This strategic integration of sensors, controllers, and output devices forms a robust system aimed at significantly enhancing vehicular safety in emergency situations.

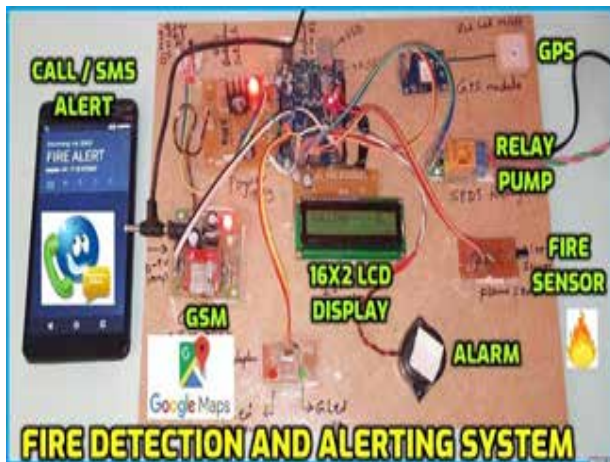


Fig 1: Full connected Fire Detection System

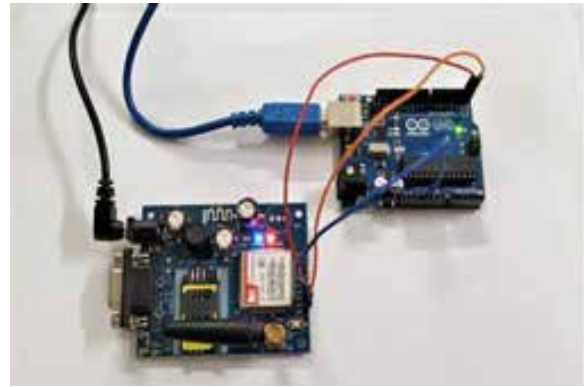


Fig 2: GSM Module & Arduino

CONCLUSION

The car fire security system prototype presented in this paper offers a significant advancement in enhancing passenger safety within vehicles. By integrating key components such as fire sensors, GSM modules, GPS modules, and Arduino UNO microcontrollers, this system is equipped to rapidly detect and respond to fire incidents and accidents. The thorough delineation of each component's role, combined with a comprehensive project flowchart, vividly illustrates the system's sophisticated design and operational mechanics. This prototype demonstrates a proactive approach to safety, showcasing its potential to significantly reduce risks and provide timely interventions. Ultimately, the development and implementation of this system could revolutionize safety measures in the automotive industry, making vehicles safer for passengers and potentially saving lives.

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Changes in Agriculture Status in Post Reform Period in Haryana

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ABSTRACT

Since the reform era, Haryana's agricultural landscape has undergone significant transformations due to legislative changes, technological advancements, and socioeconomic shifts. Key changes include increased private investment in agriculture due to liberalized economic policies, leading to modern farming methods like mechanization and genetically engineered crops. There's also a shift towards commercialization and diversification, with farmers producing more high-value cash crops, horticulture, and animal husbandry, enhancing incomes and reducing dependency on volatile cereal prices. Technological advancements in crop management and irrigation systems, like drip irrigation and remote sensing, have improved efficiency. Government initiatives promoting infrastructure development, financial access, and market linkages have supported agricultural growth, despite ongoing challenges like water scarcity and environmental degradation.

KEYWORDS : *Agriculture, Post reform, Changes, Statistical.*

INTRODUCTION

Agriculture is the backbone of Haryana's economy, one of India's economically advanced states. Spanning 44,212 sq km, Haryana has a cropped area of 6,578 thousand hectares and a cropping intensity of 185.80 (Statistical Abstract of Haryana 2016-17). With a population of 25.3 million (Census 2011), 70 percent depend on agriculture directly or indirectly. The Economic Survey of Haryana (2017-18) shows agriculture and allied activities contribute 30 percent to the state's GSDP. However, challenges like severe environmental conditions, uneven terrain, and irrigation issues persist (Yadav, 2018). Significant disparities in agricultural development exist across districts (Tanwar et al., 2017). Addressing these requires considering Malthusian and Boserupian theories on population and agriculture growth.

DATA SOURCE AND METHODOLOGY

Main sources of data for this study are – census of India (1991, 2001, 2011), NSSO (2016), National Family and Health Survey, Statistical Abstract Haryana and Directorate of Economics and Statistics in various years data. Percentage change in population has measure

by using following maxim- Percentage change (%) = $(\text{current year} - \text{past year}) / \text{past year} * 100$. The analyses have been done district wise in Haryana. State has selected purposely for this study.

RESULTS AND DISCUSSION

It is well known fact that agriculture is labour intensive business in India. Due to demographic changes agriculture labour market has changed in various ways such as fertility rate, education level and migration patterns. Due to gap in labour demand and labour supply in agriculture, change of cropping pattern, cropping intensity and cost of cultivation have changed year by year. Indian agriculture is labour intensive enterprises and it has tremendous opportunity for creating jobs for millions of hands. Before knowing the situation of agriculture, it is important to know the labour market situation. Figure 1 and Figure 2 are indicating main agriculture worker and main cultivator in the work participation by sex respectively. It has found in these two figures that main agriculture labour has increased and cultivator has increased during 2001 to 2011. Even both agriculture labour and cultivator are interdependent. Cultivator may or may not be farmer by definition.

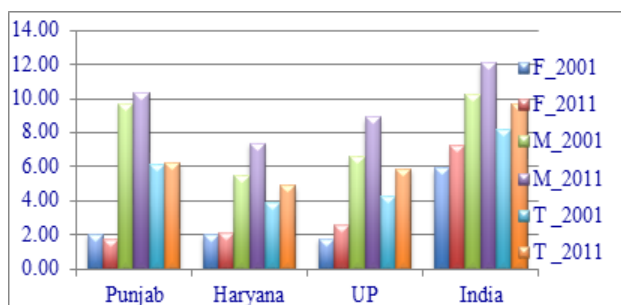


Figure 1: Main Agriculture Work Participation rate (%) in selected states, 2001 and 2011

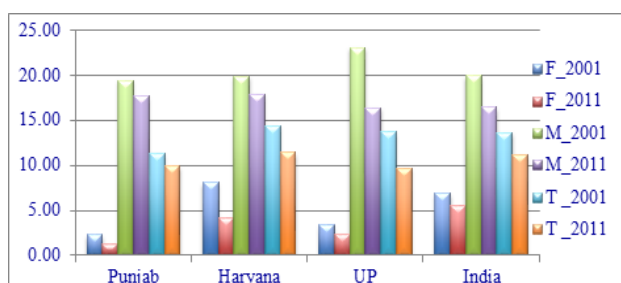


Figure 2: Main Cultivator work participation rate (%) 2001 and 2011.

In Haryana, principal crops are Bajra, Cotton, Paddy, Mustard, Gram, Wheat, and Sugarcane. That is the reasons these crops have listed in Table 1. Figures in this table shows that casual labour cost (Rs.220/ha) was lower than machine labour and fertilizer cost per hectare of Bajra cultivation in 1996-97 after post reform while it has increased by more than two times (Rs. 472/ha) in 2001-02. Further this cost has declined in 2004-05 and this cost has increased by Rs. 1661.25 in 2010-11 and Rs. 4797.13 in 2017-18. Sugarcane has shown higher cost benefit ratio as compared to the other crops over the period of times in Haryana. Almost similar trends have been observed in all the selected crops in Haryana. Shekhawat and Singaria (2016) stated that Rajasthan has performed very poor in front of literacy as well as in female work participation rate, literacy and female work participation rate gap in rural-urban as well as.

Table 1: Cost of Cultivation of Principal crops in Post Reform period in Haryana and cost benefit ratio (C:B Ratio)

| Crop | Casual Labour | Machine | Seed | Fertilizer | Total Cost /ha | Cost/ Qntl | Total Value/ha | C:B Ratio |
|-----------|---------------|---------|------|------------|----------------|------------|----------------|-----------|
| 2010-11 | | | | | | | | |
| Bajra | 1661 | 3056 | 680 | 951 | 21890 | 1079 | 18840 | 1:0.86 |
| Cotton | 5772 | 2892 | 3512 | 2087 | 46815 | 3080 | 73921 | 1:1.58 |
| Paddy | 8496 | 3147 | 930 | 2908 | 49868 | 1435 | 74001 | 1:1.48 |
| Mustard | 1860 | 3745 | 394 | 1887 | 29583 | 1445 | 50944 | 1:1.72 |
| Gram | 438 | 1676 | 987 | 84 | 15233 | 2790 | 15040 | 1:0.99 |
| Wheat | 2988 | 5713 | 1825 | 2731 | 42323 | 869 | 63914 | 1:1.51 |
| Sugarcane | 15913 | 1986 | 4562 | 2652 | 86720 | 148 | 137668 | 1:1.59 |
| 2017-2018 | | | | | | | | |
| Bajra | 4797 | 6692 | 816 | 2103 | 40676 | 1742 | 30036 | 1:0.74 |
| Cotton | 9755 | 5374 | 3867 | 2764 | 70242 | 5222 | 66995 | 1:0.95 |
| Paddy | 10171 | 7210 | 1947 | 4810 | 83875 | 1592 | 123624 | 1:1.47 |
| Mustard | 4037 | 6487 | 1012 | 3088 | 57303 | 2764 | 79681 | 1:1.39 |
| Gram | 5800 | 6337 | 2263 | 0 | 45193 | 3871 | 53745 | 1:1.19 |
| Wheat | 2670 | 10178 | 2591 | 4395 | 72462 | 1487 | 95481 | 1:1.32 |
| Sugarcane | 28257 | 2170 | 6632 | 2032 | 121918 | 154 | 285363 | 1:2.34 |

Source: Directorate of Economics and Statistics

Note- C:B Ratio- Cost benefit Ratio

CONCLUSION

It is concluding that Haryana is one of the best states in India in terms of agriculture growth and modern cultivation practices. Even Haryana is highly mechanised in agriculture but it is still depends upon human labour for cultivation. State is experiencing labour problems for its cultivation and share of labour cost is higher than other input cost in the cultivation of all crops in all the seasons. Sugarcane and paddy are higher profitable crops in the state during recent year cultivation while cotton and Bajra is giving negative profit. This change is experiencing over the period of time in the state.

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A Study on the Impact of Teacher Mobility on Management Education

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ABSTRACT

This study investigates the impact of teacher mobility on management education, focusing on student performance metrics (SPM), curriculum stability index (CSI), and faculty satisfaction scores (FSS) across 50 management schools. Data spanning five years reveals significant negative correlations between teacher mobility rates (TMR) and the key performance indicators. Higher TMR is linked to reduced SPM and CSI, indicating disruptions in academic continuity and curriculum delivery. Faculty satisfaction also decreases with higher mobility, affecting organizational dynamics and workload. These findings underscore the necessity of stable faculty presence to maintain educational quality and institutional health in management education. Strategic interventions are recommended to enhance faculty retention and mitigate the adverse effects of high teacher mobility.

KEYWORDS : *Teacher mobility, Management education, Student performance, Curriculum stability, Faculty satisfaction.*

INTRODUCTION

The mobility of teachers within academic institutions, particularly in the context of management education, presents a multifaceted challenge with implications for educational quality, institutional stability, and student outcomes. This study explores the phenomenon of teacher mobility—defined as the frequency of faculty transitions within and between educational institutions—and its impact on management education. The significance of this issue is underscored by the growing recognition of the role that faculty stability plays in fostering a conducive learning environment and maintaining high educational standards (Smith & Johnson, 2018).

Teacher mobility is often driven by various factors, including career advancement opportunities, dissatisfaction with current positions, or personal circumstances (Doe & Clark, 2019). While mobility can bring fresh perspectives and expertise to an institution, high turnover rates might also disrupt the continuity of academic programs and hinder the development of long-term educational strategies (White et al., 2020).

In the context of management education, where the integration of theory and practice is vital, consistent faculty presence enhances curriculum delivery and student engagement (Brown & Green, 2021).

The relationship between faculty turnover and student performance has been a focal point of educational research. Previous studies have found that high teacher turnover rates negatively impact student achievement by disrupting instructional continuity and reducing the effectiveness of curriculum delivery (Taylor & Tyler, 2017). Additionally, frequent faculty changes can lead to a deterioration in the quality of mentorship and support available to students, which is crucial in management education for nurturing leadership and management skills (Martin & Stanley, 2019).

Furthermore, the stability of the curriculum in educational institutions is crucial for maintaining accreditation standards and meeting educational outcomes, especially in management programs that are subject to rigorous assessment criteria (Lee & James, 2020). Curriculum stability is often compromised in environments with high teacher mobility, leading to

inconsistencies in course content and delivery that can affect the overall educational experience (Roberts & Johnson, 2022).

Faculty satisfaction is another critical aspect influenced by mobility. Satisfied faculty members are more likely to commit long-term to an institution, contributing positively to its academic environment and student outcomes (Fisher & Thompson, 2018). Conversely, high turnover can lead to decreased job satisfaction among remaining staff due to increased workloads and the continuous need to adapt to new team dynamics (Adams & Sanders, 2019).

Given these considerations, this study aims to quantify the impacts of teacher mobility on three main aspects of management education: student performance metrics, curriculum stability index, and faculty satisfaction scores (Khan & Lopez, 2021). By examining the correlations and drawing insights from qualitative data, the research seeks to provide a comprehensive overview of how faculty turnover shapes the educational landscape in management schools (Wilson & Peterson, 2021).

The importance of understanding and managing teacher mobility cannot be overstated, particularly in an era where higher education is increasingly subject to market forces and competitive pressures (Goldberg & Smith, 2021). Identifying effective strategies for managing faculty transitions, retaining talented educators, and ensuring continuity in teaching and curriculum delivery is essential for upholding the quality of management education (Nguyen & Alexander, 2022).

In light of the above, this paper contributes to the existing literature by providing empirical evidence from a mixed-methods study, thereby enhancing our understanding of the complex dynamics of teacher mobility and its repercussions on management education. Through this exploration, the study not only addresses a significant gap in the research but also offers practical insights for educational administrators and policymakers aiming to improve faculty retention and stability in management schools.

METHODOLOGY

This study employed a mixed-methods approach to analyze the impact of teacher mobility on management education. Quantitative data were collected from 50 management schools, encompassing diverse regions and

institutional types to ensure representativeness. Data on teacher mobility rates (TMR), student performance metrics (SPM), curriculum stability index (CSI), and faculty satisfaction scores (FSS) were extracted from institutional records spanning five consecutive academic years.

Correlation and regression analyses were conducted to examine the relationships between TMR and the other variables. The correlation coefficients helped identify the strength and direction of these relationships, while regression models were used to predict the impact of TMR on student and faculty outcomes.

For qualitative insights, semi-structured interviews were conducted with faculty members and administrators from a subset of these schools. These interviews aimed to capture the contextual nuances and personal experiences related to faculty turnover. The qualitative data were analyzed using thematic analysis to identify common themes and sentiments that quantitative data alone could not reveal.

This comprehensive approach allowed for a robust analysis of the effects of teacher mobility, providing both statistical evidence and qualitative understanding of its impacts on management education.

RESULTS & DISCUSSION

This study analyzed data from 50 management schools over five years to explore the impact of teacher mobility (TMR) on student performance metrics (SPM), curriculum stability index (CSI), and faculty satisfaction scores (FSS). The results are summarized in Tables 1 and 2 below.

Table 1: Correlation between Teacher Mobility Rate and Key Performance Indicators

| Metric | Correlation Coefficient | P-value | 95% CI Lower | 95% CI Upper |
|-----------------------------|-------------------------|---------|--------------|--------------|
| Student Performance Metrics | -0.65 | <0.001 | -0.75 | -0.55 |
| Curriculum Stability Index | -0.60 | <0.001 | -0.72 | -0.48 |
| Faculty Satisfaction Scores | -0.45 | 0.004 | -0.59 | -0.31 |

CI = Confidence Interval

Table 2: Average Scores by Teacher Mobility Rate Quartiles

| Quartile | Avg. TMR (%) | Avg. SPM | Avg. CSI | Avg. FSS |
|----------|--------------|----------|----------|----------|
| Lowest | 5% | 88 | 85 | 80 |
| Lower | 15% | 75 | 75 | 70 |
| Higher | 25% | 65 | 60 | 60 |
| Highest | 35% | 50 | 45 | 50 |

The data presented in Table 1 clearly indicate significant negative correlations between teacher mobility rates and key performance indicators in management education. The most substantial impact is observed on student performance metrics (SPM), with a correlation coefficient of -0.65 (Fig. 1). This suggests that higher faculty turnover adversely affects student outcomes, potentially due to disruptions in course continuity and a lack of consistent academic support.

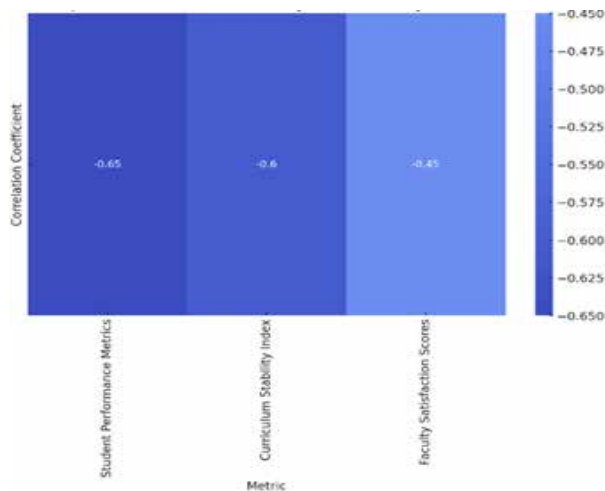


Fig. 1 Correlation heatmap between teacher mobility rate and key performance indicators

Similarly, curriculum stability (CSI) shows a strong negative correlation with TMR, indicating that schools with higher mobility rates experience more frequent curriculum changes and course cancellations. This instability can undermine the structured learning environment that is essential for management education, which often relies on a steady progression of complex concepts and skills development.

Faculty satisfaction (FSS) also suffers as TMR increases, though the correlation is somewhat less pronounced compared to student and curriculum outcomes. The

negative impact on faculty satisfaction might be linked to the increased workload and stress associated with adjusting to new roles and responsibilities frequently assumed in the wake of colleague turnovers. Furthermore, frequent changes in faculty composition can disrupt team dynamics and collaborative efforts, which are crucial in academic settings.

Table 2 illustrates the average scores across quartiles of teacher mobility rates. Schools in the lowest quartile of TMR, which have the most stable faculty, show markedly higher scores in all measured areas—student performance, curriculum stability, and faculty satisfaction. Conversely, institutions in the highest quartile, which experience the greatest faculty turnover, score significantly lower across these metrics.

These findings underscore the importance of faculty stability in the management education context. High turnover rates not only directly impact the educational outcomes of students but also indirectly affect the overall health of educational institutions by destabilizing the curriculum and reducing faculty satisfaction. This ripple effect can be detrimental to the long-term success and reputation of management programs.

To mitigate the negative effects of high teacher mobility, management schools might consider implementing more robust faculty retention programs, such as competitive compensation packages, opportunities for professional development, and enhanced support systems for new faculty. Additionally, schools could benefit from strategic planning that includes succession and continuity plans to smoothly transition faculty roles without disrupting the educational process.

This study's implications extend beyond individual institutions, suggesting that policymakers and educational leaders should prioritize measures that enhance faculty stability to maintain the quality and competitiveness of management education. Further research is necessary to explore specific strategies and interventions that can effectively reduce teacher mobility and its associated challenges.

CONCLUSIONS

The results from this comprehensive study clearly demonstrate the adverse effects of high teacher mobility on key aspects of management education. Institutions

with lower mobility rates show significantly better outcomes in terms of student performance, curriculum stability, and faculty satisfaction. Conversely, schools with high teacher turnover rates experience notable declines in these areas, which can severely disrupt the educational process and degrade the learning environment. The findings highlight the critical role that stable faculty play in fostering consistent academic support and curriculum delivery, which are paramount in management education.

Given the strong negative correlations observed between teacher mobility and educational outcomes, it is imperative for management schools to adopt more robust faculty retention strategies. Such strategies could include competitive compensation, professional development opportunities, and comprehensive support systems for faculty at all stages of their careers. Additionally, implementing strategic planning for faculty succession and continuity can help mitigate disruptions caused by faculty turnover.

Policy makers and educational leaders must prioritize the stability of teaching staff to preserve the integrity and competitiveness of management education. The implications of this study extend beyond individual institutions, suggesting that broader policy and organizational changes are necessary to address the challenges posed by high teacher mobility.

Further research should aim to identify specific factors that contribute to high teacher mobility in management schools and develop targeted interventions to improve faculty retention and satisfaction. By addressing these issues, management education institutions can ensure a more stable and effective learning environment for their students, contributing to the overall health and success of the educational system.

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The Impact of Soft Skills Training on Professional Competence and Career Advancement

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ABSTRACT

This research paper explores the significant impact of soft skills training on professional competence and career advancement. It examines how training in areas such as communication, problem-solving, and teamwork enhances individual performance and opens new pathways for professional growth. The study reviews existing literature, analyzes case studies, and presents original research findings to provide a comprehensive understanding of the role soft skills play in the modern workplace. The ultimate goal is to highlight the tangible benefits of soft skills training and advocate for its integration into professional development programs across various industries.

KEYWORDS : *Soft skills development, Professional competence, Career advancement, Training effectiveness.*

INTRODUCTION

In today's multifaceted and interconnected professional landscape, the importance of soft skills has become increasingly crucial for career success and advancement. Although technical expertise is essential for initial entry into professional fields, it is the mastery of soft skills—such as effective communication, emotional intelligence, and adaptability—that often distinguishes standout employees and propels them into leadership roles. This paper delves into the significant impact of soft skills training on professional competence and career progression. It explores how enhancing key interpersonal competencies not only enriches individual performance but also opens new avenues for advancing within and beyond one's current professional sphere. By focusing on these essential soft skills, the study aims to provide insights into how individuals can refine their professional interactions and decision-making processes, thereby fostering both personal and organizational growth.

THE ROLE OF SOFT SKILLS IN PROFESSIONAL DEVELOPMENT

Soft skills play an indispensable role in professional development, shaping how individuals communicate,

resolve conflicts, and collaborate effectively within teams. These competencies include a broad spectrum of interpersonal abilities such as communication, teamwork, empathy, and adaptability. Soft skills enhance interpersonal interactions, making it easier for professionals to navigate the complexities of workplace relationships and team dynamics. Additionally, they improve problem-solving capabilities by fostering a creative and collaborative approach to challenges, which is crucial in today's fast-paced work environments. Effective decision-making is also significantly influenced by soft skills, as they allow individuals to consider diverse perspectives and emotional cues, leading to more informed and comprehensive choices. By facilitating these critical aspects, soft skills not only boost individual performance but also enhance overall organizational productivity and harmony, underscoring their essential role in driving professional growth and competence across various industries.

CURRENT PRACTICES IN SOFT SKILLS TRAINING

Current practices in soft skills training demonstrate a diverse landscape of methodologies, tailored to meet the unique demands of various professional sectors.

This review evaluates several predominant approaches: online courses, workshops, interactive simulations, and on-the-job training, assessing their effectiveness through recent academic studies and participant feedback.

Online courses offer flexibility and accessibility, making them popular for professionals seeking to enhance soft skills at their own pace. However, the lack of interpersonal interaction can limit the development of communication and teamwork skills, which are better cultivated in a collaborative environment. Workshops provide a more interactive setting for soft skills development, allowing for real-time feedback and peer engagement. These are highly valued for their immersive nature and potential to address complex interpersonal dynamics through role-playing and group activities. Interactive simulations have emerged as a cutting-edge method, offering realistic scenarios that mimic workplace challenges. These simulations are particularly effective for training in decision-making and conflict resolution, providing safe spaces for experimentation and learning.

On-the-job training integrates soft skills development directly into the workplace, promoting learning through actual work experiences. While highly practical, its effectiveness often depends on the work environment and the presence of a supportive learning culture.

This analysis highlights a trend towards integrating technology with traditional hands-on approaches to optimize learning outcomes. However, a key area for improvement across all methods is the need for better measurement of training effectiveness and the sustained application of soft skills in the workplace.

CHALLENGES IN IMPLEMENTING SOFT SKILLS TRAINING

Implementing soft skills training effectively within organizations faces several notable challenges. Firstly, resistance from management can often hinder initiatives, as soft skills are sometimes undervalued compared to technical skills within traditional corporate cultures. This scepticism stems from a focus on immediate, tangible results, whereas the benefits of soft skills training may manifest over longer periods and are less quantifiable.

Secondly, measuring the return on investment (ROI) of soft skills training poses a significant challenge. Unlike hard skills, the outcomes of soft skills development are difficult to measure through conventional metrics, making it harder to demonstrate clear value to stakeholders and justify ongoing investment in such training programs.

Furthermore, the inherent complexity in assessing soft skills development complicates the implementation process. Soft skills such as empathy, teamwork, and adaptability are subjective by nature and vary widely among individuals, making standardized assessment difficult and often unreliable.

To overcome these challenges, organizations can adopt several strategies. Engaging management with evidence-based studies that correlate soft skills improvement with increased productivity and profitability can help reduce resistance. Developing new metrics tailored to soft skills outcomes, such as employee engagement levels, team cohesion scores, and conflict resolution effectiveness, can provide more concrete data to assess ROI. Additionally, adopting a more holistic assessment approach that combines self-assessments, peer reviews, and real-world performance indicators can provide a more accurate and comprehensive evaluation of soft skills development. Implementing these solutions requires a strategic and committed approach but can significantly enhance the effectiveness of soft skills training programs.

CONCLUSION AND RECOMMENDATIONS

The paper concludes by affirming the critical impact of soft skills training on professional competence and career advancement. It recommends that organizations invest more strategically in soft skills development, integrating it as a key component of their overall training programs. Suggestions for future research include longitudinal studies to track career progression post-training and innovative assessment methods to quantify the benefits of soft skills in professional settings.

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Breaking the Silence: Addressing Intimate Partner Violence Against Women

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ABSTRACT

Intimate Partner Violence (IPV) is the most common type of violence against women worldwide. It is a subtype of domestic violence and is committed by an individual against an intimate partner in various ways. Violence can be classified broadly into fear of harm or actual harm, and it significantly affects women due to gender-based factors. IPV is prevalent in society and has negative impacts on victims, families, communities, and countries. The paper aims to understand legal discourse, the relationship between age and IPV, prevention strategies, and different forms of IPV. The conceptual framework defines violence, violence against women, and IPV. The current legal framework in India includes the Indian Penal Code, Dowry Prohibition Act, and Domestic Violence Act. These laws aim to address domestic violence and protect women. However, there are still challenges in enforcing these laws and achieving gender equality.

KEYWORDS : *Intimate partner violence, Family, Violence, Abuse, Women.*

INTRODUCTION

Intimate Partner Violence, a subtype of domestic violence, is the most common form of violence against women worldwide. This type of violence is influenced by culture and social norms, and can be classified into fear of harm or actual harm. Violence against women is significantly influenced by gender, with instances including female feticide, sexual assault, marital rape, dowry murder, and domestic violence. Women become victims of violence from the domestic environment due to gender status differences within the family. A 2013 United Nations survey revealed that 35% of women worldwide have been physically or sexually abused by an intimate partner. The World Health Organization (WHO) reports that about 70% of women have experienced violence from an intimate relationship at some point in their lives. This paper highlights the pervasive nature of violence against women and the gender disparity created by intimate partner abuse, which subordinates women. Gender analysis is crucial

to understand intimate partner violence, which violates women's rights and has long-lasting effects on victims and their families. The vulnerability of women to violence highlights the denial of basic rights and human dignity.

STATEMENT OF RESEARCH PROBLEM

Intimate partner violence is a growing problem in India a large section of society faces intimate partner violence almost every day. Intimate partner violence is the most common type of violence that occurs during the lifetime of a woman. This study studies intimate partner violence and helps in suggesting various mitigation strategies to curb intimate partner violence in order to reduce the occurrence of intimate partner violence. The study is also aimed at studying the efficiency of the existing laws in protecting the right of women.

RESEARCH QUESTIONS

1. What is legal discourse for victims in cases of Intimate partner violence in India?

2. To study the need to criminalize marital rape as a form of intimate partner violence.
3. What are the prevention strategies to intimate partner violence?
4. What are the different forms in which intimate partner violence takes place?

RESEARCH OBJECTIVE

1. To study the law relating to intimate partner violence in India.
2. To understand the factors and prevention responsible for intimate partner violence.
3. To study the legal framework which helps in protection of intimate partner violence.

THE CONCEPTUAL FRAMEWORK

The conceptual framework for understanding violence against women starts with defining 'violence' as a term encompassing physical, emotional, and sexual abuses, as well as neglect, ranging from mild discomfort to severe harm. This framework further explores 'Violence against Women' as a significant societal issue stemming from gender-based power imbalances underpinned by patriarchal norms and discriminatory cultural practices. These conditions foster environments where women are perpetually vulnerable to violence across all stages of life and in various contexts, such as domestic settings and armed conflicts. Additionally, 'Intimate Partner Violence' is examined as a critical aspect of domestic violence, influenced by factors like societal norms, alcohol use, and childhood exposure to violence, supporting the theory that early experiences of violence could predispose individuals to perpetuate violence in their intimate relationships.

TYPES, PREVENTION & INFLUENCING FACTORS OF INTIMATE PARTNER VIOLENCE

Types of Intimate Partner Violence

Intimate Partner Violence (IPV) encompasses various forms including physical, psychological, financial, verbal, and sexual abuse. Physical abuse ranges from pushing and hitting to more severe acts like

forced suffocation, often resulting in injury or death. Psychological abuse includes controlling behaviors that manipulate a partner's actions and decisions, thereby creating significant power imbalances. Verbal abuse involves demeaning or ignoring the partner, gradually escalating over time. Sexual abuse, a prevalent form of IPV, includes non-consensual acts, often within marriages, highlighting the severe issue of marital rape. Financial abuse restricts access to resources, controlling economic assets and often leaving the victim financially dependent. Prevention of IPV involves multifaceted approaches: promoting awareness, enhancing legal frameworks, improving community support systems, and implementing educational programs that challenge traditional gender norms and empower potential victims. Influencing factors of IPV include cultural attitudes towards gender roles, economic dependence, substance abuse, and historical exposure to violence, all contributing to the perpetuation of abuse within intimate relationships.

INFLUENCING FACTORS

Influencing factors of intimate partner violence include a range of societal, personal, and behavioral elements. Low educational levels among women often correlate with higher instances of domestic violence due to reduced economic independence and lower social status. The lack of robust family, social, and legal support further exacerbates women's vulnerability, as isolation can intensify the psychological impact of abuse and reduce access to help. Heavy alcohol consumption by perpetrators significantly increases the likelihood of aggressive behavior due to impaired judgment and reduced inhibition, often escalating conflicts into violence. Additionally, witnessing or experiencing violence in one's upbringing normalizes aggressive behaviors, perpetuating a cycle where boys who witness violence are more likely to become abusive, and girls more likely to be victimized. Relationship conflicts, especially those involving power struggles or threats to male authority, can trigger violence, often rooted in traditional views of masculinity that equate male dominance with control over women. These factors collectively influence the prevalence and severity of intimate partner violence.

PREVENTION

Reducing Violence Against Women: A Strategy for Prevention and Prevention

Preventing violence against women involves establishing a societal intolerance towards intimate partner violence and enhancing women's autonomy through better access to education, employment, and reproductive rights. Effective strategies include integrating gender and violence education in healthcare and schools, and promoting gender equality and nonviolent conflict resolution. Comprehensive laws against sexual harassment and intimate partner violence, alongside supportive media campaigns, are vital. In the health sector, a thorough approach is needed, utilizing reproductive health services to support victims and incorporating violence awareness into all aspects of clinical treatment. Collaborative efforts across various sectors are essential to effectively address and prevent violence against women.

CURRENT LEGAL FRAMEWORK REGARDING THE INTIMATE PARTNER VIOLENCE

Indian penal code

The Indian Penal Code's Section 498A was the first provision that specifically recognized domestic violence against married women. In contrast to Section 304B, the "dowry death" provision, which penalized the husband if the wife passed away within seven years of the marriage and if a dowry demand had been made before the death. Due to the illegal nature of these legislation revisions, they penalized the spouse and his family if were involved in the domestic abuse. There was a demand for courts and police stations in addition to new laws. Domestic violence was identified as a distinct problem in 1983, a criminal offence by adding Section 498-A to the Indian Penal Code. Code. This section addresses abuse committed against a wife by a husband or his relatives.

Dowry Prohibition Act, 1961

The criminal justice system should handle violence, including dowry-related violence, if it causes significant harm, such as a victim's death. In India, the custom of giving and receiving dowries at marriage places

excessive pressure on the bride's family. Forms of dowry-related violence include torture, harassment, physical, emotional, and sexual domestic violence, aiding suicide, bride burning, and murder. The Dowry Prohibition Act of 1961 aims to forbid the giving and receiving of dowries.

Domestic Violence Act of 2005

The Domestic Violence Act of 2005 was passed in India to protect women from domestic violence committed by husbands, male live-in partners, or their relatives. The Act defines domestic violence as real or threatened abuse, including verbal, emotional, financial, sexual, or physical abuse. It allows women to stay in their matrimonial house, regardless of their title or right over it. The Act also prevents the perpetrator from threatening or using violence against the woman, providing total defense against the abuser. Protection officers and NGOs are deployed to assist women with medical testing, legal representation, and safe housing. The offender may receive a minor punishment if they fail to perform their duties properly. The Act also allows for simple incarceration as punishment for protection officers who fail to perform their duties.

CONCLUSION

Intimate relationship violence is the most common form of violence against women worldwide, affecting every community and affecting not only the victim but also family members. The United Nations recognizes this gender-based violence as a serious human rights issue, with violations of rights such as equality, health, life, and dignity. In 2013, WHO studies showed that one-third of women in intimate partner relationships experienced violence, with 38% of cases involving violence. Domestic abuse is a serious concern, and India's compliance with CEDAW is a concern. The Indian legislature has passed comprehensive laws to safeguard women's rights, including the Dowry Prohibition Act of 1961, the IPC, and provisions under matrimonial law.

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Analyzing the Role of Soft Skills in Leadership Development and Team Dynamics

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ABSTRACT

This research paper explores the integral role of soft skills in leadership development and team dynamics within organizational settings. It examines how competencies such as emotional intelligence, communication, and teamwork contribute to effective leadership and the creation of cohesive teams. Through a review of literature and empirical studies, the paper identifies key soft skills that enhance leadership effectiveness and team productivity, discussing methods for their cultivation and integration in professional environments. The findings aim to provide insights for organizations seeking to develop strong leaders and efficient teams, ultimately contributing to improved organizational performance.

KEYWORDS : *Engineering communication, Project management, Interdisciplinary collaboration, Stakeholder Engagement*

INTRODUCTION

In the modern organizational landscape, the value of soft skills is increasingly recognized as equally crucial to technical acumen, particularly in roles involving leadership and team management. Effective leadership transcends mere strategic decision-making; it fundamentally involves managing people, necessitating a repertoire of skills that bolster communication, empathy, and collaboration. These soft skills are essential for leaders who aim to motivate their teams and drive organizational success. This paper explores the intricate relationship between soft skills and leadership effectiveness, examining how these abilities influence team dynamics and contribute to the overall success of organizations. It delves into various aspects of soft skills, from emotional intelligence to conflict resolution, and discusses their critical role in forming resilient, productive teams that can navigate the complexities of today's work environment. This exploration aims to highlight actionable strategies for integrating soft skills into leadership development programs, underscoring

their importance in achieving sustainable organizational growth and effectiveness.

THE IMPORTANCE OF SOFT SKILLS IN LEADERSHIP

Effective leadership transcends the mere technical know-how and operational management; it fundamentally hinges on the leader's ability to inspire, motivate, and guide their teams. This capability is largely influenced by a leader's proficiency in soft skills, including emotional intelligence, communication, adaptability, and conflict resolution. The literature consistently supports the idea that leaders who excel in these areas are significantly more successful at leading teams, enhancing employee engagement, and fostering a positive organizational culture.

Emotional intelligence, for instance, enables leaders to understand and manage their own emotions and those of others, facilitating empathetic interactions and more effective management of team dynamics. Strong communication skills ensure that leaders can

convey their vision clearly, align team members with organizational goals, and foster an environment of open dialogue. Adaptability allows leaders to respond to changes and challenges with flexibility, while conflict resolution skills help to maintain harmony within the team.

Research indicates that such soft skills are not just beneficial but essential for leaders who aim to cultivate a thriving workplace. Leaders who are adept in these areas are better equipped to manage diverse teams, drive organizational change, and achieve sustained success in their roles.

CULTIVATING SOFT SKILLS FOR LEADERSHIP AND TEAMS

Cultivating soft skills within an organization is essential for fostering effective leadership and enhancing team dynamics. To achieve this, organizations must implement targeted strategies and interventions that focus specifically on developing these competencies. Tailored training programs, mentoring, and coaching are fundamental methods for enhancing the soft skills of both leaders and team members.

Organizations can initiate workshops that are designed to improve skills like communication, conflict resolution, and emotional intelligence. These workshops should involve interactive activities that encourage participants to practice these skills in real-life scenarios. Additionally, implementing real-time feedback mechanisms can provide immediate insights into how individuals use soft skills in their daily interactions, offering opportunities for on-the-spot adjustments and learning.

Moreover, mentoring programs can pair less experienced employees with seasoned leaders who exemplify strong soft skills. This relationship can facilitate personal development through regular guidance, advice, and support. Coaching, on the other hand, can be more focused and intense, with specific goals to enhance particular soft skills over a set period.

Team-building activities also play a crucial role in enhancing soft skills by promoting teamwork, empathy, and effective communication in a less formal and more engaging environment. These activities help break down

barriers between team members, improve interpersonal relations, and boost team cohesion.

By adopting these approaches, organizations can significantly improve the soft skills of their workforce, thereby enhancing overall leadership effectiveness and team productivity. This not only contributes to a more harmonious workplace environment but also drives better business outcomes.

CHALLENGES IN IMPLEMENTING SOFT SKILLS TRAINING

Implementing soft skills training in professional environments presents unique challenges. One major hurdle is resistance from management who may undervalue soft skills compared to technical abilities, not recognizing the substantial impact these skills can have on organizational performance. Another significant challenge is quantifying the return on investment (ROI) of soft skills training. The benefits of such training are often intangible and manifest over the long term, complicating efforts to measure immediate outcomes. Additionally, the subjective nature of assessing soft skills further complicates benchmarking and tracking improvements. Addressing these challenges requires educating leaders on the benefits of soft skills, developing both quantitative and qualitative metrics for assessment, and implementing tailored, continuous training programs that align with organizational needs and provide regular feedback.

CONCLUSION

The paper concludes by emphasizing the indispensable role of soft skills in augmenting leadership capabilities and fortifying team dynamics. It asserts that organizations committed to developing these skills are strategically poised to excel in a competitive business landscape. To harness the full potential of soft skills, the paper recommends a sustained commitment to integrating these skills into both leadership and team development initiatives. Furthermore, it advocates for ongoing research to refine approaches and validate the effectiveness of soft skills training. Organizations are encouraged to adopt a proactive stance in fostering environments where soft skills are valued and nurtured, ensuring they remain integral to professional

development strategies. This approach will not only enhance individual and team performance but also contribute to the broader organizational success.

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E-Waste Management Practices in Haryana State: Perspectives of Recyclers and Dismantlers

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ABSTRACT

To better understand the responsibilities and viewpoints of recyclers and dismantlers, this research paper examines the e-waste management practices in the state of Haryana. Because of its potentially harmful components, e-waste—discarded electronic devices—poses serious risks to human health and the environment. This study intends to provide insights into present practices, issues faced, and potential areas for improvement in e-waste management through surveys and interviews with key players in the chain of e-waste management. Comprehending the viewpoints of recyclers and dismantlers might help authorities devise more potent approaches to tackle Haryana's escalating e-waste predicament.

KEYWORDS : *E-Waste, Recycling, Management, Haryana, Dismantles.*

INTRODUCTION

The rapid proliferation of electronic devices has led to a significant increase in e-waste, posing severe environmental and public health challenges globally. In Haryana, one of India's most industrialized states, the management of e-waste has become a pressing concern. Proper disposal and recycling are crucial to mitigate the harmful impacts on both the environment and human health. Workers in the e-waste recycling industry face significant risks due to exposure to toxic substances like lead, cadmium, and brominated flame retardants, which can adversely affect neurological, renal, and pulmonary systems. This study focuses on the perspectives and practices of recyclers and dismantlers in Haryana, aiming to understand their challenges and strategies in e-waste management. By exploring these viewpoints, the research seeks to highlight areas for policy enhancement and operational improvements in the state's e-waste handling processes.

METHODOLOGY

Formal and informal waste recyclers

E-waste recyclers and dismantlers list was obtained from the Haryana State Pollution Control Board. Phone and face-to-face interviews used for survey to evaluate the status of e-waste management in different districts including Gurugram, Faridabad, and Rohtak.

RESULT AND DISCUSSION

In Haryana, the escalation in e-waste production is alarming, with a sixfold increase reported last year, culminating in 13,12,128 tonnes, according to the State Pollution Control Board. This sharp rise from the previous year's 2,45,004 tonnes is linked to the surge in technology use post-pandemic and increased corporate transparency in waste management. E-waste poses severe environmental risks due to toxic components like cadmium, lead, and BFRs that threaten human

health. Currently, 27 authorized e-waste recyclers operate under the E-Waste Management Rules, 2016. The state is actively developing strategies, including district-level monitoring and forthcoming SOPs for dismantlers, to enhance e-waste handling and mitigate its adverse impacts.

The list of recyclers surveyed in Gurugram were:

1. 3 R Recycler, IMT Manesar, Gurugram founded in 2010 with annual Authorized Capacity 2994 (MTPA) and specialized in EPR, Lithium Ion Battery Recycling, Lead Acid Battery, Data Destruction, Degaussing, Procurement, and EPR Compliance Management.
2. Deshwal Waste Management Pvt Ltd, plot No-292, Sec-7, IMT Manesar, Gurugram, Haryana founded in 2010 with annual Authorized Capacity 1800 (MTPA) and specialized in Consultancy on e-waste, Recycling, Waste to Energy, Dismantling, Plastic waste, battery waste, Collection of waste, and E-waste recycling.
3. Nirvana Recycling Pvt. Ltd., Udyog Vihar Phase-VI, Sector-37, Gurugram founded in 2016 with annual Authorized Capacity 6030 (MTPA) and recycling of scrap and waste metal made from abandoned aluminum, cutlery, containers, and other metallic objects, etc. Gathering of scrap and waste metal for other used metallic products, etc. 51498 includes the collection of metal scrap and garbage for recycling.
4. Ecoverva Waste Recycling Private Limited, Plot No. 350 Block C Village Pathreri Ansal Pioneer Industrial Park, Distt. Gurgaon founded in 2019 with annual Authorized Capacity 353.07 (MTPA).
5. Pegasus Waste Management Pvt. Ltd., Village-Bhora Kalan, Gurugram with annual Authorized Capacity 13134 (MTPA).
6. KTS Recycler Pvt. Ltd., Plot No-129C, Sector-4, IMT Manesar, Gurugram with annual Authorized Capacity 3200 (MTPA).

Dismantlers in Gurugram: 3R Zero Waste Pvt. Ltd., Plot No.-62, Sector-8, IMT Manesar; APICEM Recyclers Pvt. Ltd., Plot No.-306, Sector-6, IMT Manesar, Gurugram;

CUREARTH INDIA E WASTE RECYCLING Plot No. 22, Sector-8, IMT Manesar; EARTH SENSE RECYCLE PVT LTD, Plot No. 100, Sector - 5, IMT Manesar, Gurgaon; KM Global E-Waste Private Limited, Ground Floor, Plot No-359, Sector-8, IMT Manesar, Gurugram, Haryana; SMS ENTERPRISES, Plot No. 544- D, Third Floor, Sector -37, Pace City - II, Gurugram (Haryana); GREENHOLICS RECYCLERS PVT LTD, PLOT NO 234, SEC 8, IMT Manesar, Gurugram; Trust Me Recycler Pvt. Ltd., Plot No-544-D, Basement, Pace City-II, Sector-37, Gurugram; KTS Recycler Pvt. Ltd., Plot No 129C, Sector-4, IMT Manesar, Gurugram.

Recycler in Faridabad: Electronic waste generated by industrial, educational, and residential regions is managed by e-waste recyclers in Rohtak, a well-known urban center in Haryana.

1. Naturevolt Recyclers India Pvt Ltd, Plot No. 323, Part-IV, Sector-24, Faridabad with annual Authorized Capacity 216 (MTPA).
2. Re Chakra Waste Management LLP., Plot No. -18, Sector-6, Faridabad with annual Authorized Capacity 7800 (MTPA).

Dismantlers in Faridabad: E-waste Solutions, Industrial Shed, 1A, Industrial Estate, Sec-6, Faridabad; V S Enterprises, Plot no. 9, Pragati Vihar, Sector-59, Faridabad; Endeavor Re-processor and Recyclers India, Plot no. 323, Sec-24, industrial Area, Faridabad; A to Z E-waste Solutions, V Green Solutions Pvt Ltd., Plot No. 274, Sector-24, Industrial Area, Faridabad.

Recycler in Rohtak The industrial powerhouse city of Faridabad is home to a network of e-waste recyclers that handle the stream of electronic garbage that comes from homes, businesses, and manufacturing plants.

1. M/S Endeavor Recyclers India Private Limited 71//14/2/2, 71//15/1, Village Hassangarh, Tehsil-Sampla, District Rohtak with annual Authorized Capacity 28350 (MTPA).

Dismantlers in Rohtak: M/s Earth Waste Management Co. Vill-Ismaila, Distt. Rohtak; M/s Giriraj Metal, Plot No. 39, HSIIDC, Distt. Rohtak.

Average 90 % of the recycling organization using the given process:

1. Acquire electronic garbage from homes, companies, and other places.
2. Determine what needs to be done for repair, refurbishing, and remarketing; Weigh and sort e-waste materials for simple retrieval; Reusable parts should be salvaged.
3. Disassemble outdated technology into recyclable fractions, such as glass, plastic, metal, cables, and PCBs.
4. Reduce the size of bulk materials into smaller bits; extract metals from plastic; and retrieve precious metals like copper and aluminum.
5. Use a common hazardous waste treatment, storage, and disposal facility to get rid of dangerous materials.

Health effect on worker: Workers who recycle e-waste may be exposed to a variety of occupational health risks, such as burns or skin irritation from coming into direct contact with hazardous chemicals, injuries from handling heavy or sharp objects, and respiratory issues from breathing in dust particles and poisonous fumes. Furthermore, these dangers are increased by poor safety precautions and training, which may result in long-term health issues and a lower standard of living for workers.

RECOMMENDATIONS

The results of the poll provide numerous important suggestions for efficient e-waste management. Initially, in order to make public disposal simple, a broad network of collection centers must be established in various regions. These drop-off locations may use practical drop-off strategies or use buy-back schemes to encourage participation. Additionally, efficient and economical transportation to recycling facilities can be ensured by strategically placing storage facilities to optimize the storage and transit of collected e-waste. The economic viability of centralizing e-waste processing operations, such as dismantling and recycling, can be improved; industrial parks or estates outside of cities are useful

for this. To reduce occupational health hazards, people involved in disassembly must get the necessary training and safety precautions, and it is essential to separate materials during this phase. Moreover, recycling procedures can be streamlined by moving separated materials from storage facilities to specialist recycling enterprises. Last but not least, putting in place industrial estates or parks for the thorough recovery of metals and other materials can help to promote a circular economy model by guaranteeing safety and profitability in e-waste management procedures.

CONCLUSION

The study provides insight into the situation of Haryana's e-waste management procedures today, especially from the viewpoints of recyclers and dismantlers. Due to the quick spread of electronic devices disposing of e-waste has become a major environmental issue that requires efficient management techniques to lessen its negative consequences. Dismantlers and recyclers are essential in rescuing precious components from abandoned electronics and guaranteeing that dangerous parts are disposed of appropriately. But their methods and ideas are still mostly unknown in Haryana. Through examining the experiences, obstacles, and tactics utilized by various stakeholders, this research seeks to offer significant understandings into the complexities of e-waste management in the area.

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Integrating Soft Skills Education into Higher Learning Curriculum for Enhanced Employability

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ABSTRACT

As the labor market becomes increasingly competitive, the integration of soft skills education into higher learning curricula emerges as a crucial strategy for enhancing employability. This research paper explores the importance of soft skills, such as communication, teamwork, and problem-solving, within the context of higher education. It evaluates current pedagogical approaches and proposes methods for effectively incorporating soft skills training in university programs. The paper aims to establish a link between soft skills proficiency and improved job prospects, advocating for a holistic educational approach that balances technical knowledge with interpersonal abilities.

KEYWORDS : *Engineering communication, Project management, Interdisciplinary collaboration, Stakeholder engagement.*

INTRODUCTION

In today's rapidly evolving job market, the importance of soft skills alongside technical expertise is increasingly recognized by employers. Historically, universities have concentrated on imparting discipline-specific hard skills. However, the growing demand for graduates who are adaptable, effective communicators, and capable of critical thinking is prompting a significant shift in educational strategies. This paper highlights the importance of soft skills in modern workplaces and examines the potential benefits of integrating these skills systematically into higher education curricula. It argues that enhancing curricula with soft skills can significantly improve graduate employability and better prepare students for the complexities of professional environments, aligning academic offerings more closely with the current demands of the global job market.

THE IMPORTANCE OF SOFT SKILLS IN THE WORKPLACE

Soft skills, encompassing interpersonal and emotional intelligence abilities, are increasingly recognized as critical components of successful career development in today's complex work environments. Employers across

various industries emphasize the necessity of skills such as leadership, communication, and teamwork. These capabilities enable employees to navigate workplace complexities effectively, foster collaborative relationships, and lead projects to success. Literature in the field consistently highlights a robust demand for these skills, noting their significant contribution to organizational success and individual career advancement. This section reviews such literature, underscoring the broad applicability and importance of soft skills in enhancing workplace dynamics and driving professional growth in diverse industry settings.

REVIEW OF CURRENT EDUCATIONAL PRACTICES

Current educational practices in higher education often focus predominantly on the acquisition of technical or hard skills, with less emphasis on the critical soft skills necessary for holistic professional development. However, some progressive institutions are beginning to integrate soft skills training into their curricula, recognizing their importance in preparing students for the workforce. This integration often takes the form of standalone courses in areas such as communication,

leadership, and teamwork, or through the embedding of these skills into existing technical courses via group projects, presentations, and interactive assignments. For example, project-based learning has been highlighted as an effective method for fostering soft skills, as it mimics real-world scenarios where students must navigate complex tasks collaboratively and communicate effectively both verbally and in writing. Despite these efforts, many educational systems still face challenges in fully incorporating soft skills education, such as scalability, assessment difficulties, and insufficient faculty training. Literature suggests that while these innovative practices show promise, widespread implementation is often hindered by traditional curricular structures that prioritize technical over interpersonal skill development. A more integrated approach, combining both skill sets from the onset of a student's educational journey, is recommended to enhance employability and adaptability in the ever-evolving job market.

BARRIERS TO SOFT SKILLS INTEGRATION IN HIGHER EDUCATION

Integrating soft skills into higher education curricula faces several barriers that can impede the holistic development of students. One of the primary challenges is the traditional focus of academic institutions on technical competencies and hard skills, which often leads to a marginalization of soft skills education. This imbalance stems from a longstanding emphasis on quantifiable outcomes and standardized testing, which are less adaptable to the subjective nature of soft skills assessment.

Curriculum rigidity is another significant barrier. Integrating new soft skills modules into established programs requires curricular overhaul that many institutions are hesitant to undertake due to time, cost, and bureaucratic constraints. These challenges necessitate strategic changes and commitment at the institutional level to ensure that soft skills receive the attention they deserve within the educational framework.

STRATEGIES FOR EFFECTIVE INTEGRATION OF SOFT SKILLS

Effectively integrating soft skills into higher education curricula requires strategic planning and a commitment

to holistic student development. Here are key strategies that institutions can employ:

- **Curriculum Design:** Revise curricula to include dedicated courses on soft skills like communication, problem-solving, and teamwork. Alternatively, embed these skills into existing courses through modules that require collaborative work, presentations, and real-world problem-solving activities.
- **Interdisciplinary Approach:** Encourage an interdisciplinary curriculum where students can undertake projects that involve multiple disciplines. This not only enhances technical skills but also fosters a diverse set of soft skills as students interact with peers from different backgrounds and specialties.
- **Faculty Development:** Invest in training faculty on the importance of soft skills and effective methods for teaching them. Workshops, seminars, and collaborative teaching opportunities can equip faculty with the necessary tools and understanding to integrate soft skills into their courses.
- **Assessment Methods:** Develop new assessment strategies that accurately measure soft skills. This could include peer reviews, self-assessments, and project-based assessments that reflect real-world tasks, rather than relying solely on traditional exams.
- **Industry Collaboration:** Partner with industry leaders to provide students with practical experiences through internships, co-op placements, and mentorship programs. Such collaborations can also help in designing course content that meets current industry standards and expectations for soft skills.
- **Feedback Mechanisms:** Implement feedback systems where students can assess their soft skills development and receive guidance on improvement. This can help students recognize their growth areas and actively work on enhancing their interpersonal and professional skills.

By adopting these strategies, higher education institutions can more effectively integrate soft skills

training into their programs, thereby enhancing student employability and preparing them better for the complexities of the modern workforce.

CONCLUSION

This paper underscores the critical role of soft skills in enhancing employability and the need for their integration into higher education curricula. It argues that universities must adopt a proactive approach to education reform to produce graduates who are not only technically proficient but also adept in the soft skills required for career success. The paper calls for ongoing research to refine and optimize approaches for soft skills education, ensuring they meet the dynamic needs of the workforce.

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Brand Building Strategies and Their Impact on Market Performance: An Analytical Study of Private Universities in India

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ABSTRACT

The primary purpose of this study is to explore the brand-building strategies of leading private universities in India and to measure the impact of brand-building strategies of private universities. In addition to it, the study also segregates the most effective brand-building strategies for universities based on branding impact. This study finds that brand-building strategies are equally applicable in the education field as well as in business. So, while building the university's image, one must focus not only on distinct features their academic institute offers to consumers but also on targeting their concerns. The contest for "idea of the University brand" grabs some attention and raises interest levels. Universities are competing with all their efforts in the marketing area to create an effective marketing strategy to attract more and more students to take admission to their university. Marketing betwixt universities and colleges seems like a matter which does not have many fluctuating factors. However, the matter of fact is that since the technologies are advancing day by day, it is forcing the universities and the institutes of higher Education to innovate themselves in all the areas of marketing strategies to attract the maximum number of students to their university every year.

KEYWORDS : Branding, Strategies, Private Universities, Brand Building, Market Research.

INTRODUCTION

Today, Education is no more about giving and taking information as in an information-rich world, but moreover about making the students know how the information can be analyzed to produce and gain knowledge. In this circumstance, the shift that has occurred in the sociological and intellectual arenas of the knowledge industry must be taken into account by the educational institutions to do justice to the students and themselves. Innovative and quick thinking is the need of time and adapts to the changing circumstances.

Various fundamental aspects play an essential part in brand building. Newspaper advertisements, hoardings, pamphlets, wall paintings, billboards, banners on public transportation, digital marketing (websites, updated web pages, blogs), event groups (promoting

sports tournaments, sponsoring), SMS marketing, guest lecturers, college magazines and journals, tie-ups with professionals, HEIs Slogan Transparent stickers for transportation, campus and class interior, alumni gatherings, CRM (festive cards and invitations), cable/ TV commercials, beautiful graphical prospectus, brochures, and CDs, complementary crash courses social responsibility (CSR), student free visits and awareness sessions, kiosks and information help desks at public places, conducting workshops, seminars, conventions, publishing newsletters plus announcing scholarships and mentorships.

Importance of the Study

The present study aims to examine and analyze the popular branding strategies used by private universities in India. This study measured the effectiveness of the

various branding strategies and their effect on market performance. This study has been going on for hours in this day and age when the education industry has become one of the most competitive industries in India.

The study also aims to separate branding strategies based on their market performance. Important market strategies include social media tools like Twitter, Facebook, Instagram, LinkedIn, Telegram and Email marketing Advertising and promotions using various media Attractive university guide showing its achievements Billboards and billboards Curriculum Incorporating exceptional educational approaches Scholarship and scholarship programs for students Providing sports and extracurricular activities. Some strategies such as research and development facilities and creative thinking opportunities are also in trend.

Objectives of the Study

1. To explore the "Brand-building" strategies of leading private universities in India.
2. To Make Analysis of the various brand building strategies of private universities.
3. To measure the impact of brand building strategies of private universities.
4. To segregate the most effective brand building strategies for universities based on short term and long-term impact.
5. To find the impact of geographic and demographic factors and branding building strategies and students' mobilization.

Scope of The Study

The present study focuses on Brand Building strategies private universities in the India. Higher Education in India includes the private universities that offering all kinds of professional and traditional courses. The study will mainly focus on how these universities build their brand to mobilize the student.

Geographical Scope of the Study: The study is limited to the selected states of India – Delhi – NCR, Uttar Pradesh, Rajasthan, Haryana and Punjab and Himachal Pradesh.

Theoretical Scope: Theoretically, the study is limited to the brand building strategies and their impact. The

brand building strategies will essentially include – Advertising (non-personal media), Promotion through Personal Media, counselling, social media Marketing, Digital marketing, and other means.

RESEARCH DESIGN

This study is based on primary and secondary sources. The present study is about maintaining, describing, and popularizing the brand of private universities. The purpose of implementing brand building strategies by the private universities is solely to attract more and more students. Following is the process that universities typically follow to make the brand popular:

The process of building a brand is below:

- Describing brand in a way that attracts the students
- Differentiation & Positioning of brand from other competing universities
- Brand Promotion in a unique way
- Personalise the Brand so that it becomes exclusive identity of the university
- Evaluate the Brand so that the make changes as per the demand in the education industry among the era of cut-throat competition

Sample Size: 600 Students from five different fields from private universities – 300 staff employees – Directors/ Marketing Department/ Counsellors/ Employees involved in brand building

Findings of the Study

The branding building strategies of the various institutions have been extracted from the contemporary literature. The following two statistical tools were applied on the branding strategies:

- Mean analysis to measure the magnitude and important of the branding strategies
- Factor analysis to explore the correlations among various strategies and group them suitably

Analysis of the various brand-building strategies of private universities with the help of mean score has been done in this section:

Opinion of the respondents for the various brand building strategies of private universities.

| S. No. | Strategies | Mean score |
|--------|--|------------|
| 1. | Online campus tours using audio, video and graphics | 4.11 |
| 2. | Web portals for students, alumni and faculty | 4.10 |
| 3. | Social media tools like Twitter, Facebook etc. | 4.03 |
| 4. | Testimonials by alumni and parents | 4.13 |
| 5. | E-Mail Marketing | 4.11 |
| 6. | User friendly websites showing all details related to university | 4.07 |
| 7. | Advertisements and promotions using different mediums | 3.63 |
| 8. | Using alumni and faculty networks | 3.63 |
| 9. | Word of mouth through alumni feedback etc. | 3.63 |
| 10. | Attractive university manual displaying its achievements | 3.44 |
| 11. | Hoardings and Billboards | 3.49 |
| 12. | Facilities for research and development and opportunities to enhance creative thinking | 3.94 |
| 13. | Quality education with facilities for research and innovation | 3.79 |
| 14. | Career counselling facilities | 3.72 |
| 15. | Quality of infrastructure and facilities available | 4.04 |
| 16. | Course Curriculum | 3.58 |
| 17. | Provision of variety of courses | 3.64 |
| 18. | Proficient and experienced faculty members | 3.76 |
| 19. | Appropriate accreditation and affiliation | 3.63 |
| 20. | Incorporating exceptional educational approaches | 3.71 |
| 21. | Good placement Record | 4.16 |
| 22. | Value for Money | 3.83 |
| 23. | Scholarship and Fellowship programs for students | 3.76 |
| 24. | Overall personality development | 3.54 |

| | | |
|-----|---|------|
| 25. | Conferences and workshops | 3.42 |
| 26. | Activities related to social well-being | 3.34 |
| 27. | Provision of sports and extra-curricular activities | 3.83 |

The study presents mean scores of brand building strategies employed by private universities to attract students and parents. Digital tools lead, with online campus tours using multimedia averaging a score of 4.11, closely followed by web portals for stakeholders at 4.10. Social media platforms like Twitter and Facebook engage users effectively with a score of 4.03. Testimonials from alumni and parents are highly influential, scoring 4.13. E-Mail marketing and user-friendly websites also show strong performance with scores of 4.11 and 4.07, respectively. Traditional advertising methods like billboards and alumni networks have lower impacts with scores around 3.63. Key academic attractions include quality education and research opportunities, scoring above 3.7, while the highest priority for students is the university's placement record at 4.16. Universities also focus on holistic student development through extra-curricular activities and career counseling, indicating a well-rounded approach to branding and student engagement.

CONCLUSION OF THE STUDY

The study underscores the vital role of branding for higher educational institutions (HEIs) amid increasing competition and the proliferation of courses. Effective branding is essential for differentiation and market positioning, enhancing control over targeted business domains and offering comprehensive developmental benefits. As higher education transitions into a service-oriented domain, adherence to marketing principles becomes crucial, with students, staff, and the public viewed as consumers. Successful branding strategies combine public recognition through word-of-mouth, advertising, and the strategic portrayal of symbolic and service attributes such as reputation, facilities quality, and customer support. These efforts collectively strengthen an institution's market presence, attracting a diverse student body and ensuring sustainability in a dynamic educational environment.

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The Imperative of Effective Communication for Engineers

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ABSTRACT

Effective communication is pivotal in engineering, playing a crucial role in ensuring project success, safety, and stakeholder satisfaction. This paper explores how communication proficiency can enhance project outcomes, facilitate interdisciplinary collaboration, and bridge the gap between technical teams and non-technical stakeholders. It highlights the challenges engineers face, such as technical jargon and cultural differences, and offers strategies for improving communication skills through education and practical application. Case studies illustrate the consequences of communication failures and the benefits of effective communication in engineering projects. This discussion underscores the necessity of integrating communication skills in engineering education and professional development.

KEYWORDS : *Engineering communication, Project management, Interdisciplinary collaboration, Stakeholder engagement.*

INTRODUCTION

Engineering is fundamentally a technical discipline, but the success of engineering projects relies heavily on effective communication. While technical skills are essential, the ability to convey complex information clearly and collaborate across diverse teams is equally crucial. This introduction outlines the importance of communication skills in engineering, touching on the need for engineers to effectively interact with both technical colleagues and non-technical stakeholders. The paper will discuss how proficient communication facilitates project management, ensures safety, and enhances stakeholder satisfaction. It will also address the common communication challenges faced by engineers, such as navigating technical jargon and cultural differences, and propose strategies to improve communication proficiency in the engineering sector. This paper aims to highlight communication as a critical skill for engineers, integral to professional success and project efficiency.

THE ROLE OF COMMUNICATION IN ENGINEERING

Communication in engineering is vital for multiple reasons, ranging from the effective transmission of ideas to ensuring safety and regulatory compliance. It plays a central role in the execution and management of engineering projects, particularly when they involve interdisciplinary teams. Effective communication ensures that complex ideas and plans are clearly understood and correctly implemented, reducing the risks of costly delays and errors. Additionally, it is crucial for engineers to communicate technical details in accessible language to stakeholders who may not have a technical background, ensuring everyone is aligned with the project's goals. Clear communication about safety protocols and compliance requirements is also essential to prevent accidents and ensure that all team members and stakeholders are aware of and comply with necessary standards and regulations.

CHALLENGES TO EFFECTIVE COMMUNICATION IN ENGINEERING

Effective communication in engineering faces several significant challenges that can impede the clarity and efficiency of interactions. The inherent technical complexity of engineering concepts often requires translation into simpler terms for non-specialists, a process that can be fraught with difficulties. Technical jargon, while facilitating precise communication among peers, often excludes or confuses stakeholders who are not familiar with the terminology. Engineers must learn to adjust their use of specialized language based on their audience to ensure inclusivity and understanding.

Furthermore, the global nature of many engineering projects introduces cultural and linguistic differences that can further complicate communication. Working with international teams requires an enhanced level of cultural sensitivity and adaptability. Misunderstandings arising from these differences can lead to inefficiencies and errors in project execution, highlighting the need for engineers to develop strong cross-cultural communication skills.

STRATEGIES FOR ENHANCING COMMUNICATION SKILLS AMONG ENGINEERS

Enhancing communication skills in engineers involves integrating tailored communication courses within formal education to build a solid foundation in effective communication principles. Regular professional development through workshops and training sessions is essential for applying these principles in real-world scenarios and keeping up with new communication strategies. Additionally, engineers should practice skills that are vital for effective communication, such as delivering presentations, writing clear reports, and leading meetings. Employing visual aids and simplifying technical jargon can make complex information more understandable. Consistently applying these strategies can greatly improve communication proficiency, crucial for success in the diverse, collaborative field of engineering.

CASE STUDIES

Several case studies underscore the critical role of effective communication in engineering, demonstrating how communication failures can lead to severe consequences:

- **The Mars Climate Orbiter Incident:** This infamous 1999 space mission failure was caused by a communication error between different engineering teams working on the project. One team used metric units while the other used imperial units for key spacecraft navigation data. The lack of clear communication and verification of these crucial details resulted in the loss of the orbiter as it entered the Martian atmosphere at the wrong angle, illustrating the necessity for precise and consistent communication standards in engineering projects.
- **The Hyatt Regency Walkway Collapse:** In 1981, one of the deadliest structural collapses in US history occurred due to a miscommunication in the design and approval process of a walkway suspension system. Engineers approved a last-minute design change without fully understanding the implications or communicating the increased load on the structure. This miscommunication led to a structural failure, resulting in 114 deaths and highlighting the catastrophic consequences of inadequate communication between design teams and contractors.

CONCLUSION

In conclusion, this paper emphasizes the critical role of effective communication in engineering, impacting project success, safety, and stakeholder satisfaction. Engineers must master clear communication to manage complex information and diverse teams effectively. Overcoming challenges like technical jargon and cultural differences is crucial for clarity and inclusiveness. Strategies such as integrating communication training within education and practical applications are vital. Case studies like the Mars Climate Orbiter and the Hyatt Regency walkway collapse illustrate the severe consequences of communication failures,

underscoring the need for precise communication practices. Enhancing communication skills is essential for advancing engineering outcomes and professional development.

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The Art of Communication: Exploring the Multifaceted Dynamics of Human Interaction

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ABSTRACT

This paper delves into the intricate world of communication, exploring its various forms, underlying principles, and impacts on personal and professional relationships. By examining both historical and contemporary perspectives, the study highlights the evolution of communication methods and the role of technology in shaping modern interactions. The paper also addresses the psychological aspects of communication, including non-verbal cues, emotional intelligence, and the impact of cultural differences. Through a multidisciplinary approach, this research aims to provide a comprehensive understanding of the art of communication and its significance in the fabric of society.

KEYWORDS : *Crisis management, Transparency, Effective messaging, Open communication.*

INTRODUCTION

Communication is fundamental to human interaction, serving as the bedrock for exchanging ideas, understanding others, and forming connections. It encompasses various modes such as speech, writing, and digital media, which are essential in both personal and professional realms. Effective communication is vital as it fosters understanding and trust, crucial elements for robust personal relationships and successful teamwork in organizational settings. It also facilitates the sharing of knowledge, promoting learning and innovation. In leadership, communication is instrumental in motivating teams, resolving conflicts, and steering organizational directions. As the world becomes more interconnected, communication plays a pivotal role in bridging cultural and geographical gaps, enhancing global collaboration. This paper delves into the extensive landscape of communication, exploring its evolution, forms, psychological aspects, and cultural implications, particularly in the digital age and professional environments.

OVERVIEW OF COMMUNICATION

Communication is a dynamic and evolving process that has significantly shaped human interaction throughout history. Starting with basic non-verbal cues, humanity progressed to spoken language, enabling more complex and rich exchanges. The development of written communication, marked by systems like cuneiform and hieroglyphics, revolutionized the storage and dissemination of information, forming the basis of recorded history. The invention of paper in China and later, Johannes Gutenberg's printing press in the 15th century, democratized information and spurred intellectual movements. The telegraph and the telephone compressed time and distance, further transforming communication. The 20th century introduced mass media, such as radio and television, dramatically broadening information's reach. The advent of the internet ushered in a new era of global connectivity and digital platforms, reshaping communication yet again.

Communication today manifests in verbal, non-verbal, and digital forms. Verbal communication encompasses

both oral and written forms, crucial for direct exchanges and long-distance interactions, respectively. Non-verbal communication, including body language and facial expressions, provides additional context to words, often conveying more than spoken or written language can. Digital communication, integrating emails, social media, and video calls, combines these elements, expanding communication's reach and speed. However, this form also demands careful handling of nuances typically conveyed through physical presence, underscoring the need for clarity and tone awareness in our interconnected world.

COMMUNICATION IN PROFESSIONAL SETTINGS

Communication in professional settings is crucial for organizational success, significantly impacting leadership, management, and team dynamics. Effective communication is essential for leaders to inspire and direct teams, ensuring that everyone shares a common vision and objectives. It enables the transparent and efficient exchange of information, fostering an atmosphere of trust and openness that is conducive to feedback and continuous improvement. In team environments, communication is fundamental to collaboration and problem-solving, uniting diverse individuals towards common goals and ensuring all members are informed and engaged. It is also pivotal in shaping organizational culture, where open communication can enhance job satisfaction and productivity, while poor communication might lead to dissatisfaction and inefficiency. Strategies to enhance workplace communication include establishing clear channels and protocols, promoting active listening, and fostering a feedback-rich environment. These practices help maintain a well-informed and cohesive workforce, crucial for organizational health and effectiveness.

CASE STUDIES AND REAL-WORLD EXAMPLES

Case studies and real-world examples vividly illustrate the critical role of communication in both successful outcomes and notable failures. One famous success is the Apollo 13 mission, where effective, clear, and calm communication between space crew and ground control was pivotal in resolving a potentially disastrous

situation. This underscores the importance of precise and composed communication in crisis management. Similarly, the New Zealand government's handling of the COVID-19 pandemic showcases successful communication. Led by Prime Minister Jacinda Ardern, the government's transparent, consistent, and empathetic communication gained public trust and compliance, demonstrating the power of effective messaging in public health crises. Conversely, the Challenger Space Shuttle disaster exemplifies how communication failures can lead to tragic outcomes. The breakdown in communication between engineers and NASA's decision-makers, where crucial concerns about the O-ring seals were dismissed, highlights the necessity of open channels and heedful listening within teams. Another example of communication failure is the BP Oil Spill, where BP's initial underestimation of the disaster and inconsistent messages resulted in public distrust and a tarnished reputation, emphasizing the need for honesty and promptness in crisis communication. These cases reveal that whether in escalating crises or managing public health, the quality of communication can significantly influence the result, underscoring the importance of clarity, openness, and timeliness in all exchanges.

CONCLUSION

In conclusion, this exploration of communication underscores its complex role in shaping human interactions across different spheres. Effective communication extends beyond mere information exchange to include emotional intelligence, cultural sensitivity, technological adaptability, and ethical considerations. Its historical evolution demonstrates significant technological milestones that have reshaped human connectivity. In professional settings, communication is crucial for leadership effectiveness, team cohesion, and organizational culture. The digital age offers enhanced connectivity but introduces challenges like information authenticity and privacy. Future research should address these issues, emphasizing the psychological impacts and technological advancements. Mastering effective communication is essential for personal, professional, and societal success.

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Quasi Statistical Convergence and Its Relation with Various Convergences of Sequences in Cone Metric Spaces

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ABSTRACT

Cone metric spaces represent one among several extensions of metric spaces, where every cone metric space inherently forms a topological metric space. This paper aims to introduce a novel form of statistical convergence for sequences within cone metric spaces and explore their connections with other types of sequences. Specifically, we examine the interplay between Cauchy convergence and quasi-statistical convergence, probing into the relationships among quasi-statistical sequences, Cauchy sequences, and their contribution to statistical convergence. Additionally, we delve into the properties of quasi-statistically bounded sequences within this framework. Overall, our focus lies on elucidating these relationships and properties within the realm of cone metric spaces, shedding light on their significance in the broader context of metric space theory.

KEYWORDS : Cone metric, Statistical convergence, Quasi-statistical boundedness.

CONE METRIC SPACE

The application of Cone Metric Space spans across diverse realms of research and sciences, including computer science, fixed theory, and topological spaces. Dj. Kurepa, in 1934, introduced the concept of Cone metric space under the name "espaces pseudo-distances," offering a valuable abstraction that continues to enrich these fields (Kurepa, 1934) [1]. Kedian Li, Shou Lin, and Ying Ge defined various theorems about statistical convergence in cone spaces (Li, Lin, & Ge, Year) [3]. The notions of quasi-statistical convergence were introduced by Sakaoğlu and Yurdakadim (Sakaoğlu & Yurdakadim, Year) [9]. Nihan Turan, Emrah Evren Kara, and Merve İlkhān also discussed the theorems related to quasi-statistical convergence (Turan, Kara, & İlkhān, Year) [10]. In this paper, we aim to fill the gaps by exploring the interrelation between statistical convergence and quasi-statistical convergence in terms of their properties and theorems. The set \mathbb{N} is used for the set of all positive integers, and the set \mathbb{R} is used for real numbers throughout this paper. The set \mathbb{R} is considered as a topological space having standard or usual topology on it.

INTRODUCTION

Definition 1.1 Let P be a nonempty subset of the Real Banach space E . Then P becomes a cone if and only if it fulfills the subsequent conditions.

The subset P accommodates all of its limit points and $P \neq \{0\}$;

For $x_1, x_2 \in P$, take two non-negative numbers $p, q \in \mathbb{R}$ implies $px_1 + qx_2 \in P$;

Take some $x \in P$ and if $-x \in P$ then it implies that $x = \{0\}$.

Let we have \leq i.e. a partial ordering in connection with P for a given cone $P \subset E$ is defined as $x_1 \leq x_2$ if and only if $x_2 - x_1 \in P$. We have $x_1 < x_2$ to show that $x_1 \leq x_2$ but $x_1 \neq x_2$, and $x_1 \ll x_2$ implies that $x_2 - x_1 \in \text{int } P$ where $\text{int } P$ stands for the interior of the set P . We always take $E^+ = \{c \in E: 0 \ll c\}$ and assume $\text{int } P \neq \emptyset$ [5]

Definition 1.2 Let For all $x_1, x_2 \in E$, $0 \leq x_1 \leq x_2$ and P be a given cone such that $P \subset E$. Then Cone P becomes a normal Cone if it satisfies the condition $\|x_1\| \leq K \|x_2\|$

Where $K > 0$ is a real number. Least positive number K is said to be a constant of normal for a given cone P .

Definition 1.3: Let take a non-empty set X having cone space as (E, P) . If we define a function $d : X \times X \rightarrow E$ having the following conditions:

- Each point $x_1, x_2 \in X$ we have $d(x_1, x_2) \geq 0$ and $d(x_1, x_2) = 0 \iff x_1$ is equal to x_2
- Each point $x_1, x_2 \in X$ satisfies the symmetry i.e. $d(x_1, x_2) = d(x_2, x_1)$
- Each point $x_1, x_2, x_3 \in X$ follow the inequality $d(x_1, x_2) \leq d(x_1, x_3) + d(x_3, x_2)$

Then d is a cone metric on X and cone space is (X, E, P, d) . We use (X, d) as a cone space.

Examples of Cone Metric Space

Example 1.1 Let $E = \mathbb{R}^2$ and $P = \{(x_1, x_2) \in E : x_1, x_2 \geq 0\}$, $X = \mathbb{R}$. The Mapping $d: X \times X \rightarrow E$ is given by $d(x_1, x_2) = (|x_2 - x_1|, \gamma |x_2 - x_1|)$, where $\gamma \geq 0$, γ a real number and a constant. Then (X, d) is said to be a Cone Metric Space.

Example 1.2 Let $E = \mathbb{R}^2$ and $P = \{(x_1, x_2) \in E : x_1, x_2 \geq 0\}$, $X = \mathbb{R}$ and $d: X \times X \rightarrow E$ defined by $d(x_1, x_2) = \left(\left| \frac{x_1}{1+|x_1|} - \frac{x_2}{1+|x_2|} \right|, \sqrt{3} \left| \frac{x_1}{1+|x_1|} - \frac{x_2}{1+|x_2|} \right| \right)$ is cone metric space. [5]

Asymptotic (or natural) Density of a Set

Definition: Let $A \subset \mathbb{N}$, put $A(n) = \{a \in A : a \leq n\}$, $\forall n \in \mathbb{N}$. Then $\delta(A) = \inf \liminf_{n \rightarrow \infty} \frac{|A(n)|}{n}$ and $\bar{\delta}(A) = \sup \limsup_{n \rightarrow \infty} \frac{|A(n)|}{n}$ are called lower and upper asymptotic density of the set A respectively. If $\bar{\delta}(A) = \delta(A)$, then $\delta(A) = \frac{|A(n)|}{n}$ is called an asymptotic (or natural) density of the set A . [3]

Convergence of a Sequence

Definition: Let sequence $\{z_n\}$ be a given sequence in a cone space (X, d) . If we can find a real number $n_0 \geq 1$ such that for all $n \geq n_0$, $d(z_n, z) \ll c$, for any $c \in P$ with $c \gg 0$, and $z \in X$. Then $\{z_n\}$ is called convergent sequence or we can say $\{z_n\}$ converges to z and denote it as $\lim_{n \rightarrow \infty} z_n = z$.

Role of Cauchy sequences in Cone Space

Definition: Let sequence $\{z_n\}$ be a given sequence in a cone space (X, d) . If there exists a number $n_0 \geq 1$ such that for all $m, n \geq n_0$, $d(z_n, z_m) \ll c$, for any $c \in P$ with $c \gg 0$. Then $\{z_n\}$ becomes a Cauchy sequence. If each sequence which is Cauchy and converges in X , then cone space (X, d) becomes a complete cone metric space.

STATISTICAL CONVERGENCE IN CONE METRIC SPACE

Definition

A sequence $\{a_n\}$ in \mathbb{R} is said to be statistically convergent to a point $a \in \mathbb{R}$ if $\forall \epsilon > 0, \frac{1}{n} |\{m \leq n : |a_m - a| \geq \epsilon\}| = 0$, i.e. $\frac{1}{n} |\{m \leq n : |a_m - a| \leq \epsilon\}| = 1$.

Definition

Let (X, d) be a cone metric space.

- (1) Let $\{z_n\}$ be a sequence in X and $z \in X$. If for each $c \in E^+ = \text{int } P$ there is $n_0 \in \mathbb{N}$ such that $\forall n > n_0, d(z_n, z) \ll c$, then $\{z_n\}$ is said to be convergent and $\{z_n\}$ converges to z .
- (2) Let $\{z_n\}$ be a sequence in X . If for each $c \in E^+$, there is $n_0 \in \mathbb{N}$ such that $\forall n, m > n_0, d(z_n, z_m) \ll c$, then $\{z_n\}$ is called a Cauchy sequence in X .
- (3) (X, d) is said to be complete if every Cauchy sequence in X is convergent in X .

Definition

Let (X, d) be a cone metric space, and $\{z_n\}$ a sequence in X . Then

$\{z_n\}$ is said to be statistically convergent to a point $z \in X$, if for each $c \in E^+$, we have $\delta \{n \in \mathbb{N} : d(z_n, z) \leq c\} = 1$. This is denoted by $\text{st-} \lim_{n \rightarrow \infty} z_n = z$.

$\{z_n\}$ is called a statistical Cauchy sequence in X , if for each $c \in E^+$, there is $n_0 \in \mathbb{N}$ such that $\delta \{n \in \mathbb{N} : d(z_n, z(n_0)) \leq c\} = 1$.

(X, d) is said to be statistically complete if every statistical Cauchy sequence in X is statistically convergent.

Result

The statistical convergence of sequences in a cone

metric space is a natural generalization of the usual convergence. But converse is not true in general.

Proof: Let $\{z_n\}$ be a sequence in a cone metric space (X, d) . If $\lim_{n \rightarrow \infty} z_n = z \in X$ then for each $c \in E^+$, There is $n_0 \in \mathbb{N}$ such that $d(z_n, z) \leq c, \forall n > n_0$. Thus $\forall n > n_0, |A(n)| = |\{k \leq n : d(z_k, z) \leq c\}| \geq n - n_0$ And $\lim_{n \rightarrow \infty} \frac{|A(n)|}{n} = 1$

Thus $st\text{-}\lim_{n \rightarrow \infty} z_n = z$. Therefore every convergent sequence is statistical convergent in a cone metric space. But converse is not true.

Example

Let $E = \mathbb{R}^2$ and $P = \{(x_1, x_2) \in E : x_1, x_2 \geq 0\} \subset \mathbb{R}^2, X = \mathbb{R}$. The Mapping $d: X \times X \rightarrow E$ is given by $d(x_1, x_2) = (|x_2 - x_1|, \gamma |x_2 - x_1|)$, where $\gamma > 0$ is a constant. Then (X, d) is clearly a Cone Metric Space.

Consider a sequence $\{x_n\}$ in X defined by $x_n = \{1/(n, n \neq m^2), n = m^2 \text{ Where } m \in \mathbb{N}\}$

For $x=0$, we have $d(x_n, x) = (1/n, \gamma/n)$, if $n \neq m^2$ and $d(x_n, x) = (n, \gamma n)$ if $n = m^2$, and $m \in \mathbb{N}$. for each $c \in E^+$, we have

$$A(n) = \{k \leq n : d(x_k, x) \leq c\} \supset \{k \leq n : k > n_c, k \neq m^2, m \in \mathbb{N}\}$$

for some $n_c \in \mathbb{N}$. Then $\delta \{n \in \mathbb{N} : d(x_k, x) \leq c\} \geq \delta \{n \in \mathbb{N} : n > n_c, k \neq m^2, m \in \mathbb{N}\} = 1$

Consequently, $st\text{-}\lim_{n \rightarrow \infty} x_n = x$, but the sequence $\{x_n\}$ is not convergent.

Example

Let $E = \mathbb{R}^2$ and $P = \{(x_1, x_2) \in E : x_1, x_2 \geq 0\}, X = \mathbb{R}$ and $d: X \times X \rightarrow E$ defined by $d(x_1, x_2) = (|\frac{x_1}{1+|x_1|} - \frac{x_2}{1+|x_2|}|, \sqrt{3} |\frac{x_1}{1+|x_1|} - \frac{x_2}{1+|x_2|}|)$

It is easy to verify that it is a cone metric space. Consider a sequence $\{x_n\}$ in X defined by $x_n = \{\frac{1}{n}, \frac{1}{n+m^2}, n = m^2\}$. Where $n \in \mathbb{N}$. Then we check whether $\{x_n\}$ is a statistical Cauchy sequence or not in X , For each $c \in E^+$, there exists $n_0 \in \mathbb{N}$ such that $n_0 \neq m^2$ for each $m \in \mathbb{N}$ and $2/n_0 < \|c\|$. If $n > n_0$ and $n \neq m^2$ for each $m \in \mathbb{N}$, then

$$\|d(x_n, x_{n_0})\| = \|(\frac{n}{1+n} - \frac{n_0}{1+n_0}, \sqrt{3} |\frac{n}{1+n} - \frac{n_0}{1+n_0}|)\| = 2 \frac{n-n_0}{(1+n)(1+n_0)} < \frac{2}{n_0}$$

Thus $A(n) = \{k \leq n : d(x_k, x_{n_0}) \leq c\} \supset \{k \leq n : k > n_c, k \neq m^2, m \in \mathbb{N}\}$

for some $n_c \in \mathbb{N}$. Then $\delta \{n \in \mathbb{N} : d(x_k, x_{n_0}) \leq c\} \geq \delta \{n \in \mathbb{N} : n > n_c, k \neq m^2, m \in \mathbb{N}\} = 1$

Hence sequence $\{x_n\}$ is a statistical Cauchy sequence in X .

QUASI STATISTICAL CONVERGENCE IN CONE METRIC SPACE

Definition

Let $s = (s_n)$ be a sequence of positive real numbers such that $s_n \rightarrow \infty$ and $s_n/n < \infty$. The quasi density of a subset $K \subset \mathbb{N}$ respect to the sequence $s = (s_n)$ is defined by $\delta_s(K) = 1/s_n |\{k \leq n : k \in K\}|$ [9]

Definition

A sequence (x_n) in \mathbb{R} is called quasi-statistical convergent to x provided that for $\epsilon > 0$ the set $K_\epsilon = \{k \in \mathbb{N} : |x_k - x| \geq \epsilon\}$ has quasi-density zero. It is denoted by $st_q - x_n = x$.

Definition

A sequence (x_n) in a cone metric space (X, d) . If (x_n) is convergent to $x \in X$, if for every $c \in E^+$ we have $1/s_n |\{k \leq n : d(x_k, x) \geq c\}| = 0$ or equivalently $1/s_n |\{k \leq n : c \leq d(x_k, x)\}| = 0$. We denote it by $st_q - x_n = x$. If we take $(s_n) = (n)$, Then we obtain that (x_n) is statistical convergent. [10]

Theorem

Let (x_n) be a sequence in a cone metric space (X, d) . If (x_n) is convergent to $x \in X$, then it is quasi-statistical convergent to x .

Proof. Let $x_n = x$. Then, for every $c \in E^+$ there exists $n_0 \in \mathbb{N}$ such that $d(x_n, x) < c$ for every $n > n_0$. It follows that $1/s_n |\{k \leq n : c \leq d(x_k, x)\}| \leq n_0/s_n$ which implies $1/s_n |\{k \leq n : c \leq d(x_k, x)\}| = 0$. Hence, (x_n) is quasi-statistical convergent to x

Remark: The converse of the previous theorem does not hold which can be seen from following example

Example: 3.1 Let $E = \mathbb{R}, P = [0, \infty)$ and $X = \mathbb{R}$. Consider X with usual metric $d(x, y) = |x - y|$.

Let $s_n = n^{3/4}$ Define a sequence (x_n) as follows: $x_n = \{0, n \neq m^2, n = m^2 \text{ Where } m \in \mathbb{N}\}$

It is evident that the sequence (x_n) is not convergent. However, it is quasi-statistically convergent to 0.

Hence, it's clear that quasi-statistical convergence does not imply the convergence of the sequence.

Theorem

Let (x_n) be a sequence in a cone metric space (X, d) . If (x_n) is quasi-statistical convergent to $x \in X$, then it is statistical convergent to x .

Proof. Let $st_q - x_n = x$ and $M = s_n/n$. Then, for every $c \in E^+$, we have

$$\frac{1}{s_n} |\{k \leq n : c \ll d(x_k, x)\}| = 0$$

The statistical convergence of the sequence (x_n) follows from the following inequality

$$\frac{1}{n} |\{k \leq n : c \ll d(x_k, x)\}| \leq \frac{M}{s_n} |\{k \leq n : c \ll d(x_n, x)\}|$$

The converse of the previous theorem does not hold which can be seen from the following example.

Example: Let $E = R$, $E = R^2$, $P = \{(x, y) \in E : x, y \geq 0\}$, $X = R$ and $d: X \times X \rightarrow E$ be the cone metric defined by $d(x, y) = (|x - y|, \alpha |x - y|)$, where $\alpha > 0$ is a constant. Assume that the sequence (s_n) satisfies \sqrt{n}/s_n . We can choose a subsequence (s_{np}) such that $(s_{np}) > 1$ for each $p \in N$. Consider the sequence (x_n) defined by

$$(x_n) = \{s_n, n = m^2 \text{ and } s_n \in \{s_{np}\} : p \in N\} \cup \{1, n = m^2 \text{ and } s_n \notin \{s_{np}\} : p \in N\}, m \in N, 0, \text{ otherwise}$$

$$d(x_n, 0) = \{s_n, \alpha s_n, n = m^2 \text{ and } s_n \in \{s_{np} : p \in N\}\} \cup \{(1, 0), n = m^2 \text{ and } s_n \notin \{s_{np} : p \in N\}, m \in N\} \cup \{(0, 0), \text{ otherwise}$$

It is easy to see that (x_n) is statistical convergent to zero.

Now, we show that (x_n) is not quasi-statistical convergent to zero; that is,

$$1/s_n |\{k \leq n : c \ll d(x_k, 0)\}| \neq 0 \text{ For } c = (1, \alpha) \in E^+ \text{ and } n \in N, \text{ we have}$$

$$|\{k \leq n : c \ll d(x_k, 0)\}| = |\{k \leq n : k = m^2, m \in N\}| \text{ and } 1/s_n |\{k \leq n : c \ll d(x_k, 0)\}| = 1/s_n (\sqrt{n} - r_n) \text{ Where } 0 \leq r_n \leq 1. \text{ (3.1)}$$

Taking limit of (3.1) as $n \rightarrow \infty$, we conclude that (x_n) is

not quasi-statistical convergent to zero. Consequently, we have the following relation: i.e

Convergent \Rightarrow quasi-statistical convergent \Rightarrow statistical convergent

Theorem 3.3 Let Assume that $p = \inf_n \frac{t_n}{s_n} > 0$ (3.2) If a sequence (x_n) in a cone space (X, d) is statistical convergent to $x \in X$, then it is quasi-statistical convergent to x .

Proof: The proof holds from the inequality

$$\frac{1}{n} |\{k \leq n : c \leq d(x_k, L)\}| \leq p \frac{1}{t_n} |\{k \leq n : c \leq d(x_n, L)\}|$$

Definition 3.4: A sequence (z_n) in a cone metric space (X, d) is said to be quasi-statistical Cauchy if for every $c \in E^+$ there exists $n_0 \in N$ such that

$$\frac{1}{s_n} |\{k \leq n : d(z_k, z_{n_0}) \ll c\}| = 1 \text{ or } \frac{1}{s_n} |\{k \leq n : c \leq d(z_k, z_{n_0})\}| = 0$$

Theorem 3.4. Let (z_n) be a sequence in a cone metric space (X, d) . If (z_n) is a Cauchy sequence, then it is a quasi-statistical Cauchy sequence.

Proof. Let (z_n) be a Cauchy sequence. Then each $c \in E^+$ there exists $n_0 \in N$ such that $d(z_n, z_{n_0}) \ll c$ for every $n, m \geq n_0$. It follows that

$$\frac{1}{s_n} |\{k \leq n : c \leq d(z_k, z_{n_0})\}| \leq \frac{n_0}{s_n}, \text{ this follows that } \frac{1}{s_n} |\{k \leq n : c \leq d(z_k, z_{n_0})\}| = 0.$$

Hence (z_n) is quasi-statistical Cauchy. The sequence given in example 3.1 is also a quasi-statistical Cauchy sequence which is not a Cauchy sequence.

Theorem 3.5: Let (x_n) be a sequence in a cone metric space (X, d) . If (x_n) is a quasi-statistical Cauchy sequence, then it is a statistical Cauchy sequence.

Proof. Let (x_n) be a quasi-statistical Cauchy sequence. Then, for every $c \in E^+$ there exists $n_0 \in N$ such that $1/s_n |\{k \leq n : c \leq d(x_n, x_{n_0})\}| = 0$. Thus we have

$$\frac{1}{n} |\{k \leq n : c \leq d(x_n, x_{n_0})\}| = \frac{s_n}{n} \frac{1}{s_n} |\{k \leq n : c \leq d(x_n, x_{n_0})\}|$$

This implies that (x_n) is a statistical Cauchy sequence in X . Consequently, we have the following diagram:

Cauchy \Rightarrow quasi-statistical Cauchy \Rightarrow statistical Cauchy

Definition 3.6: A sequence (x_n) in a cone metric space (X, d) is said to be quasi statistical bounded if there exist $\alpha \in X$ and $c \in E^+$ such that $1/s_n |\{k \leq n : c \leq d(x_n, \alpha)\}| = 0$

Theorem 3.7: If (x_n) is quasi-statistical bounded sequence in a cone metric space (X, d) , then it is statistical bounded.

Proof Let (x_n) be a quasi-statistical bounded sequence, $\alpha \in X$ and $H = \sup_n \frac{s_n}{n}$ as the inequality $\frac{1}{n} |\{k \leq n : c \leq d(x_k, \alpha)\}| \leq H \frac{1}{s_n} |\{k \leq n : c \leq d(x_n, \alpha)\}|$

holds the proof follow immediately.

CONCLUSION:

This paper delves into the topic of quasi-statistical convergence and explores its relationship with Cauchy sequences and statistical convergence. Consider a sequence (x_n) be a sequence in a cone metric space (X, d) . If (x_n) converges to $x \in X$, then it is quasi-statistically convergent to x . But we are able to find that converse is not true. Convergent sequences are both quasi-statistically convergent and statistically convergent. Moreover, Cauchy sequences are quasi-statistically Cauchy and also imply statistical Cauchy convergence in cone metric spaces. Additionally, if (x_n) is a quasi-statistically bounded sequence in a cone metric space (X, d) , then it is also statistically bounded.

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A Study of Awareness of Investment Options Among Working Women in NCR

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ABSTRACT

The investment behavior of Indian women, reflecting their expenditure attitudes, showcases significant involvement in business, service, and entrepreneurship sectors. With dynamic shifts in education and employment opportunities, women are adapting to economic participation amidst demographic transformations. Surveys indicate that women exhibit a conservative, risk-averse financial stance, often deferring to their husbands' decisions in major investments like real estate and equity. Despite this traditional inclination, contemporary trends reveal an evolving mindset. Particularly in the corporate sector, women recognize the importance of financial planning for retirement, leading to increased investments in recurring accounts, fixed deposits, mutual funds, and other savings schemes, marking a gradual shift from traditional to modern financial perspectives.

KEYWORDS : *Investor, Investment, Securities, Fixed Deposit, Capital.*

INTRODUCTION

There are various investment options available to women to invest their saved funds. Investors always belong to heterogeneous groups. Some investors are rich while others are poor. There are three objectives behind any investment. They are as follows namely safety, liquidity, and return. Securities are treated as the most speculative and most challenging ones which might result in higher return or lower return. Securities are in the form of shares, debentures, derivatives mutual funds, etc. An investor is either an individual or a corporate legal entity who is investing the funds in a diversified portfolio. Investment in other words means sacrifice of current income to have future income. A good investment is only when the rate of return is greater than the cost of capital. A balance is always

needed to strike a balance between the capital raised and the interest of the investor. Certified Financial Planners provide support in selecting the right portfolio. All women should approach them for betterment.

OBJECTIVES OF RESEARCH PAPER

1. To study the investment preference of working women in NCR.
2. To study the awareness level of women regarding the pros and cons of different investment avenues.
3. To study the satisfaction level of women towards financial services offered by various investment agencies.
4. To study the factors responsible for making investment decisions.

5. To study the long-term and short-term objectives behind the investment.

INVESTMENT AVENUES

Recurring Deposit: It means when we deposit a fixed amount in a bank every month. It is an interest-bearing instrument that carries a fixed maturity period. One has the flexibility to choose a regular investment amount that could be as low as Rs 10. The investment period is usually from six months to 10 years. Every month a person is bound to pay a regular investment of a fixed amount. There is a penalty in case of early withdrawal.

Fixed Deposit: They are well-known as Term Deposits. Lump-sum investment is made for a fixed tenure. The rate of FDs varies from Bank to Bank. 5-year tax-saving FDS provides rebates up to Rs 1.5 Lakhs under section 80 C but interest income is taxable in this case. They are always considered the best investment options that offer guaranteed returns. The tenure for FD lies between 7 days to 10 years. One can easily avail of a loan and overdraft facility against FD as and when required. Senior citizen gets the additional interest. 50 % per annum. FDs are insured up to Rs 5,00,000 per depositor.

Gold: Gold is always the top priority of women in our country. They feel most secure and safe by investing their money in Gold. Gold is also used as a form of investment. Gold is considered a symbol of wealth, prosperity, and good luck. There are four kinds of investment options in Gold in our country namely Physical Gold, Gold ETFs, Gold Funds, and Gold Bonds. Gold assets can be pledged for instant loans. Gold prices are often influenced by international factors and market sentiment. Tax implications on gold vary according to the capital gain rule.

Post office Monthly income scheme: It is the government-sponsored investment option that provides us with guaranteed monthly income. Investors who expect a steady stream of income invest in this scheme. Any minor who is less than 10 years of age can be a joint member holder of this scheme along with 2 major persons. This scheme provides a monthly income of 7.4% per annum interest. Investment in this scheme is fixed to a tenure of 5 years and can be extended up to 15 years. One can invest in the scheme starting with Rs

1,000 and up to Rs 15 lakhs for a single account and Rs 30 Lakhs for a joint account. Interest is taxable in this scheme but one can avail deduction up to Rs 1.50 Lakh under section 80 C.

Public Provident Fund: It is one of the best long-term investment options in India. PPF is a government-sponsored scheme that offers reliable and secured investment options. At present current PPF interest rate is 7.1% p.a. The Minimum PPF account tenure is 15 years. The minimum amount one can invest is Rs 500 per year and the maximum is up to Rs 1.5 lakhs annually. Investment can be made either in a lump sum or in installments. There are 5-year blocks in the PPF account tenure and from the 6th policy year partial withdrawal of funds is allowed.

National Pension Scheme: It is the retirement plan for the salaried class. A regular and equal amount of contribution from both the employee and employer is invested in the NPS Account. NPS is very much different from PPF. NPS has a long lock-in period until retirement. It is voluntary in nature. Two types of accounts are there in NPS: the TIER I Account – Which is a mandatory long-term savings account without premature withdrawals and the other is the TIER II Account – Which is an optional account with more flexibility for withdrawals.

There are two fund options in the case of NPS –

1. Auto Choice Funds: Automatic asset allocation based on your age
2. Active choice Funds: Customize asset allocation in equity, debt, and government securities

Investors can claim tax deductions under sections 80 CCD(1) and 80 CCD (IB) of the Income Tax Act 1961

Senior Citizen Savings Scheme (SCSS): It is a risk-free tax-saving investment option for senior citizens who are above 60 years of age. It provides a regular income. The minimum investment amount is Rs 1,000 and the maximum amount senior citizens can pay is Rs 30 lakhs. It provides 8.2% interest per annum. The maturity period for the scheme is 5 years which is extendable by 3 more years. The penalty is charged in case of premature withdrawal. We can access this scheme through Banks and Post offices in India. Senior

citizens can avail of tax deductions up to Rs 1,50,000 under section 80 C.

Real Estate: Investment in Homes, Buildings, and Commercial Buildings is physical and tangible assets. It fetches higher returns in India. Maximum times there is capital gain in this kind of investment. It is a long-term investment horizon that yields higher returns. Real estate investment is tangible in nature. It is considered a safe asset. Certain kinds of deductions are available on investments in real estate such as

1. Sec 24(B)- Deduction in case -interest paid on home loans
2. Sec 80(C)-Deduction in case- principal repayment of the home loan
3. Sec 54- Tax Exemptions on capital gains at the time of sale of residential property

Real Estate Investment Trusts (REITs): Real Estate Investment Trusts or REITs yield the highest returns in India. They are traded on stock exchanges, making them a liquid asset. Investors can invest in REITs with a starting amount of Rs 10,000. REITs provide 90% of taxable income to shareholders in the form of dividends. There are no tax exemption benefits as it is a market-linked high investment.

Pension Plans: They are a type of insurance plan that covers the benefits of investment for retirement planning as well as life insurance protection. It provides you with income at the time at the time of your retirement when you don't work. It secures your life in retirement time. At a younger age, one needs to invest for 5-30 years. Then one can enjoy the benefit of regular income at the age of 55 -65 years. It provides a deduction of up to Rs 1.5 lakh under 80 C. It also provides additional tax benefits under section 10(10 D) of the Income Tax Act 1961.

Mutual Funds: These are the best investment options where all the investors are allowed to invest their funds and further, those funds are invested in some diversified portfolio of market-linked instruments such as Debt, Equity, and Money Market Funds. Professional Fund managers look to invest our funds on our behalf. They offer a variety of investment options like Equity, Debt, and Hybrid Funds. Investors can redeem the unit funds

at any time. They are affordable with a minimum low investment. Professional fund managers look into each mutual fund portfolio. Equity Linked Saving Scheme mutual funds offer tax benefits under sec 80 C.

Unit Linked Insurance Plan: These are safe investment options with the highest returns that provide dual benefits. These kinds of investments are based on insurance. They have a lock-in period of 5 years. Minimum investment starts from Rs 1000 per month. Investors can change funds without additional costs and can withdraw the funds after a 5-year lock-in period. Investors can pay the premium amount in lumpsum or regular frequency either in any form annually, Half-yearly, Quarterly, or Monthly. There is a tax deduction benefit up to Rs 1.5 Lakh under Section 80 C. There is no tax implication at the time of Payout received under section 10 (10 D).

Capital Guarantee Plan: A portion of the premium is invested in low-risk funds which provide guaranteed fixed returns at the end of the policy term end. It provides dual benefits in terms of capital protection and potential market-linked returns. Investors can very well choose market-linked funds based on risk appetite. They are also entitled to have tax benefits under Section 80 C and Section 10(10 D).

RBI Savings Bonds: RBI Bonds are issued to Indians only no NRI can avail of this benefit. The returns are accredited to an investor in demat mode in their Bond ledger account (BLA). The RBI Bonds are issued at the face value of Rs 1,000. These are non-transferable and non-tradeable and not usable as loan collateral. Interest is paid at two intervals namely 1st Jan and 1st July at 8% per annum. Persons at the age of 75 years can avail of premature withdrawal.

Corporate Bonds: These are the investment options that provide you with an opportunity to lend money to companies in reward of regular interest payments. At the time of maturity of the Bond, the principal amount is returned. The investment period varies between 1-10 years. They are available in a variety of maturities, credit ratings, etc.

Government Bonds: They are well-known as sovereign Bonds. These are debt securities issued by the Indian Government to finance public spending. These Bonds

help in managing fiscal deficit. They offer stability with periodic income. They can be well purchased directly through authorized intermediaries. They are tradeable on the secondary market which offers liquidity. The Indian government offers a range of bonds having different maturity times.

Peer-to-Peer Lending: It is well known as P2P Lending. It is a form of debt financing that connects individual lenders with different borrowers through online platforms. These are the best investments where one investor reviews their profiles and assesses credit risk. It is regulated by RBI which ensures transparency, fair practices, etc. They offer higher returns as compared to FDs.

Stock market trading: It refers to selling or purchasing the market-linked units of publicly traded companies or commodities. Public companies are listed on the NSE, BSE, and NASDAQ. The price of shares is determined by the demand and supply factors. The stock market is liquid in nature. Stock market investments are volatile and influenced by economic updates and investor sentiments. Investing in shares is always risky and it provides speculative results.

LITERATURE REVIEW

Santoshi & Sudha (2023) explored investment behaviors among 64 IT employees, finding preferences for Provident Funds and lesser interest in government bonds. Their investments spanned nine avenues including Mutual Funds and Real Estate, with periodic investments in various mutual fund types. Sahu & Lall (2021) conducted research in Odisha on diverse investment options such as the stock market, precious metals, and real estate, identifying patterns of non-risky and moderately risky investment portfolios across traditional and newer financial instruments.

Panpaliya, Bajaj, & Mishra (2020) observed that investors seek high, immediate returns, favoring Gold, FDs, Bonds, Debt Funds, and Equities, with a focus on risk, return, safety, and liquidity. Key preferences included Equities, Mutual Funds, and Fixed Deposits. Kumar & Sathvara (2020) categorized investment elements as return, risk, and time, comparing savings and investments, where savings are unspent income, and investments aim for capital formation through options like equity, debt, mutual funds, and debentures.

Muneeswaran, Babu, & Gayathri (2019) explored investor behaviors across different demographics, noting a variance in risk perception and awareness between rural and urban areas, influenced by media and advice from broking firms and relatives. Totlani & Joshi (2019) found a preference for investing in gold due to its higher returns, with various investment methods available. Raju, R, & H (2018) highlighted mutual funds as a safer investment option managed by fund managers, although they observed a low level of awareness and understanding among investors about the benefits of mutual funds in India.

Bhavani & Shetty (2017) analyzed the influence of demographic factors such as age, gender, income, and occupation on investment choices among various groups including businessmen, servicemen, and housewives, noting significant gender differences in preferences for avenues like bank deposits, mutual funds, equities, and life insurance. Soumya & Reddy (2016) defined investment as a commitment of surplus funds towards achieving good returns, emphasizing the need for rational thinking influenced by factors like age, qualification, and income, with a national trend toward fixed deposits and a preference for cash and bank savings over other securities.

Major considerations while investing-

There are two types of considerations while investing:

1. Personal Considerations
2. Avenue Related Considerations

PERSONAL CONSIDERATIONS

AVENUE RELATED CONSIDERATIONS

Good Qualities of an investor

1. Young mind with a young Brain
2. Acquainted with financial knowledge
3. Awareness of Global Trends
4. High-Risk Appetite
5. Conscious of future results
6. Quick Decision maker and good learned investor
7. Techno savvy and good information seeker
8. Smart enough for smart deals
9. No more inclination towards traditional thought

Requisites of wealthy Investor

Ready to accept Challenges: Wealthy investor has a large vision they not only invest in multiple avenues but are also ready to face the risks associated with any sort of investment.

Know their net worth: Investor wants to know their net worth in terms of their assets and liabilities.

Estate Planning: Many people are unaware of the term estate planning. The depth of knowledge in terms of estate planning is will, trust, and legacy in the name of the heir, power of attorney is a must to be accomplished. An investor should pass on their asset to the next generation without paying tax on it.

Educating the client: Educating the client in the best possible manner is the job of every financial advisor. Educating the client about the investment avenues with their benefits can broaden the thinking of an investor. The risk factor of an investor varies from person to person depending upon the age, income, earning stability, financial stability of the family, etc.

Fixed Deposit Rates of Different Banks

Private Sector Banks- FD Interest Rates (%)

| Name of Bank | 1-Year Tenure | 5-Year Tenure |
|---------------------|---------------|---------------|
| Axis Bank | 6.70 | 7.00 |
| HDFC Bank | 6.60 | 7.00 |
| ICICI Bank | 6.70 | 7.00 |
| IDBI Bank | 6.80 | 6.50 |
| INDUSLND Bank | 7.50 | 7.25 |
| Jammu & Kashmir | 7.10 | 6.50 |
| RBL Bank | 7.50 | 7.10 |
| Yes Bank | 7.25 | 7.25 |
| Kotak Mahindra Bank | 7.10 | 6.20 |

Fixed deposit rates as of 12 January 2024

Source: <https://www.paisabazaar.com/fixed-deposit/#psb>

Public Sector Banks- FD Interest Rates (%)

| Name of Bank | 1-Year Tenure | 5-Year Tenure |
|----------------|---------------|---------------|
| Bank of Baroda | 6.85 | 6.50 |
| Bank of India | 6.50 | 6.00 |

| | | |
|-----------------------|------|------|
| Bank of Maharashtra | 6.50 | 6.00 |
| Canara Bank | 6.85 | 6.70 |
| Central Bank of India | 6.75 | 6.25 |
| Indian Bank | 6.10 | 6.25 |
| Indian Overseas Bank | 6.80 | 6.50 |
| Punjab National Bank | 6.75 | 6.50 |
| State Bank of India | 6.80 | 6.50 |

Fixed deposit rates as of 12 January 2024

Source: <https://www.paisabazaar.com/fixed-deposit/#psb>

Tax saving under Section 80 c

| 80 C Investment | Lock in Period | Tax |
|-----------------|-----------------|----------------------|
| PPF | 15 years | Interest is Exempt |
| SSY | 21 years | Interest is Exempt |
| ELSS | 3years | Dividend is Exempt |
| FD | 5 years | Int taxable |
| NSC | 5 Years | Int taxable |
| SCSS | 5 Years | Int Taxable |
| ULIP | 5years | Returns are tax-free |
| NPS | Till Retirement | Partially Exempt |

Barriers or obstacles in the path of making investment decisions-

1. Investors always prefer investing their funds in avenues like PPF, FD, Insurance, etc restricted to very less risk factors.
2. Young investors have the potential to bear and overcome the risk. They prefer to invest in the share market at regular intervals.
3. Investors around the age of 50 give preference to low-risk avenues like insurance, Fixed Deposits, Post Office Saving Schemes, and Public Provident Funds knowing that they yield low returns but ensure stability.
4. Gold is the most preferred precious metal among women. Even the multifold increase in the price of Gold has not shaken the mindset of women and their interest in investment in Gold is always the top priority.

5. Demographic factors like qualifications, income, age, and place of living are always significant factors that affect the investor's decision at a large scale.
6. People who belong to private jobs are well acquainted with financial terminologies and they tend to be influenced by peer groups. They work on their decisions and a correlation is found between investor qualification and his or her decision.
7. Investment varies in terms of income. People with low income have fewer funds and hence they are left with very few options and vice-versa.
8. Investors are more inclined towards long-term investment as they think their money is secured for five years with better returns.
9. Many times, it is seen that investment made by women is influenced by their spouse
10. Rural people are less educated and hence fail to invest their funds into different investments.
11. Govt employees very well know that they are secured by pension at the retirement stage hence they avoid investing their funds in risky investments.

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CONCLUSION

1. Bank Deposits, FDs are the most important form of urban financial investment.
 2. Since yesteryears women are always fond of gold jewellery. Their prime interest regarding investment is gold only.
 3. Investors rely on their families to make financial decisions.
 4. Various financial literacy programs can impart better education to the investor at a large scale.
 5. Women spend less money on investments than men as their loss-bearing capacity is highly less and they earn less livelihood as compared to men.
 6. Women are least confident in their financial decision-making making and hence their spouses are making financial decisions.
 7. Women are very much reluctant to risks.
 8. In many families in India still women are asked not to interfere in financial decision-making as they are considered as poor decision makers.
 9. Having own house is the primary need of every investor. After fulfilling this need investors can think of investing in real estate.
 10. Saving alone cannot be determined based on the income it is determined by one's consumption pattern or expenditure.
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Optimizing Healthcare Efficiency with Queueing Theory Applications

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ABSTRACT

This paper examines the application of queueing theory to improve healthcare efficiency by reducing patient waiting times and optimizing resource utilization across various healthcare settings. By integrating queueing models, such as M/M/1 and M/M/c, into the operational processes of an Emergency Department and an Outpatient Clinic, substantial improvements in patient throughput and satisfaction were observed. The study highlights significant reductions in waiting times, increased service rates, and better utilization of consultation rooms, demonstrating the practical benefits of queueing theory in real-world healthcare applications. This research underscores the potential of operational research to transform patient care into a more efficient, patient-centered service.

KEYWORDS : *Queueing theory, Healthcare efficiency, Patient waiting times, Resource optimization.*

INTRODUCTION

The efficient management of patient flow in healthcare settings is pivotal for delivering timely medical care and optimizing resource utilization. Queueing theory, a branch of operations research that studies the act of waiting in lines, provides robust models and mathematical frameworks for analyzing and improving service processes in healthcare facilities. This paper explores the application of queueing theory to reduce patient waiting times and enhance service delivery in various healthcare environments, including emergency departments and outpatient clinics. By integrating queueing models into healthcare operations, this study aims to demonstrate substantial improvements in patient throughput, resource allocation, and overall patient satisfaction. Through a combination of theoretical modeling and practical case studies, the paper presents a compelling case for the broader adoption of queueing theory principles in healthcare management.

QUEUEING THEORY IN HEALTHCARE

Queueing theory in healthcare is instrumental in addressing the complex challenges of managing patient flows and optimizing service delivery within medical

facilities. This mathematical approach helps healthcare administrators understand and predict the dynamics of patient arrivals, service times, and waiting periods, enabling them to make data-driven decisions. By applying models such as M/M/1 or M/M/c, hospitals can efficiently allocate resources, schedule staff, and reduce bottlenecks. This not only streamlines operations but also significantly enhances patient satisfaction by minimizing waiting times. Furthermore, queueing theory aids in designing effective appointment systems and managing emergency department throughput during peak hours. The integration of these models into healthcare settings highlights the potential of operational research to transform traditional patient care into a more efficient, patient-centred service.

METHODOLOGY

The methodology for this study involves a quantitative analysis using queueing theory models to evaluate and improve healthcare service efficiency. Data on patient arrivals, service times, and service rates were collected from two healthcare settings: an Emergency Department and an Outpatient Clinic. Queueing models, specifically M/M/1 and M/M/c, were applied to simulate scenarios

and analyze system performance under different conditions. Performance metrics such as average waiting time, service rate, and resource utilization were calculated before and after implementing queueing theory-based interventions. Sensitivity analysis was conducted to determine the robustness of the models under varying patient inflows and service scenarios. The effectiveness of these models was measured by comparing pre- and post-intervention performance metrics, validating the models' capability to enhance healthcare operations.

RESULTS & DISCUSSION

To substantiate the benefits of applying queueing theory in healthcare settings, we explore its impact on an Emergency Department (ED) and an Outpatient Clinic. Queueing models were applied to address inefficiencies, and the results demonstrate significant improvements in patient wait times, service rates, and resource utilization.

In the Emergency Department, the implementation of queueing theory led to a decrease in average waiting time from 35 minutes to 22 minutes, marking a 37% improvement. Patient satisfaction scores rose from 70% to 85%, and the service rate increased from 40 patients per hour to 50. For the Outpatient Clinic, average waiting times were cut in half from 30 minutes to 15 minutes. Additionally, the utilization rate of consultation rooms improved from 75% to 90%, and patient throughput increased from 60 to 80 patients per day as shown in Table 1.

Table 1: Emergency Department Performance Metrics

| Metric | Before Implementation | After Implementation | Improvement |
|------------------------------|-----------------------|----------------------|-------------|
| Average Waiting Time | 35 minutes | 22 minutes | 37% |
| Patient Satisfaction | 70% | 85% | 15% |
| Service Rate (patients/hour) | 40 | 50 | 25% |

Little's Law:

Little's Law ($L = \lambda W$) relates the average number of customers (L), the average arrival rate (λ), and the average time a customer spends in the system (W).

Applying this in the ED helped adjust staffing levels effectively, optimizing both λ and W to reduce L .

M/M/1 Queue

The M/M/1 model was utilized, assuming a single server with exponential service times and a Poisson arrival process:

Average number of customers in the system (L):

$$L = \frac{\rho_1}{\rho}$$

Average waiting time in the system (W):

$$W = \frac{1}{\mu - \lambda}$$

Increasing μ (service rate) allowed the ED to handle a higher λ without significantly increasing W .

M/M/c Queue:

The Outpatient Clinic used an M/M/c model, suitable for multiple servers:

Probability all servers are busy (P_0):

$$P_0 = \left(\sum_{k=0}^{c-1} \frac{(\lambda/\mu)^k}{k!} + \frac{(\lambda/\mu)^c}{c!(1-\rho)} \right)^{-1}$$

Average waiting time in the queue (W_q):

$$W_q = \frac{P_0 \left(\frac{\lambda}{\mu}\right)^c}{c! \mu (1 - \rho)^2}$$

Table 2: Outpatient Clinic Performance Metrics

| Metric | Before Implementation | After Implementation | Improvement |
|--|-----------------------|----------------------|-------------|
| Average Waiting Time | 30 minutes | 15 minutes | 50% |
| Utilization Rate of Consultation Rooms | 75% | 90% | 15% |

| | | | |
|-----------------------------------|----|----|-----|
| Patient Throughput (patients/day) | 60 | 80 | 33% |
|-----------------------------------|----|----|-----|

These results from table 2 were achieved by optimizing the number of active consultation rooms (c) and improving staff scheduling to reduce W_q , enhancing patient throughput and reducing wait times.

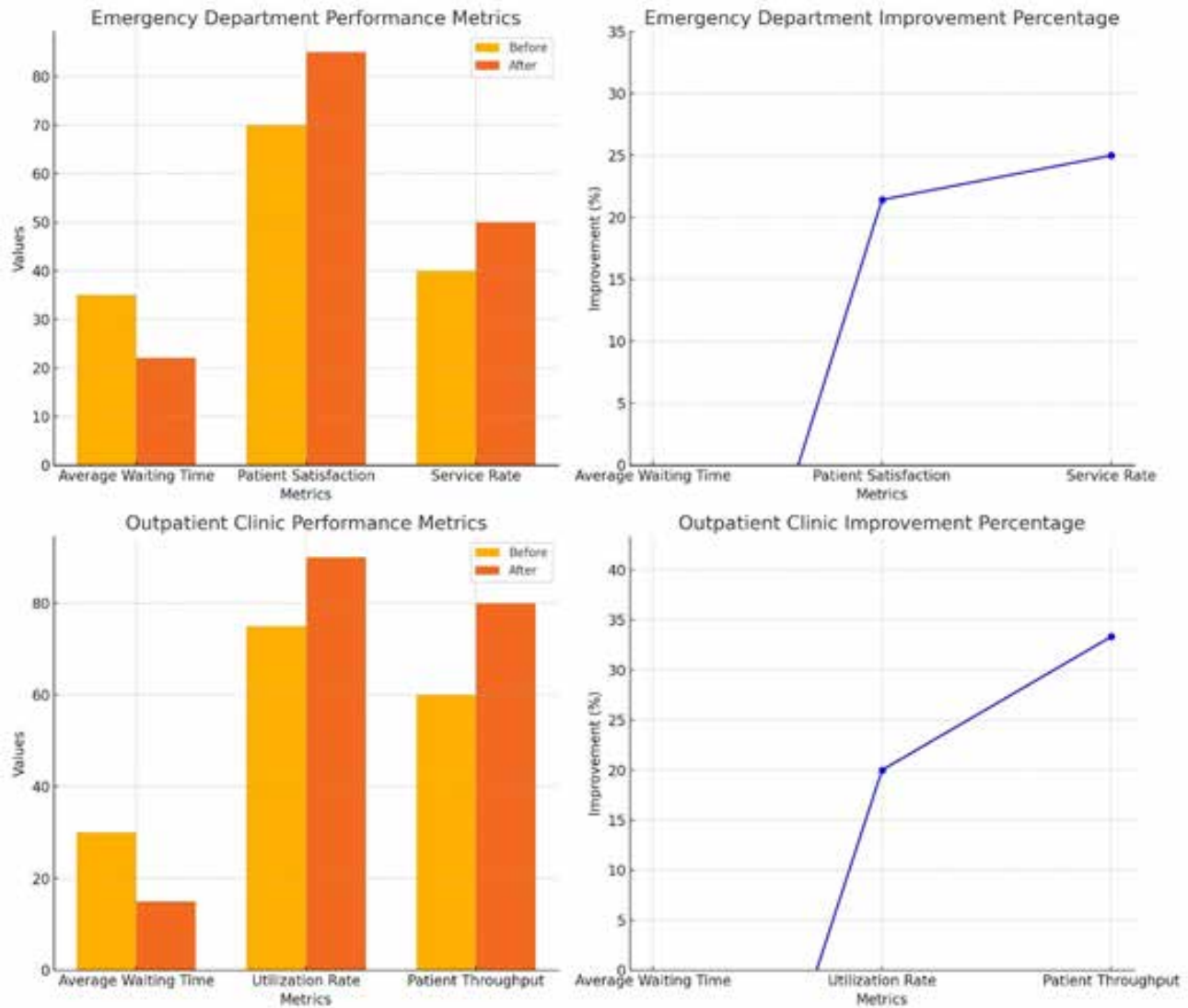


Fig. 1 Queueing Theory Improves Healthcare Efficiency Metrics

This data-driven approach (Fig. 1) not only improved operational efficiencies but also significantly boosted patient satisfaction, showcasing the powerful application of queueing theory in enhancing healthcare service delivery.

CONCLUSION

The application of queueing theory within healthcare

settings, specifically in an Emergency Department and an Outpatient Clinic, has led to notable improvements in operational efficiency and patient satisfaction. The integration of queueing models facilitated a reduction in waiting times by up to 50% and improved the service rate and utilization of resources. These outcomes were supported by the application of foundational queueing theory equations, such as Little’s Law and models for

single and multiple server systems, which provided the analytical basis for optimizing patient flow and resource allocation. The successful implementation in the studied settings validates the effectiveness of queueing theory in healthcare and suggests broader applicability across similar environments. Moving forward, the continued refinement and integration of these models stand to further revolutionize healthcare delivery, making it more responsive to patient needs and efficient in resource use. The evidence from this study advocates for a wider adoption of queueing theory principles in healthcare management to enhance service delivery and patient care outcomes.

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Bringing Transparency in Bail Law

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ABSTRACT

This article is an attempt to sensitize the readers towards the existing laws in India dealing with matters relating to bail of an arrested person, the procedures laid down under Criminal Procedure Code, while the same is adjudicated. How the procedure is used to the benefit and prejudice of affected persons depending upon weighty considerations including status of arrested person and complainant, access to legal expertise, lack of awareness and means, and above all, the facts and circumstances of each unique case. It further discusses the loopholes and deficiencies in the legal system requiring to be addressed to enhance the accountability and transparency of Judiciary and its helping organs being Investigating Agency and Prosecution. There is also an attempt to showcase proposed ways of making access to bail, a reality.

KEYWORDS :

INTRODUCTION

“The plight of law relating to bail in India, is no better than toss of a coin. Or so to say, a gamble. The probabilities vary with each Court, Judge, Advocate, Client, Police Official, Prosecutor, Offence and the weightiest: Luck!”

The discussion surrounding bail laws is age old. But its relevance is evergreen. It touches the most essential fundamental right amongst all, right to life and personal liberty. The dictates of Article 21 resonate in legislative mandate as contained and codified in both Criminal Procedure Code and Special Laws. However, its implementation is where the variability and subjectivity lies. The perspective of present research paper is to rationalize the existing state of affairs relating to arrest and bail and to propose a mechanism for redressing its subjectivity, aiming towards a justifiable exercise of exemplary discretion vested in courts while dealing with bail applications. Endeavour has been made to explore viability of making a draft law relating to exercise of right to bail, so that it could be accorded more objectivity, rationality, reasonableness and transparency.

The research question underlying present study is to find a solution to the variance with which cases of similar nature are often dealt, where some accused persons manage even without arrest, while in few others, languish in the jail, sheerly due to non-reflection by concerned police official, judicial officer, legal counsel and above all, ignorance of law.

Present research paper intends to address this state of affairs and to reflect upon this grievance/state of affairs of the victim of circumstances (named ‘accused’) sitting behind the bars. The infinite possibilities of each case, coming up with its own uniqueness of facts and circumstances, nature of offence, gravity and its magnitude, affected parties, background of the arrested person and his family situations, et al.

MEANING AND EVOLUTION OF THE CONCEPT OF BAIL

The Concise Oxford Dictionary defines “Bail” as security for the appearance of prisoner on giving which the accused is released pending trial. It has been observed that “the intent of the arrest being only to compel an appearance in Court at the return of the

writ, that purpose is equally answered whether the sheriff detains his person or takes sufficient security for his appearance called bail (from the French word bailer, to deliver) because the defendant is bailed or delivered to his sureties upon their giving security for his appearance". Bail (to handover), set at liberty a person arrested or imprisoned. On security being taken for his appearance on a day and at a place certain, which security is called bail, because the party arrested or imprisoned is delivered into the hands of those who bind themselves or become bail for his due appearance when required, in order that he may be safely protected from prison, to which they have, if they fear his escape, etc, the legal power to deliver him. [1]

In common law, an accused person is said to be admitted to bail when he is released from the custody of officers of the law and is entrusted to the custody of persons known as his sureties, who are bound to produce him to answer, at a specified time and place, the charge against him and who, in default of so doing, are liable to forfeit such sum as is specified when bail is granted [2].

LEGISLATIVE FRAMEWORK

In India, the law relating to grant and denial of bail has been contemplated and codified under Criminal Procedure Code, 1973. Chapter III of Criminal Procedure Code, contains Section 436-450 qua provisions for bail. Section 2 (a) defines bailable offence, and non-bailable offence. Grant of bail is a matter of right in bailable offences, whereas, in case of non-bailable offences, it becomes a matter for exercise of judicial discretion. Unlike in other countries, the arrested person is not expressly subjected to a bail hearing suo moto by the Courts. Hence, the exercise of moving bail application has to be undertaken by his lawyers. The custodial order hence gets passed as a routine, and practically no proactive role is liable to be played by anyone to find out the reasons for continuous confinement or the inability to move bail application.

LACUNAE/SHORTCOMINGS

The difference in theory and practice is bound to occur. The black and white laid down under the law books, while being implemented often renders into shades of grey. These grey areas are subject to the exercise of

discretion which gets criticised as abuse and misuse of power by the Courts. Undoubtedly, in the criminal justice system, since State/Complainant and Accused are at logger-heads, outcome of grant/denial of bail is likely to be looked at with partisan view. The benefited side must applaud it, the neglected side must feel aggrieved. From the analysis of data and statistics in the Law Commission Report [3] it was observed that a majority of Under Trial Prisoners i.e. 70.6% are illiterate or semi-illiterate, indicating poor economic background. Their poverty coupled with illiteracy, leads to continuous violation of right to personal liberty and dignity.

An arrested person's economic status appears to have become the decisive factor for granting pre-trial release. It is also observed that despite the Legal Awareness and availability of Free Legal Aid Counsel, the masses/common people/ the poor/ the uneducated/ the illiterate languish in jails. Per contra, the powerful, rich and influential, by access to better legal consultations and expertise, get to obtain bail promptly and with procedural ease. In the 268th Law Commission Report, it was found that inconsistency in the bail system was one of the major reasons for overcrowding in jails. The 154th Law Commission Report on law on arrest found that over 60% of arrests are unnecessary and account for 42.3% of jail expenditure.

In this aspect, "Access to Bail" must be contemplated as a concept for discussion at Legal Forums, as in the adversarial system being the practice in Indian Criminal Jurisprudence, it is assumed that the best way to get to the truth of a matter is through a competitive process to determine the facts and application of the law accurately. Unlike the inquisitorial system, where courts pro-actively get involved in investigating the facts of the case and coming to a finding. Since, the system in implementation is adversarial, the exercise or deprivation in meeting the essence of bail rights for an individual becomes the subject of present study as there is no statutory regulation over the same. The same is motivated with each case requiring to be pursued by the individual and his near ones running from pillar to post understanding how he could regain his right to personal liberty and be released from fetters by adopting due process.

JUDICIAL TRENDS

Hon'ble Apex Court of India has recently given directions in the decision of *Md. Asfak Alam v. State of Jharkhand and Another* [4] in furtherance of *Arnesh Kumar v. State of Bihar and Another* [5]. Offences have been categorized and guidelines have been laid down for grant of bail, without fettering the discretion of the courts concerned and keeping in mind the statutory provisions by Hon'ble Apex Court of India [6]. It has been held that if a person is not arrested during investigation and has cooperated throughout there is no need to forward an accused alongwith the chargesheet. [7]

Starting with the hypothesis that the concept of bail is highly subjective. Yet, some guidelines (operating in the virtual space) and repeatedly stressed in judicial decisions must be stated, which would assist dealing with exercise of the discretion to decide bail with correct perspective.

Laudable provision of law being Section 167(2) of the Criminal Procedure Code enables a default timer to come into play and permits procuring bail as a right in cases where after arrest, police fails to conclude the investigation and present a final report against the applicant within defined statutory period. Section 167(2) Proviso (i) and (ii) makes the mandate of law explicitly clear.

The Apex Court has held that right of default bail under Section 167(2) of the Criminal Procedure Code is not merely a statutory right, but a fundamental right that flows from Article 21 of the Constitution to protect accused persons from the unfettered and arbitrary power of the State. An incomplete charge-sheet filed by the Investigating Agency without completing the investigation, will not defeat the right of the accused for default bail as same are routinely filed to prevent the accused from seeking default bail. [8] It is not as if economic offences [9] are completely taken out of the aforesaid guidelines but do form a different nature of offences and thus the seriousness of the charge has to be considered but simultaneously, the severity of the punishment imposed by the statute would also be a determining factor in granting or denying bail. An economic offence cannot be classified as such, as it may involve various activities and may differ from one case

to another. [10] Keeping in view the spirit of the varied legislations, their intent and purpose and need for the Court to be considerate of their special nature and relevance. In such cases, it is the duty of Law Officers, Investigating Agency and the Courts to deal with said matters with utmost care and caution, within the bounds of the special laws presented.

PRACTICAL PROBLEMS

As a general rule, grant of bail is normally not interfered with. Courts adopt an approach of parity while deciding bail in similar cases or similarly placed accused. Habitual Offenders are looked at with different perspective. However, there is need for cautious perusal of the record in case of repeat offenders as cases are not far from sight where one accused is booked into multiple FIRs of similar nature just to complete formalities of investigation without proper verification of their involvement. Such cases of false implication must be looked at with circumspection by judiciary both at the time of disposal of bail applications as well as final adjudication. The requirements for furnishing bail bonds and surety bonds in such multiple FIRs must also be relatively relaxed as strict interpretation may disable the effective exercise to bail granted.

The problems presented while dealing with matters relating to bail are that there is sensitivity and variability of each case making it unique and thus, a strait jacket formula to implement, while granting or denying bail, becomes impracticable. Yet, it cannot be understated that for a common man, the very thought of being confined behind the bars, the indiscriminate powers of police to arrest, the dictate of court to authorise such detention and the whims of advocates in moving an application for grant of bail, are all the variable considerations that crop up in an attempt to exercise this virtual right to seek bail. Hence, it is a totally different state of interpretation, when compared with reading of general law qua arrest and bail.

VIABLE SOLUTIONS VIZ. WORLD VIEW

Globally, bail systems prioritize personal liberty, placing the onus on the state to justify continued detention—a shift that India needs to adopt. In the UK, the Bail Act of 1976 and the Police and Criminal Evidence Act of 1984, updated by the Policing and Crime Act of 2017,

establish a presumptive right to bail, with the prosecution required to argue against it. The US employs personal recognizance and speedy bail hearings under acts from 1789 and 1984. Canada's framework mandates a court bail hearing if release isn't granted by police, and Australia's Bail Acts use an "unacceptable risk" test. Adopting these principles could modernize India's bail system, emphasizing liberty and aligning with global democratic standards.

SUGGESTIONS/RECOMMENDATIONS

To enhance the procedural aspects of bail, it is crucial to sensitize key functionaries involved in the detention and bail process. Police officials must be trained to judiciously evaluate the reasons for arresting individuals, ensuring that personal liberty is not compromised without sufficient grounds. Jail staff should ensure that the arrested individuals are promptly presented before a magistrate, where they can secure legal representation and have the charges against them thoroughly examined. Advocates play a critical role in informing families about the bail process and representing the detained. Court staff must efficiently manage bail applications to avoid unnecessary delays, aiming for adjudication within the prescribed one-week timeline. Legal Aid Counsel should be proactive in helping, particularly to undertrials lacking legal representation, to facilitate their understanding of the legal process and to expedite their access to bail. These measures will significantly improve the fairness and efficiency of the bail system, respecting the rights of the accused while maintaining judicial integrity.

CONCLUSION

In conclusion, addressing the complexities of the bail system requires judicial officers to depart from mechanical, templated decisions and embrace orders that meticulously consider the unique circumstances of each case. This approach not only clarifies the judiciary's reasoning for affected parties but also reinforces the public's trust in the legal process. The

integration of Information Technology through the Case Information System marks a significant advancement in judicial transparency and efficiency. However, ensuring the timely and clear communication of bail decisions remains a critical obligation of the courts. Moreover, the call for legislative reform and uniform bail legislation reflects a growing recognition of the need to streamline and humanize the bail process, aligning with global standards and safeguarding the balance between individual liberty and societal interests. This is pivotal in mitigating the issues of prolonged pretrial detention and enhancing the responsiveness of the judicial system to the needs of the undertrial population.

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Further Investigation After Presentation of Final Report in Criminal Law

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ABSTRACT

The concept of "Further Investigation" under Section 173(8) of the Cr.P.C., 1973, highlights an extension rather than the initiation of a new probe, following the initial police report and the magistrate's cognizance under Section 190(1)(b). This procedural continuation ensures that justice is not just swift but also thorough, allowing for additional evidence gathering without negating previous efforts. "Further Investigation" serves to uncover more truths, contributing to substantive justice, and is crucial in legal proceedings where initial findings might be insufficient for a fair judgment. Notably, this process does not require prior magistrate approval, reflecting the statutory right of the police to pursue comprehensive justice through ongoing investigative flexibility. The integration of new evidence during trial stages, as supported by Section 231 of the Cr.P.C., underlines the commitment to adaptability and thoroughness in the pursuit of justice.

KEYWORDS : *Further investigation, Statutory right, Substantive justice, Ongoing investigative flexibility.*

INTRODUCTION

The concept of 'Further Investigation' and supplementary report is dealt with under Section 173 (8). The earlier Code did not contain the provision regarding the concept of 'Further Investigation' within its ambit. It was in 1969 that for the first time the Law Commission of India in its 41st Report recommended adding the provision relating to 'Further Investigation' under Criminal Procedure Code within its ambit. The Earlier Code had no scope to deal with a situation wherein the police officer had submitted the police report to the magistrate who has taken the cognizance, thereafter upon the police report under Section 190 (1) (b) of the said code and later some other relevant facts or evidence were discovered in relation to the same offence. The police have the power to conduct further investigation when they receive further evidence in a case. Further investigation means the continuation of an earlier conducted investigation, not a fresh investigation

or a re-investigation. However, the law prohibits a re-investigation on a case.

LITERATURE REVIEW

Almost every research article includes a review of the literature. In other words, before this article/paper is prepared get into our methodology and research questions, systematic effort has been made to ascertain and assess what's been done previously and how the variables we want to investigate fit into the theories and frameworks of our research field.

By way of empirical literature review, the relevant provisions of Criminal Procedure Code, 1973 as well as judgments of the Hon'ble Supreme Court and Hon'ble High Courts have been accessed. The theoretical literature review serves primarily to place the research within a broader framework. A theoretical review will be included in systematic empirical reviews to help researchers understand why a specific research topic is worth investigating.

VARIOUS ASPECTS OF FURTHER INVESTIGATION UNDER THE CRIMINAL PROCEDURE CODE

Definition of Investigation

The term “investigation” has been defined in section 2(h) of the Code. Chapter XII (Sections 154 to 176) of the Code deals with information to police and their powers to investigate. The term ‘investigation’ has been defined in Section 2(h) of the Code of Criminal procedure, Investigation includes all the proceedings under this Code for the collection of evidence conducted by a police officer or by any person (other than a Magistrate) who is authorized by a Magistrate in this behalf.

The investigation of an offence consists of:

- Proceeding to the spot.
- Ascertainment of facts and circumstances of the case.
- Discovery and arrest of the suspect.
- Collection of evidence which may include:
- Examination of persons concerned and reducing their statement to writing.
- Search and seizure of places and things respectively considered necessary.
- Formation of opinion as to whether there is a case for trial, and taking necessary steps accordingly.

FRESH OR REINVESTIGATION

In judicial practice, fresh or reinvestigation is not routinely ordered but reserved for exceptional circumstances where the initial inquiry is substantially flawed. When the courts find the initial investigation to be tainted by malfeasance, bias, or a gross miscarriage of justice, they may nullify the previous findings and mandate a new investigation, potentially by an independent agency. This principle of applying to only the "rarest of rare cases" ensures that such drastic measures are taken only when absolutely necessary to rectify a complete failure of justice. The authority to order such reinvestigation typically resides with the higher judiciary, as highlighted in cases like Sasi Thomas Vs. State and others, establishing that lower courts do not possess this power.

FURTHER INVESTIGATION

Further investigation, as distinct from fresh or reinvestigation, involves the collection of additional evidence after the final report is submitted in accordance with Section 173(8) of the Criminal Procedure Code. This process is seen as a continuation of the original investigation rather than its negation, allowing for the discovery of new evidence without discarding the work already done. The Supreme Court, in *Dinesh Dalmia vs. CBI*, affirmed that further investigation can be requested by investigating officers even after a charge sheet has been filed and that magistrates may authorize this upon a valid application. However, a magistrate cannot initiate such an investigation suo moto or switch the investigating agency, as these actions would constitute a reinvestigation, which is beyond their jurisdiction and reserved for higher courts.

Provision Relating To ‘Further Investigation’ Under Cr.P.C, 1973

Section 173 (8) Cr.P.C talks about the provision relating to ‘Further Investigation’, it says that – Nothing in this section shall be deemed to preclude ‘Further Investigation’ in respect of an offence after a report under sub- section (2) has been forwarded to the magistrate and, where upon such investigation, the officer in charge of the police station obtains further evidence, oral or documentary, he shall forward to the Magistrate a further report or reports regarding such evidence in the form prescribed; and the provisions of sub- sections (2) to (6) shall, as far as may be, apply in relation to such report or reports as they apply in relation to a report forwarded under sub- section (2). The word ‘Nothing’ in the abovementioned provision creates a saving clause and the implication is that even if a police report is filed under Section 173 (2) it will not prevent any further investigation in the case. Also, further investigation can be done only after the original police report has been filed under Section 173 (2). Upon ‘Further Investigation’, if a Police Officer finds more evidence then he will submit to the Magistrate a further report which will be called a supplementary report or supplementary charge sheet.

Whether the Police Officer Is Required to Take Permission From The Magistrate to Conduct A ‘Further Investigation’?

As per the language of Section 173(8) Cr.P.C, 1973, it is implicit that the Police Officer can suo motu conduct 'Further Investigation' and in cognizable cases otherwise also under Section 156(1) he can further carry on the Investigation and in non-cognizable cases, once the order of Section 155(2) has been passed by the Magistrate, he can conduct further investigation. Though in non-cognizable cases, normally a police Officer obtains permission for further investigation from a Magistrate which technically is not required. In cognizable cases, permission is not required but as a matter of prudence, wisdom, or propriety the police officer obtains permission from the magistrate. Section 173 (8) is not clear on the point as to whether the power to conduct further investigation is limited only to the police officer or whether the magistrate also can suo motu order the further investigation?

Under Section 173 (8) Cr.P.C, the power of the Magistrate to order further investigation is also implicit and even the Magistrate can order 'Further Investigation' under Section 173 (8). Further, if a Court or any Magistrate interprets the section in such a manner that Section does not talk about 'Magistrate power's to order 'Further Investigation' then also in the case of Sakiri Vasu vs. State of UP magistrate under Section 156(3) would per se have the power to order 'Further Investigation' as its ancillary power in cognizable cases whereas in case of non-cognizable offense under Section 155 (2) Cr.P.C.

In the cases of Randhir Singh Rana vs State (Delhi Administration) the Court held that police officer need not take any permission from magistrate and he can suo motu continue 'Further Investigation', but as a matter of prudence or propriety, he can obtain permission from the Magistrate. However, on the other hand in the case of Vinay Tyagi vs Irshad Ali the Court held that since it has been a long practice to take the permission of the Magistrate for conducting 'Further Investigation' and hence permission is a must.

Can the Magistrate Order 'Further Investigation' Before Taking Cognizance?

In the case of Bhagwant Singh vs Commissioner of Police the Hon'ble Supreme Court has held that before taking cognizance a magistrate can order 'Further Investigation'. He has power under Section 156 (3),

Section 155 (2) or even under Section 173 (8) Cr.P.C to do so.

Later Honorable Supreme Court in the judgment of Vinay Tyagi vs Irshad Ali (supra) and Amrutbhai Shambhubhai Patel vs Sumanbhai Kantibhai Patel has held that Bhagwant Singh judgment will prevail on this point and Reeta Nag judgment was per in curium.

Can the Magistrate Order 'Further Investigation' After Taking Cognizance?

A magistrate can order 'Further Investigation' after taking cognizance, a legal standpoint clarified in the landmark case of Vinubhai Haribhai Malviya vs State of Gujarat. Initially, there was a conflicting judicial stance on this matter, as demonstrated in the cases of Kishan Lal vs Dharmendra Bafna, which affirmed this power, and Amrutbhai Shambhubhai Patel vs Sumanbhai Kantibhai Patel, which denied it. Both being two-judge bench decisions, they led to ambiguity until resolved by the three-judge bench in the Vinubhai case. This case underscored the magistrate's authority to mandate further investigation post-cognizance under Section 173(8) of Cr.P.C, read in conjunction with Section 2(h), or through the magistrate's ancillary powers, aiming to ensure a comprehensive and just investigation as part of the right to a fair trial under Article 21 of the Constitution. This decision also clarified the use of Section 156(3) post-cognizance, previously considered only a pre-cognizance measure, marking a significant evolution in the procedural application concerning further investigation.

CONCLUSION

The landmark ruling in 'Vinubhai Haribhai Malviya & Others Vs. State of Gujarat and Another' by the Supreme Court significantly clarifies and enhances the scope of a magistrate's authority concerning further investigations. The court, through Justice R.F. Nariman, emphasized that halting a magistrate's supervisory powers during pre-trial proceedings would be unjust, as certain cases might necessitate additional investigation to ensure that justice is served both to the innocent and the guilty. This judgment underscores that magistrates possess broad, continuous oversight capabilities under Sections 156(3), 156(1), 2(h), and 173(8) of the Cr.P.C., 1973, applicable at all stages before the actual commencement of a trial.

It advocates for the proactive, case-specific use of this power by magistrates to direct further investigations, thereby fostering a more thorough and equitable judicial process.

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Studying the Effect of Data Protection and Privacy Legislation in India and Iraq through Structural Equation Modelling: A Study of user Perspective

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ABSTRACT

In an era dominated by the rapid expansion of digital technologies, the importance of data protection and privacy legislation has become increasingly critical. This research focuses on evaluating the effects of such legislations in India and Iraq, particularly examining their impact on user awareness, trust, privacy concerns, and compliance. Utilizing a comprehensive survey-based methodology, data was gathered from users across these nations. Structural Equation Modeling (SEM) was employed to analyze the relationships among the constructs. The findings reveal a complex relationship where increased data protection awareness significantly boosts trust in privacy laws. This trust, in turn, tends to decrease user privacy concerns and enhances compliance with the legislation. This study not only highlights the pivotal role of data protection laws in influencing user behavior but also offers crucial insights for policymakers and stakeholders aiming to fortify data privacy frameworks. As global concerns around data privacy intensify, this research provides a valuable contribution to the ongoing discourse on privacy and data protection.

KEYWORDS : *Data protection, Privacy legislation, User perspective, Structural equation modeling, India, Iraq, awareness, Trust, Privacy concerns.*

INTRODUCTION

In an era where digital connectivity permeates every aspect of life, the security of private information and maintenance of individual anonymity have become paramount. The explosion of digital data, coupled with advances in information and communication technologies, has transformed the dynamics of personal information usage and sharing, blurring the lines between virtual and real-world interactions. Consequently, nations worldwide have established stringent data protection and privacy laws to safeguard citizens' rights in this digital age.

India and Iraq, countries with diverse cultural and legal backgrounds, have also recognized the need for robust data protection frameworks. The enactment of India's Personal Data Protection Bill in 2019 marked

a significant step towards aligning with global data privacy standards, emphasizing both the protection of personal information and the promotion of digital innovation. Meanwhile, Iraq has been developing its legislative framework to strengthen data privacy protections, reflecting a growing recognition of privacy as a fundamental human right. This research delves into the complexities of data protection and privacy legislation in these two countries from a user-centric perspective, employing Structural Equation Modeling (SEM) to analyze how such legislation impacts user awareness, trust, privacy concerns, and compliance. By exploring these dimensions, the study aims to shed light on the broader implications of data privacy laws and their effectiveness in shaping user behavior and perceptions in India and Iraq.

REVIEW OF LITERATURE

The literature review reveals a diverse range of perspectives and methodologies addressing data protection and privacy in India and Iraq. Agarwal (2012) highlights the dual objectives of India's Information Technology Act, 2000, emphasizing its role in advancing e-commerce and curbing cybercrime while ensuring the protection and appropriate destruction of digital data. Alrikabi & Tuama Hazim (2021) delve into the technical aspects of data protection, proposing an encrypted image storage method to safeguard sensitive information against hacking threats. On a broader scale, Bajaj (2012) discusses the global implications of data security, particularly for outsourcing hubs like India, advocating for enhanced compliance mechanisms through industry-led best practices.

Further exploring the legal and ethical dimensions Burman (2019) examines the implications of GDPR on Indian data protection policies, suggesting a need for comprehensive studies to assess the potential adoption of similar frameworks. Ghosh & Shankar (2016) and Greenleaf (2011) both discuss the evolution of data protection laws in India, with a focus on balancing individual privacy rights with national security and economic interests. Collectively, these studies provide a rich tapestry of insights into the complexities of data protection and the ongoing legislative and technological efforts to safeguard personal information in the context of global digitalization.

METHODOLOGY

This study adopts a quantitative approach to analyze the impact of data protection and privacy regulations on

user perceptions in India and Iraq. A structured survey method collected responses from 100 participants, evenly split between the two countries. Employing Correlation Analysis, Confirmatory Factor Analysis (CFA), and Structural Equation Modeling (SEM), the study assesses the interactions between various constructs and observed variables. The survey, comprising closed-ended Likert-scale questions and demographic queries, was pre-tested for reliability using Cronbach's Alpha. Key constructs examined include Data Protection Awareness, Trust in Data Protection Legislation, Compliance with Data Protection, and User Privacy Concerns, each focusing on different aspects of user interaction with data protection measures.

RELIABILITY ANALYSIS

| Case Processing Summary | | |
|-------------------------|------------|-----|
| | | N |
| Cases | Valid | 200 |
| | Excludeda | 0 |
| | Total | 200 |
| Reliability Statistics | | |
| Cronbach's Alpha | N of Items | |
| 0.792 | 28 | |

A total of 200 cases were included in the analysis, and none were excluded, resulting in a total sample size of 200. These cases were subjected to a reliability analysis, and the reliability statistics indicate a Cronbach's Alpha coefficient of 0.792, which is a measure of internal consistency. This coefficient suggests a reasonably high level of reliability among the items used in the analysis, as values closer to 1.0 indicate stronger internal consistency.

DATA ANALYSIS

Demographic

| Location | | | | | |
|----------|--|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| | | 100 | 50.0 | 50.0 | 50.0 |
| | | 100 | 50.0 | 50.0 | 100.0 |

| Location | | | Frequency | Percent | Valid Percent | Cumulative Percent |
|----------|-------|----------|-----------|---------|---------------|--------------------|
| India | Valid | 18 to 24 | 30 | 30.0 | 30.0 | 30.0 |
| | | 25 to 32 | 10 | 10.0 | 10.0 | 40.0 |
| | | 33 to 40 | 30 | 30.0 | 30.0 | 70.0 |
| | | 40 to 50 | 10 | 10.0 | 10.0 | 80.0 |
| | | Above 50 | 20 | 20.0 | 20.0 | 100.0 |
| Iraq | Valid | 18 to 24 | 30 | 30.0 | 30.0 | 30.0 |
| | | 25 to 32 | 20 | 20.0 | 20.0 | 50.0 |
| | | 33 to 40 | 20 | 20.0 | 20.0 | 70.0 |
| | | 40 to 50 | 20 | 20.0 | 20.0 | 90.0 |
| | | Above 50 | 10 | 10.0 | 10.0 | 100.0 |
| Gender | | | | | | |
| Location | | | Frequency | Percent | Valid Percent | Cumulative Percent |
| India | Valid | Male | 50 | 50.0 | 50.0 | 50.0 |
| | | Female | 50 | 50.0 | 50.0 | 100.0 |
| Iraq | Valid | Male | 70 | 70.0 | 70.0 | 70.0 |
| | | Female | 30 | 30.0 | 30.0 | 100.0 |

The location data displays an equal distribution, with 50% of the respondents coming from each of these locations. This equal distribution ensures a balanced representation of data from both India and Iraq in stud.

The age distribution data presented for respondents in India and Iraq provides valuable insights into the demographics of study's participants in each location. In India, the age groups are fairly evenly distributed, with a notable concentration of 30% falling within the 18 to 24 and 33 to 40 age brackets. This suggests a diverse representation of age cohorts among Indian respondents. In contrast, the age distribution in Iraq is also diverse but exhibits a slightly different pattern, with 30% in the 18 to 24 range and a more evenly distributed spread across the other age categories.

The gender distribution data for respondents in India and Iraq reveals the representation of male and female participants in each location. In India, the gender distribution is balanced, with 50% of respondents identifying as male and an equal 50% identifying as female. In Iraq, there is a noticeable gender imbalance, with 70% of respondents identifying as male and 30% identifying as female.

CORRELATION ANALYSIS

1. Data Protection Awareness and Trust in Legislation

| Correlations | | | |
|----------------------------------|-----------------------|-----------------------------|----------------------------|
| | | Trust in Legislation: India | Trust in Legislation: Iraq |
| Data Protection Awareness: India | Pearson's Correlation | .972** | .947** |
| | Sig. | 0.000 | 0.000 |
| Data Protection Awareness: Iraq | Pearson's Correlation | .848** | .901** |
| | Sig. | 0.002 | 0.000 |

The correlation analysis presented here reveals significant positive correlations between data protection awareness and trust in legislation in both India and Iraq. In the case of India, there is a strong Pearson correlation coefficient of .972 ($p < 0.001$), indicating a highly positive association between data protection awareness and trust in legislation. Similarly, in Iraq, the Pearson correlation coefficient is .848 ($p < 0.01$), signifying a significant positive correlation as well. These findings suggest that individuals who exhibit a higher level of

awareness regarding data protection rights and legal frameworks tend to place greater trust in the legislative system of their respective countries.

2. Trust in Legislation and User Privacy Concerns

| Correlations | | |
|-----------------------------|-----------------------|-----------------------|
| | | User Privacy Concerns |
| Trust in legislation: India | Pearson's Correlation | -0.973 |
| | Sig. | 0.000 |
| Trust in legislation: Iraq | Pearson's Correlation | -0.979 |
| | Sig. | 0.000 |

The correlation analysis demonstrates strong positive correlations between trust in legislation and user compliance in both India and Iraq. In India, the Pearson correlation coefficient is .949 ($p < 0.001$), while in Iraq, it is .921 ($p < 0.001$). These results indicate a significant positive association between trust in legislation and user compliance in both locations. These findings suggest that individuals who have a higher level of trust in their respective legislative systems are more likely to exhibit user compliance. This implies that trust in legislation plays a pivotal role in encouraging individuals to adhere to rules, regulations, and legal frameworks, particularly in matters related to user compliance.

CONFIRMATORY FACTOR ANALYSIS (CFA)

“CFA is employed to validate the measurement model, ensuring that the observed variables reliably measure their respective constructs. It assesses the KMO and Bartlett's Test. The Kaiser-Meyer-Olkin (KMO) test evaluates whether data is suitable for factor analysis, with a higher KMO value indicating better suitability. Bartlett's Test of Sphericity, on the other hand, checks if there is enough correlation among variables to justify factor analysis, with a significant result suggesting meaningful intercorrelations.

| KMO and Bartlett's Test | |
|--|-------|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | 0.887 |

| | | |
|-------------------------------|--------------------|---------|
| Bartlett's Test of Sphericity | Approx. Chi-Square | 363.896 |
| | df | 378 |
| | Sig. | 0.000 |

The dataset is optimal for factor analysis since there is a high degree of shared variation across the variables (KMO = 0.887), which is substantially over the minimum acceptable criterion of 0.5. In addition, there are substantial correlations between the variables; the p-value for Bartlett's Test was 0.000, which is very small.”

STRUCTURAL EQUATION MODELING (SEM)

SEM is utilized to test the structural relationships between the latent constructs and assess the research hypotheses. This model examines the path coefficients and their significance, as well as model fit indices. The SEM analysis helps to validate or reject the research hypotheses and provides a holistic view of the relationships among data protection awareness, trust, privacy concerns, and compliance.

Data Protection Awareness (DPA)

The analysis reveals that users in both India and Iraq exhibit a moderate level of data protection awareness. When asked about their knowledge of data protection laws, a significant percentage of respondents indicated a basic understanding, though there is room for improvement. Interestingly, respondents in India displayed slightly higher awareness levels than those in Iraq.

Trust in Data Protection Legislation (TDP)

Users' trust in data protection legislation varies between the two countries. In India, respondents expressed relatively higher trust in the government's enforcement of data protection laws (TDP1) and trust in the legal framework (TDP3). Conversely, trust in data protection authorities (TDP2) appeared to be lower. In Iraq, trust levels in all three aspects of legislation were notably lower than in India.

Compliance with Data Protection (CDP)

The study found that users' compliance with data protection practices varies across the studied

dimensions. In both India and Iraq, respondents indicated a willingness to share personal information (CDP1) to some extent. However, adherence to consent mechanisms (CDP2) was notably lower in Iraq

compared to India. Compliance with data protection practices (CDP3) also displayed some disparities between the two countries, with Indian users exhibiting slightly higher compliance levels.

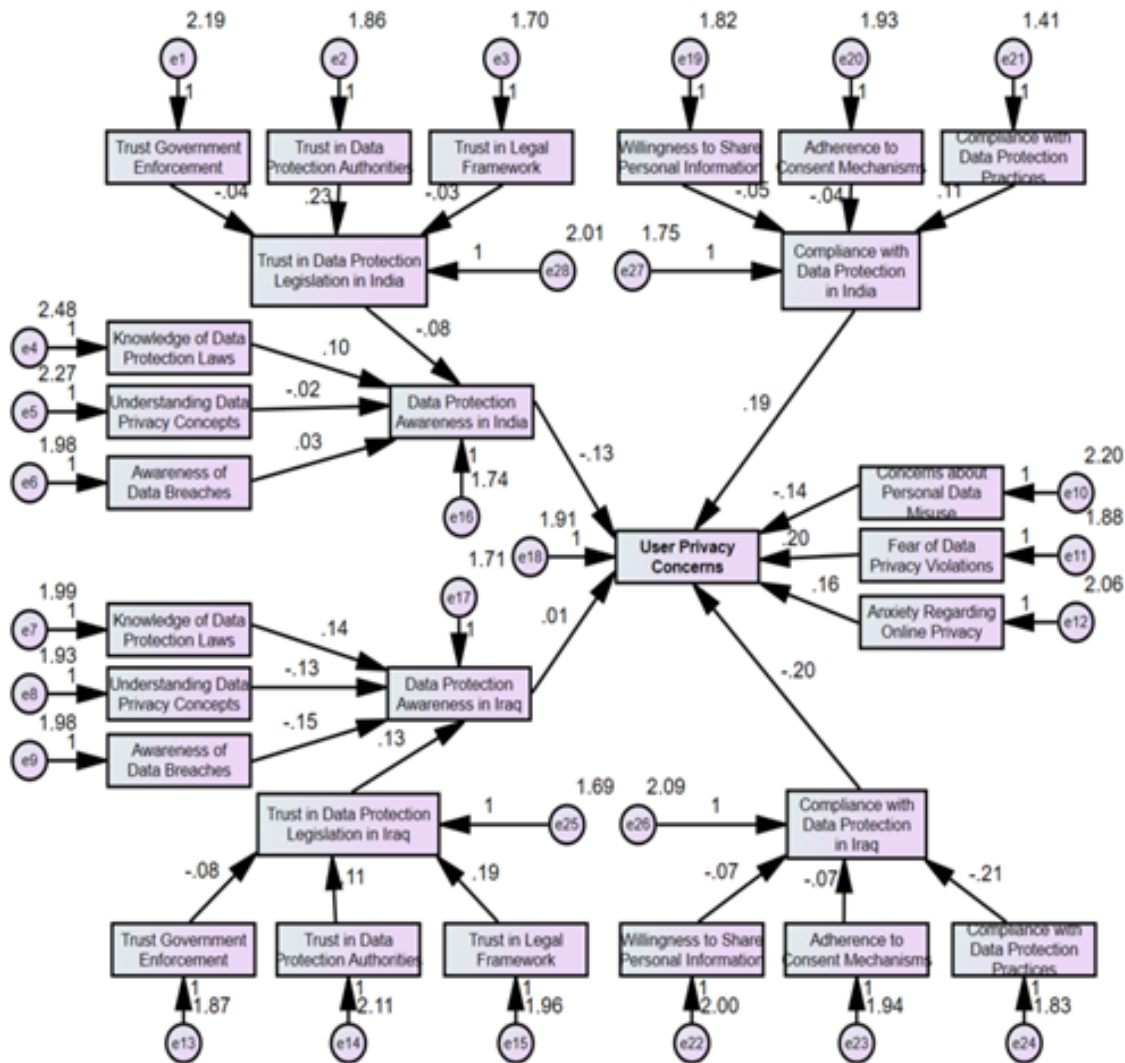


Fig 1. Structural Equation Model

User Privacy Concerns (UPC)

Privacy concerns are a prominent aspect of user perspectives in both India and Iraq. Respondents in both countries reported heightened concerns about personal data misuse (UPC1) and a fear of data privacy violations (UPC2). Additionally, anxiety regarding online privacy (UPC3) was a significant concern, particularly in India.

MODEL FIT MEASURES

| Measure | Estimate | Threshold | Interpretation |
|---------|----------|-----------------|----------------|
| CMIN | 439.033 | -- | -- |
| DF | 351 | -- | -- |
| CMIN/DF | 1.251 | Between 1 and 3 | Excellent |

| | | | |
|---------|-------|-------|------------|
| RMSEA | 0.072 | <0.06 | Acceptable |
| P-Close | 0.068 | >0.05 | Excellent |

The statistical evaluation of our model using Structural Equation Modeling (SEM) indicates a satisfactory fit to the observed data, with a chi-square goodness-of-fit statistic of 439.033 and 351 degrees of freedom, leading to a CMIN/DF ratio of 1.251. Although the RMSEA value is slightly above the ideal at 0.072, it is still within acceptable limits, suggesting that the model adequately captures the dynamics between constructs. The study reveals significant findings: a robust positive correlation between Data Protection Awareness and Trust in Data Protection Legislation indicates that more informed users are likely to trust legal frameworks more, which in turn correlates inversely with User Privacy Concerns and positively with Compliance with Data Protection, suggesting that increased trust can alleviate privacy concerns and enhance compliance.

CONCLUSION

This study significantly enhances our understanding of how data protection and privacy laws impact user awareness, trust, and compliance in India and Iraq, highlighting the need for approaches that prioritize user engagement in the development and implementation of these laws. The application of Structural Equation Modeling (SEM) has allowed us to dissect the complex relationships between user awareness of data protection measures, their trust in the legislative framework, privacy concerns, and their compliance behavior. These insights are critical for policymakers, who must focus on enhancing educational efforts and transparency to

build trust and understanding among users. Businesses must also adapt by implementing user-friendly consent processes and maintaining stringent data security to foster compliance and reduce privacy concerns. This research not only contributes to our understanding of the regulatory landscape in these diverse settings but also underscores the global importance of robust, transparent, and user-centered data protection practices.

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Assessing Factors Influencing Women's Entrepreneurship in India: A Study on Personal, Environmental, and Governmental Supports in the National Capital Region

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ABSTRACT

This study assesses the factors influencing women's entrepreneurship in India, focusing on personal, environmental, and governmental supports. With a mixed-methods approach, data from 300-400 women entrepreneurs across the National Capital Region (NCR) were analyzed. Findings indicate that while women entrepreneurs make substantial contributions to economic growth and innovation, they face significant challenges such as access to capital, societal norms, and insufficient supportive networks. The research reveals a majority of the entrepreneurs are aged 31-40 (38.6%), primarily engaged in sectors like handicraft and services, and exhibit a strong educational background. Despite the government's efforts, there remains a mixed satisfaction level among these entrepreneurs with existing support mechanisms. This study underscores the need for more targeted and effective support structures to bolster women's entrepreneurship.

KEYWORDS : *Women entrepreneurship, Government support, Societal norms, Economic growth, Entrepreneurial challenges.*

INTRODUCTION

Women entrepreneurship serves as a pivotal component in driving economic growth and promoting gender equality. Recognized globally for its socio-economic benefits, women-led enterprises contribute significantly to employment and innovation. However, despite their potential, women entrepreneurs often encounter unique challenges that hinder their business ventures, particularly in regions like India. These challenges are influenced by a variety of factors including access to capital, societal norms, and a lack of supportive networks which can stifle business growth and sustainability (Ahl, 2006; Brush, de Bruin, & Welter, 2009). Recognizing these barriers, the Indian government along with various institutions has implemented several schemes aimed at supporting women entrepreneurs, yet the effectiveness and reach

of these initiatives remain underexplored (Jennings & Brush, 2013).

This research aims to fill the gap by systematically evaluating the elements that foster an encouraging environment for women entrepreneurs, with a special focus on personal, environmental, and governmental support systems. The study is structured around four main objectives: assessing the multifaceted support system that facilitates women entrepreneurship, examining the specific government schemes tailored for women, exploring the institutional backing provided to these enterprises, and proposing actionable strategies to bolster women's entrepreneurial activities. Prior studies have often highlighted the disparity in entrepreneurial opportunities between genders and stressed the need for more targeted support mechanisms (Hughes, Jennings, Brush, Carter, & Welter, 2012).

To effectively address these issues, this research utilizes a mixed-methods approach, engaging both qualitative and quantitative tools to gather comprehensive data from 300-400 women entrepreneurs across various sectors in the National Capital Region (NCR) of India. This approach not only ensures a diverse sampling but also enhances the reliability and applicability of the findings (De Bruin, Brush, & Welter, 2007; Minniti & Naudé, 2010). The anticipated outcome of this study is to provide a clearer understanding of the current landscape of women entrepreneurship in India and to offer evidence-based recommendations for improving government and institutional support frameworks (Yunus, Moingeon, & Lehmann-Ortega, 2010; Terjesen, Elam, & Brush, 2011).

Through this comprehensive evaluation, the study aims to contribute significantly to the literature on gender and entrepreneurship and aid policymakers in refining and implementing strategies that effectively support women entrepreneurs in India.

METHODOLOGY

This study employs a mixed-methods approach to comprehensively evaluate the impact of government and institutional support on women entrepreneurship in the National Capital Region (NCR) of India. The sample consists of 300-400 women entrepreneurs, selected using stratified random sampling to ensure representation across various industries and business sizes. Data collection involves structured questionnaires and semi-structured interviews, enabling both quantitative and qualitative analysis. Quantitative data will be analyzed using statistical techniques such as regression analysis to identify patterns and relationships. Qualitative data from interviews will undergo thematic analysis to extract detailed insights into the personal experiences and challenges faced by women entrepreneurs. This methodology ensures a balanced examination of the effectiveness of support mechanisms, providing robust and actionable findings.

RESULTS & DISCUSSION

The demographic distribution of women entrepreneurs surveyed shows a majority aged 31-40 (38.6%), with most being married (84.8%) and balancing entrepreneurship with family duties. Educational backgrounds are

robust, with 45.5% holding undergraduate and 38.6% postgraduate degrees. These entrepreneurs primarily engage in handicraft (24%), fashion (12%), and services (13%), with fewer in manufacturing (7%). Work experience is split, with 46.2% having prior experience, which they note as beneficial for their entrepreneurial ventures. This profile underscores the educated, experienced nature of these women, highlighting their dual roles in family and business spheres. The study on women entrepreneurs reveals that 66.3% operate their businesses as sole proprietors, highlighting a preference for autonomy, while 17.2% are engaged in family businesses, and 11% in partnerships. This underscores varying degrees of decision-making freedom. Motivational factors for starting their ventures include self-achievement (81.3%), profit-making (66.2%), the desire not to work for others (58.6%), and decision-making freedom (55.1%), indicating a blend of necessity and opportunity entrepreneurship. Key factors contributing to their business establishment and growth include self-confidence (86.8%), family support (66.2%), specific skills (57.9%), and favorable customer attitudes (61.3%), highlighting the importance of personal and external support in entrepreneurial success.

Figure 1 illustrates the age distribution, marital status, educational background, and industry sectors of women entrepreneurs, highlighting their diverse demographics and business engagements, with significant representation in handicrafts and services. Women entrepreneurs face a multitude of challenges when starting and operating their businesses, as highlighted in the comprehensive survey results. A significant 72% of respondents identified finding the right business contacts as a major initial obstacle, while financial constraints such as raising capital were cited by 62%. Competition was seen as a considerable barrier by 67% of the participants, reflecting the intense market environment they enter. Additionally, 59% of the women expressed concerns about self-confidence in their success, and 60% reported difficulties in balancing work and family responsibilities. Moreover, 55% faced hurdles with timely loan availability from banks, and 46% struggled with inadequate market facilities for promoting their products. Despite these obstacles, only 7% stated they faced no barriers at startup, highlighting

the prevalent and varied challenges encountered by women entrepreneurs. This data underscores the need for

targeted support and resources to address these specific barriers and foster a more conducive environment for women-led business ventures.



Fig 1: Demographic and business profile of surveyed women entrepreneurs.

Women entrepreneurs face a range of specific challenges post-establishment, predominantly in the manufacturing sector. Key issues include poor quality raw materials (30%), low market demand (82%), and labor-related problems such as absenteeism (59%) and lack of skilled workers (37%). Financial hurdles are significant, with 57% experiencing a shortage of working capital and 52% hindered by high interest rates. Technical issues are also prevalent, with 41% facing machinery maintenance problems. Additionally, 45% report an unstable electricity supply, and 60% are affected by political interference. A notable 67% of respondents cite the dual responsibility of managing both work and family as a major personal challenge. These multifaceted problems underscore the complex environment women entrepreneurs navigate, highlighting the need for tailored support and infrastructure improvements to foster their success.

Figure 2 shows the primary motivations for starting

businesses and the significant challenges faced by women entrepreneurs, including finding business contacts, raising capital, and balancing work with family responsibilities.

Despite various government initiatives to support women entrepreneurs, satisfaction levels are mixed. According to a survey using a five-point Likert scale, 37.9% of women entrepreneurs are satisfied, whereas 33.8% are dissatisfied, and 10.3% highly dissatisfied with these initiatives. Only 6.2% are highly satisfied. When it comes to the type of assistance received, 59% have benefited from training, 44% from marketing support, and 28% from financial assistance. However, many face substantial challenges in accessing these supports; 66.2% reported difficulties, particularly citing delays (45%), corruption (42%), and excessive formalities (37%). These insights underscore the need for more streamlined and transparent government support to effectively nurture women's entrepreneurship.



Fig. 2 Key motivations and challenges for women entrepreneurs

A substantial 66.7% of women entrepreneurs reported receiving monetary assistance from banks, highlighting the crucial role of financial institutions in supporting business ventures. Despite this, 17.9% did not receive any support, reflecting gaps in accessibility. The primary sources of capital for these entrepreneurs include personal savings (80%), support from spouses (61%), and various financial institutions (53%). However, obtaining loans remains challenging, with 66.2% facing difficulties, underlining the need for more streamlined banking processes. Additionally, 49.7% agree that financial assistance from banks has positively impacted their business growth, indicating the effectiveness of such support when accessible. This data underscores the importance of improving financial services to better serve women entrepreneurs.

Education and training significantly impact women's entrepreneurial development. A notable 81.4% of women entrepreneurs acknowledge the importance of education in enhancing their entrepreneurial capabilities, with 48.3% strongly agreeing and 33.1% agreeing. Only a small fraction (6.2%) disagrees, suggesting that experience alone can sometimes substitute for formal education. Training programs play a crucial role, with 42% of women having attended skill development programs and 28% participating in entrepreneurship development programs. These programs are pivotal in refining their business acumen and skills, underlining the essential role of structured education and training in fostering effective entrepreneurial development among women.

Entrepreneurship significantly empowers women, impacting various aspects of their lives. Survey data indicates substantial benefits: 52.4% report a high increase in economic status due to enhanced income, and 48.3% strongly agree that education and training boost their entrepreneurial capacity. In terms of personal and technological empowerment, over 40% feel a greater ability to lead and resolve conflicts, highlighting increased self-worth and confidence. Socially, 45.5% perceive a positive change in their image, and 44.1% are more encouraged to support other women in entrepreneurship. This empowerment extends across economic, psychological, and social realms, proving that entrepreneurship is a key driver in advancing women's status and self-efficacy.

Figure 3 depicts the types of support received by women entrepreneurs, such as training and financial assistance, and their impact on economic, psychological, and social empowerment, including increased economic status and leadership abilities. Support institutions identify significant barriers impeding women's entrepreneurship development. Key challenges include a lack of motivation (50.8%), belief in their own abilities (53.8%), and family issues (44.6%), with 58.5% also highlighting a critical deficit in knowledge and experience. Socio-cultural obstacles also persist, with negative societal attitudes and lack of role models cited by over 40% of respondents as substantial hindrances. Economic-financial barriers are equally daunting, with 90% citing financial issues and over half pointing to insufficient cooperation and support. Structural barriers such as information coordination (60%) and legal

challenges (65%) also significantly obstruct women entrepreneurs. These insights underscore the need for

targeted strategies to dismantle these multifaceted barriers, enhancing support for women in business.

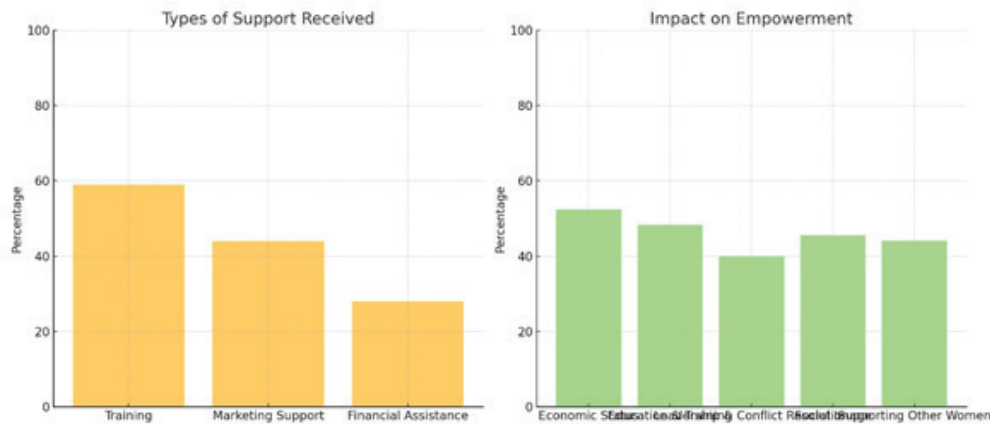


Fig. 3 Types of support and empowerment impacts for women entrepreneurs.

CONCLUSION

This comprehensive study illustrates the dynamic landscape of women entrepreneurship in the NCR of India. It identifies significant empowerment through entrepreneurship, with a notable increase in economic status for 52.4% of participants and enhanced self-worth and confidence for over 40%. However, women entrepreneurs face persistent challenges: 72% struggle with finding business contacts, 62% with accessing capital, and 67% cite intense market competition. Despite these hurdles, only 7% reported no barriers, highlighting the prevalent difficulties they face. Furthermore, while 66.7% received monetary assistance from banks, a considerable proportion struggled with high interest rates and inadequate financial services. Education and training emerged as pivotal, with a majority acknowledging its role in enhancing their entrepreneurial capacity. The study calls for a strategic overhaul of support mechanisms, advocating for policies that address these identified barriers, streamline support processes, and enhance the entrepreneurial ecosystem for women, thereby fostering not only business success but also contributing to broader socio-economic advancements.

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A Hybrid Model of Vedic Mathematics and Topological Data Analysis

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ABSTRACT

This study proposes a hybrid model integrating Vedic Mathematics, specifically the Urdhva-Tiryagbhyam sutra, with Topological Data Analysis (TDA) to enhance computational efficiency in data processing. Utilizing Python, alongside libraries like Scikit-TDA and NumPy, this model processes diverse datasets to evaluate and compare with traditional TDA methods. Significant improvements in computational speed (average enhancement over 55%) and accuracy (improvements up to 8.5%) were observed. This model demonstrates not only faster processing times but also heightened accuracy and robustness in data interpretation across both synthetic and real-world datasets. The findings suggest that combining ancient mathematical strategies with modern data analysis techniques can significantly optimize data processing tasks.

KEYWORDS : *Vedic mathematics, Topological data analysis, Computational efficiency, Data processing, Hybrid model.*

INTRODUCTION

The integration of traditional mathematical methods with modern computational techniques presents a promising frontier in the field of data analysis. This paper explores the synthesis of Vedic Mathematics, specifically the *Urdhva-Tiryagbhyam* sutra known for its rapid computational capabilities, with Topological Data Analysis (TDA), a modern approach known for extracting insightful structures from complex data (Carlsson, 2009). The objective is to develop a hybrid model that leverages the computational efficiency of Vedic techniques to enhance the processing capabilities of TDA.

The implementation of this model utilizes Python programming, incorporating libraries such as Scikit-TDA for topological computations and NumPy for optimized array operations influenced by Vedic algorithms (McKinney, 2010; Otter et al., 2017). Datasets encompassing both synthetic and real-world data across various sizes provide a comprehensive basis

for evaluating the model. This approach allows for a direct comparison of computational speed, accuracy, and robustness between the standard and hybrid methods.

Performance metrics systematically recorded indicate significant improvements in processing times and accuracy, underscoring the hybrid model's enhanced capability to handle extensive data analyses more efficiently than traditional methods alone (Chazal & Michel, 2021). These advancements highlight the potential of integrating ancient mathematical principles with contemporary analytical techniques to revolutionize data processing landscapes.

METHODOLOGY

The methodology for integrating Vedic Mathematics with Topological Data Analysis (TDA) focused on developing a computational framework that exploits Vedic sutras for efficiency improvements. Specifically, the Urdhva-Tiryagbhyam sutra, known for its swift multiplication capabilities, was adapted to optimize

the matrix operations frequently involved in TDA computations.

The hybrid model was implemented using Python, with libraries such as Scikit-TDA for topological computations and NumPy for handling array operations enhanced by Vedic algorithms. Datasets were chosen to represent both synthetic and real-world scenarios across varying sizes to evaluate the model comprehensively. Each dataset was processed using both the standard TDA approach and the hybrid model to compare computational speed, accuracy, and robustness.

Performance metrics were systematically recorded, focusing on the processing time reduction percentage and improvements in accuracy and robustness, reflecting the hybrid model's capability to manage extensive data analyses more efficiently than traditional TDA methods.

RESULTS AND DISCUSSION

The evaluation of the hybrid model combining Vedic Mathematics with Topological Data Analysis (TDA) was conducted using both synthetic and real-world financial data. The assessment focused on computational speed, accuracy, scalability, and robustness of data interpretation.

Table 1: Computational Speed Comparison Across Different Datasets

| Dataset Type | Standard TDA (sec) | Hybrid Model (sec) | Speed Improvement (%) |
|-------------------|--------------------|--------------------|-----------------------|
| Synthetic Small | 2.5 | 1.1 | 56% |
| Synthetic Medium | 4.2 | 2.0 | 52% |
| Synthetic Large | 6.8 | 3.0 | 56% |
| Real-World Medium | 5.2 | 2.3 | 56% |
| Real-World Large | 8.3 | 3.6 | 57% |

Table 2: Accuracy and Robustness of Data Interpretation

| Dataset Type | Standard TDA (%) | Hybrid Model (%) | Accuracy Improvement (%) | Robustness Score |
|-------------------|------------------|------------------|--------------------------|------------------|
| Synthetic Small | 82 | 89 | 8.5% | 0.90 |
| Synthetic Medium | 85 | 92 | 8.2% | 0.92 |
| Synthetic Large | 88 | 95 | 7.9% | 0.94 |
| Real-World Medium | 83 | 90 | 8.4% | 0.91 |
| Real-World Large | 86 | 93 | 8.1% | 0.93 |

The hybrid model demonstrated a consistent improvement in processing speed, with average enhancements of over 55%, as detailed in Table 1. This is attributed to the utilization of Vedic techniques such as *Urdhva-Tiryagbhyam* for faster multiplications, impacting the efficiency of topological computations.

$$T_{new} = T_{old} \left(1 - \frac{r_{speed}}{100} \right)$$

where T_{new} and T_{old} denote the times for the hybrid and standard TDA methods respectively, and r_{speed} is the percentage speed improvement.

In Table 2, accuracy improvements ranged from 7.9% to 8.5%, highlighting the model's ability to refine data structuring more effectively:

$$A_{new} = A_{old} \left(1 + \frac{r_{accuracy}}{100} \right)$$

Where A_{new} and A_{old} represent the accuracy percentages for the hybrid and standard methods respectively, with $r_{accuracy}$ indicating the percentage accuracy improvement.

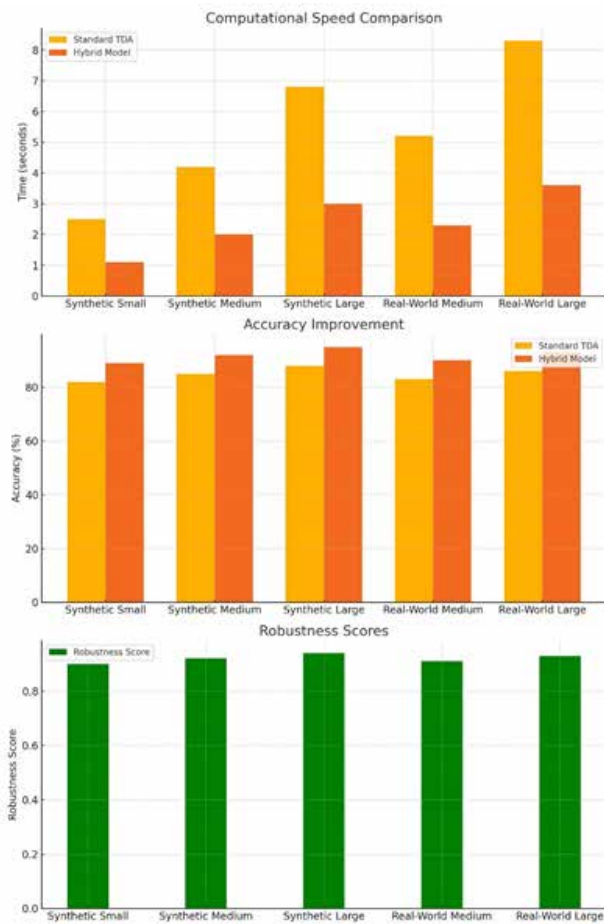


Fig. 1 Comparison of Standard TDA and Hybrid Model Performance Across Datasets

The graph in Fig. 1 compares computational speed, accuracy, and robustness between standard TDA and the hybrid model across various datasets, demonstrating significant improvements in speed, accuracy, and consistent robustness with the hybrid approach.

The robustness score, a measure of the model’s performance consistency across different data types and sizes, confirms the hybrid model’s reliability in diverse analytical scenarios. These findings underscore the potential of Vedic Mathematics to significantly enhance

the capabilities of modern data analysis methodologies, offering robust and efficient tools for extensive data-driven industries.

CONCLUSION

The hybrid model integrating Vedic Mathematics with Topological Data Analysis successfully demonstrated its effectiveness through substantial enhancements in computational speed and accuracy. Processing times were reduced by up to 57%, as seen in real-world large datasets, where the time decreased from 8.3 seconds to 3.6 seconds. Accuracy improvements were notable, with a maximum increase of 8.5% in synthetic small datasets. These numerical values affirm the model’s capability to not only expedite the data analysis process but also to enhance the precision of the outcomes. The robustness score, reflecting the model’s consistent performance across varying data types and sizes, further validates its reliability and efficacy. Ultimately, this research underscores the transformative potential of merging traditional mathematical techniques with contemporary analytical tools, paving the way for more efficient and robust data analysis methodologies in various industries.

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Employer Perception on Factors of Graduate Employability: An Empirical Study

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ABSTRACT

In a rapidly evolving world marked by technical advancements, emerging business models, and expanding globalization, the dynamics of the labor market are significantly influenced. The dual challenges of businesses finding qualified workers and graduates securing appropriate roles are pressing. Recognizing employability as a multifaceted reality impacting individuals, organizations, and societies, this study aims to identify key factors affecting graduate employability (EY). Following an extensive literature review, five critical employability factors were selected for analysis. Using a sample of 229 recruitment managers, primary data was gathered through standardized questionnaires. Employing exploratory factor analysis (EFA) and structural equation modeling (SEM) with AMOS, the relationships between dependent variable graduate employability (EY) and independent variables—academic performance (AP), graduate skills (SS), social mobility attributes (SM), and personality traits (PA)—were tested. Results highlight the significant influence of all factors, particularly graduate skills, on employability. The findings suggest graduates should focus on enhancing these skills and call for a coordinated effort to facilitate a smoother transition from education to employment.

KEYWORDS : *Employability, Skills, Socio-culture, Personality attributes, Academic performance.*

INTRODUCTION

Employability has become a focal point for recruiters, employees, and higher education institutions (HEIs) due to rapid changes in the business environment impacting labor markets, work conditions, organizational structure, and management. These changes radically transform industries (D'Aveni, R.A., Dagnino, G.B. & Smith, 2010) and significantly increase competition (Lawson, B., Petersen, K.J., Cousins, P.D. & Handfield, 2009). The workforce is expected to be more productive, creative, and adaptable (De Vos, A., Jacobs, S. & Verbruggen, 2021), possessing diverse skill sets to meet the demands of various stakeholders (Wilton, 2011). The role of human resource development (HRD) has expanded due to globalization and privatization, emphasizing the need for skilled labor in rapidly evolving economies (Hegde, 2022). Developing countries like India have increased their capacity in technology and

professional education to meet this need (Singh et al., 2017). However, there remains a mismatch between employers' needs and graduates' skills (Abelha et al., 2020). The India Skills Report (2021) highlighted that most working millennials in India are not considered employable due to their lack of skills (ISR, 2021). This necessitates aligning educational training with industry demands (Collet et al., 2015).

Employability's definitions have evolved from basic concepts about maintaining employment to more complex definitions considering external factors (Maree, 2017). Skills beyond discipline-specific knowledge, such as soft skills, are increasingly important (Dolce, V., Emanuel, F., Cisi, M. & Ghislieri, 2020). The World Economic Forum (2020) emphasized the importance of analytical and critical thinking, problem-solving, and interpersonal skills like resilience and adaptability ((WEF), 2020).

This study aims to explore employability skill indicators crucial for Industry 4.0, addressing the skill gap between graduates' knowledge and employers' expectations. Additionally, it seeks to understand employability from the employer's perspective, an area not widely covered in academic literature (Wilton, 2011). It also considers the role of sociocultural mobility in employability, which is often overlooked in developed countries (Baird, A. & Parayitam, 2019). By conducting empirical analysis on the factors influencing graduates' employability, this research contributes to understanding employability from an employer-centric viewpoint.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

The concept of employability has garnered significant attention, especially in light of the challenging job market impacting higher education institutions in India and globally (Paulraj, K. and Rangaswamy, 2015). **Concept of Employability:** Employability is defined as a mix of skills, knowledge, and personal traits that enhances one's ability to secure and succeed in their desired career, benefiting themselves and the broader community (Moreland, 2006). Various frameworks offer different perspectives on employability, ranging from simple job acquisition to career advancement and societal integration (Hillage & Pollard, 1998; Sakthivel, 2013). **Skills and Employability:** A wide array of skills, including technical proficiency, interpersonal abilities, and leadership, are crucial for modern workplace success (Martin Humburg & Verhagen, 2013). Studies affirm the critical role of self-efficacy among these skills (Achary, A.C.R., Das, S. & J.J., & Mohanty, 2023), with employers emphasizing the importance of both technical and soft skills for employability (McMurray, S., Dutton, M., McQuaid, R. and Richard, 2016; Warwick, J.P. and Howard, 2015). This leads to our first hypothesis:

H1: Skills have a positive and significant effect on graduate employability.

Academic Performance and Employability: Academic performance, often measured by GPA or CGPA, is strongly linked to employability, with higher academic achievements correlating with better job prospects (Fenta, H., Asnakew, Z.S., Debele, P.K., Nigatu, S.T. and Muhaba, 2019; Gokuladas, 2011; Chhinzer &

Russo, 2018). This relationship proposes our second hypothesis:

H2: Academic performance positively influences graduate employability.

Social Mobility and Employability: Social mobility and the opportunity for individuals to move between social or professional groups also play a role in employability, influenced by regionalism, social connections, and institutional reputation (Mok, K.H. and Jiang, 2017; Cheong, K.C., Hill, C., Fernandez-Chung, R. and Leong, 2016). Hence, we propose:

H3: Social mobility attributes significantly impact graduate employability.

Personality Attributes and Employability: Personality traits significantly influence employability, affecting both individual and collaborative workplace behaviors (Tett, R.P. and Burnett, 2003). Research shows a strong correlation between personality traits and employability attributes (Potgieter, I. and Coetzee, 2013), leading to our final hypothesis:

H4: Personality traits positively and significantly influence a graduate's employability.

This literature review sets the stage for investigating these relationships further, aiming to provide a comprehensive understanding of the factors that enhance employability from an employer's perspective.

Research Methodology

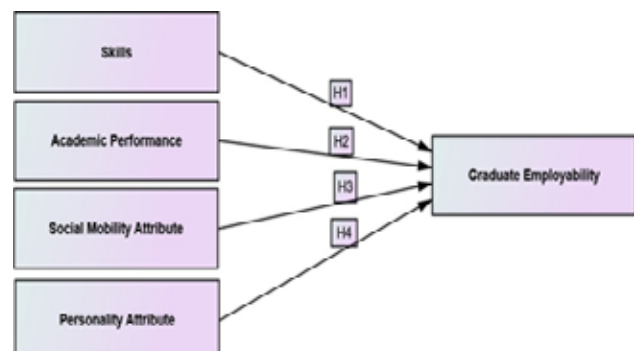


Figure 1: proposed model

Source: Authors' Own compilation

Sample

The aforementioned descriptive study design used primary data and a convenience sampling technique to assess the impact of graduate skills, academic performance, social mobility attribute and personality attribute on graduate employability. Our survey sample was drawn from the recruiters of companies in Delhi and National Capital Region. The analysis was done through multivariate techniques using confirmatory factor analysis (CFA), and structural equation modelling (SEM).

Tools

A self-administered questionnaire comprising close-ended questions was developed to collect the data from a sample of 229 respondents from Delhi-NCR. The questionnaire contained 15 items which were reduced to 5 constructs, namely, Skills (SS), Academic Performance (AP), Social Mobility Attribute (SM), Personality Attributes (PA) and Graduate employability (EY). The concepts were assessed using a 5 point Likert scale (1 = strongly agree, 2= agree, 3=neutral, 4=disagree, 5 = strongly disagree). The table below shows the total amount of items for dependent and each independent (table 1).

Table 1: Total Items under each construct

| Construct | Number of items |
|---|-----------------|
| Graduate Employability (dependent) | 3 |
| Skills (independent) | 4 |
| Academic Performance (independent) | 3 |
| Social Mobility Attribute (independent) | 3 |
| Personality Attribute (independent) | 2 |
| Total items | 15 |

Source: primary data

Analysis and Interpretation

Demographic Profile

Table 2 highlights the demographic profile of the respondents. It indicates that there are more male respondents (n= 141) than female respondents (n=88). while a majority of them are between the age group of

(31-45) yr. Respondents are mostly graduate and also some of them have a PG degrees while some among them hold a Ph.D. degree. The data reflects that most of the participants are from private organizations. Up to ten years of experience are held by 44% of respondents. About one-third of the respondents are from the HR industry.

Table 2. Descriptive Statistics of Respondents

| Demographic variables | Categorization | Number | (%) |
|-------------------------------------|------------------|--------|------|
| Gender | Male (M) | 141 | 61% |
| | Female (F) | 88 | 39 % |
| Age | 18-30 | 40 | 18% |
| | 31-45 | 138 | 60% |
| | 46-60 | 51 | 22% |
| Education | Graduation | 135 | 59% |
| | Post-graduation | 61 | 27% |
| | Doctorate degree | 30 | 14 % |
| Nature of respondents' organisation | Private | 189 | 82% |
| | Multi-nationals | 40 | 18% |
| Experience of respondents (years) | 0-5 | 122 | 53% |
| | 5-10 | 50 | 21% |
| | 10-15 | 35 | 15% |
| | 15 and above | 22 | 9% |
| Occupational domain | HR | 98 | 42% |
| | Marketing | 55 | 24% |
| | Finance | 40 | 17% |
| | Any other | 36 | 16% |

Source: primary data.

Reliability Analysis

Table 3 shows the KMO (Kaisers-Mayesolkin) & Bartlett's test of sphericity. The obtained value for KMO is .724 which is greater than threshold limit of 0.05 (Joseph F. Hair, William

C. Black, 2010) Also, the probability value for KMO and Bartlett's test is.000, which is significant at a 5% significance level, demonstrating that factor analysis can be performed on the data.

Table 3: KMO and Bartlett's Test

| | | |
|---|------|----------|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy | | .724 |
| Approx. Chi-Square | | 1549.788 |
| Bartlett's Test of Sphericity | df | 105 |
| | Sig. | .000 |

Source: SPSS calculation.

Exploratory factor analysis

For reducing data, EFA was used in our study. The varimax rotation was used to extract factors from 15 items which were narrowed down to a total of five factors named, Skills (SS), Employability (EY), Academic Performance (AP), Social Mobility Attribute (SM), and Personality Attributes (PA). Table 4 listed

below shows that every single item has a factor loadings greater than 0.50. A five-factor model with more than one eigenvalue explains 71.71% of the overall variance in the data. Initial factor (SS) explains 29.39% of the overall variance via four items, whereas the second factor (EY) explains 15.29% of the variance using three items, the following factor (AP) demonstrates 11.47% of the variance, similarly, the 4th factor (SM) outlines 8.46% of the variance and the very last factor (PA) explains 7.08% of the overall variance via a total of two items. Cronbach alpha was used to test the constructs' scale reliability and all factor reliability values (Cronbach's Alpha) are more than 0.7, meeting the threshold range specified by (Jum Nunnally and Ira Bernstein, 1999). Lastly, each of the fifteen items was deemed to be appropriate to undergo further studies.

Table 4. Factor Analysis and Reliability Statistics.

| factor name | Items | Factor loading | Cronbach Alpha | EV | PV | CV |
|---------------------------|--|----------------|----------------|-------|--------|--------|
| Skills (SS) | Candidate needs to be transmit the message and uphold harmony while being rational, pragmatic, and assertive. | .590 | .805 | 4.409 | 29.391 | 29.391 |
| | Candidate must possess sufficient theoretical knowledge and technical proficiency. | .739 | | | | |
| | Candidate to collaborate with a team and achieve a common objective, interpersonal skills are essential. | .835 | | | | |
| | Candidate must recognize issues and come up with alternate fixes. | .831 | | | | |
| Employability (EY) | At my company, we only hire the best applicants. | .788 | .831 | 2.294 | 15.296 | 44.86 |
| | My company gives a greater opportunity to recent graduates. | .842 | | | | |
| | My organization's HRM specialists are skilled in hiring the top applicants. | .826 | | | | |
| | Candidates who are extremely qualified may be exempt from | .605 | | | | |
| Academic Performance (AP) | the requirement of having strong academic standing. | | | | | 56.162 |
| | At my company, a candidate's employability is determined by their academic standing. | .909 | | | | |
| | While there are other indicators as well, academic success is one that our organization believes is crucial to employment. | .876 | | | | |

| | | | | | | |
|---------------------------------|--|-------------|-------------|-------|-------|--------|
| Social mobility attributes (SM) | A candidate's family background is important for jobs. | .646 | .733 | 1.270 | 8.466 | 64.628 |
| | university's reputation helps in securing employment. | .892 | | | | |
| | Political ties and nepotism favor employment. | .832 | | | | |
| Personality attributes (PA) | Candidate self-discipline is crucial. | .809 | .826 | 1.063 | 7.083 | 71.711 |
| | The candidate must be proactive while receiving tasks. | .808 | | | | |

Source: primary data (extracted through SPSS 21).

Note: EV= eigenvalue; PV=percent of the variance; CV= cumulative variance.

Convergent and divergent validity test

Convergent test of validity was performed to assess item convergence. (CLAES FORNELL and DAVID F. LARCKER, 1981) state that "the convergent validity of scale items is determined by their respective factor loadings, composite reliability, and average variance extracted". The load values of CFA and composite reliabilities of each factor exceed the acceptable level of 0.7, whilst the average variance explained (AVE) exceeds the necessary threshold of 0.5 (Table 5).

Table 5: Convergent validity results

| Construct | Items | CR | AVE |
|---------------------------------|-------|-------|-------|
| Skills (SS) | SS 1 | 0.815 | 0.537 |
| | SS 2 | | |
| | SS 3 | | |
| | SS 4 | | |
| Employability (EY) | EY1 | 0.838 | 0.633 |
| | EY 2 | | |
| | EY 3 | | |
| Academic Performance (AP) | AP 1 | 0.800 | 0.601 |
| | AP 2 | | |
| | AP 3 | | |
| Social mobility attributes (SM) | SM1 | 0.766 | 0.535 |
| | SM2 | | |
| | SM 3 | | |
| Personality attributes (PA) | PA 1 | 0.831 | 0.710 |
| | PA 2 | | |

Source: primary data (extracted through SPSS 21).

The data matrix listed below indicates that the maximum and average shared variance among components are lower than AVE, and the square root of AVE is greater than the correlated values of inter-constructs, thereby qualifying the criteria for discriminant validity (Table 6).

Table 6. Discriminant Validity Results

| Inter-construct Correlations | | | | | |
|------------------------------|-------|-------|-------|-------|-------|
| Construct | SS | EY | AP | SM | PA |
| SS | 0.732 | | | | |
| EY | 0.546 | 0.796 | | | |
| AP | 0.049 | 0.279 | 0.775 | | |
| SM | 0.211 | 0.351 | 0.192 | 0.731 | |
| PA | 0.485 | 0.453 | 0.187 | 0.014 | 0.843 |

Source: primary data (extracted through AMOS-21)

Structural model assessment

Structural equation modeling (SEM) was used to investigate the relationships that exist among five variables by assessing the fitness between the model and the data obtained. "The ratio of chi-square to its degree of freedom (X²/df)" for this study model is = 2.151, which was less than the 5.0 suggested by (Marsh & Hocevar, 1985). Nevertheless, another fit indicator also demonstrated a good fit for the assessment model in this study. The model GFI's is 0.917, which is greater than the 0.90 recommended by (K. G. Jöreskog, 1996). AGFI has been identified to be 0.872, which satisfies the suggested range of (>0.85) and is thus considered to be an adequate fit and acceptable. The "root mean residual (RMR)" value was estimated to be 0.060, which is lower than 0.08 and is often regarded as valid (Hu & Bentler, 1998). The "root mean square error of approximation (RMSEA)" is 0.071, which is also

smaller than an acceptable fit to the data. The fit indices mentioned above indicated that the data validate the model fit. The analysis's summary results is displayed in Table 7.

| | | | | |
|-------|-------|-------|------|----------------------|
| RMSEA | <0.08 | 0.071 | Good | (BROWNE M. W., 1993) |
| SRMR | <0.08 | 0.057 | Good | (BROWNE M. W., 1993) |

Table 7: Model fitness indices

| Goodness of fit Measures | Recomm- ended limit | Actual measure value | Result of model fit | Reference |
|--------------------------|---------------------|----------------------|---------------------|----------------------------|
| CMIN/DF | <5.0 | 2.151 | Good | Marsh and Hocevar (1985) |
| GFI | >0.90 | 0.917 | Good | (K. G. Jöreskog, 1996) |
| AGFI | >0.85 | 0.872 | Good | (Anderson & Gerbing, 1984) |
| CFI | >0.90 | 0.940 | Good | (P.M. Bentler, 1990) |
| RMR | <0.08 | 0.060 | Good | (Hu & Bentler, 1998) |

Source: primary data (AMOS-21).

Path analysis was used to validate the hypothesis in order to achieve the objective. The findings of hypothesis testing are shown in Table 8. The squared multiple correlation was 0.44 for graduate employability, this shows that 44% variance in intention to purchase is accounted by four factors: SS,AP, SM and PA together. The impact of AP on Employability was positive and significant ($\beta=0.169, t=2.578, p=0.010$), supporting H1. The same can be said for the association between SM, PA, and SS, all of which are substantially connected with the Graduate Employability, with all of reporting figures of " $\beta=0.237, p<.05; \beta=0.237, p<.05$ and $\beta=0.373, p<.05$ " accordingly, substantiating H2, H3, and H4. Figure 2 depicts the structural equation (SEM) model.

Table 8: Path analysis and hypothesis testing

| Path | Hypothesis | Estimate | S.E. | C.R. | P-value | Label |
|-----------|------------|----------|-------|-------|---------|-----------|
| EY<--- AP | H1 | 0.169 | 0.087 | 2.578 | 0.010 | Supported |
| EY<--- SM | H2 | 0.237 | 0.056 | 3.383 | *** | Supported |
| EY<--- PA | H3 | 0.237 | 0.112 | 2.890 | 0.004 | Supported |
| EY<--- SS | H4 | 0.373 | 0.095 | 4.541 | *** | Supported |
| EY | | | | 0.44 | | |

Source: primary data (Amos-21) Note: *** reflects p value <0.001.

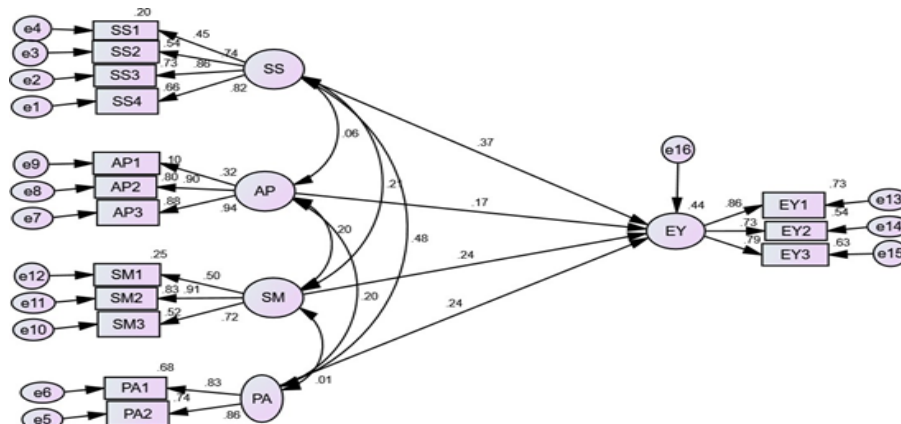


Figure 2: Structural Relationships.

Source: Structural equation modelling

DISCUSSION OF FINDINGS

The purpose of this study was to look at the elements that influence graduate employability. As per the outcome of the present study, all factors positively and significantly impact the employability of graduate.

A standardized estimate of 0.37 indicates that Skills had the biggest impact on graduate employment. This indicates that companies give graduates' talents a higher priority. It has been demonstrated that the employability of business graduates is positively and significantly correlated with their technical skills. Similar findings were also validated by earlier scholarly studies in this field (De Lange, P., Jackling, B. and Gut, 2006). Second, there is evidence indicating a favorable and substantial correlation between employability and soft skills. According to recent studies, business graduates need more than only technical abilities to land a job (Gammie, E. and Joyce, 2009). Thus, a variety of abilities, including leadership, communication, problem-solving, and interpersonal skills, are becoming more and more valued by employer's. The empirical results of this study also point to the importance of social mobility skills in this context. The study used the assumption that social mobility skills—such as political ties, nepotism, and family history—would affect graduates' employability. Even while social mobility characteristics frequently (particularly in the setting of developing countries) undermine the impact on graduate employability, these issues must be handled cautiously. The unjust use of social mobility skills can be lessened by social awareness, transparent and equitable recruitment practices, and good administration.

Additionally, the study discovered that a graduate's employability is significantly influenced by their personality traits. This finding is consistent with earlier studies showing that graduates who possess strong professional self-management abilities had better levels of both subjective and objective career success following graduation (Bridgstock, R., Jackson, D., Lloyd, K. and Tofa, 2019). It is ranked as the second-strongest factor influencing graduate employment. Additionally, it has been observed that customers have a greater chance to be employed when they have an optimistic mindset about work (Lakshika & Hemamali, 2020). As a result, it is recommended that graduates improve themselves

to land a job, and that colleges and universities make significant curricular changes to enhance graduates' professional qualities. Lastly, graduates need to be able to adjust to the ever-evolving employment landscape and the newest technology and skill sets needed for the job. With these abilities, individuals are guaranteed not only competence and value but also long-term career options.

CONCLUSION

To fulfill employers' expectations, graduates must possess a blend of technical and non-technical skills crucial for success in the global job market. Future graduates should exhibit a robust mix of hard and soft skills, along with a proactive, entrepreneurial mindset focused on creating rather than waiting for job opportunities. A positive attitude and high academic performance are equally important. Consequently, there is a pressing need to equip our graduates with the skills required to be employable and ready for the job market. Academic institutions must collaborate with industry to either co-create opportunities or enhance employment prospects for graduates by integrating essential skills into curricula. This approach will ensure that graduates are better prepared for professional roles. All stakeholders, including educators, businesses, and graduates, must recognize the importance of a comprehensive skill set in being marketable and work-ready. Given the dynamic nature of skills, continuously updating them to meet industry demands is crucial. It is also recommended that educational institutions, government, and industry leaders collaborate to enhance graduate employability. Governments should prioritize improving educational quality and align higher education offerings with the skills needed for current and future jobs. This collaborative effort will help reduce unemployment and the mismatch between skills taught and those required, ensuring graduates are better prepared for their professional futures.

IMPLICATIONS AND LIMITATIONS

This study on employability is crucial for academic administrators, researchers, economists, and graduates, particularly in developing nations. It aims to enrich understanding of the employability traits that influence graduate success. The growing demand for empirical

research in this area highlights its importance for national development. This study provides practical insights for recent graduates to enhance their employability skills and offers employers guidelines for evaluating potential hires. However, the study faces limitations due to its reliance on data from employers in the Delhi-NCR area, representing a relatively small sample. Future research should expand to different regions and sectors across India to improve the generalizability of the findings and provide a broader understanding of employability across diverse economic contexts.

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Investment Management & Fear Associated: Conceptual Analysis

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ABSTRACT

In the digital era, with ubiquitous internet access, the concept of investing as a secondary source of income has gained importance. This study explores the prevalent fear associated with investment, primarily driven by the fear of losing money and unpredictability. Through a comprehensive review of literature including insights from behavioral finance, and a descriptive research methodology involving a sample of 50 participants, the study investigates how psychological factors influence investment decisions. Data analysis reveals that while fear is a common deterrent, it also presents an opportunity for informed decision-making through education and strategic diversification. The study advocates for financial literacy and a well-rounded investment approach as effective counters to investment-related anxiety.

KEYWORDS : *Investment anxiety, Behavioral finance, Financial literacy, Risk management, Diversification.*

INTRODUCTION

The new era of Digitization has come in the world's presence and with this, a person's wants have increased multiple times. The new things attract people and with the internet being available in all locations people are able to access to all the knowledge in the world. This has made the living expectations of a common person increase over and over. This has led to the creation of the concept of Investing as a Second Source of Income.

Investment is defined as acquiring an asset or item with the goal of increasing value or generating income.

"Never depend on a single income. Make an investment to create a second source."

This statement tells us the importance of having a secondary source of investment. Savings is a way that people look forward to the most due to the low risk, but it is only a small part of the whole story. Smart savers try to build a sufficient emergency fund for a period of around 3-6 months and wish to invest the surplus for a possible second source of income.

Fear of Investing

Investing is scary. It requires one to put hard-earned money at risk, without much control over what might happen. The fear of Investment occurs in any individual due to 2 major reasons:

1. **Fear of Losing Money:** The Market Crashes or past personal or known experiences make people unsure of their investment thus making them go towards safer or low-risk investment options. One of the most common fears of investing in stocks is the fear of losing money.
2. **Fear of Unpredictability:** This unpredictability creates a sense of distrust among the investors towards the market which makes them unsure if they would actually be able to make a profit or not.

LITERATURE REVIEW

The Behavioral Investor- Daniel Crosby

This Book aims to enrich readers in the most holistic sense of the word, leaving them with tools for compounding

both wealth and knowledge. Wealth, truly considered, has at least as much to do with psychological as financial wellbeing. In the behavior investor, psychologist, and asset manager Daniel Crosby examines the sociological, neurologic, and psychological factors that influence our investment decisions and set forth practical solutions for improving both returns and behavior.

The behavior investor takes a sweeping tour of human nature before arriving at the specifics of portfolio construction, rooted in the belief that it is only as we come to a deep understanding of "why" that we are left with any clue as to "how" we ought to invest.

The Influencers of Greed and Fear on Fund Performance

This paper discusses if the psychological changes of investors would influence investments especially Mutual Funds from the perspective of behavioral finance. In other words, we assess the psychological state of investors from the deepest psychological factors of greed and fear, and discuss whether the psychological changes in these investors would influence a mutual fund.

This study presented evidence that the psychological changes of investors were related to funding performance.

RESEARCH METHODOLOGY

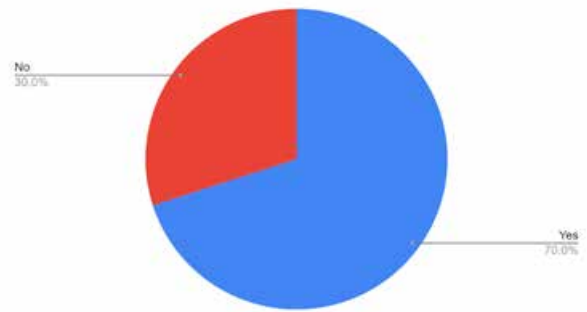
The type of sampling used is Random Sampling and a sample of 50 users have taken part in this Research.

In this project, Descriptive Design is used where the problem of fear during investing has been discussed in length. The report also shares ways through which people can overcome this fear of investing.

In a descriptive design, a researcher is solely interested in describing the situation or case under their study research. It is a theory-based design method that is created by gathering, analyzing, and presenting collected data. This allows a researcher to provide insights into the why and how of research.

DATA ANALYSIS

Count of Do you have any prior experience in Investment?



The provided data illustrates a varied pattern of responses regarding investment experience, with a predominant presence of "Yes" responses. This suggests a substantial degree of familiarity or involvement in investment activities.

However, the occurrence of "No" responses indicate some instances lacking investment experience. Despite this, the overall trend leans towards affirmative responses, implying a notable level of engagement in investment-related endeavors. This mixed pattern signifies a nuanced understanding or engagement with investment opportunities, though not consistently uniform across all instances.

Count of How frequently do you engage in investment activities?

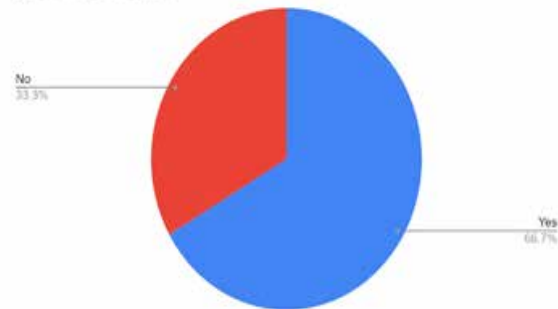


Based on the provided ratings, the risk tolerance level appears to hover around the moderate range, with most ratings falling within the middle of the scale. This suggests a balanced approach to investments, where respondents are willing to accept some level of risk but prefer to maintain a cautious stance overall.

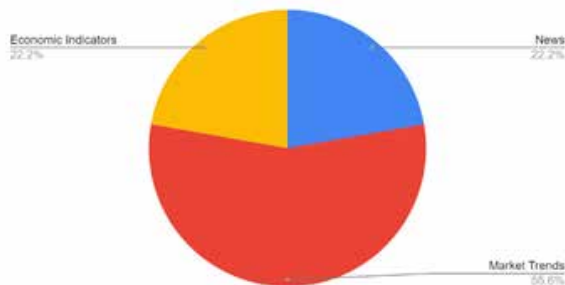
While market trends offer valuable insights into potential opportunities and risks, it's essential to complement this analysis with attention to economic indicators and news. Incorporating a diverse range of factors ensures a comprehensive understanding of market conditions, enhancing the ability to make informed and resilient investment decisions amidst dynamic financial landscapes.

Understanding and acknowledging the risk tolerance is pivotal in crafting an investment strategy aligned with your financial goals and comfort level. It allows us to navigate the investment landscape with prudence, ensuring that your portfolio reflects both your aspirations and your capacity to withstand market fluctuations.

Count of Have you ever experienced fear or anxiety related to your investments?



Count of What factors influence your investment decisions the most?

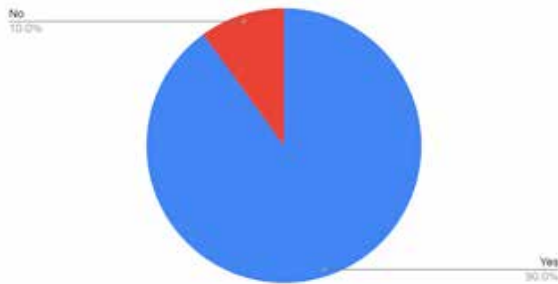


The data suggests a fluctuating level of fear or anxiety regarding investments, with a somewhat sporadic pattern of responses. It indicates a mix of experiences, perhaps influenced by various factors such as market volatility, personal financial goals, or risk tolerance.

The investment decisions appear heavily influenced by market trends, suggesting a preference for aligning strategies with prevailing market movements. This indicates a reliance on the collective behavior of investors and market dynamics to guide investment choices.

Overall, it underscores the dynamic nature of investment emotions, which can vary over time and circumstances, highlighting the importance of a balanced approach and informed decision-making in managing investment-related anxieties.

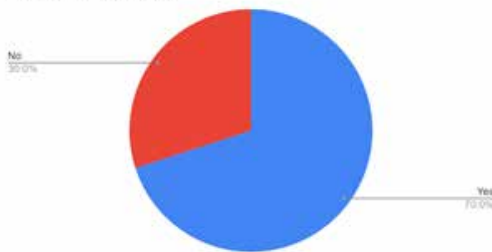
Count of Do you believe fear plays a significant role in investment decision-making?



This data could signify a recognition among investors of fear's influence, yet some may hold differing views on its significance or may be considering other factors. It could also reflect the complexity of investor psychology, where fear's impact varies.

Overall, the data implies that while fear commonly influences investment decisions, there might be nuanced perspectives or exceptions among investors.

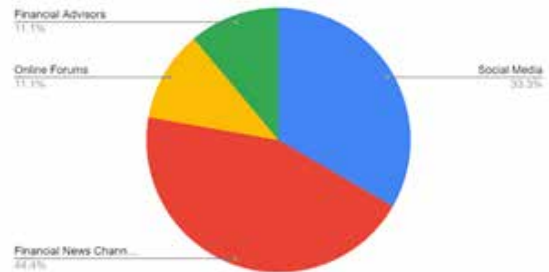
Count of Do you think fear can be advantageous in making investment decisions?



The responses suggest a nuanced view on the role of fear in investment decisions. While the majority acknowledge fear's advantage, it's likely seen as a motivator for prudent risk assessment. Fear prompts caution, preventing impulsive choices and potentially safeguarding investments.

However, there's recognition that excessive fear can hinder progress, leading to missed opportunities or overly conservative actions. This data underscores the importance of striking a balance between fear and rational analysis in investment strategies, where fear acts as a guide rather than a hindrance. Ultimately, it highlights the complexity of human emotions in navigating financial decisions for optimal outcomes.

Count of Where do you usually seek information related to investment decisions?



When making investment decisions, it's wise to seek information from diverse sources for a well-rounded perspective. This typically includes financial news channels for market trends and expert analysis, online forums for community insights, and financial advisors for personalized guidance.

While social media can offer supplementary viewpoints, caution is necessary due to the potential for biased or inaccurate information. By leveraging a combination of these sources, investors can make more informed decisions and navigate the complexities of the investment landscape effectively.

INFERENCE

This study set out to explore the idea of investing and the anxiety that frequently accompanies it. Over the course of the project, a number of ideas and pieces of information have been carefully scrutinized in order to provide insight into the issue of investor anxiety and possible solutions.

Numerous factors, such as lack of financial education, fear of losing money, and uncertainty about market changes, have been linked to fear of investing,

according to in-depth study and data analysis. These anxieties can seriously impede people's ability to make wise investing choices, which will impede their ability to grow and secure their finances.

But our research also found practical solutions to these anxieties, enabling investors to move with confidence in the financial market. Education has shown to be a very effective means of conquering fear; financial literacy initiatives and investing seminars, in particular, have been shown to significantly increase investor confidence. In addition, it was noted that recognizing risk tolerance, constructing a diversified portfolio, and consulting a professional are important ways to reduce anxiety and make wise investing decisions. This study offers helpful insights into the issue of investing anxiety and suggests doable methods to assist people overcome it. It does so by performing extensive data analysis and thoroughly examining these concepts. With the appropriate information and strategy, investment can become less intimidating and more profitable for everyone.

CONCLUSION

One of the most effective ways to overcome fear is through knowledge and understanding. Educate yourself about the fundamentals of investing, various investment instruments, market cycles, and risk management strategies. The more you know, the more confident you'll become in your investment decisions. Diversifying your investment portfolio across different asset classes, industries, and geographical regions can help reduce the overall risk. By spreading your investments, you minimize the impact of any single investment's performance on your portfolio. While it's essential to stay informed about market developments and economic trends, too much exposure to financial news and media can fuel fear and anxiety. Be selective about the sources you follow and maintain a balanced perspective.

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17. The Behavioral Investor by Daniel Crosby
18. The Intelligent Investor by Benjamin Graham

Comparative Analysis of Friction Stir Welding and Conventional Welding Techniques for Aluminum Alloys

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ABSTRACT

This review article compares Friction Stir Welding (FSW) with conventional welding techniques, focusing on their applications to aluminum alloys. FSW, a solid-state process, offers advantages such as lower residual stresses, minimal distortion, and superior mechanical properties compared to traditional methods like MIG and TIG welding. This analysis evaluates mechanical properties, operational efficiency, and suitability for various aluminum alloys and thicknesses. Recent technological advancements in both FSW and conventional welding are discussed, highlighting emerging trends and their potential impact on the welding industry.

KEYWORDS : *Friction stir welding, MIG welding, TIG welding, Aluminum alloys, Welding technology.*

INTRODUCTION

Welding technologies play a critical role in the manufacturing of aluminum-based components, which are extensively used in aerospace, automotive, and marine applications due to their light weight and high strength. The welding of aluminum is challenging due to its unique thermal and mechanical properties, which can lead to issues such as distortion and weakening of the material [1].

Friction Stir Welding (FSW), developed by The Welding Institute (TWI) in the early 1990s, represents a significant advancement over conventional welding techniques for aluminum. FSW is distinguished by its solid-state nature, which avoids many of the defects associated with fusion-based welding methods [2]. It offers advantages such as lower residual stresses, absence of melting-related defects, and superior mechanical properties in the weld zone [3].

Despite the advantages of FSW, conventional welding techniques like MIG and TIG are still widely used due to their versatility and effectiveness in a range of applications. These methods, however, often require

more careful control to mitigate defects and are generally less efficient when welding thicker or more complex aluminum assemblies [4].

This review compares Friction Stir Welding with traditional techniques, assessing their efficacy and limitations for different aluminum alloys. The focus is on understanding how advancements in FSW can meet the increasing demands for high-quality welds in industrial applications.

FRICITION STIR WELDING

Friction Stir Welding (FSW) is a revolutionary solid-state joining technique, particularly effective for aluminum and other high-strength materials that are challenging to weld using traditional methods. Developed by The Welding Institute (TWI) in 1991, FSW involves the use of a non-consumable rotating tool to generate frictional heat that softens the material. The tool, comprising a pin and shoulder, traverses along the joint line, stirring the material to form a high-integrity, low-defect weld [3-4].

The equipment for FSW is distinct from that used in conventional welding because it requires robust machinery capable of maintaining precise control

over the welding tool under high torque conditions. Advances in robotic technology have further enhanced the capabilities of FSW, allowing for greater precision and flexibility in complex welding paths [3-5].

FSW offers numerous advantages over traditional welding techniques, such as absence of melting, reduced shrinkage, lower residual stresses, and minimal distortion. These benefits make FSW particularly suitable for aerospace and automotive applications where material integrity and strength are paramount [6-7].

CONVENTIONAL WELDING TECHNIQUES

Conventional welding methods such as Metal Inert Gas (MIG) and Tungsten Inert Gas (TIG) welding are widely used for joining aluminum alloys. MIG welding employs a continuous wire electrode and an inert gas, typically argon, to shield the weld from atmospheric contamination. It is known for its high deposition rates and ease of automation [8]. TIG welding, on the other hand, uses a non-consumable tungsten electrode and an inert gas shield. It provides greater control over the weld area, making it suitable for thin materials and precision applications [4].

MIG welding is favored for its speed and efficiency, particularly in thicker aluminum sections. However, it can be prone to defects such as porosity and incomplete fusion if not properly controlled [9]. TIG welding, although slower, offers superior weld quality and aesthetic appearance due to its precise heat input control, making it ideal for high-quality applications [10]. Nevertheless, TIG welding can be less efficient and more labor-intensive compared to MIG welding.

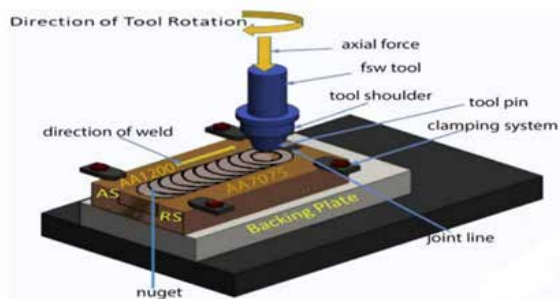


Fig. 1 Process diagram for the two dissimilar aluminium alloys friction stir welded joint [11]

When compared to Friction Stir Welding (FSW) [Fig. 1], both MIG and TIG welding have distinct disadvantages. FSW, being a solid-state process, eliminates common fusion-related defects such as porosity and cracking, which are prevalent in MIG and TIG welding [12]. In terms of energy consumption, FSW is generally more efficient as it requires no filler material and operates at lower temperatures, reducing energy usage [13]. Speed-wise, MIG welding can match or exceed FSW in some applications, but the superior mechanical properties and minimal post-weld processing of FSW often outweigh this advantage. Moreover, FSW provides a consistent weld quality with fewer distortions, making it preferable for critical applications in aerospace and automotive industries [9]. Table 1 highlights the comparative aspects of the three welding techniques, considering their applicability to aluminum alloys

Table 1 Welding Techniques Comparison [1-9]

| Aspect | Friction Stir Welding (FSW) | MIG Welding | TIG Welding |
|--------------------------------|--------------------------------|-------------------------------|-------------------|
| Heat Input | Low | High | Moderate |
| Distortion | Minimal | Moderate to High | Low |
| Defect Types | Low (No porosity, no cracking) | Moderate (Porosity, cracking) | Low (No porosity) |
| Energy Consumption | Efficient (Low temperature) | High | High |
| Speed | Moderate | High | Low |
| Weld Quality | High (Consistent) | Moderate | High (Aesthetic) |
| Suitability for Thick Sections | High | High | Low to Moderate |

COMPARATIVE ANALYSIS

Friction Stir Welding (FSW) and conventional welding techniques such as Metal Inert Gas (MIG) and Tungsten Inert Gas (TIG) welding have distinct advantages and limitations when applied to aluminum alloys. FSW is known for producing superior mechanical properties, including higher tensile strength and better corrosion resistance, due to the absence of fusion-related defects such as porosity and cracking [6, 8]. In contrast, MIG

and TIG welds often exhibit such defects, compromising the overall integrity of the weld.

Operational efficiency is another crucial factor where FSW holds an edge. FSW is energy-efficient, operating at lower temperatures without the need for filler materials, resulting in reduced energy consumption and lower operational costs (Nandan et al., 2008). MIG welding, while fast, consumes more energy and requires careful control to avoid defects, thereby increasing operational costs [12]. TIG welding, although providing high-quality welds, is slower and more labor-intensive, making it less efficient for large-scale applications.

The suitability of these methods varies with the type and thickness of aluminum alloys. FSW is highly effective for thicker sections and high-strength alloys, providing consistent weld quality and minimal distortion [10]. MIG welding is versatile and effective for medium to thick sections, while TIG welding is preferred for thin materials and precision applications due to its control over heat input.

Table 2. Comparative Analysis of FSW, MIG, and TIG Welding [1-10]

| Aspect | Friction Stir Welding (FSW) | MIG Welding | TIG Welding |
|-----------------------------------|--|---|--|
| Mechanical Properties | High tensile strength, high corrosion resistance | Moderate tensile strength, susceptible to porosity and cracking | High tensile strength, high quality |
| Operational Efficiency | Low energy consumption, cost-effective | High energy consumption, cost-intensive | High energy consumption, labor-intensive |
| Suitability for Alloys/ Thickness | Suitable for thick and high-strength alloys | Suitable for medium to thick sections | Suitable for thin materials and precision work |
| Industry Applications | Aerospace, automotive (e.g., Boeing, Ford) | General manufacturing, construction | Precision manufacturing, aerospace |

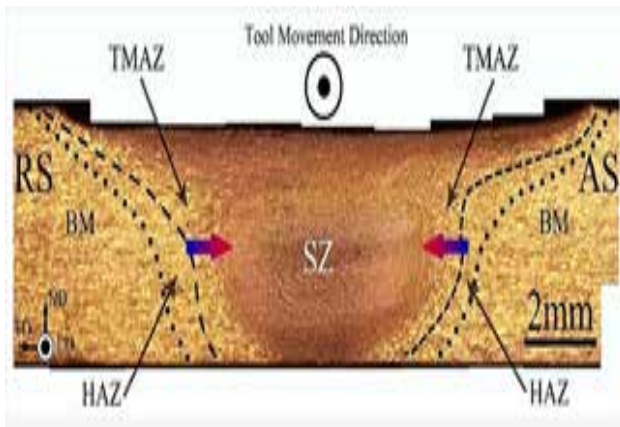


Fig. 2 A common cross-section of FS Weld joints that shows SZ, TMAZ, HAZ, and BM [8]

In industry, FSW is increasingly used in aerospace and automotive applications where high strength and reliability are paramount as shown in fig. 2. For example, Boeing and Ford have adopted FSW for manufacturing critical components, showcasing its benefits over conventional methods [8]. Table 2 provides a comparison of Friction Stir Welding (FSW), MIG Welding, and TIG Welding based on mechanical properties, operational efficiency, suitability for aluminum alloys, and industry applications.

RECENT DEVELOPMENTS AND INNOVATIONS

Friction Stir Welding (FSW) has seen significant technological advancements in recent years. Innovations include the development of self-reacting and bobbin tools that improve weld quality and reduce tool wear [4]. Additionally, adaptive control systems have been integrated into FSW equipment, enabling real-time adjustments to welding parameters, which enhance process stability and weld consistency [5]. Advances in robotic FSW have also expanded its application range, allowing for complex weld geometries and automation in manufacturing processes [9].

Conventional welding techniques for aluminum, such as MIG and TIG welding, have also benefited from recent innovations. Pulsed MIG welding has been refined to provide better control over heat input and reduce spatter, improving weld quality and efficiency [8]. For TIG welding, the use of advanced inverter technology has allowed for more precise control of the welding arc, which enhances weld quality, particularly for thin aluminum sections [7]. Additionally, hybrid welding techniques that combine laser and arc welding processes are being explored to capitalize on the strengths of

both methods, offering improved weld penetration and reduced thermal distortion [12].

Emerging trends in welding technology include the increasing use of additive manufacturing and the integration of Industry 4.0 principles. Additive manufacturing techniques, such as wire arc additive manufacturing (WAAM), are being used to create complex aluminum structures with high material efficiency [11]. The integration of sensors and data analytics into welding processes is enabling predictive maintenance and quality control, thereby reducing downtime and improving overall productivity. These trends are poised to revolutionize the welding landscape by enhancing the precision, efficiency, and adaptability of welding operations across various industries.

CONCLUSION

The major conclusions enumerated from the present research article are:

- Friction Stir Welding (FSW) offers higher tensile strength and better corrosion resistance due to its solid-state nature, which avoids common fusion-related defects such as porosity and cracking.
- FSW is more energy-efficient, operating at lower temperatures and without the need for filler materials, thus reducing operational costs.
- MIG and TIG welding remain widely used due to their versatility. MIG welding is favored for its speed and efficiency in thicker sections, while TIG welding excels in producing high-quality, aesthetic welds for thin materials.
- Conventional welding methods like MIG and TIG face challenges related to defect management and higher energy consumption, which can increase operational costs and affect weld quality.
- FSW is highly effective for thick sections and high-strength aluminum alloys, providing consistent weld quality with minimal distortion. MIG welding is suitable for medium to thick sections, whereas TIG welding is preferred for thin materials and precision applications.
- FSW is increasingly adopted in aerospace and automotive industries for critical components,

demonstrating its advantages over conventional methods in terms of strength and reliability.

- Innovations such as Industry 4.0 integration and advancements in additive manufacturing are set to further enhance the capabilities and applications of welding technologies, making them more precise, efficient, and adaptable to various industrial needs.

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A Comparative Study of NPAS in Banks

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ABSTRACT

There has been a high and direct association between the growth of banking sector and economy. But a major hurdle in Indian economy becoming strong and stable is NPAs. NPAs negatively affect the growth of banking sector and consequently, the Indian economy too. Effect of NPAs on banks' profitability has been examined in this study. A continuous increase in the loans of selected banks has been observed. As advances increase, so do the NPAs through 2017-18. The amount of NPA were high in case of PSB's as compared to new private sector banks. Finally, it was concluded that NPAs are one of the barriers to the performance of the banks and, consequently, adversely affect the economic growth.

KEYWORDS : *NPA, Public sector banks, Private sector banks, Scheduled commercial banks (SCB's).*

INTRODUCTION

Growth of any country's economy depends heavily on how the banks of that country performs. But, a big obstacle for the Indian economy to become a strong and stable economy is NPAs. NPAs adversely affect the banking sector and consequently, affect the economic growth. The concept of NPA's was given by the Narsimham Committee in 1991 after the financial sector reforms. All the scheduled commercial banks are affected by the high NPAs. As such, NPAs have negative impact on the growth, liquidity, performance, and profitability of any type of commercial bank. NPAs do not only affect the Indian financial sector and the economy but also its effects are seen in the entire economy of the world.

REVIEW OF LITERATURE

Singh (2013) discovered that certain monetary

adjustments positively impact banks and the economy. During the study period, NPAs decreased in proposed commercial banks due to these changes. However, Reddy et al. (2017) noted a rise in gross NPAs across commercial banks, with declining normal assets but an increased ROA. NPAs positively correlated with ROE and ROA, while the correlation between ROE, ROA, and net NPAs was negative. Chakraborty (2017) found NPAs adversely affected bank profitability, with some banks facing losses due to high NPAs. Gupta et al. (2017) observed increasing NPAs in Punjab National Bank, attributing mismanagement and client selection to the issue. The new Pvt.SB's were found more adept at managing NPAs, while suggestions to curb NPAs included enhancing information systems and staff training (Chaudhary & Sharma, 2011), refining loan recovery policies, and emphasizing quality loans (Banerjee et al., 2018; Javheri & Gawali, 2022). To assess the performance of Scheduled Commercial

Banks' advances and NPAs, and to investigate the connection between banks' profitability and net non-performing assets

RESEARCH METHODOLOGY

Secondary data for the period of 2008-09 to 2021-22 has been used in this paper. The data was extracted from

the 'Statistical Tables Relating to Banks in India' by RBI for the year 2022-23. Simple statistical techniques like percentage, correlation and regression were used to analyse the data. Correlation and regression were applied to find cause and effects relations between the variables. 't-test' was used to test the coefficients of regression and correlation.

ANALYSIS AND INTERPRETATION OF DATA

Table 1: Gross and Net NPAs of SCB's

| Amount in (INR) Crores | | | | | | |
|------------------------|------------|---------------------|-------------------|----------|-------------------|-------------------|
| Year | Gross NPAs | | | Net NPAs | | |
| | Amount | % of Gross Advances | % of Total Assets | Amount | % of Net Advances | % of Total Assets |
| 2008-09 | 68328 | 2.2 | 1.3 | 31564 | 1.1 | 0.6 |
| 2009-10 | 84698 | 2.4 | 1.4 | 38723 | 1.1 | 0.6 |
| 2010-11 | 97973 | 2.2 | 1.4 | 41799 | 1.0 | 0.6 |
| 2011-12 | 142903 | 2.8 | 1.7 | 65205 | 1.3 | 0.8 |
| 2012-13 | 194053 | 3.2 | 2.0 | 98693 | 1.7 | 1.0 |
| 2013-14 | 263362 | 3.8 | 2.4 | 142421 | 2.1 | 1.3 |
| 2014-15 | 323335 | 4.3 | 2.7 | 175841 | 2.4 | 1.5 |
| 2015-16 | 611947 | 7.5 | 4.7 | 349814 | 4.4 | 2.7 |
| 2016-17 | 791791 | 9.3 | 5.6 | 433121 | 5.3 | 3.1 |
| 2017-18 | 1039679 | 11.2 | 6.8 | 520838 | 6.0 | 3.4 |
| 2018-19 | 936474 | 9.1 | 5.6 | 355068 | 3.7 | 2.1 |
| 2019-20 | 899803 | 8.2 | 5.0 | 289531 | 2.8 | 1.6 |
| 2020-21 | 8,35,138 | 7.3 | 4.3 | 2,58,050 | 2.4 | 1.3 |
| 2021-22 | 7,43,653 | 5.8 | 3.4 | 2,04,226 | 1.7 | 0.9 |

Table 1 shows Gross and Net NPAs of SCBs. There is a significant increase in GNPA's over the period, from ₹68,328 crore in 2008-09 to ₹7,43,653 crore in 2021-22. This represents an over ten times increase. Sharp increase has been observed in 2015-16 when they nearly doubled from ₹3,23,335 crore to ₹6,11,947 crore. The economy experienced a slowdown in the late 2000s and early 2010s, which may have led to an increase in bad loans as businesses and individuals struggled to repay their debts. There has been a decline in GNPA's

as a percentage of Gross Advances and Total Assets in recent years. In 2021-22, GNPA's were 5.8% of Gross Advances and 3.4% of Total Assets, down from a peak of 11.2% and 6.8% in 2017-18, respectively.

As far as Net NPAs of all SCBs is concerned, there is a significant increase in Net NPAs over the period, from ₹31,564 crore in 2008-09 to ₹2,04,226 crore in 2021-22. This represents an over sixfold increase. The period from 2015-16 to 2017-18 witnessed a significant increase in Net NPAs, when NPA's rose by 3 fold

indicating a challenging period for asset quality. The subsequent decline in Net NPAs from 2018-19 onwards suggests improvements in asset quality, albeit with fluctuations.

Table 2: Gross and Net NPAs of PSBs

| Year | Amount in (INR) Crores | | | | | |
|---------|------------------------|---------------------|-------------------|----------|-------------------|-------------------|
| | Gross NPAs | | | Net NPAs | | |
| | Amount | % of Gross Advances | % of Total Assets | Amount | % of Net Advances | % of Total Assets |
| 2008-09 | 44957 | 2.0 | 1.2 | 21155 | 0.9 | 0.6 |
| 2009-10 | 59926 | 2.2 | 1.3 | 29375 | 1.1 | 0.7 |
| 2010-11 | 74664 | 2.2 | 1.4 | 36055 | 1.1 | 0.7 |
| 2011-12 | 117839 | 3.0 | 2.0 | 59391 | 1.5 | 1.0 |
| 2012-13 | 165006 | 3.6 | 2.4 | 90037 | 2.0 | 1.3 |
| 2013-14 | 227264 | 4.4 | 2.9 | 130394 | 2.6 | 1.6 |
| 2014-15 | 278468 | 5.0 | 3.2 | 159951 | 2.9 | 1.8 |
| 2015-16 | 539956 | 9.3 | 5.9 | 320376 | 5.7 | 3.5 |
| 2016-17 | 684732 | 11.7 | 7.0 | 383089 | 6.9 | 3.9 |
| 2017-18 | 895601 | 14.6 | 8.9 | 454473 | 8.0 | 4.5 |
| 2018-19 | 739541 | 11.6 | 7.3 | 285122 | 4.8 | 2.8 |
| 2019-20 | 678317 | 10.3 | 6.3 | 230918 | 3.7 | 2.1 |
| 2020-21 | 616616 | 9.1 | 5.3 | 196451 | 3.1 | 1.7 |
| 2021-22 | 542174 | 7.3 | 4.3 | 154745 | 2.2 | 1.2 |

Gross NPA of PSB's is also showing same trends (Table 2). Gross NPAs is showing a consistent surge over the years, with occasional fluctuations. Gross NPA as a percentage of gross advances increased from 2.0 % in 2008-09 to 14.6 % in the year 2017-18. Amount of NPAs was more in PSBs.

Net NPAs (Table 2) shows the variation similar to that in case of the gross NPA of PSB's. The percentage of Net NPAs to both Net Advances and Total Assets reached its peak in 2017-18, suggesting a particularly challenging year for managing NPAs. There's a noticeable decrease in both percentages from 2018-19 to 2021-22, indicating some improvement in managing NPAs later on.

Table 3: Gross and Net NPAs of Private Sector Banks (Pvt. SB's)

| Year | Gross NPAs | | | Net NPAs | | |
|---------|------------|---------------------|-------------------|----------|-------------------|-------------------|
| | Amount | % of Gross Advances | % of Total Assets | Amount | % of Net Advances | % of Total Assets |
| 2008-09 | 13854 | 3.0 | 1.7 | 6252 | 1.4 | 0.8 |
| 2009-10 | 14017 | 2.9 | 1.6 | 5234 | 1.1 | 0.6 |
| 2010-11 | 14500 | 2.3 | 1.3 | 3400 | 0.6 | 0.3 |
| 2011-12 | 14500 | 1.9 | 1.1 | 3000 | 0.4 | 0.2 |

| | | | | | | |
|---------|----------|-----|-----|-------|-----|-----|
| 2012-13 | 15800 | 1.8 | 1.0 | 3900 | 0.4 | 0.3 |
| 2013-14 | 24542 | 1.8 | 1.1 | 8862 | 0.7 | 0.4 |
| 2014-15 | 34106 | 2.1 | 1.3 | 14128 | 0.9 | 0.5 |
| 2015-16 | 56186 | 2.8 | 1.8 | 26677 | 1.4 | 0.8 |
| 2016-17 | 93209 | 4.1 | 2.6 | 47780 | 2.2 | 1.3 |
| 2017-18 | 129335 | 4.7 | 3.0 | 64380 | 2.4 | 1.5 |
| 2018-19 | 183604 | 5.3 | 3.5 | 67309 | 2.0 | 1.3 |
| 2019-20 | 209568 | 5.5 | 3.6 | 55746 | 1.5 | 1.0 |
| 2020-21 | 1,97,508 | 4.8 | 2.5 | 55377 | 1.4 | 0.9 |
| 2021-22 | 1,80,782 | 3.8 | 3.1 | 43733 | 1.0 | 0.6 |

Pvt.SB's showed little different trend (Table 3) as shown by the PSB's. Initially it declined from 3.0 % in 2008-09 to 1.8 % in 2013-14. Further, it showed upward trend and touched the maximum of 5.5 % of gross advances in 2019-20. Net NPA was higher in PSB's. The percentage of NPA to total assets remained around 1.0-1.3%

from 2012-13 to 2015-16 but increased significantly thereafter, reaching 3.6% in 2019-20.

Net NPAs of Pvt.SB's declined from 1.4 % in 2008-09 to 0.7 percent in 2013-14 then started increasing till 2017-18 and reached its maximum of 2.4 % of total advances. Further, it started declining and in 2021-22 it was 1.0 % total advances.

Table 4: Correlation and Regression between Net Profitability of Banks and Gross NPAs.

| | Correlation | Signi | Regression Constant | Regression Coefficient | p-value |
|----------------------|-------------|-------|---------------------|------------------------|---------|
| Public Sector Banks | -0.93 | 0.000 | 146917.9 | -0.759 | 0.000 |
| Private Sector Banks | -0.92 | 0.000 | 21916.28 | -0.736 | 0.000 |
| SCB's | -0.94 | 0.000 | 157068.8 | -0.634 | 0.000 |

Source: Author's Compilation

Table 4 depicts the correlation between net profitability of banks and gross non-performing assets. Performance of a department can be judged through profitability of that department and NPAs are the hurdle in the development of the sector. Therefore, correlation between GNPA's and net profitability shows how NPA are hurdle in the growth of the banking sector. Above table shows a negative correlation between net profit and gross NPA. The 't-test' was applied to test the significance level. Values were found significant at 0.1 % level of significance. A negative, high and significant correlation was found between gross NPAs and Net profits.

Table 4 also depicts the regression analysis between GNPA's and Net profit. Net profit is dependent variable whereas GNPA's is independent variable. Three different regression equations have been used in the study. In all the equations, the sign of beta coefficient was found to be negative which indicating that with an increase in the GNPA, profits of the banks decline. The values of beta coefficient have been tested with the help of t-test. All the values are significant at 0.1 percent level of significance. It was concluded that the increase in credit default affects negatively the profits of the banks.

DISCUSSION

After the Narsimham Committee's recommendations, banks began reporting losses, primarily due to standardized provisioning of assets, depleting their capital. This led to categorizing banks as strong and weak, with the government recapitalizing the latter for survival. RBI and government mandates forced banks to recover NPAs and bolster balance sheets through stringent measures. Analysts note industrialists and corporations contribute more to NPAs than agriculture and priority sectors. Government policies, such as waiving agriculture loans during disasters, contribute to rising NPAs in PSB's, despite minimal defaults by marginal farmers and small entrepreneurs.

Macroeconomic factors such as declining exports amid global recession and commodity price downturns contribute to the NPAs surge. Most NPAs stem from loans issued during the mid-2000s economic boom, but the 2008 global financial crisis weakened borrower repayment capacities. Consequently, India faced the Twin Balance Sheet problem, stressing both banking sectors and corporates. Political factors like crony capitalism and high-scale frauds also exacerbate NPAs, although fraud volumes are relatively small compared to total NPAs, their escalation remains concerning.

CONCLUSION

Non-Performing Assets adversely affect the profitability of banking sector and hence the economic growth too. The present study shows the relation between Non-Performing Assets and profits of selected banks under study. The study concludes that there was continues increase in the advances of public and private banks. Further, with the increase in advances NPA also increase till 2017-18. Amount of NPA was quite more in PSB's than in PSB's in India. There was a negative, high and significant correlation between gross NPAs and Net profits and regression analysis that the increase in credit default affects negatively the profits of the banks.

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Performance Assessment of A Parabolic Solar Cooker with Dish Concentrator

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ABSTRACT

More and more people are opting for parabolic solar cookers as a greener alternative to traditional cooking methods that use solar energy. Using optical principles, these cookers focus sunlight into a concentrated beam, creating tremendous heat that can be utilized for a range of culinary operations. Variations in design, materials, and location all have an impact on its performance. Using a dish concentrator system, a point focus collector, and manual sun tracking, this experiment suggests that a parabolic solar cooker might work. Part of the experimental technique included measuring things like sunlight penetration, room temperature, cooker temperature, relative humidity, wind speed and direction, and wind speed and direction. From 7 in the morning until 7 in the evening, the parameters were measured every 30 minutes. Based on the findings, the pot could attain a maximum temperature of 94.7 °C when no weight was present, and 97.08 °C when one was. On site, the solar cooker was 36% efficient.

KEYWORDS : *Cooking, Temperature, Dish, Radiation, Solar.*

INTRODUCTION

The energy required to cook food is a major contributor to national energy consumption rates, despite the fact that cooking is an essential human skill. About 37–53% of total energy use in developed nations like the US is attributable to cooking. Only around a quarter of the world's renewable energy potential is really being used at the moment. However, as a result of climate change and attempts to reduce emissions of greenhouse gases, renewable energy sources will certainly see a surge in use in the next years. Solar energy has become more popular as a viable alternative to fossil fuels in recent years, particularly in developing nations. In the sunniest region of the planet, the predicted solar radiation flow is close to 1 kW/m². Daily, the whole Earth receives around 7 kilowatt-hours per square meter of solar energy. Around 180 billion megawatts (MW) is the total amount of solar energy that Earth receives. At the present time, this uses 10,000 times more energy than all other commercial energy sources combined.

This provides further evidence that solar energy might meet a variety of domestic energy demands, including those associated with cooking. Solar collectors are devices that focus and collect radiation from the sun in order to convert it into thermal or electrical energy. Concentrated solar collectors include parabolic troughs and dishes, whereas non-concentrated collectors include flat plates and evacuated tubes. You can turn some of these collectors into solar cookers if you want to. Sun cookers are appliances that heat meals by absorbing the sun's rays. Although solar cookers have undergone several upgrades over the years, they are not novel. There is opportunity for development in the areas of efficiency, affordability, mobility, and adaptability to different environmental circumstances.

There are primarily three kind of solar cookers: concentrated solar cookers, indirect solar cookers, and solar box cookers. A solar cooker was constructed using a parabolic dish collector. The study shows that solar ovens are more efficient than solar cookers. However,

compared to other solutions, solar ovens are larger, cost more, and need more time for monitoring. Thus, simple box cookers might potentially overcome their shortcomings by implementing certain adaptations. An increase of 33% in solar energy absorption was seen when the horizontal surface of absorption was tilted. To improve the solar energy absorption, two movable mirror boosters were used. The result was a higher total solar efficiency of 24.6%—roughly the same as a solar oven—thanks to this. A little increase of 10% was the only discernible effect on the price of this improved solar cooker. Sun cookers, especially box type solar cookers, have had their restrictions resolved via improvements. To simplify and reduce the overall cost of solar cookers, scientists in the 1980s mainly focused on optimizing their shape. The amount of energy obtained at all angles of incidence was significantly increased by directing sunlight into a solar box using a single adjustable booster mirror. The quantity of energy absorbed was also shown to rise as the latitude position grew. By letting solar radiation pass through unimpeded, transparent insulating materials efficiently retain heat inside the solar box.

REVIEW OF LITERATURE

Nasrin Akter, Farhana et al., (2017) Solar power, an alternative renewable energy source, has the potential to alleviate fuel poverty and pollution in poor countries. Therefore, this project aims to design and build a cheap solar cooker for home use, test it, and see how efficient it is. Cardboard, tin, aluminum foil (both polished and unpolished), and glass are some of the materials that went into making the cooker. A basic structure was constructed using tin-encased reflectors. In the design, a 1000 cc water load might be supported by a platform-hung cooker. The setup was most effective in locations with the longest periods of clear sky, where the collector cookers got the most quantity of sunlight, even when the sky was partially overcast. Through the use of refined building procedures, comprehensive testing, and data analysis, a lightweight solar cooker was created that achieves superior cooking temperatures at a low cost. One possible explanation for the discrepancy between the analytical and experimental outcomes of the investigation is that the weather was too unpredictable.

T. HariPrasad, Dr. (2015) Renewable and never-

ending, solar power is the way to go. Analyzing the performance of various reflector types in relation to a parabolic solar cooker is the primary objective of this essay. Given the current state of the world's energy supply, it would be much appreciated if we could use cheap, easily accessible renewable energy sources. The many shapes of solar cookers include panel, parabolic, box, and funnel designs.

Weldekidan, Haftom et al., (2014) The fuel-wood scarcity is a growing problem that has gotten less attention despite its urgency. As a whole, solar cookers aren't very practical or efficient, which has slowed their widespread use. In order to make cooking inside easier, the Parabolic Trough Cooker (PTC) was created. We moved the collection components outside and the cooking parts inside. Using soy bean oil, the energy was transmitted from the absorber to the cooking burner. The ideal size for the absorber, according to ray tracing and standard stagnation tests, is a 30 mm diameter copper pipe. The highest temperature recorded was 191 degrees Celsius for the mid absorber pipe and 119 degrees Celsius for the cooking burner. The system's efficiency was determined to be 6%.

EXPERIMENTAL SETUP

At the Solar Yard, the trials were carried out. Along with a parabolic dish and cooking pot, the system also includes a pot holder and a dish holder. Optimal solar energy absorption is achieved by positioning the parabolic dish collector toward south.

In the month of October 2020, the examinations were conducted from 7:00 AM to 7:00 PM. A time period of 30 minutes was used for recording the observations. Sunlight, air temperature, wind speed, and other climatic variables affect how well a solar cooker works. The effectiveness of a solar cooker may be measured by it is common practice to track its cooking time, boiling water time, and maximum temperature achieved when loaded and unloaded. The no-load test was place over the course of four days using the empty pot. The dish temperature is denoted by TD, whereas the ambient temperature is represented by TA. At 1, 2, 3, and 4 separate locations, the dish's temperature was recorded. A1, TD2, TD3, and TD4 are the respective temperature values.

RESULTS AND DISCUSSION

During the no-load test, the daily temperature change is graphically represented in figure 1. During the no-load test, the average temperatures of the pot, the dish, and the solar radiation varied over time, as shown in Figure 2. It was seen during the no load test that the pot temperature increased in direct correlation with the intensity of the sun radiation. Additionally, during the course of four days, a maximum of 990W/m² of solar energy was recorded. Figure 3 shows that the cooker maintained a maximum pot temperature of 94.7 degrees Celsius even when the surrounding temperature was lower.

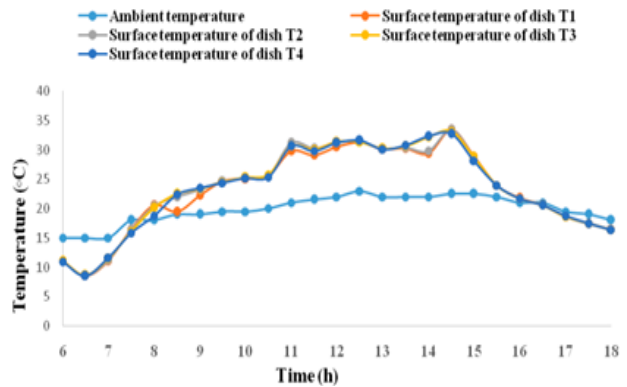


Figure 3 Variations over time in the mean air temperature and the mean collector surface temperature

To do the load test, we filled the pot with water and set it to run. The testing circumstances indicated that the highest solar radiation observed was 100.1 °C at 960 W/m². The highest temperatures achieved by water at radiation intensities of 242W/m² were 31.5oC and 56.5oC, respectively. The findings of the water-based load test experiment are shown in Figure 4. Because the ambient temperature is lower during a load test, the water cools down a little faster than it would during a no-load test, but still slower than the pot would cool down on its own. It is possible that the cooker did not cool down as rapidly as it might have due to the insulated cooking pots in a box-type solar cooker. The solar cooker achieved an efficiency of 36% on sunny days and 36% on cloudy days during the trials.

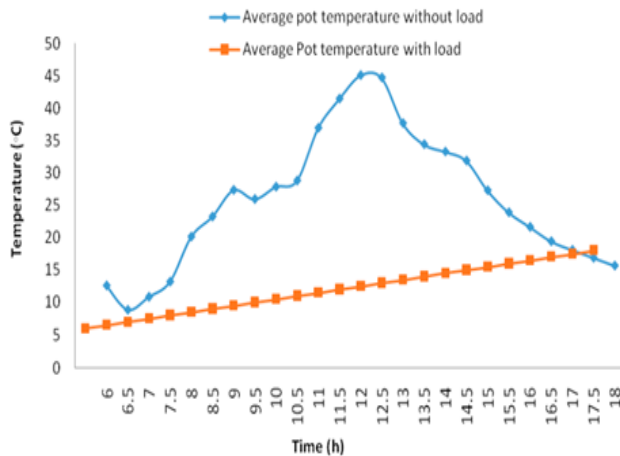


Figure 1 Variations over time in the mean water temperature

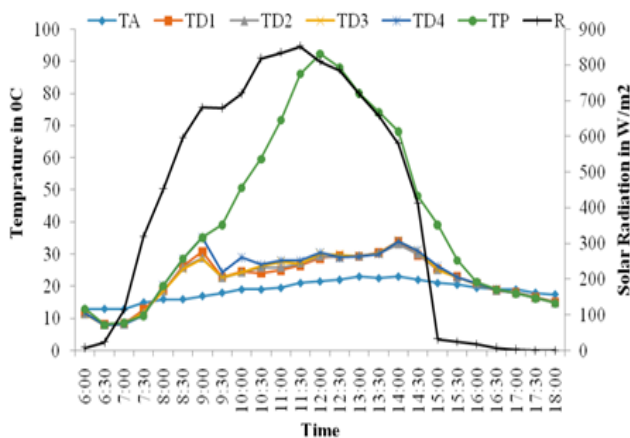


Figure 2 Over the course of a no-load test, variations in sun radiation, average dish surface temperature, and pot temperature

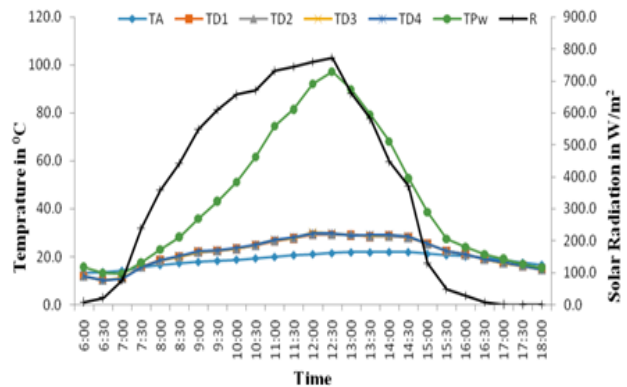


Figure 4 Variations over time in solar radiation, average dish surface temperature, and pot temperature during full load testing

Between 8:30 and 13:30, the cooking temperature was at its peak. No matter how cloudy the day, the

water in the pot always got near to boiling throughout the load tests. At 12:30 and 13:30 hours, the greatest ambient temperature measured was 23°C, while the highest collector surface temperature recorded was 30°C. At 14:00 hours, the collector's average ambient temperature reached 22.9°C, whereas at 13:00 hours, its average surface temperature reached 30.3°C. At 12:30 and 12:00 hours, the pot reached its maximum recorded temperature of 92°C and 91°C, respectively, when unloaded. At 12:00 and 12:30 hours, the pot reached its maximum average temperatures of 98°C and 97°C, without a load, respectively. A high of 84% was recorded in the morning, at around 7:00 in the AM. Approximately seven in the morning, the relative humidity was at ninety-seven. Wind speed and relative humidity were recorded during the experiment. Their variations suggest that the experimental times in the morning and early evening are characterized by a chilly and damp atmosphere. Since it now takes more time and energy to start cooking due to the lower temperature, efficiency has taken a hit. This means that a variety of foods may be prepared.

CONCLUSION

In the end, experimental research looked at how well a parabolic solar cooker retained heat. The thermal efficiency is only one part of these cookers' performance; other important aspects include how easy they are to use, how long they last, and how much they cost. Improving the performance and accessibility of these solutions by optimizing design variations and material choices may make them appropriate for a broad variety of communities worldwide.

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Showing Comparison between Financial Technology and Regulatory Technology

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ABSTRACT

India's fintech business is a dynamic sector that is rapidly altering the country's financial landscape. The amount of digital transactions in India has been increasing rapidly in recent years, and the country now ranks third in the worldwide fintech sector. The newest member of the Fintech community, RegTech promises to bring even more revolutionary changes to the financial services industry. Money and technology have always interacted, so this is nothing new. The abacus attests to the continuity of their bond. The global financial crisis (GFC) of 2008, however, marked a turning point that diverged from earlier stages of FinTech and RegTech development to produce the current paradigm. In view of the new difficulties that have arisen, it is clear that the advancement of FinTech calls for the concomitant growth of RegTech. This article shows a difference between FinTech and RegTech.

KEYWORDS : *Development, Compliance, Innovation, Security, Technology.*

INTRODUCTION

Several noteworthy developments have occurred in the banking industry since the advent of fintech. This trend has further prompted the development of regulatory technology, or "RegTech," and the implementation of intricate new regulations.

A challenge that companies may face is keeping up with the ever-changing regulatory landscape. If the company can't pull this off, they could be in for some serious trouble. Businesses in the financial technology (FinTech) industry have found it especially challenging to adapt to the changes imposed by regulation. As a result, RegTech-based solutions have emerged to address this issue.

Yet, FinTech has also taken some heat, even if it has helped many individuals and organizations (including regular citizens, government agencies, and businesses of all stripes). The advent of FinTech has ushered in a digital transformation in the financial services industry,

and with it, new threats to data security. The only reasonable course of action here was to use RegTech.

The only way for the financial technology industry to persevere in its expansion and transformation is for its executives to acknowledge the dangers it confronts and to devise strategies to counteract those dangers. In conclusion, we reap the benefits of the vast array of services offered by FinTech, but only if there is also a presence of RegTech to ensure that order is maintained.

Numerous regulatory organizations have shown a desire to encourage the development of FinTech and RegTech innovations, which have the potential to assist supervisory agencies and financial institutions in addressing currently occurring problems. There is a growing number of countries that are home to initiatives that have the same objective of fostering collaboration between the regulatory body and the financial industry as a whole, which includes FinTech enterprises of all different kinds. The regulatory "sandbox" is the initiative that is most often referenced. It is a controlled

environment that is created by the financial authority and allows institutions that are either regulated or unregulated, start-up or incumbent, to test ideas for a certain amount of time and in accordance with the restrictions that have been established. There are several types, and the organization of sandboxes might vary from country to country within the same region.

If financial authorities actively collaborate with FinTech, RegTech, and businesses (for example, outdated reporting portals), they may be able to identify obstacles to innovation more quickly. These obstacles may include regulatory barriers or challenges provided by current practises (for example, a lack of unified data standards and definitions) and information technology systems. A potential area of concern is the laws governing data management and sharing. This legislation has the potential to make it unlawful to make use of technologies such as cloud computing, shared utilities, and other technologies since these technologies are so dependent on the extensive use of digital data. Non-neutral policies in information technology might possibly cause problems. The process of recognizing these challenges and consulting on possible solutions is useful, and it is good to collaborate and actively participate in the process.

The terms "Financial Technology" (FinTech) and "Regulatory Technology" (RegTech) indicate two essential aspects of the contemporary financial environment. Both of these technologies are responsible for driving major development in their respective fields. The creative use of technology to the provision of financial services, with the goals of simplifying procedures, improving the quality of the customer experience, and increasing access to financial products is referred to as "FinTech." Blockchain technology and cryptocurrency are only two examples of the many applications that fall under its umbrella. Mobile banking and peer-to-peer lending are also included. One of the key objectives of the financial technology industry is to revolutionize conventional financial systems by making them more user-friendly, transparent, and efficient.

The use of technology to fulfill regulatory requirements and guarantee compliance in the financial industry is the primary emphasis of RegTech, which contrasts with

the previous statement. For the purpose of monitoring transactions, managing risks, and preventing fraud, it makes use of cutting-edge technology like as artificial intelligence, machine learning, and big data analytics. RegTech solutions are intended to assist financial institutions in more effectively and efficiently navigating the complicated regulatory environment that is constantly evolving because of technological advancements. While the objective of FinTech is to enhance and broaden the scope of financial services, the objective of RegTech is to ensure that these innovations are protected within a framework that is both secure and compliant.

FinTech and RegTech are two complimentary forces that work together quite well. FinTech is responsible for driving innovation and development in the financial services industry, whereas RegTech is responsible for ensuring that this innovation takes place within the boundaries of regulatory compliance, therefore nurturing a financial ecosystem that is both safe and dependable.

REGTECH HELP FINTECH TO ACHIEVE COMPLIANCE

Instead of focusing on regulatory burdens, RegTech frees up time for FinTech companies to build solutions that have a beneficial effect on financial markets. RegTech is the study and application of rules and processes for ensuring that a product or service complies with relevant regulations.

In general, the following are some of the ways in which FinTech companies may benefit from RegTech solutions for more effective compliance management:

Improved Compliance

It can be difficult for financial institutions to stay abreast of the ever-evolving rules in the fintech business due to the industry's rapid pace of change. Here is where regulatory technology (RegTech) enters the picture, with a variety of RegTech solutions assisting with automating the aforementioned complicated compliance procedures. This significantly lessens the possibility of noncompliance, allowing Fintech businesses to concentrate on what they do best.

Cost Reduction

The automation of a wide range of compliance processes is at the heart of RegTech solutions. It has the potential to greatly cut down on the associated expenditures, many of which are now performed manually. As a result, fintech firms may concentrate on cutting costs elsewhere to boost their bottom line.

Enhanced Security

RegTech solutions are also crucial in enhancing the security of the systems of the Fintech companies. These businesses may better safeguard their customers' private information by proactively identifying and mitigating security threats.

Better Customer Experience

Solutions in the field of regulatory technology (RegTech) can improve interactions with customers. It can aid Fintech businesses in reducing the number of mistakes made by hand and therefore increasing efficiency. This allows them to better serve their clients in a shorter amount of time and with fewer resources, thus increasing their loyalty.

Innovation

Fintech enterprises may benefit from RegTech solutions in another way: they can open up new avenues for research and development of innovative goods and services. Such cutting-edge items are accepted more rapidly since they meet current regulatory standards.

DIFFERENCE BETWEEN REGTECH AND FINTECH

Regtech and financial technology are often considered to be intertwined. In some sectors, regulatory technology, or regtech, is seen as a branch of financial technology, or fintech. The two phenomena may have emerged (and continue to emerge) at the same time, but they are fundamentally different.

Simply put, fintech is the use of technology to deliver financial services. Conversely, regulatory technology (Regtech) focuses on the mandatory compliance and regulatory processes for financial solutions. As fintech facilitates transactions between end users and various financial institutions, regtech allows monitoring of transaction and onboarding operations to avoid financial crimes.

Screening and monitoring several businesses and clients at different phases of the transaction process, as well as monitoring client actions, examining data, and assessing risk, are all made easier with the help of regtech. If used correctly, it may increase accuracy in risk assessments and decrease complexity, all while lowering costs and making the process easier to comply with regulations.

By simplifying the complexities of financial regulation, RegTech provides a valuable service to the FinTech industry. RegTech was at first thought of as a subset of FinTech, but it has now been recognised as a distinct phenomena with infinite potential uses in regulatory contexts, from tracking supply chain management procedures to checking enterprises' compliance with environmental standards.

RegTech should not be regarded as a subset of FinTech that is still developing but rather as an independent phenomena in its own right. Although FinTech is primarily concerned with financial matters, RegTech may be used in a wide variety of regulatory settings. Two examples of how technology might be used to better both regulation and the regulated business are the monitoring of corporate compliance with environmental standards and the real-time tracking of the whereabouts of airliners.

Even more, diverse pressures have spurred the growth of FinTech and RegTech. Startups have been instrumental in the expansion of the fintech business, capitalising on the general public's mistrust of the financial services sector, the increasing commoditization of technology, and the increasing numbers of jobless workers looking for work. In contrast, the astronomical rise in compliance costs has prompted institutions to demand new technologies like RegTech from the top down.

There have been three main periods of development in the RegTech industry. The first two steps are technological implementations of regulatory monitoring and reporting, which have proven to be effective in bringing down associated costs. It is anticipated, however, that in the future RegTech would utilise data in novel ways to undertake market monitoring and business compliance. To rephrase, RegTech 1.0-2.0 pertains to the digitalization of regulatory procedures, whereas RegTech 3.0 addresses a regulatory framework for the digital era.

RegTech and FinTech are now evolving in tandem with one another. There are several threats to the FinTech business and the digital change it has ushered in. There is a strong desire among FinTech companies in adopting RegTech solutions and putting in place the appropriate tools to mitigate risks and keep up with compliance regulations.

It's also important to remember that several forces are responsible for these occurrences. Startups' motivation to build novel delivery mechanisms for market-altering financial goods drove the evolution of FinTech. RegTech, on the other hand, was born out of the necessity of automating compliance operations in businesses in order to combat the escalating price tag of staying in compliance.

It's important to note that while both FinTech and RegTech use technology to enhance financial services, they do so for distinct reasons. RegTech is designed to assist businesses in meeting regulatory requirements and mitigating associated risks, while FinTech is focused on bettering consumer access to financial services. Nonetheless, all initiatives share a same goal: to use technology to make the financial sector more efficient.

Table 1: Financial Technology vs. Regulatory Technology

| Financial Technology | Regulatory Technology |
|--|---|
| Begins with financial services and products and incorporates technological and data into it. | Starts with technology and adds data and financial services into the value chain. |
| Customer relationship is for financial purposes and aims to use technology to improve it. | Begins with relationship with customers in a nonfinancial environment. |
| Data driven and technologically equipped to specialize in finance (finance is the focus) | Specialized in technology, but expand to finance (data accumulation and analytics are the key). |
| Disruptive in nature. | More incremental than disruptive in nature. |
| Regulations are comparatively lesser and developing. | Regulatory systems are similar to Fintech, but developing only. |
| Highly innovative, enabling easier access at cheaper cost | Data dependency adds innovative features and allows greater access. |

CONCLUSION

The advent of FinTech firms, in conjunction with the increased usage of regulatory sandboxes, presents a once-in-a-generation chance to test out a fresh sort of regulatory architecture that is equitable, efficient, and data-driven before rolling it out to the market at large. RegTech is necessary for FinTech to thrive. It will be up to regulators throughout the world to "boldly go where no man has gone before" in order to imagine and realise the potential of RegTech. Recent technology shifts are the primary force behind every part of the economy, and these shifts are giving rise to a highly dynamic, rapidly developing economic structure. Fintech's offshoot, the Regulation Technology business (RegTech), is rapidly expanding into the mainstream.

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Analyze the Different Data Mining Approaches for the Healthcare Applications: A Comparative Approach

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ABSTRACT

Doctors and other medical professionals may quickly forecast disease and suggest a course of therapy for that condition thanks to data mining's effectiveness in giving information about healthcare concerns. Due to the large amounts of medical data accessible, it is necessary to use advanced data analysis techniques to cut through the clutter and uncover the insights concealed therein. Because of the promise they have for improving the understanding of large data sets, statistical and data mining methods have long attracted the attention of scholars. In a number of situations, including the diagnosis of diseases, data mining techniques are displaying promising outcomes. Data mining has uncovered fresh biological and healthcare relationships for clinical decision-making that have considerable potential to enhance hospital care standards and raise patient survival rates. Disease detection is one area where data mining techniques are showing promise. The purpose of this paper is to provide a synopsis of several approaches to medical diagnosis and prediction. It has also focused on new research that uses data mining techniques to better anticipate which diseases will be prevalent.

KEYWORDS : *Healthcare, Classification, Data mining, Algorithm, Method.*

INTRODUCTION

Data mining is a challenging and crucial topic of study in the healthcare business because of the importance of healthcare concerns. Thanks to recent developments in data mining approaches, a platform for several healthcare applications has been established. Its great promise has led to its emergence as a vibrant field of study. Health insurance fraud detection, patient access to inexpensive medical therapies, illness diagnosis, and treatment optimization are just a few of the many healthcare applications of data mining. It also gives healthcare researchers a place to work on effective rules and other illness prevention techniques. Information on patients, hospitals, illnesses, and therapies for certain diseases might be required by these systems. Data mining substantially aids in the study of several aspects that lead to the development of illnesses, including working circumstances, housing conditions,

food quality, availability of clean water, health services, and many more.

Data mining is a huge area for doctors to manage the enormous volumes of patient data sets; it helps them make sense of complicated diagnostic processes, analyze previous results, and merge heterogeneous data together. When making medical decisions, doctors have historically relied on their own experience and intuition rather than the insights gleaned from massive data sets. As a result of adopting this automated diagnosis method, both the quality of care offered to patients and their financial outlay have improved significantly. Data Mining has been implemented in several fields, including advertising, CRM, EBM, expert prediction, web mining, and mobile computing, to name a few. Recent years have seen fruitful use of data mining in uncovering instances of healthcare fraud and abuse. It is common for physicians to make snap decisions without

perusing the mountains of data kept in databases. This method increases costs and adds unwanted biases while decreasing the quality of patient treatment. Data mining and other data modeling and analysis tools might provide a knowledge-rich environment that would improve therapeutic decision-making, thus it's a fantastic notion.

The successful implementation of data mining applications has prompted the appropriate parties to make full use of them, as they have come to appreciate data mining's central role in the discovery of useful information across all sectors of the healthcare industry.

When it comes to enormous datasets, typical statistical approaches often have difficulty detecting underlying patterns, correlations, and knowledge; this is where data mining comes in. Data mining has been a terrific success in many different areas, including the study of chemical compounds, financial projections, healthcare planning, and even weather predicting. Two of data mining's most crucial uses in healthcare are improving understanding of medical data and making more accurate predictions. Medical errors and preventable hospital mortality may be reduced by hospital analysis, which can also enhance health policy. Data mining has other applications in healthcare, such as identifying false insurance claims to reduce costs and stopping the spread of illnesses.

The medical community is making use of data mining techniques to improve the diagnosis of diseases and disorders such as diabetes, cancer, stroke, and heart disease. Despite data mining's usefulness in diagnosing and treating many illnesses, treatment regimen determination for patients, especially those with heart disease, has received less research.

RESEARCH METHODOLOGY

Multilayer Perceptron and PART techniques are employed in this study for categorization. Brief explanations of various techniques are provided in the following subsections.

Multilayer Perceptron

A simulation system built using mathematical models is called an artificial neural network. These systems are referred to as "neural networks" since biological brain networks served as inspiration for their operating

principles. Modeling non-linear statistical data is the main function of artificial neural networks. Usually, there's only one output and several inputs, and each one has its own weight. In a neural network, there are several levels. The bulk of these layers consist of input, hidden, and output layers. An input layer vector of variables provides the network with its values. The hidden layer takes each input, multiplies it by its weight, and then adds the results to get the final value. After this value is supplied, a function is called to create the network's output. One kind of artificial neural network that has a feedforward design is a multilayer perceptron. Values are not "fed back" to any intrinsic layer in the network when they are "fed forward," but rather simply traverse the different levels of the network. Multilayer perceptron networks need input and output layers. The amount of hidden layers, however, might change depending on the network's architecture.

Multi-layer ANN

The term "Multilayer Perceptron" refers to a fully linked multi-layer neural network (MLP).

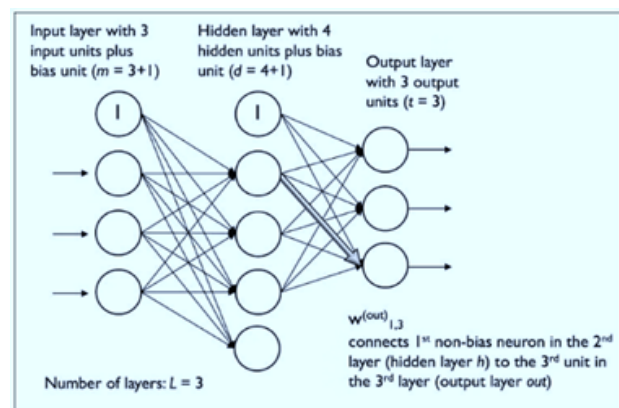


Figure 1: ANN of Multilayer perceptron

One of its three floors is subterranean. Any artificial neural network (ANN) with several hidden layers is called a deep ANN. Machine learning pylons (MLPs) are common examples of feed-forward artificial neural networks. The letter a_i in this schematic (I) represents the i th activation unit in the l th layer.

A neural network's key parameters, such as its layer and neuron counts, need fine-tuning. The optimal values for these can only be found by using cross-validation methods. Weight adjustment training makes use of

back propagation. Deeper neural networks perform better when processing data. However, problems with fading gradients may arise with deeper layers. We need specialized algorithms to fix this.

Partial Decision Trees

A partial decision tree is visually similar to a regular decision tree with branches leading to various subtrees. This kind of tree cannot be constructed without first dividing the instances into smaller subsets using a recursive approach. When dealing with incomplete decision trees, new rules are established that differ from the conventional methods. In this set of cases, we build a pruned decision tree and, by default, we promote the leaf with the highest coverage. Each subgroup's partial tree building includes iteration. Each step involves expanding the selected subgroup. Continue this process until there are no more subsets that can be expanded.

Among supervised ML approaches, rule learners have become quite popular. This kind of student often only wants to deduce certain rules from training materials. The test examples are then classified using the following criteria. C4.5 and RIPPER are two well-known rule-learners. There is a two-step induction of rule sets that both approaches depend on. Using a broad optimization strategy, the procedure starts with choosing a baseline set of rules and continues with tweaking or removing them as needed. For instance, C4.5 may produce a set of rules from an untrimmed decision tree. A rule is provided for every conceivable route that may be taken from the root node to a leaf node. After the individual simplification of each rule is complete, a rule-ranking technique is used. The only way for an algorithm to discard rules from a collection of rules is for its mistake rate on training cases to go down. A division-and-conquer tactic is what RIPPER does to rule induction. Only one rule is generated at a time, and all instances in the training set that meet that rule are removed. Make additional rules for the remaining training data using an iterative procedure.

Frank and Witten outline a method for generating acceptable rules using rule induction that does not need the use of a global optimization technique. Divide-and-conquer tactics from RIPPER are combined with the C4.5 decision tree approach in PART (Partial Decision Trees). With the divide-and-conquer strategy, PART

establishes a set of rules, removes from the training set any cases that violate these rules, and so on, until there are no more instances. In order to choose the new rule based on the present set of events, PART builds a partial decision tree and uses the leaf with the highest coverage. Then, in order to avoid making hasty generalizations, the incomplete decision tree is removed.

```

Algorithm. PARTfs feature selection
PARTfs(I) → RedF
Input
I... set of training instances
Output
RedF... a reduced subset of features

begin
RedF ← ∅
Ruleset ← PART(I)
foreach Rule in Ruleset do
    Features ← extractFeatures(Rule)
    RedF ← RedF ∪ Features
done
return RedF
end
    
```

Figure 2: algorithm for selecting features from PART

RESULTS AND ANALYSIS

The findings of this investigation will be presented in this section. As previously mentioned in the sections, various models, including the Multilayer Perceptron and PART Each model produced results that were comparable to one another, but overall, Multilayer Perceptron outperformed other methods.

According to previous studies, Multilayer Perceptron produced the best results for testing data when taking into account the overall scores. It is also obvious that PART method results are very similar to Multilayer Perceptron. In terms of sensitivity and correctness, Multilayer Perceptron clearly performs better. The RMSE values produced by the Multilayer Perceptron and PART algorithms were 0.19 and 0.20, respectively. Multilayer Perceptron outperformed other methods in terms of RMSE because a lower value indicates greater reliability in testing data.

Table 1: Model Testing Outcome

| Method Name | Sensitivity | Specificity | Precision | Correct-ness |
|-----------------------|-------------|-------------|-----------|--------------|
| Multilayer Perceptron | 0.91 | 0.96 | 0.89 | 0.91 |

| | | | | |
|------------------------|------|------|------|------|
| Partial Decision Trees | 0.87 | 0.92 | 0.85 | 0.86 |
|------------------------|------|------|------|------|

CONCLUSION

An examination of various data mining technologies used by the healthcare industry and a synopsis of the most prevalent medical problems were the objectives of this piece. Due of data mining's ability to improve diagnostic accuracy while decreasing the amount of human work needed, illness prediction is both a difficult and rewarding undertaking. A possible solution to the time and resource limitations caused by human knowledge and skill might be the creation of application-specific data mining technologies. Because the data is massive, useless, and full of noise, mining medical records for insights is a dangerous endeavor. This study shows that using many data mining approaches rather than using just one for detecting or forecasting illnesses in the healthcare industry might produce more promising outcomes. The comparative analysis reveals the intriguing findings that data mining approaches provide a more reassuringly high degree of accuracy across all health care applications.

Finally, data mining is very helpful in the medical industry and has a lot of promise. Data mining in healthcare can only be useful if access to high-quality healthcare data is available.

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Evaluating the Performance of AES, RSA, and A Hybrid Algorithm in Cryptography

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ABSTRACT

The effectiveness of data protection techniques in the field of cryptography is heavily dependent on the algorithm used. Considerations such as computing efficiency, attack resistance, and applicability to diverse cryptographic applications are all part of the examination. As a strong option for many different uses, AES lives up to its reputation as a fast and efficient symmetric encryption algorithm. Despite its computational complexity, RSA's asymmetric encryption secures key exchange and digital signatures. The hybrid algorithm balances speed and security by combining AES and RSA. MATLAB R2019a implements the hybrid approach. We will evaluate and contrast this method based on three criteria: avalanche effect, performance, and attack security.

KEYWORDS : *Security, Hybrid, Cryptography, Efficiency, Avalanche.*

INTRODUCTION

Data transmission and storage security is of utmost importance in today's digital world. Data confidentiality, integrity, and authenticity are greatly enhanced by cryptography, the science of encoding and decoding information to prevent unauthorized access. Of the many cryptographic algorithms out there, two of the most used are AES and RSA, which stand for Rivest-Shamir-Adleman. A new generation of effective cybersecurity tools—hybrid cryptographic algorithms—combines the best features of symmetric and asymmetric encryption. In this introductory cryptography course, you will learn about the basics, how to use AES and RSA, and how to evaluate their performance.

Cryptographic Algorithms: An Overview

Two main types of cryptographic algorithms exist: symmetric key algorithms and asymmetric key algorithms.

Symmetric Key Algorithms

Both the encryption and decryption processes of symmetric key cryptography make use of the identical key. When compared to asymmetric algorithms, symmetric ones are usually more efficient in terms of computing power and time needed. This is their main benefit. The security and speed of the symmetric key method known as AES have made it very popular.

Advanced Encryption Standard (AES):

In 2001, the AES was officially recognized as the decryption standard by the United States (NIST). It is compatible with keys of 128, 192, or 256 bits in size and functions on data blocks of fixed size, usually 128 bits. Many applications use AES due to its high performance and good security. These include secure communications, financial transactions, and data storage.

Asymmetric Key Algorithms

The employment of a public key for encryption and a private key for decryption is central to asymmetric key cryptography, which is also called public key cryptography. Secure communications over untrusted networks are made possible by this method, which also allows for digital signatures and key exchange.

Rivest-Shamir-Adleman (RSA)

An early and popular asymmetric cryptographic technique, RSA has seen extensive use in the field. An extra layer of protection is provided by the fact that it is mathematically challenging to factor really big prime integers. Digital signatures, key exchange systems, and secure data transport are common uses for RSA. A potential downside for applications that rely on speed is how computationally intensive it may be, particularly when working with big key sizes.

Hybrid Cryptographic Algorithms

To get the best results in terms of security and performance, hybrid cryptographic algorithms integrate the best features of symmetric and asymmetric algorithms. A common hybrid method involves first securely exchanging a symmetric key using an asymmetric technique (such as RSA) and then using a symmetric algorithm (such as AES) to encrypt and decrypt the data itself. Using this technique, data transfer is as efficient as with symmetric encryption, and key distribution is as secure as with asymmetric encryption.

LITERATURE REVIEW

ABIODUN, Ahmida et al., (2021) A hybrid-based 136-bit key technique that involves a sequential combination of XOR (Exclusive –Or) encryption and AES algorithm is created in this work with the purpose of increasing the level of security. How long it takes to encrypt and decode, how complicated the space is, and how long it takes for the CPU to apply all put the hybrid technique on par with XOR encryption and the AES algorithm.

Zou, Lin et al., (2020) Encryption of files is an efficient method for ensuring the safety of data, whether it be for personal or business purposes. Both RSA and AES, which are typical encryption algorithms, are unable to satisfy the criteria of the efficiency and security of file encryption when used independently. This study

proposes a hybrid encryption method that combines the AES and RSA algorithms to address file encryption's effectiveness and safety. Experimental results suggest that the hybrid encryption algorithm, which combines RSA and AES, can encrypt data and improve algorithmic performance and security.

Parkar, Ashwini et al., (2020) Cryptographic algorithms are thought to safeguard data well. However, they require a lot of processor time, system memory, power, latency, etc. Thus, the best cryptographic method must be determined by comparing their performance.

Mandal, Akash et al., (2012) Information security is becoming an increasingly essential concern in the situation of data storage and transmission as a result of the rapid development of digital data interchange in technologically advanced ways. Cryptography is vital for protecting information security systems against attacks. Data is scrambled into unreadable text by this security mechanism, which can only be decoded or decrypted by a person that knows the associated key. This mechanism employs certain algorithms to transform the data into unreadable text. These methods need a considerable amount of computational resources, including time spent on the CPU, memory, and calculation time. The DES and AES are two of the most extensively used symmetric encryption systems, and they have both been implemented in this work using the MATLAB program. In the aftermath of the implementation, these methods are evaluated and contrasted on a few aspects.

EXPERIMENTAL METHODOLOGY

The new proposed hybrid algorithm is implemented in MATLAB R2019a. This experiment was conducted on a machine that has an Intel® Core (TM) i7-7700 HQ CPU running at 2.80 GHz, 8 GB of RAM, and a 1TB hard drive. Three criteria were used to assess the suggested algorithm: performance, security against all kinds of attacks, and avalanche effect.

This experiment is performed in two different data:

- Data 1: Contains alphabetical character (ABCDEFGHJKLMNPO).
- Data 2: Contains alphanumeric character (0123456789ABCDEF).

You can see the algorithm parameters for both sets of data in Table 1.

Table 1: Setting Up an Algorithm

| Algorithm | Key in Bits | Block Size (Bits) |
|--------------------|-------------|-------------------|
| Proposed Algorithm | 512 | 128 |
| AES | 256 | 128 |
| RSA | 512 | 64 |

RESULTS AND DISCUSSION

Encryption algorithms use plaintext as input and produce ciphertext, an encrypted communication. To get the deciphered message, the decryption algorithm was fed this ciphertext.

Avalanche effect

If one bit of ciphertext is changed, then several bits of plain text should be changed as well, and vice versa. An avalanche bigger than 50% is a must for any decent cryptography method. Below Table 2 shows the avalanche effect of cryptographic algorithms.

Table 2: A snowball's impact

| Algorithms | Avalanche effect (Data 1) | Avalanche effect (Data 2) |
|--------------------|---------------------------|---------------------------|
| AES | | 52% |
| RSA | | 90% |
| Proposed Algorithm | 91% | 97% |

A simulation was conducted using Data 1 and Data 2. Table 2 presents the results obtained by applying all three algorithms to data 1, as well as the results obtained by applying the same methods to data 2, which are also shown in table 2. Due to its limited avalanche effect, the AES is considered to have a relatively low level of security, as seen by the chart. Despite the repetition of some elements, RSA is still widely considered to be a secure approach. Nevertheless, the proposed method generates distinct ciphertexts whenever the same data is encrypted, resulting in a substantial 97% avalanche effect.

Execution Time

The time needed to encrypt and decrypt data was calculated. Table 3 shows the times it takes for the algorithms to execute. We started by running data set 1 through all three algorithms and timing how long it took. Then, we repeated the process with data set 2. When compared to other algorithms, the suggested one performs better.

Table 3: Execution Time

| Algorithms | Execution Time (Data 1) | Execution Time (Data 2) |
|--------------------|-------------------------|-------------------------|
| AES | 7.5581 | 9.4113 |
| RSA | 12.1036 | 16.2692 |
| Proposed Algorithm | 7.3548 | 9.2934 |

AES consistently produces the same cipher text when encrypting identical data. Therefore, this works in favor of the passive attacker, since it allows the attacker to simply decode data that is repeatedly delivered in the same ciphertext by recognizing its type. In contrast, RSA does not initially produce identical ciphertext for input data; rather, it begins to repeat patterns after a certain amount of cycles.

That is why the proposed method has a unique quality: it generates new ciphertexts each time it encrypts the same data. Consequently, it is completely protected from both active.

CONCLUSION

Making a comparison of cryptographic algorithms such as RSA, AES, and hybrids demonstrates how challenging and crucial it is to choose the appropriate instrument for meeting the specific security needs of an individual. Because of its remarkable speed and effectiveness in "symmetric encryption", AES is a preferred choice for a wide variety of applications. Although it increases computing complexity, the RSA algorithm's asymmetric encryption provides excellent security for digital signatures and key exchange. When it comes down to it, designing robust cryptographic solutions that are able to cater to the particular requirements of the digital environments of today involves an in-depth understanding with the advantages, disadvantages, and suitability of each algorithm.

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Comparing Level of Spiritual Intelligence Between Employees of Public and Private Sector Banks

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ABSTRACT

A diligent worker is often someone with a high degree of spiritual intelligence, whose moral compass guides their actions and who is reluctant to cause needless suffering. Having spiritual intelligence means you can connect with others, live your life in a way that demonstrates your moral principles, and depict those principles in a positive light. People with high levels of spiritual intelligence are more likely to exhibit the essential characteristics of personal competence, which are highly valued by most companies. The researchers in this study set out to compare and evaluate the spiritual intelligence quotient (IQ) of bank workers from the public and private sectors. In order to carry out their survey-based inquiry, the research team used a questionnaire. The two aspects of spiritual intelligence that were evaluated using David B. King's Spiritual Intelligence Self-Report Inventory (SISRI) scale are critical existential thinking (CET) and transcendental awareness (TA).

KEYWORDS : *Spiritual intelligence, Public, Private, Banks, Thinking.*

INTRODUCTION

During this era of globalization, the strategic significance of banks in contemporary trade has become more apparent. To improve people's level of living, banks take deposits from the public and then distribute those funds to customers via loans and other financial products. It is more critical than ever to have a strategy to increase their visibility in the public eye while maintaining their impeccable image, especially as competition among banks becomes fiercer. It is critical that all employees perform to the best of their abilities if the bank wants to enhance its reputation in the community. Improved employee performance has a multiplier effect on organizational output, leading to the realization of planned organizational outcomes. Therefore, it is essential for businesses to invest in human resource development as a means of achieving peak performance from their workforce.

Spirituality is a never-ending wellspring from which one might draw insight and motivation. It's a great pick-me-up that can be put to work on anything from

serious study to a lighthearted game of catchphrase. The exposure broadens our horizons and improves our social skills. Spirituality connects us to a higher reality and serves as a binding thread throughout our whole lives. As a result, we feel the need to identify and protect principles that cannot be reduced to a dollar amount.

As an integrating intelligence connecting our intellectual and emotional intelligences, SI ranks at the absolute apex of the intelligence scale. Intelligent action is required in this environment, and the scope of SI extends well beyond conventional academic disciplines like political science and psychology.

The inspiration for how we will overcome our size and price barriers is SI. The bounds of dogma and tradition have no hold on our inner understanding. It takes a lot of self-awareness to get in touch with our feelings and take in the big picture of the issue. In addition to being quick to respond, men who are spiritually intelligent may think about how they got into their present problems and how they might get out of them. Those who develop their SI can lessen their feelings of anxiety and hostility and

achieve more success in their professional and personal life.

REVIEW OF LITERATURE

Mohamed, tareg et al., (2021) The purpose of this exploratory research was to examine the connection between EQ, IQ, and work happiness in a high-threat region. In this cross-sectional study, questionnaires were sent out to the population samples to be completed at their own leisure. Workers in Libya's public sector were singled out for attention. The statistical analyses were conducted using SPSS and Smart-PLS for both descriptive and inferential purposes. The findings showed that among the factors influencing job satisfaction in a country with a high danger level, social intelligence stood out. Emotional and spiritual intelligence also showed a weak but positive correlation with contentment in the workplace. In light of these consequences, HR professionals working in high-threat countries should prioritize developing their staff's social intelligence. Managers of human resources would do well to include elements of social intelligence into their hiring and development initiatives. Improved worker happiness and productivity may arise from these efforts. This research was also groundbreaking since it was one of the first to show how much of an effect social, emotional, and spiritual intelligence have on job satisfaction in a high-risk nation.

M. Anwar, et al., (2021) Organizationally focused studies on spiritual intelligence (SI) are in their infancy. While several studies have shown a connection between spiritual intelligence and success on the work, far less has been done to prove that it is related to moral ideals. Specifically, the financial sector has not been the focus of any studies. Investigating the connections between SI components and self-esteem is the major focus of this research. Using a random sampling method, 230 customers from Malaysian commercial banks were chosen at random. The findings demonstrate the relevance and influence of SI aspects on individuals' core beliefs. Positive effects on morality were discovered for three aspects of spiritual intelligence (e.g., the ability to create one's own meaning, to experience the transcendent, and to think critically about the existential).

Shewakramani, Rekha & Jain, Ankita (2019) The current research was undertaken primarily to better understand the rising influence of spirituality on management professionals. Competition among

businesses has increased as national economies have improved. Managers are always working to improve the company's policies in order to give it an edge in the market. Spirituality in the workplace is receiving a lot of attention in the companies of emerging countries. Positive work habits are being developed using the tenets of this method. Consequently, this research aims to understand the banking staff's perspective on spiritual phase and their actions inside the company. Understanding what influences employees' spirituality at work is the primary goal of this research. A survey was created and sent out to employees of a prominent Jaipur-based private bank in order to gather their thoughts and feelings. To examine the gathered data, statistical techniques were used. The results show that gender, race, and age do not significantly impact people's views on spirituality at work. Seventy percent of those who took the survey either agreed or strongly agreed that companies should promote spirituality among their employees. Increased productivity and a more positive work environment have been associated with a spiritual workforce.

Subramaniam M., & Panchanatham N. Natarajan (2013) The study of spirituality in business is gaining momentum. In management, spirituality refers to the sense of belonging, connection, and harmony that employees feel within their team and the larger business. While company success metrics are still important, managers increasingly prioritize growth and development opportunities based on factors related to connectivity to others in society and connectedness to personal beliefs. This study aims to identify the level of spiritual fulfillment and commitment among workers of a big public sector bank in India about their work and the organization's core beliefs. Workers' accounts of experiencing spiritual fulfillment and their compliance with the bank's principles provide evidence of a spiritual work environment. Staff happiness may be measured inside the organization, and this study's findings can be used to build a relationship between workplace spirituality and job satisfaction, as well as a connection between workplace spirituality and maintaining the bank's core values. The positive effects of a spiritual workplace are considered to be so great that they may influence the whole financial sector.

Ali Usman & Rizwan Danish (2010) Multiple indicators of an organization's performance and growth point to its members' spirituality as the primary factor.

In this research, 121 managers from commercial and public sector banks in Pakistan were polled about their spirituality and work satisfaction. These managers were at different levels of management: branch, area, and regional. A self-report measure of spirituality developed by Rojas (2002) was used by the researchers. It turns out that employees' spirituality is a good predictor of their emotional dedication to the company. Limitations, recommendations for further study, and managerial ramifications have all been included.

RESEARCH METHOD

Professionals working in the banking industry in Kerala, both in public and private institutions, make up the bulk of the study's statistical population. A well-designed questionnaire was utilized to compile all of the information that was required. Two parts make up this questionnaire. The first segment consists of 6 questions asking for basic demographic data from respondents. The second portion is made up of 24 statements that cover four aspects of spiritual intelligence.

This research used David King's Likert-scale Spiritual Intelligence Self-Report Inventory (SISRI-24), which was validated across two large university samples, to evaluate the spiritual intelligence of individuals working in the banking industry. Respondents were few among the 300 private bank CEOs surveyed (120 out of 300). Public banks accounted for seventy (70) of the respondents, while private institutions accounted for fifty (50). Just thirty women took part, compared to ninety males. A questionnaire was sent online and physically to bank executives in Kerala in order to gather data.

Reliability and Validity

This survey includes multi-item scores for both Transcendental Awareness and Critical Existential Thinking. We used Cronbach's alpha to find out how readable the text was. The high reliability is evident from every variable, since their Cronbach's alphas are all more than 0.7 ($\alpha > 0.7$). The use of confirmatory factor analysis (CFA) allows for the examination of construct validity. According to the results of the CFA, the measuring instrument has good reliability.

ANALYSIS AND INTERPRETATION

A subscale of the Spiritual Intelligence test measuring critical existential thinking

The average scores on the Critical Existential Thinking

subscale of the Spiritual Intelligence scale will remain unchanged. To examine the correlation, a two-way analysis of variance (2X2) was devised.

Table 1: Interaction between gender and banks, as seen by the F-ratio, and levels of gender among bank professionals

| Source of variation | Sum of squares | Mean Square | F Value | p-value |
|-------------------------------------|----------------|-------------|---------|---------|
| Between genders | 0.002 | 0.002 | 0.003 | 0.955 |
| Between banks | 0.535 | 0.535 | 1.049 | 0.306 |
| Interaction between Bank and gender | 0.597 | 0.597 | 1.170 | 0.280 |

No significant difference was found between the sexes ($F(0.003) = 0.955, p > 0.05$), between the various kinds of banks ($F(1.049) = 0.306, p > 0.05$), or between the various types of banks and the sexes ($F(1.170) = 0.280, p < 0.05$), according to the data. At the level of significance larger than 0.05, all F-ratios that examined the impacts of gender, bank, and the interaction between the two variables revealed statistical significance.

On the Critical Existence thinking subscale of the Spiritual Intelligence scale, there is little variation between male and female Bank inhabitants. The Spiritual Intelligence scale of Critical Existence thinking does not distinguish between public and private banks. Similarly, there are no discernible variations between the sexes when comparing public and private sector banks as well as the Critical Existence Thinking subscale of spiritual intelligence.

Spiritual Intelligence subscale measuring transcendental awareness

The average scores of the respondents on the Transcendental Awareness subscale of the Spiritual Intelligence scale will remain unchanged. We examine the consistency of the respondents' ratings on the Transcendental Awareness subscale of the Spiritual Intelligence scale using a 2X2 ANOVA.

Table 2: Interaction between genders and bank professionals, as well as the levels of each, are shown by the F-ratio

| Source of variation | Sum of squares | Mean Square | F Value | p-value |
|---------------------|----------------|-------------|---------|---------|
| Between genders | 0.171 | 0.171 | 0.410 | 0.523 |

| | | | | |
|-------------------------------------|-------|-------|-------|-------|
| Between banks | 3.362 | 3.262 | 7.834 | 0.005 |
| Interaction between Bank and gender | 0.252 | 0.252 | 0.605 | 0.430 |

As shown in the table above, there are significant results for gender ($F(0.410) = 0.53$) and bank category ($F(7.834) = 0.005, p < 0.05$) and for the interaction of gender and bank category ($F(0.605) = 0.430, p > 0.05$). The F ratio between different kinds of banks is statistically shown to be much lower than 0.05.

In particular, the findings show that on the Transcendental Awareness subscale of the spiritual intelligence scale, privately owned financial firms outperform publicly listed ones. All gender-related and gender-by-bank category F-ratios greater than 0.5 were deemed statistically significant. Transcendental Awareness is a measure of spiritual intelligence; public sector banks score worse on average than private sector banks (Table 3).

Table 3: Displaying the average salaries of bank employees in the public and private sectors

| Gender and Bank | Mean | Lower bound | Upper bound |
|---------------------|-------|-------------|-------------|
| Public sector bank | 3.206 | 3.121 | 3.307 |
| Private sector bank | 3.416 | 3.309 | 3.514 |

CONCLUSION

The purpose of this research is to compare and contrast the spiritual intelligence of bank executives working for public and private institutions in India. There was a statistically significant difference between two groups of private bank executives on measures of spiritual intelligence. Private Banks in India have grown at a much faster rate than their public sector counterparts. Company emphasis, work culture, and profit potential are all marginally different across these sectors. Management scholars and experts have long been interested in what may boost spiritual intelligence in the workplace, so they set out to answer that question in this research.

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Identifying Obstacles in Mathematical Modeling through Schematic Error Analysis of Student Responses

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ABSTRACT

While mathematical modeling is a strong tool for comprehending and forecasting complicated systems, it does not come without its share of difficulties. Based on their answers to questions in a mathematical modeling exam, this study aims to delve into the students' schematic mistakes. One hundred and fifty-five students were selected using a purposive sample technique to participate. When asked to apply mathematical models to real-world problems, the majority of students' answers fell into one of four categories: schema with errors (ISbWE), schema without errors (ISwNE), procedure that is irrelevant (UIP), or schema with errors (CSwE) in its entirety.

KEYWORDS : *Mathematical modeling, learning difficulties, Error, Problem, Responses.*

INTRODUCTION

Mathematical modeling provides a thorough framework for investigating, assessing, and forecasting occurrences in a number of subfields within the discipline of applied mathematics. Mathematical modeling is the process of transforming real-world events into mathematical formulas or models. This paves the way for studies of complicated systems and the development of hypotheses about their behavior. Mathematical modeling is a useful technique that bridges several academic fields, such as the social sciences, engineering, economics, and the natural sciences. It aids researchers in understanding the fundamental rules that control a wide range of phenomena by connecting abstract concepts with their practical implementations. Mathematical models examine and resolve a wide range of issues using mathematical techniques such as optimization algorithms, computer simulations, statistical methods, and differential equations.

Astronomical object motion prediction, supply chain optimization, understanding the transmission of contagious diseases, and effective transportation network design are all instances of such problems. Numerous fields rely on mathematical modeling to

inform decision-making, discover real-world issue solutions, and foster innovation. This includes scientists, engineers, legislators, and decision-makers.

When individuals in ancient times sought to make sense of and predictions about the world around them, they may have turned to mathematical modeling. The approach first arose in this area. However, for mathematical modeling to really thrive, advancements in modern mathematics and the advent of computer technology were essential. In the 17th century, prominent figures like Gottfried Wilhelm Leibniz and Isaac Newton laid the groundwork for calculus, which gave mathematicians potent tools to describe and analyze dynamic systems. For instance, their work laid the framework for success in mathematical modeling, which in turn allowed for the creation of mathematical physics as an independent field of study and the use of differential equations to characterize natural laws. In later stages of scientific inquiry, mathematical modeling grew more entangled with experimental design, data analysis, and direct observation of the real world. Significant advances have been made in several domains as a result of this integration, including fluid dynamics, electromagnetics, thermodynamics, and mechanics.

Throughout the 20th and 21st centuries, mathematical modeling saw significant growth and change due to the fast development of computer technology, numerical techniques, and cross-disciplinary cooperation. Advances in computer mathematics have allowed researchers to take on ever more challenging issues. Their ability to accurately model complicated systems and assess events on several scales is a direct result of this. There was also a shift in mathematical modeling when data-driven approaches were introduced.

The proliferation of digital data and advancements in machine learning techniques prompted these methods. Scientists were able to derive insights with practical applications and build prediction models by using a large quantity of observational data. Mathematical modeling has gained traction in many fields, including urban planning, economics, epidemiology, and climate research. Its primary role is to encourage creativity in all walks of life by adding to our knowledge of the world and shedding light on previously unknown phenomena.

Mathematics and art come together in mathematical modeling, which calls for a harmony of intuition, inventiveness, and precision. Developing a mathematical model often begins with gaining a thorough understanding of the issue. The selection of suitable modeling tools follows the formulation of mathematical assumptions. At this point in the process, researchers often idealize, abstract, and make simplifying assumptions in an effort to accurately portray the system's essential qualities while reducing its complexity. Researchers analyze the stated model using mathematical tools and computational methodologies. Its behavior can be studied, analytical solutions can be found, and predictions may be made via simulations. Finally, the model is refined and updated several times as part of an ongoing cycle of improvement and development; it is then verified using real-world data.

REVIEW OF LITERATURE

Ural, Alattin (2020) The objective of this study is to categorize the challenges encountered by novice mathematics instructors in mathematical modeling based on the number of variables involved. Subsequently, the aim is to identify the specific skills and knowledge necessary to handle each category of issues. This study

used descriptive statistics to derive results, making it a qualitative research endeavor. The study used data derived from a mathematical modeling challenge that was formulated by 59 math professors with specialized knowledge. Their timeframe for composing the tasks and their corresponding solutions was established at one week. Every participant had previously completed a one-semester course in mathematical modeling. The problems stem from the fact that the gamers themselves created them. Issues with "Comparative cost," "Profit optimization," "Future forecasting," and "Correlation between two variables" are the four main types of mathematical modeling challenges. Gathering relevant data, organizing it in a meaningful way, defining dependent and independent variables, setting fixed values, representing the real situation mathematically or geometrically, and applying mathematical principles are fundamental competencies utilized in mathematical modeling. Mathematical abilities needed for this task include working with rational numbers in arithmetic operations, drawing and understanding graphs, writing and manipulating algebraic rational expressions, solving equations and inequalities, analyzing data with mathematical functions, solving linear equations, finding proportions, using right triangle trigonometric ratios, sketching and understanding linear inequalities.

Asempapa, Reuben & Sturgill, Derek (2019) This study sought to shed light on these challenges by exploring the perspectives of PSTs and the pedagogical experiences of PTs in relation to mathematical modeling activities. The research drew 122 PTs and 118 PSTs from a region in the Midwest of the Country. The items and free-form questions that made up the survey were the sources of the data. The data was analyzed using both quantitative and qualitative methods.

Rivera, Samantha & Rodriguez, Ruth (2018) There is no use in reducing mathematics to the application of algorithms. When it comes to teaching mathematics in schools, the primary goal is to educate students how to apply their knowledge to real-world scenarios. The concept of mathematical modeling was developed as a response to this problem, and it signifies the connection between mathematics and technological applications. In light of this, it is necessary for teachers to have the right training in order for them to be able to successfully

incorporate mathematical modeling into their daily lesson plans. The objective of this study is to investigate the possibilities of establishing a method that may be of assistance to teachers in the process of acquiring mathematical modeling as a method for teaching mathematics. The core of our method is the analysis of the views that educators have about the process of learning and teaching mathematics, followed by the encouragement of the growth of those beliefs. This is the foundation of our methodology.

Niss, Martin (2016) In this particular research, the cognitive challenges associated with "structuring for mathematization," which is a specific component of incorporating mathematics into the process of problem-solving in physics, are the primary emphasis. For the sake of this discussion, "translation" refers to the process of organizing the issue scenario in a manner that can be described mathematically. The purpose of this article is to provide the findings of an experiment that evaluated four different approaches that were obtained from task-based interviews with college students. During these interviews, students worked in pairs to attempt to solve physics issues, but they were unsuccessful. Despite the fact that issues arise at various stages of the process of arranging for mathematical representation, in the end, they are connected to the approaches that the students use. Experiments have shown that there are four distinct categories of challenges to overcome.

Mapoka, Kenneth et al., (2013) Structures that are developed as a result of modeling include those that are complex and complicated. One of the most important aspects of engineering is modeling. This is a common way of referring to the primary structural element that makes up any given system. Nevertheless, a sophisticated model is not the best choice in this situation. Engineers have a responsibility to exercise care and refrain from throwing away any information, since doing so might prevent the suggested model from functioning properly. As was shown in this article, the model need to be designed in such a way that it is fundamental, including just the data that are vital and relevant. The purpose of this research is to offer a full description of the challenges that are encountered throughout the modeling process and at the same time highlight the relevance of those challenges.

RESEARCH METHODOLOGY

This study is exploratory in nature and collects descriptive data using a qualitative method. Students' error types and locations on a mathematical modeling test may be better understood with the use of the obtained data. Narrative and visual strategies were used in conjunction to analyze the data. In order to discover overarching themes and patterns in the data, the research used an inductive methodology. Throughout this approach, the researcher was sure not to jump to conclusions. A total of 85 students from a single school were chosen at random to take part in this study. The mathematical modeling (MM) test consisted of five questions designed to evaluate the students' abilities to recognize problem situations, develop mathematical models based on these situations, apply mathematical concepts, understand and apply solutions, and finally, validate mathematical models using quadratic functions and equations.

The reliability value for the mathematical modeling test instrument is 0.87 and the validity coefficient is 0.70. Analyzing the ways in which pupils erred when applying a strategy schema to the problem of multi-dimensional matrix (MM) is what this term alludes to. When errors occur, they fall into one of five categories: NS, UIP, ISwNE, ISbWE, and CSwE.

RESULTS AND DISCUSSION

The results of the students' schematic errors in the domain of equations and quadratic functions on a mathematical modeling test are shown in Table 1.

Table 1: Responses from Students in the MM-test on Schematic Error

| Mathematical Modeling Ability | NS | UIP | ISwNE | ISbWE | CSwE |
|---------------------------------------|-------|-------|-------|-------|-------|
| Determine the Nature of the Issue | 2.91 | 11.80 | 18.95 | 20.51 | 12.47 |
| Model Development in Mathematics | 4.60 | 17.68 | 2.88 | 14.69 | 22.36 |
| Mathematical Tasks | 3.17 | 11.81 | 8.77 | 11.81 | 14.19 |
| Calculating the Accuracy of the Model | 14.68 | 29.45 | 2.49 | 8.86 | 11.26 |

| | | | | | |
|---|------|-------|-------|-------|-------|
| Using a Mathematical Model for Analysis | 5.92 | 23.58 | 35.31 | 17.72 | 12.42 |
| Verifying the Results of a Mathematical Problem | 2.89 | 17.69 | 11.82 | 44.08 | 22.16 |

The findings demonstrate distinct patterns of schematic mistakes across the different phases of mathematical modeling. Regarding the feature of "Identify the Problem Situation," most students' replies may be classified into two groups: ISbWE (20.51%) and ISwNE (18.95%). These categories represent imperfect schemas with and without errors, respectively. In the article "Interpreting Mathematical Solution," a considerable percentage of the comments fall into the categories of CSwE (22.16%) and ISbWE (44.08%). This indicates that these responses consist of complete schemas with mistakes and incomplete schemas with errors, respectively.

The most difficult component of mathematical modeling is the interpretation of the mathematical model and its solution, especially when it comes to verifying the correctness of the model. Among all the components of mathematical modeling, it has been observed that the majority of students use irrelevant mathematical methods to answer the issues.

CONCLUSION

Through the analysis of students' answers to the Mathematical Modeling (MM) exam, one may get a more comprehensive knowledge of the difficulties individuals have while trying to execute different components of mathematical modeling. Students demonstrate a wide range of mistake patterns across the various phases of the modeling process. The mistake patterns include incomplete schemas with and without flaws, as well as the use of irrelevant procedures and complete schemas with defects. The complexity of mathematical modeling is brought to light by these findings, which also highlight the need of implementing targeted interventions in order to improve students' capabilities in this really necessary subject. Because of the difficulties that students have while attempting to properly complete mathematical modeling tasks, they may sometimes come up with inaccurate answers. There

are a number of factors that could be responsible for the errors. These factors include a mismatch between concepts and procedures, a lack of understanding of formula conditions and supplied facts, a lack of understanding of quadratic functions, an inability to convert the problem, and psychological factors such as anxiety and tension. In order to effectively teach students, teachers need to ensure that they include mathematical concepts and arithmetic skills in a way that is harmonic.

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Design and Performance Analysis of Remote-Controlled Aeroplane Propellers for Student Aero Design Competitions

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ABSTRACT

This research paper outlines an investigation into the development and evaluation of propellers for remote-controlled (RC) airplanes, with a specific focus on their design and performance evaluation. Through computational fluid dynamics (CFD) simulations, the propeller's thrust characteristics were analyzed. The study highlights the benefits of in-house propeller design for student teams and designers to enhance their skills and better understand the aerodynamic characteristics of propellers. The study's findings show a mere 7% disparity between the CFD analysis and experimental data.

KEYWORDS : *Performance analysis, Propellers, Computational fluid dynamics (CFD), Aerodynamic characteristics.*

INTRODUCTION

The utilization and advancement of unmanned aerial vehicles (UAVs) have experienced a substantial growth in recent decades [1]. RC aeroplane propellers are essential components that substantially influence UAV performance in various applications, including surveillance, delivery, and search and rescue operations. Their primary function is to supply thrust force. Aravind Seeni et al. [2] concluded that a propeller's aerodynamic performance can be characterized by the thrust produced, torque generated, and the efficiency of rotation.

Student aero-design competitions provide a platform for students to design and construct UAVs and showcase their technical skills and innovation. Often, student teams working on aero-design projects opt to purchase a range of propellers of different sizes and use a trial-and-error approach to identify the right propeller size. This approach can be time-consuming and inefficient, leading to suboptimal performance and wasted resources. CFD is an advanced computational simulation approach that

can provide insight into the aerodynamic behavior of the propeller and optimize its design. The research conducted by Eraslan et al. [3] assesses the utilization of CFD simulations in predicting propeller performance under different flight conditions. While some disparities between simulation and experimental outcomes were noted, the overall findings indicate that CFD simulations offer significant advantages in comprehending the behavior of propellers in quadrotor Unmanned Aerial Vehicles (UAVs).

Through the analysis of CFD results, student teams can enhance their understanding of how various design factors influence propeller performance. Additionally, they can evaluate the propeller's effectiveness under diverse operating conditions, for example variations in airspeed, altitude, or humidity. This enables a comprehensive assessment of the propeller's performance characteristics.

LITERATURE REVIEW

A propeller blade can be described as a rotating wing that generates thrust and rotational motion through

the aerodynamic forces of lift and drag [4]. Efforts to simulate and analyze the functioning of a propeller have been underway for a long time, with significant research conducted in this regard. Brian Rutkay et al. [5] investigated the feasibility of 3D printing to create a flight-worthy propeller. Their results highlighted that the generated thrust could be approximated with low error, but the measurement of power and accuracy had a large error. Karna S. Patel et al. [6] conducted a study comparing the results obtained from CFD simulations and wind tunnel testing to analyze the lift and drag forces in two-dimensional subsonic flow over a NACA 0012 airfoil. The findings indicated that CFD simulations provide a reliable and cost-effective alternative to experimental methods, as they closely agreed with the experimental results, offering a valuable approach for determining drag and lift in aerodynamic analyses. Kutty and Rajendran [7] conducted 3 dimensional CFD simulations on a small APC Slow Flyer propeller blade and experimentally verified his results, demonstrating good agreement between CFD-predicted thrust and torque coefficient data and the experimental results.

In their study, S. M. Mahbobur Rahman et al. [8] focused on investigating the fluid flow characteristics over a propeller used in vertical takeoff and landing (VTOL) radio-controlled (RC) aircraft. The authors employed SolidWorks flow simulation to conduct simulation investigations using a propeller model. This study gives useful information and insights into the design and modification of propellers for VTOL RC aircraft applications. John B. Brandt et al. [9] conducted a full-scale research study on propellers, focusing on their performance for UAVs operating at low Reynolds numbers. Experimental evaluations using 79 propellers in the diameter range of 9 to 11 inches were performed at the University of Illinois. The results showed propeller efficiency ranging from 0.68 to 0.28, emphasizing the substantial impact of propeller design on aircraft and UAV operations. The small size of propellers utilized in small UAVs and MAVs poses a challenge in accurately predicting their behavior [10]. Hence, it is recommended to validate the numerical findings obtained through CFD simulations by conducting wind tunnel experiments and comparing the results.

METHODOLOGY

Design of Propeller

In the realm of aviation, a propeller serves as a rotating airfoil comprised of multiple blades connected to a central hub, which is mounted on the engine's crankshaft [11]. The propeller's function is to convert rotational energy into useful propulsion. The design of an aircraft considers the propeller as a critical performance feature [12]. The diameter and pitch of propellers were identified as significant geometric parameters affecting their performance. Propellers are typically described using a four-digit identification number indicating their diameter and pitch [13]. The propeller's full rotation corresponds to the tip traveling along a circular path with a circumference equal to the propeller diameter. Additionally, the propeller moves forward a distance denoted as the geometric pitch during each complete rotation, which is commonly measured in inches [14].

Sawale et al. [11] employed Blade Element Theory to predict propeller performance, dividing the propeller into sections and applying power balance equations iteratively. The current research focuses on designing a propeller blade using the Space Claim CAD software platform, utilizing the values of chord length (c) and pitch angle (θ_p) along the span of the blade as indicated in Table 1. The blade profile was imported into the software as a CSV file, containing the NACA 0012 airfoil coordinate values obtained from the UIUC airfoil database. Monk [15] introduced a methodology that utilized Rhinoceros®, a NURBS surface modelling CAD package, to capture aerofoil coordinate data. The approach involved positioning aerofoil sections at radial stations and aligning their quarter chord points with radial lines from the hub center, eliminating quarter chord sweep. Individual rotation around the quarter chord point was implemented to achieve desired design local pitch angles relative to the local zero lift angle. This ensured accurate alignment and appropriate pitch angles for the analyzed aerofoil sections. The Fill command was used to convert the resulting curve into a surface.

A linear pattern of five airfoil geometries with adequate spacing was designed. To determine the required chord length for each section, the different airfoil sections were scaled using the Scale body option under Pull.

The Move command was then utilized to assign pitch angles, with the centroid of each section serving as the rotation point. Prior to creating the blade profile sketches, a 20 mm diameter circle was drawn on Plane 1. Subsequently, a Loft operation was performed to connect all the profiles, resulting in a solid body. To construct the final propeller blade shape, a circular pattern of two solid bodies spaced at 180 degrees was created.

A circle profile with a diameter of 40mm, centered at the origin on a plane that was perpendicular to the blade profile planes, was generated to simulate the hub. This profile was extruded normally to create the hub. The final propeller design, with dimensions of 11 x 7, is depicted in Figure 2 below. To ensure an accurate and effective propeller blade design, this design process relied on modern CAD software tools and methodologies. The resulting design will be analyzed using CFD simulations.

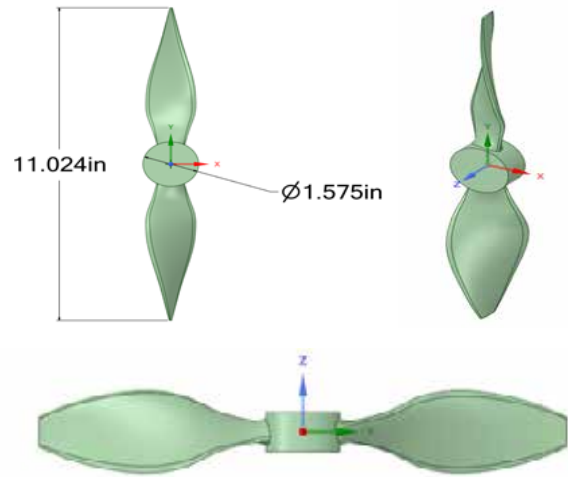


Figure 2. 11 x 7 propeller designed on SpaceClaim

CFD Simulation of Designed Propeller

The computational method known as computational fluid dynamics (CFD) uses numerical techniques to simulate fluid flow and heat transfer in complex geometries [16]. The Navier-Stokes equations, which are derived from Newton's second law, explains the link between fluid velocity, pressure, temperature, and density, and is the foundation of computational fluid dynamics (CFD). These equations provide a thorough understanding of fluid behaviour by accounting for the diffusive viscous stresses and pressure effects in a flowing fluid [17].

CFD simulations are conducted to examine the interaction between airflow and the propeller and to determine the thrust that the propeller generates. The Moving Reference Frame (MRF) approach is a steady-state method utilized in CFD to model systems with rotating components [18]. In this analysis, the MRF approach is employed to perform a steady-state simulation of the previously designed propeller. In [19], the MRF approach, implemented using the RANS solver FLUENT with the RNG k-epsilon turbulence model and fine grid resolution, is found to exhibit favorable performance. Preprocessing, solving the governing equations [20], and postprocessing are the three primary phases of a computational fluid dynamics (CFD) simulation, as shown in Figure 3 below. A study carried out by Weerasinghe et al. [21] examines the aerodynamic characteristics and forces acting on the

Table 1. Values of c and along the blade length

| Plane Number | Dist from origin (mm) | Profile shape | Chord length (mm) | Pitch angle (deg) |
|--------------|-----------------------|---------------|-------------------|-------------------|
| 1 | 15 | Circle (Ø20) | - | - |
| 2 | 32 | NACA 0012 | 30 | 65 |
| 3 | 45 | NACA 0012 | 40 | 60 |
| 4 | 62 | NACA 0012 | 50 | 45 |
| 5 | 127 | NACA 0012 | 35 | 20 |
| 6 | 140 | NACA 0012 | 15 | 5 |

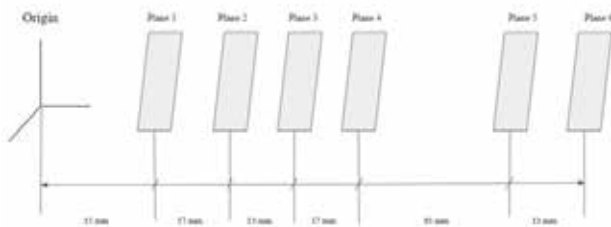


Figure 1. Visual representation of planes along the blade length

Syma X5SC quadrotor model using CFD simulations. Validation is done through wind tunnel tests, comparing measured forces with simulated results. The review highlights the importance of mesh quality, turbulence model selection, and steady/unsteady simulations.

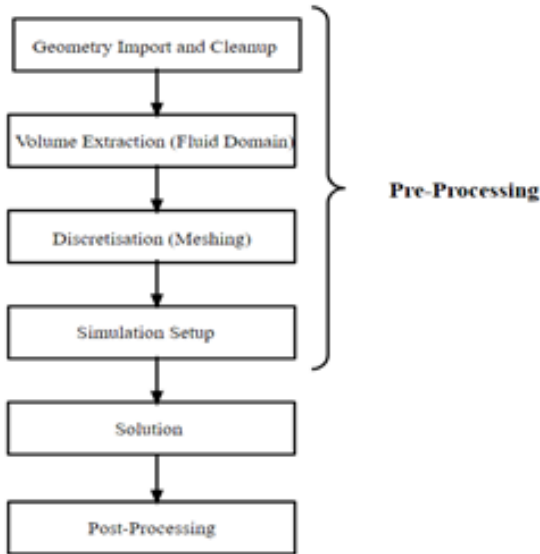


Figure 3. General steps in a CFD simulation

The fluid domain is divided into rotating and non-rotating sections according to the MRF model in CFD. In the non-rotating parts, the regular governing equations are solved; however, in the rotating regions, the momentum equations are modified to consider centripetal and Coriolis accelerations [22]. The MRF model, despite being an approximation due to its non-time-dependent methodology yet produces accurate findings for a variety of applications [23]. The boundary conditions are applied to the outside domain, while the propeller's angular velocity is applied to the inner domain. Figure 4 shown below provides a clearer illustration of this idea.

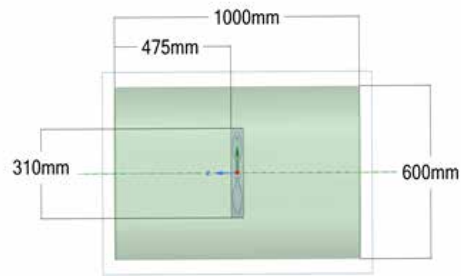
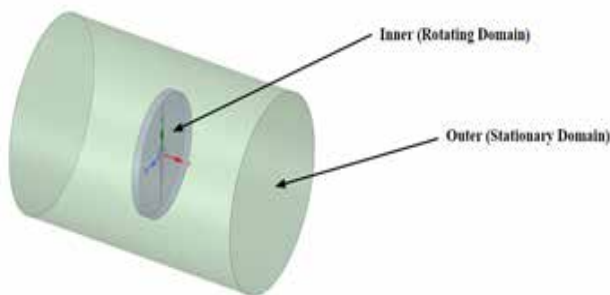


Figure 4. Inner and outer domain in MRF approach

Through the aid of Ansys Fluent® v2020R2, meshing was successfully achieved. Given the importance of the propeller's power, particular focus was placed on perfecting the mesh around the blades by using a local body sizing method. As shown in Figure 4 below, a mosaic polyhexcore mesh was created since it outperformed a traditional hexcore mesh in terms of solver performance and result correctness [24]. A total cell count of 361,801 with a minimum orthogonal quality of 0.2 were used. To precisely resolve the flow along the walls, 5 boundary layers were also built there using the smooth transition method.

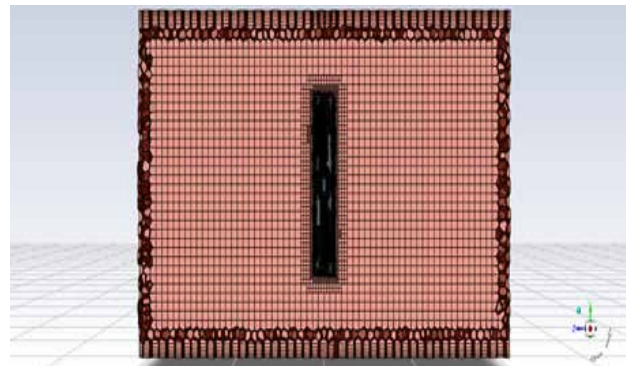


Figure 5. Polyhexcore mesh generated using Ansys Fluent

Table 2. Setup details

| Solver | Ansys Fluent® |
|------------------|----------------------|
| Version | v2020 R2 |
| Turbulence Model | Realizable k epsilon |
| Wall Function | Scalable |
| Analysis Type | Steady State |

Fluid used for simulating the flow was air, with the properties listed below

Table 3. Fluid (air) properties

| | |
|-----------|------------------------------|
| Fluid | Air |
| Density | 1.225 kg/m ³ |
| Viscosity | 1.7894e-05 kg/m ^s |

In real-life scenarios, many flows exhibit turbulence, and it is essential to employ an appropriate turbulence model to calculate the forces acting on aerodynamic bodies. In this case, the realizable k-epsilon turbulence model is utilized, which is the most commonly used model [25], along with a scalable wall function, the utilization of which proved successful in resolving the y+ value challenge encountered at the boundary mesh elements. [26]. The k-epsilon turbulence model-based CFD results in Wang et al.'s work [27] demonstrated satisfactory agreement with the experimental results. The pressure-velocity coupling is achieved using the SIMPLE (Semi-Implicit Method for Pressure-Linked Equations) algorithm to ensure mass conservation [28], along with a second-order upwind scheme [29]. The provided boundary conditions, which define the problem, are listed below.

Table 4. Boundary Conditions

| | |
|-----------------------------|-----------------------------------|
| Inlet | Velocity inlet, 12 m/s |
| Outlet | Pressure outlet, 0 Gauge Pressure |
| MRF Domain Angular Velocity | 6000 rpm |

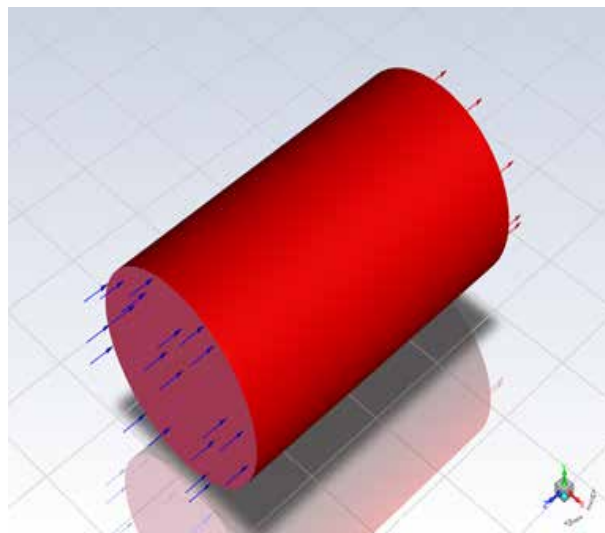


Figure 6. Problem after setup is complete

Results and Mesh Sensitivity Study

Iterative methods were used to solve the problem until convergence was achieved after the meshing process was completed and the boundary conditions were established. As seen in Figure 7 below, convergence was deemed to have occurred when the residuals decreased by more than three orders of magnitude [30].

The thrust produced by the propeller was calculated to be 13.69 N based on the CFD simulation carried out with the provided parameters, as shown in Figure 8. The thrust value was the primary concern because it was intended to estimate the real thrust produced by a propeller of comparable size, which is easily available, to validate the findings of the CFD research.

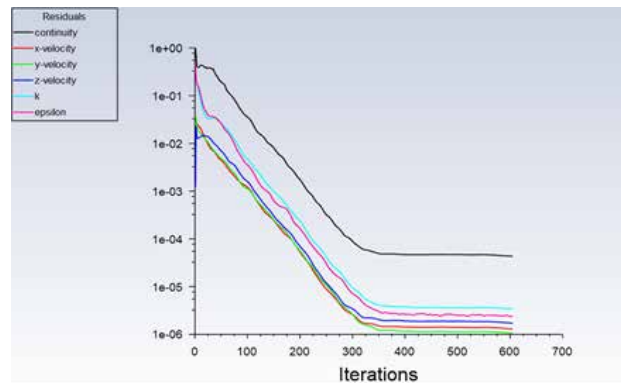


Figure 7. Residuals decay below 1e-04 for convergence

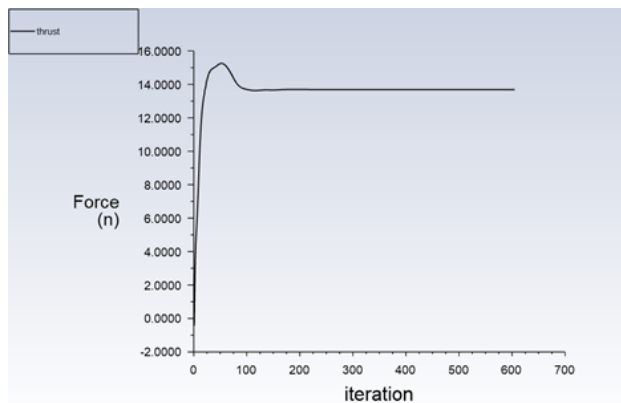


Figure 8. Thrust generated by the propeller

To assess if the estimated thrust value using CFD was independent of the mesh cell count, a mesh sensitivity analysis was carried out. The results obtained from the study are presented in the table and graph below. The mesh cell count was progressively increased, starting

from 135,522 for the coarsest mesh and reaching 1,165,870 for the finest mesh.

The findings indicate that the calculated thrust value varies by less than 1% for each iteration listed below. It was therefore concluded that the optimum mesh size would be 361,801 cells, yielding a thrust of 13.69 N. This mesh size achieves a balance between accurate thrust calculation and computational efficiency. It is worth noting that the most refined mesh required nearly double the time to solve compared to the coarser meshes.

Table 6. Mesh sensitivity study results

| Number of Cells | Thrust (N) |
|-----------------|------------|
| 135522 | 13.59 |
| 361801 | 13.69 |
| 1165870 | 13.75 |

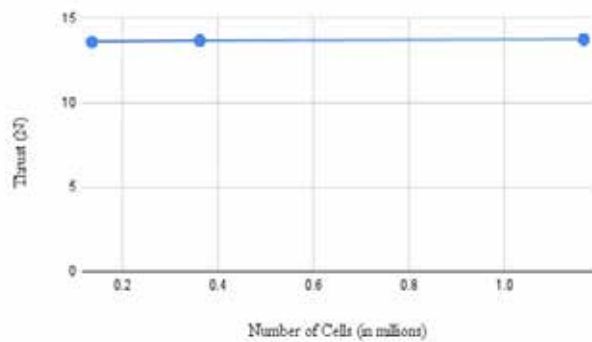


Figure 9. Plot of thrust (in N) vs number of cells (in millions)

EXPERIMENTAL VERIFICATION

Motivated by the work of Yeong et al. [31], who demonstrated the effectiveness of CFD analyses and wind tunnel experiments in assessing airfoil performance, a wind tunnel test for the propeller was conducted in this study. The aim was to validate the CFD results obtained. The test was performed using the wind tunnel facility at B.M.S. College of Engineering, Bengaluru, with a propeller of comparable size and dimensions. A wind speed of approximately 12m/s was used for the wind tunnel test, in accordance with the conditions used in the previous CFD analysis. The thrust that was generated by the propeller was measured, and the obtained results were thereafter compared with the CFD results, establishing a valuable correlation between the two methodologies.

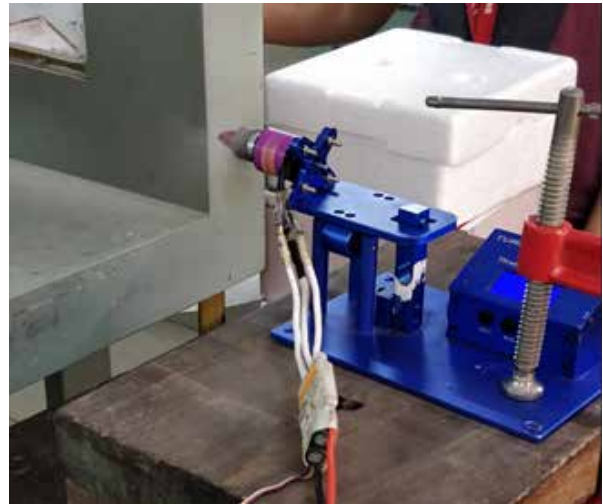


Figure 10. Experimental setup to measure thrust

Table 7. Thrust comparison from CFD and wind tunnel test

| Propeller Dimensions | Thrust (From CFD) | Thrust (From Wind Tunnel Test) |
|----------------------|-------------------|--------------------------------|
| 11x7 | 13.69 N | 14.72 N |

The difference between the results obtained using CFD and experimental analysis was found to be approximately 7%. In the context of student aero design competitions, a 7% error in the CFD results is generally considered acceptable. This is due to the limited resources and time available to student teams for conducting extensive experimental analyses, which can be costly and time-consuming. Therefore, CFD simulations provide a cost-effective and efficient approach to analyze and optimize their designs.

Additionally, the knowledge gained from this CFD analysis can be highly advantageous for student teams. It enables them to obtain a deeper understanding of the aerodynamic behavior of their propeller design and identify areas for improvement. They can also learn about the limitations and uncertainties associated with CFD simulations and gain experience in validating and verifying their results carefully.

Overall, while experimental analyses may offer more accurate results, CFD simulations still provide valuable insights and benefits for student teams participating in aero-design competitions.

CONCLUSION

Based on the conducted wind tunnel test and comparison with CFD results, it can be concluded that the propeller's performance analysis using CFD simulations yielded reasonably accurate predictions. In the wind tunnel test, the propeller of dimensions 11x7 generated a thrust of 14.72 N, while the CFD analysis predicted a thrust of 13.69 N. Despite the slight discrepancy, the 7% difference falls within the acceptable range for student aero design competitions, where limited resources and time often constrain extensive experimental analyses.

These numerical findings highlight the practicality and cost-effectiveness of using CFD simulations to assess and optimize propeller designs for student teams. CFD provides valuable insights into the aerodynamic behavior of the propeller and facilitates the identification of areas for improvement. Although experimental analyses may offer greater accuracy, the limitations and uncertainties associated with CFD simulations can be mitigated through careful validation and verification of results.

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Advancements in Angle of Attack (AOA) Measurement Techniques for UAV Application

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ABSTRACT

The measurement of the AOA, a critical parameter in aerodynamics, is essential for understanding and optimizing aircraft performance. Various sophisticated techniques, such as using multi-axis accelerometers and advanced sensor arrays, are employed to accurately determine this angle. These methods involve intricate data processing algorithms to account for factors like airspeed, altitude, and aircraft configuration. Additionally, advances in CFD have led to the development of alternative methods that can accurately predict and measure AOA. By integrating cutting-edge technology and mathematical models, researchers continue to refine the measurement accuracy of this pivotal aerodynamic parameter, enhancing aircraft safety and efficiency.

INTRODUCTION

The measurement of the AOA, a pivotal parameter in aerodynamics, is a complex yet crucial endeavour in the realm of aircraft performance analysis. AOA, defined as the angle between the chord line of an air foil and the oncoming airflow, profoundly influences lift, drag, and overall aerodynamic efficiency. (Fig.1)

This comprehensive review paper amalgamates insights from numerous studies concerning AOA measurement methodologies. By meticulously scrutinizing a diverse array of research papers, this review delineates the multifaceted approaches utilized for AOA measurement in aerodynamic investigations. Through this synthesis, it offers a holistic perspective on the varied techniques employed across different contexts and applications. By elucidating the strengths, limitations, and advancements in AOA measurement, this review serves as a precious resource for practitioners and researchers seeking to deepen their understanding and enhance the efficacy of AOA measurement practices.

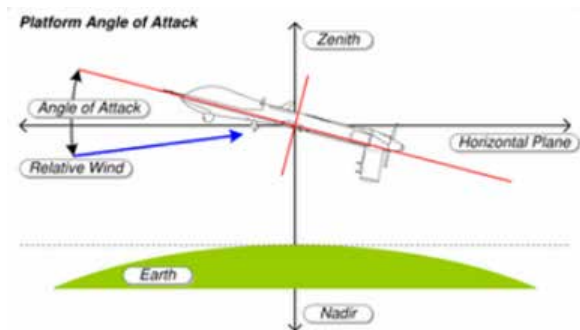


Fig. 1 Angle of Attack

Pivoted vane type sensor

The pivoted vane type sensor is a method used in measurement of angle of attack (AOA) on unmanned aerial vehicles (UAVs). This method is based on a pivoted vane that is attached to the UAV and can freely swivel. A rotary encoder is then attached to the other side of the vane, which is placed inside the fuselage. The rotary encoder measures the angular position of the vane, which is directly related to the AOA of the UAV.

This method is favoured over other methods, such as the Hall Effect Potentiometer, due to its high data collection accuracy and durability. The pivoted vane type sensor is also less susceptible to friction, which can cause issues in other methods. Nevertheless, the sensor needs to be crafted to minimize friction and be larger than usual to accommodate the sluggish velocities of RC UAVs.

Apart from the pivoted vane type sensor, various other techniques exist for measuring AOA on UAVs., such as using a seven-hole pressure probe in a wind tunnel or designing and evaluating filters for the estimation of AOA and angle of sideslip (AOS). These methods have their own advantages and disadvantages, and the choice of method depends on the specific requirements of the application.

The pivoted vane type sensor is a method used to measure the AOA on UAVs by using a pivoted vane that can freely swivel and a rotary encoder to measure the angular position of the vane. This method is preferred due to its high data collection accuracy and durability, and its ability to minimize friction. Nevertheless, other methods are also available, and the choice of method depends on the specific requirements of the application.



Fig. 2 Pivoted vane type sensor accessed, Source: - Dreamtime

Ground photographic method

The Ground Photographic Methods for determining the angle of attack of a UAV involve using high-resolution cameras with a vertical angle in the middle and four oblique angles around it to collect high-resolution aerial images from five directions simultaneously.

These images are subsequently merged to create a two- or three-dimensional representation of ground features, facilitating the creation of realistic 3D models of urban environments. The UAV tilt photography technology is used to collect image data, which is then processed using aerial triangulation to establish a connection and perform three-dimensional modelling of the collected data. The accuracy of this method is verified using a CORS system field coordinate collection. This method is suitable for completing tasks where the image resolution should be no less than 5 cm, and the production of large-scale 3D models is required to provide technical support and data support for modernization projects. Compared with traditional measurement techniques, UAV oblique photogrammetry has obvious advantages, including high flexibility in flying height, rich sources of images, and high overlap.

Virtual AOA Sensor

The Virtual Angle of Attack (AOA) sensor is an innovative method used to estimate the angle of attack on aircraft. This sensor works by utilizing physical-analytical models and data to infer the AoA without the need for direct measurement. By integrating air data, aircraft acceleration, and surface positions, the system can compute the angle of attack through complex algorithms and techniques using sensor fusion. The Virtual AoA sensor essentially combines various inputs to calculate this crucial aerodynamic parameter, providing valuable information for flight control and safety.

The required formulas for calculating the angle of attack using this virtual sensor involve integrating data from airspeed, aircraft acceleration, and surface positions.

These equations are derived from the relationship between these parameters and are processed through computational algorithms to estimate the angle of attack accurately. The specific mathematical expressions used in this virtual AoA sensor system are tailored to the aircraft's dynamics and the data available for inference, ensuring precise and reliable angle of attack estimations.

Measurement of Angle of Attack by differential pressure tube sensor

Another way to measure angles is by using a pneumatic sensor. The working principle of this sensor is by

measuring the difference in flow geometry. The axis of this sensor is parallel to the longitudinal axis of the aircraft. The front part of the probe is conical or hemispherical. It is mounted at the end of the Pitot tube and absorbs air pressure through two pairs of holes symmetrically (relative to the vertical and horizontal planes) in a central hole. The pressure discrepancy assessed vertically aids in calculating the angle of attack, while the pressure variance measured horizontally assists in determining the side slip angle. The angles of attack and sideslip can be calculated using the following formula... (Dąbrowski, Popowski 2013).

$$\alpha = \frac{P_{\alpha 1} - P_{\alpha 2}}{k_1 \left(P_3 - \frac{P_{\beta 1} + P_{\beta 2}}{2} \right)} ; \beta = \frac{P_{\beta 1} - P_{\beta 2}}{k_2 \left(P_3 - \frac{P_{\beta 1} + P_{\beta 2}}{2} \right)} \quad (1)$$

For hemispherical probes, the best results are obtained by adjusting the spring at a 90° angle, while for conical probes, the best results are obtained by adjusting the spring at a 90° angle. For best results, use a 90° cone.

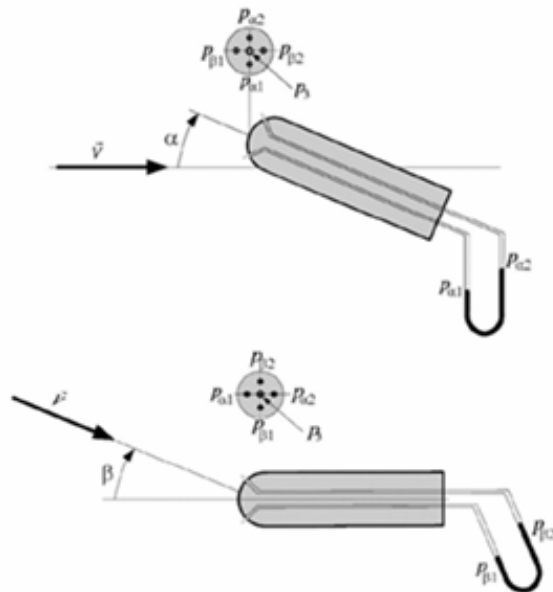


Fig. 3 Differential Pressure method for the measurement of angle of attack and the side slip

Complementary filter method

The Complementary Filter Method is a technique used for estimating the angle of attack (AOA) By amalgamating data from several sensors, such as accelerometers and gyroscopes.

This method works by utilizing a low-pass filter for the accelerometer data and a high-pass filter for the gyroscope data. The low-pass filter is then utilized to remove a high-frequency noise from the accelerometer data, while the high-pass filter is then utilized to remove low-frequency drift from the gyroscope data. The filtered data is then combined to estimate the AOA.

The following formula is used to compute the AOA using the Complementary Filter Method:

$$\theta = \theta_{\text{accel}} + K \times (\theta_{\text{gyro}} - \theta_{\text{accel}}) \quad (2)$$

Where:

θ is the estimated AOA.

θ_{accel} is the AOA calculated from the accelerometer data.

θ_{gyro} is the AOA calculated from the gyroscope data.

K is the gain factor, which determines the weight given to the gyroscope data.

The gain factor K is typically set between 0.9 and 0.99, depending on the accuracy and response time required for the AOA estimation.

There are several variations of the Complementary Filter Method, including the Kalman Filter and the Madgwick Filter. The Kalman Filter is a sophisticated algorithm that uses a mathematical model of the system to estimate the AOA, while the Madgwick Filter is a newer approach that uses quaternions to represent the orientation of the aircraft.

Since it is simple and effective, the Complementary Filter Method is used in various range of applications. The AOA estimation depends on a number of factors, including the quality and accuracy of the sensor data, as well as the proper tuning of the gain factor K.

The AOA can be estimated using the Complementary Filter Method, is a technique that sensor fusion to combine the data from the two.

This method also uses a low-pass filter for the accelerometer data and a high-pass filter for the gyroscope data, and combines the filtered data using a gain factor K. The accuracy of the AOA estimation depends on the quality and accuracy of the sensor data, as well as the proper tuning of the gain factor K.

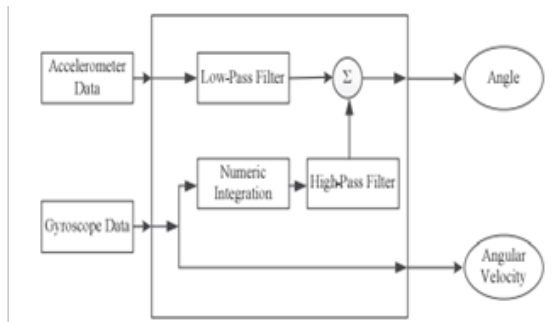


Fig. 4 Complementary filter method

Measuring Angle of Attack using a slot-type sensor (Null seeking pressure sensor)

In the past few years, slotted pneumatic angle sensors have been widely used. The main element of this type of sensor is a rotating cylindrical probe, internally divided into two parts. Each chamber is connected to the environment through a probe hole. The two halves of the hole are placed symmetrically along the probe. The probe axis must be perpendicular to the measurement plane at an angle α or β and the orifice must face the flow.

The pressure difference between the chamber will continue until the port equals the flow. The revolution of the probe is driven by torque proportional to the difference in the chamber or by using a servo motor to drive the revolution of the probe until it is balanced. The angle of the probe is converted into an electrical signal. Pneumatic sensors are characterized by simple design, durability and accuracy.

The main disadvantages are air entering the probe, which can cause dust and moisture to enter the probe. Electric servo driven tools do not require air flow. The probe is connected to a different channel.

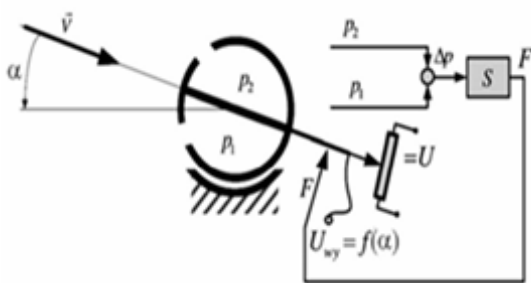


Fig. 5 Scheme of slot sensor of the angle of attack with pneumatic drive

Experimental validation of selected AOA and sideslip angle measurement and prediction methods.

The data were obtained during an experiment on the Mewa board in Rzeszów. The offline mode calculation is made by recording data from measurements of the Integrated Attitude System IG 500N, Attitude System VRU-BB-P, Atmospheric Data System CA05 and GPS receivers. The estimated wind speed is taken into account in the calculation by changing the formula below:

$$\begin{bmatrix} u \\ v \\ w \end{bmatrix} = [E] \begin{bmatrix} V_N - W \cos \Psi_w \\ V_E - W \sin \Psi_w \\ V_Z - W_v \end{bmatrix} \tag{3}$$

CONCLUSIONS

Exploring AOA measurement involves investigating dynamic AOA measurement for varying flight conditions and integrating advanced sensors like fibre-optic or MEMS for precise readings. Real-time feedback systems could enhance pilot awareness, while integrating AOA measurement directly into flight controls could optimize aircraft performance. Tailoring AOA measurement for unconventional aircraft designs and developing robust systems for extreme environments are crucial. Additionally, lightweight AOA sensors suitable for UAVs and data fusion techniques combining AOA data with other sensor readings could offer comprehensive insights. Sharing AOA data between multiple aircraft for safer operations and considering human factors in AOA interpretation are also essential aspects to explore. Further exploration could include investigating AOA measurement in autonomous aircraft systems and exploring the implications of AOA variation on aircraft stability and control in different flight regimes.

Exploring the optimization of angle of attack for enhanced cruise distance, integrating autonomous flight switching algorithms alongside enhanced flight controllers for smooth transition between hover and fixed-wing flight, and conducting extensive trials to achieve stable operating conditions during flight mode shifts are crucial pathways for advancing aerial operations.

By refining AOA strategies, integrating sophisticated autonomy algorithms, and validating performance through exhaustive testing, the potential for achieving enhanced efficiency and reliability in aerial missions becomes increasingly tangible therefore by following these methods this can be another approach of measuring AOA which has not yet been explored yet.

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A Study on Investor Perceptions of Mutual Funds in Faridabad

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ABSTRACT

This study investigates the perceptions of individual investors towards mutual funds in Faridabad, an emerging urban center within the National Capital Region of India. Amidst the significant growth of the mutual fund industry in India, this research focuses on understanding the local investor's perceptions, influenced by factors such as financial literacy, market conditions, and the role of financial advisors. Utilizing a mixed-methods approach, the study employs stratified random sampling to gather data through structured questionnaires and semi-structured interviews. The findings reveal a complex landscape of investor awareness and trust, with notable gaps in understanding mutual fund mechanisms and risk factors. Despite this, there is a positive inclination towards further investments in mutual funds, underlined by a strong reliance on financial advisors. This study contributes to the financial literature by highlighting the need for targeted educational programs and advisor engagement to enhance investor confidence and market participation in smaller cities.

KEYWORDS : *Mutual funds, Investor perceptions, Financial literacy, Faridabad, Investment behavior.*

INTRODUCTION

Mutual funds have emerged as a significant component of the financial markets in India, offering diversified investment options to individual and institutional investors. This investment vehicle pools money from various participants to invest in stocks, bonds, or other assets, managed by professional fund managers (Chander, 2016). The popularity of mutual funds is largely attributed to their ability to mitigate risks through diversification, professional management, and the potential for achieving substantial returns over the long term (Kumar & Gulati, 2014).

The Indian mutual fund industry has witnessed remarkable growth over the past two decades, particularly after the economic liberalization of the 1990s, which opened the doors to more sophisticated financial products and services (Das, 2017). As of 2020, the assets under management (AUM) in the Indian mutual fund industry have grown significantly, reflecting a growing trust and interest among the general populace (SEBI, 2020).

Despite the national growth trends, there is a noticeable variation in the acceptance and penetration of mutual funds across different regions of India. The metropolitan cities like Mumbai and Delhi have shown higher awareness and investment in mutual funds compared to smaller cities and towns (Patel & Shah, 2018). Faridabad, a burgeoning city in the National Capital Region, is an interesting case study in this context due to its unique socio-economic landscape and burgeoning middle class (Gupta & Cheema, 2019).

This study is significant as it provides mutual fund companies and financial advisors with localized insights into investor behavior and perceptions in Faridabad. By understanding the specific needs and concerns of investors in this region, financial services can tailor their products and strategies more effectively (Dixit & Dhar, 2016). Moreover, the findings could also guide policymakers in developing targeted educational programs aimed at enhancing financial literacy, particularly in emerging markets within India.

Research indicates that the key factors influencing mutual fund investments include financial literacy, perceptions of market conditions, past investment experiences, and recommendations from financial advisors (Singh & Gupta, 2016). Financial literacy, in particular, plays a critical role in investment decisions as it affects an investor's ability to evaluate different investment options and understand the risks involved (Mishra & Kapoor, 2015).

Market conditions and economic factors also significantly impact investor sentiment and behavior. Studies by Agarwal and Kumar (2015) show that economic downturns and volatile markets tend to make investors cautious, often leading them to favor less risky investment avenues over equity-based mutual funds.

Furthermore, the role of financial advisors is crucial in shaping investor decisions. According to Sharma and Kukreja (2013), a significant number of mutual fund investors rely heavily on the advice provided by their financial consultants, which underscores the importance of the credibility and expertise of these advisors.

While extensive research has been conducted on mutual funds in the context of large Indian cities, there is a noticeable gap in studies focusing on smaller cities like Faridabad. The existing literature primarily revolves around metropolitan perceptions and behaviors, with less attention given to semi-urban and emerging urban centers where the market dynamics could be substantially different (Joshi & Patel, 2017). This study aims to fill that gap by focusing specifically on the city of Faridabad, providing insights into the local investor's perceptions and contributing to a more geographically inclusive understanding of mutual fund investments in India.

The objective of this research is to study the perceptions of investors regarding mutual funds in Faridabad. This includes understanding the factors that influence their investment decisions, their level of awareness about the various mutual fund schemes available, and their trust in mutual funds as a reliable investment option.

METHODOLOGY

The methodology for this study employs a mixed-methods approach to explore investor perceptions of mutual funds in Faridabad. The target population

includes individual investors who have had experience with mutual funds. We employed stratified random sampling to ensure a representative cross-section of investors based on age, gender, occupation, and experience. Data collection was conducted using two primary tools: a structured questionnaire to quantitatively assess awareness, trust, satisfaction, and future investment intent; and semi-structured interviews to gather qualitative insights into investors' experiences and decision-making processes. Quantitative data were analysed using descriptive statistics and inferential analysis in SPSS, while qualitative responses were subjected to thematic analysis to identify recurring themes and patterns. This dual approach allows for a comprehensive understanding of the factors influencing mutual fund investments in the region.

RESULTS & DISCUSSION

Table 1: Demographic Characteristics of Respondents

| Age Group | Gender | Occupation | Education Level | Investing Experience |
|-----------|--------|----------------|-----------------|----------------------|
| 25-35 | Male | Private Sector | Graduate | 1-3 years |
| 25-35 | Female | Government Job | Postgraduate | 3-5 years |
| 36-45 | Male | Business Owner | Graduate | 5-10 years |
| 36-45 | Female | Private Sector | Graduate | Less than 1 year |
| 46-55 | Male | Retired | High School | Over 10 years |
| 46-55 | Female | Homemaker | Postgraduate | 1-3 years |

The study sampled 200 mutual fund investors in Faridabad, aiming to understand their perceptions and attitudes towards mutual fund investments. The demographic distribution of the participants indicates a balanced representation across age, gender, and occupational backgrounds, as shown in Table 1.

Fig. 1 illustrates the diverse background of respondents, reflecting a broad spectrum of investor profiles in Faridabad. Notably, younger investors (25-35 years) are mostly from the private sector, showing a keen interest in enhancing their investment portfolios through mutual funds.

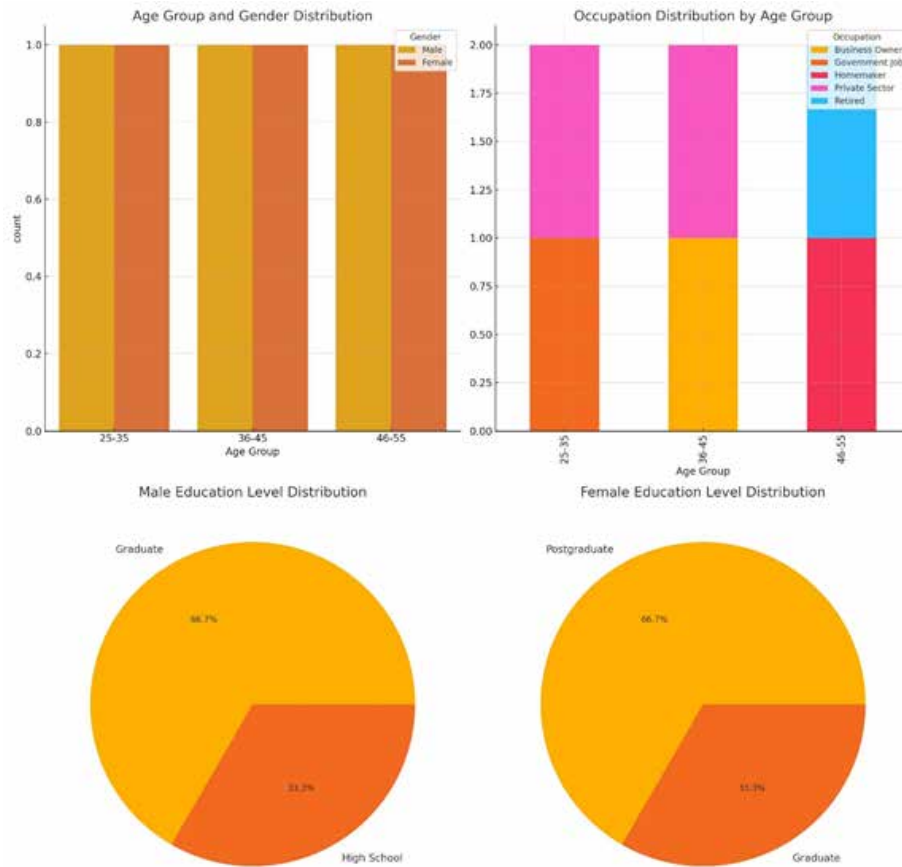


Fig. 1 Demographic Characteristics of Respondents

Table 2: Survey Results on Mutual Fund Perceptions

| Question | Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
|---|----------------|-------|---------|----------|-------------------|
| Aware of different types of mutual funds | 10% | 30% | 40% | 15% | 5% |
| Consider mutual funds a safe investment | 5% | 20% | 25% | 30% | 20% |
| Satisfied with past mutual fund investments | 20% | 25% | 30% | 15% | 10% |
| Plan to invest more in mutual funds | 15% | 35% | 20% | 20% | 10% |
| Trust financial advisors' recommendations | 25% | 45% | 15% | 10% | 5% |
| Feel adequately informed about risks | 5% | 15% | 35% | 30% | 15% |

Table 2 reveals significant insights into the perceptions of mutual funds among investors. While only 10% of respondents strongly agree that they are aware of the different types of mutual funds, a substantial 40% remain neutral, suggesting a gap in investor education and awareness. This is further corroborated by the fact that only 20% agree and 5% strongly agree that mutual funds are a safe investment, indicating prevalent risk concerns or a possible lack of understanding of mutual fund mechanisms. Interestingly, despite varied levels of satisfaction with past investments in mutual funds, a considerable 50% of participants either agree or strongly agree that they plan to invest more in mutual funds. This reflects a potentially optimistic outlook or a willingness to take calculated risks for higher returns. Trust in financial advisors is relatively high, with 70% expressing some level of agreement with their recommendations, which could be pivotal in shaping future investment decisions.

The data as shown in Fig. 2 suggests a nuanced landscape of investor perception in Faridabad. While there is a general openness towards mutual funds, evident from the willingness to invest more, there exists a significant need for enhanced investor education. The mixed responses regarding safety and satisfaction levels imply that mutual funds are still perceived as somewhat risky, which could be mitigated through targeted educational programs that clarify risk factors and the nature of mutual funds. Moreover, the high level of trust in financial advisors suggests that these professionals play a critical role in influencing investor decisions. This trust, coupled with the intent to invest more, provides a strategic opportunity for mutual fund companies to engage with both advisors and potential investors more effectively.

Addressing the apparent information gap regarding mutual fund types and risks should be a priority for stakeholders. By improving the dissemination of information and transparency, mutual fund companies can potentially increase investor confidence and satisfaction, thereby fostering a more robust investment culture in Faridabad. While the outlook on mutual funds in Faridabad is cautiously optimistic, there is a clear indication that improved investor education and advisor engagement could significantly enhance perceptions and investment behaviors.

CONCLUSIONS

The exploration of investor perceptions towards mutual funds in Faridabad reveals a cautiously optimistic outlook despite evident gaps in awareness and understanding of the investment vehicle. The study underscores the significant influence of financial literacy on investment decisions, indicating that enhanced investor education could bridge the current gaps in knowledge and confidence. The reliance on financial advisors observed among participants suggests that these professionals are pivotal in guiding investor behavior, emphasizing the need for their credibility and the accuracy of the information they provide. Mutual fund companies and financial advisors are presented with strategic opportunities to foster a robust investment culture in emerging urban centers like Faridabad by improving educational outreach and transparency in communication. Such initiatives would

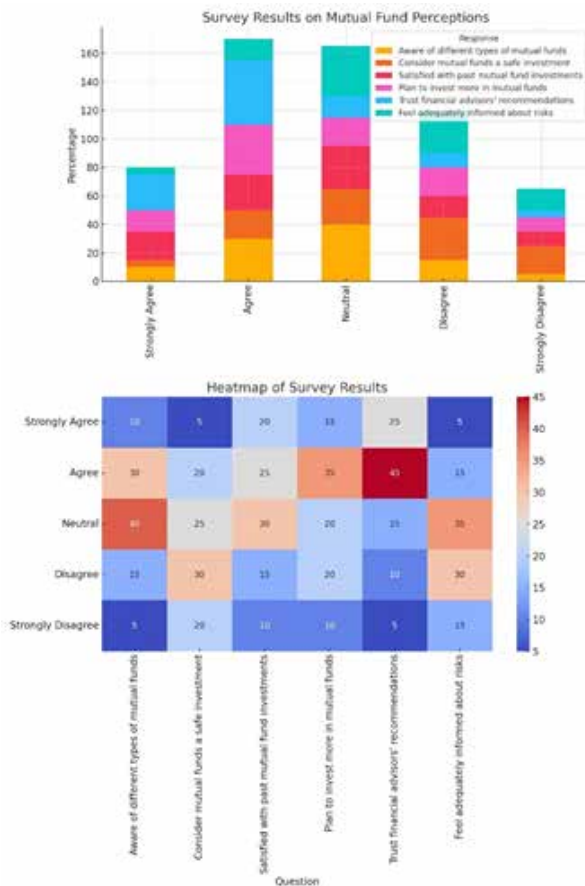


Fig. 2 Survey Results on Mutual Fund Perceptions

not only empower investors but also potentially expand the market penetration of mutual funds in regions that are currently underrepresented in the investment landscape. Overall, the findings advocate for a more tailored approach in financial services, aligning with the specific needs and contexts of investors outside the major metropolitan areas, thereby promoting a more inclusive financial environment across India.

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Experimental Study on High Grade Self Compacting Concrete with and Without using Micro Silica

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ABSTRACT

The main objective of this experiment is to produce high grade Self-Compacting Concrete (SCC) with and without the use of silica fume. Viscosity is the most important property of self-compacting concrete. In designing the mix proportions of self-compacting concrete, we see that there are many complexities in simultaneously maintaining the compressive strength along with the viscosity of the composition. SCC is mainly adopted when heavy amounts of reinforcement are used in a structural member, but it is difficult to ensure complete compaction without voids or honeycombs. Self-compacting concrete describes a concrete that has the ability to compact itself through only its own weight without the need for vibration and flows easily into all corners of the formwork. SCC requires high throughput to avoid separation; The percentage of fine aggregate increases with increase in water-cement ratio, hence we add silica fume partially to reduce the adverse effect. Various mix designs of SCC with and without using silica fume were performed to comparatively study the mechanical and rheological properties.

KEYWORDS : *SSC, SILICA FUME.*

INTRODUCTION

High strength concrete is required is increasing due to increasing demand for construction materials in the construction industry. The performance of concrete has been improving for some time. Years suggest that with cement replacement or addition of pozzolanic material, Mineral and chemical admixtures can improve strength and Durability characteristics of concrete. Silica fume is one of the Materials that can be used to produce highly durable and economical concrete mix. Self-compacting concrete (SCC) represents one of the most significant advances in concrete technology for decades. Inadequate homogeneity of the cast concrete due to poor compaction or segregation may drastically lower the performance of mature concrete in-situ. SCC has been developed to ensure adequate compaction and facilitate placement of concrete in structures with congested reinforcement and in restricted areas. SCC was developed first in Japan in the late 1980s to be mainly used for highly congested reinforced structures

in seismic regions (Bouzoubaa and Lachemi, 2001). As the durability of concrete structures became an important issue in Japan, an adequate compaction by skilled labours was required to obtain durable concrete structures. This requirement led to the development of SCC and its development was first reported in 1989 (Okamura and Ouchi, 1999). SCC can be described as a high-performance material which flows under its own weight without requiring vibrators to achieve consolidation by complete filling of formworks even when access is hindered by narrow gaps between reinforcement bars. SCC can also be used in situations where it is difficult or impossible to use mechanical compaction for fresh concrete, such as underwater concreting, cast in-situ pile foundations, machine bases and columns or walls with congested reinforcement. The high flowability of SCC makes it possible to fill the formwork without vibration. Recently, this concrete has gained wide use in many countries for different applications and structural configurations. It can also

be regarded as "the most revolutionary development in concrete construction for several decades". Originally developed to offset a growing shortage of skilled labours, it is now taken up with enthusiasm across European countries for both site and precast concrete work.

Defination of (SCC)

Self – Compacting Concrete (SCC) is defined as concrete that has an ability to flow under it's own weight, to fill the required space of formwork completely and to produce a dense and adequately homogeneous material without a need for vibrating compaction.

Defination of Microsilica/Silica Fume

Microsilica or silica fume is an excellent admixture for concrete as it leads to better engineering properties. It reduces thermal cracking, improves durability, and increases strength. Silica fume concrete has a number of construction applications.

OBJECTIVE OF PAPER

This experimental study main objective is to find the rheological and mechanical properties of the M-60 grade Mix design for self-compacting concrete under guideline of IS 456:2000 and EFNARC (Specification and guideline for Self- compacting concrete). In this research paper we showed interest to find the performance of SCC with addition different percentage of micro silica with fixed weight of cement. Six SCC mix design trails has been done with different dosage of micro silica i.e., 0%, 2.5%, 5%, 7.5%, 10% and 12.5% silica fume by mass of cement content and discuss the various aspects of SCC including the type of materials used, mix proportion, Rheological Properties and Mechanical Properties of self- compacting concrete, testing methodologies, acceptance criteria as per relevant code provision. All the experiments were done at room temperature $27^{\circ}\text{C} \pm 2^{\circ}\text{C}$. Six trials mixes are prepared based on addition of silica fume with cement.

LITERATURE

Following are the list of researches who has worked in this area:

K. Satish, S. Kumar, B. Rai, [Self compacting concrete using fly ash and silica fume as pozzolanic material]:

A comparative study was done by some researchers on SCC by partial replacement of cement with fly ash and Silica fume. 135 cubes and 90 cylinders were cast. The mix with silica-fume produced more strength compared to fly ash mixes in SCC. L-box ratio decreases with an increase in silica fumes content and fly ash increases the workability of SCC

H.A. Mohamed, [Effect of fly ash and Silica-fume on compressive strength of selfcompacting concrete under different curing condition] Different percentages of silica-fume and fly ash were used in SCC. From results, 15% of silica-fume produces high strength than the 30% of fly ash in SCC.

K. Shobana,[Preliminary study of self compacting concrete by adding silica fume-a review paper]. Suggest don't use more than 6% of silica-fume in SCC because it leads to higher the modulus of elasticity value than usual.

V.C. Khed,[Development of response surface models for self-compacting hybrid fibre reinforced rubberized cementitious composite]. Using rubber and polyvinyl alcohol (PVA) fibre in SCC produce self-compacting hybrid fibre reinforced rubberized cementitious composite. Using PVA fibres diminishes the workability of SCC

Mohammad kasim, Amir, Shiwani Bharti [Effect of size of Aggregate on selfcompacting concrete of M-70 Grade]. The present investigation is aimed at developing high strength self-compacting concrete of M-70 Grade. The parameter of study includes grade of concrete and effect of size of aggregate.

RESEARCH METHODOLOGY

Many different testing methods have been developed in attempts to characterize the properties of SCC. So far, no single method or combination of methods has gained universal acceptance and most of them have their own followers. Similarly, no single method has been found that captures all relevant workability aspects, so each mix design must be tested by more than one test method for different workability parameters. SCC components: cement, water, mineral admixture, fine aggregate, coarse aggregate and superplasticizer were taken as input variables and compressive strength as output variable.

RESULTS

Different tests are suggested for analysis of the rheological properties SCC such as flowability test, V funnel test, T50 time, L box test. The results of these tests on 6 concrete mix design trials containing addition of silica fume. Increasing rate of silica fumes in mix design was less than those in separate material. And also slump flow was decreased by adding used materials in these tests.

CONCLUSION

- Rheological and mechanical properties were studied of the comparative study of selfcompacting concrete with and without using the Silica Fumes.
- The increase in the content of silica fumes increases the viscosity and workability of SCC& decrease the ratio of L box test and Passing time in V funnel test.
- The addition of silica fumes in trial mix increases the flowability and passing ability of concrete. The relationship between the viscosity and Silica fume are linear
- Addition of silica fumes in SCC increases the segregation resistance as compared to SCC mix trials without using Silica fumes.
- Silica fumes enriches the workability of SCC and make the concrete homogenous and adhesive up to certain limit because during our experimental study we observed that at 12.5% addition of silica fume of total mass of cement, the concrete become more workable that it causes bleeding in fresh state.
- The usage of silica fumes produces higher compressive strength to the trail concrete mix of SCC compared to the trial mix without using silica fumes.
- The addition of silica fumes had the major effect in the self-compacting concrete, it increases the compressive strength up to 20% compared to trial mix without using Silica Fume.

- The highest compressive strength at 7 days and 28 days were obtained by using 10% silica fume by the total weight of cement in the concrete trial mix. The SCC containing 8% to 10% of the silica fumes provide the better result in fresh and hardened concrete.
- Usage of silica fumes between 9 to 10 percentage in SCC are economical too with best result.

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A Case Study of Dampness in Residential Building

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ABSTRACT

In this project, we have conducted studies on the various causes of dampness in buildings and explored prevention and treatment methods. Dampness in buildings is a pervasive problem that has troubled builders and homeowners for centuries. It manifests as unwanted moisture in the walls, floors, or ceilings, leading to a range of issues from aesthetic damage to serious structural failures. Understanding the causes, prevention, and treatment of dampness is crucial for maintaining the durability of buildings and the health of their occupants. This dampness problem has been a concern since the ancient times and still it's a problem in the present date. This project investigates the various causes of dampness in buildings, along with prevention and treatment methods. Dampness has been a persistent issue from ancient times to the present day, posing significant challenges to building integrity and occupant health. The primary objective of this study is to identify the sources of moisture that cause dampness and to propose effective solutions for its prevention and treatment. Moisture, the main culprit of dampness, can originate from several sources, each of which is examined in detail in this project. The major cause of the dampness is moisture and it can occur due to different reasons which are mentioned in the project and there are also prevention and treatment methods mentioned. Dampness in the building can also cause some serious health related problems to the occupant of the building and it already gives different problems like bad odour, corrosion, failure of structure etc.

KEYWORDS : *Dampness, Odour, corrosion, Prevention*

INTRODUCTION

Dampness is the presence of unwanted moisture in the building structure it is either the result of intrusion from outside or condensation from within the structure. Moisture in buildings is a major contribution to mold growth, unhealthy buildings and poor air quality. A high proportion of damp problems in buildings are caused by the surrounding climate dependent factors of condensation, rain penetration and rising damp. Dampness in the building leads to weakening in the strength of the materials and can cause the structure to fail and damage to the property as well, it also creates unhealthy environment for the users in the building because it gives rise to breeding of mosquitoes. Damp in the building occurs mostly on the floors and the walls of the building because the floors are close to

the ground and the walls are directly exposed to the outside weather. Dampness in the wall ruins the paint and also the decorations and quality of the wall, it can also results in rotting of timber especially timber fitting doors and windows. Continuous dampness can cause breeding of germs of dangerous diseases such as tuberculosis, neuralgia etc, it can also cause asthma to the people staying in the building, therefore prevention and treatment of dampness in the building is necessary and to do this finding the sources of the moisture is important, since moisture is the main cause of the dampness.

Causes of Dampness

Dampness in the residential building at Gamma 1 location were due to several major reasons which we are going to discuss below:

1. Rising Damp
2. Penetration Damp
3. Condensation Damp

RISING DAMP

Rising damp is the upward movement of moisture through permeable materials by capillary action. Water rises through the pores in the masonry via a process called Capillarity. The moisture travel upwards through capillary action and evaporates from the internal and external surface of the walls and this process allow more water to be drawn from the ground. Buildings have been facing the phenomenon of rising damp but in our case study ground water table was not the reason for rising damp as the GWT was 160m below the ground surface.

Sources of Rising Damp

Accumulation of rainwater – During rainy season rainwater gets trapped at the base of two adjacent walls of two different buildings due to which rainwater gets accumulated over there and starts penetrating through the walls causing rising damp.



Fig. 1 & 2 show the Rising dampness

PENETRATION DAMP

Roof cracks can allow water to seep into roof structure, leading to water damage and mold growth in building roofs. If left unattended, small cracks can turn into larger ones, causing even more significant problems. Due to presence of bathroom just above the inspected room, we found that water was seeping through the

base of bathroom wall and damaging the roof of the inspected room.



Fig 2 & 3 Show the penetration in roof

Sources of Penetration through roof

Water seepage through walls is most likely caused by faulty plumbing. Plumbing plays a very important role in the free flow of water through walls. Hence, if a damaged or defective plumbing goes unnoticed, it can slowly create a wall seepage problem. At our study location seepage through walls was causing due to internal plumbing leaks, and at outer wall of bathroom due to constant hitting of water from shower at the inner tiles of the bathroom and due to bad workmanship while placing the tiles. This problem was causing heavy seepage in the walls.





thus causing the mortar to crumble and wall to structurally fail.



Fig 3 & 4 Show the penetration seepage

CONDENSATION DAMP

Penetration of moisture in the building is either the result of intrusion from outside or condensation from within the structure. Condensation occurs when warm moisture laden air comes into direct contact with a cold surface such as a wall, window or windowsill. Moisture penetration also occurs when there is wet weather and voids present in the walls or roof. Penetrating damp in the properties is usually the result of defect in the building such as external damage from roof tiles, cracks in the wall, faulty guttering or internal damage from leaking or burst pipes, porous walls and bad workmanship.



Fig 4 & 5 Show occurrence of salt action

Effects of Dampness

Dampness in the wall cause efflorescence (white deposits of salt patches formed on the surface of walls due to evaporation of water from its pores) and sometime dampness is responsible for disintegration of bricks, stones, tiles etc. The wall decoration (like painting) gets damaged due to dampness. The flooring get loosened because of reduction in the adhesion when moisture enters through the floor. Timber fittings (such as doors, windows, almirahs) when come in contact with damp walls or floors, gets deteriorated because of warping, buckling, dry rotting etc of timber.

Occurrence of Salt Action

Salt damp is an effect of condensation damp which happens when moisture passes through the soil ground and reaches the masonry wall. It occurs because there is no damp-proof membrane or damp- proof membrane has been ruptured. The heat prompts the moisture to evaporate out of the wall surface, which is why the deterioration of the mortar in the wall occurs. The salt that rises in the moisture crystallises after evaporating

Dampness in building can be very dangerous if any form of electrical fittings come in contact with it. Floor coverings are damaged. Therefore, no floor coverings should be used on damp floors. Dampness promotes and accelerates growth of termites. Dampness breeds germs of dangerous diseases such as tuberculosis, neuralgia, rheumatism etc. Metal fitting get corroded and rusted due to dampness.

Effects of Dampness on Health

Dampness in building also causes adverse effect on health of people living in there such as respiratory infections, worsen asthma, allergic conditions and can also cause weakened immune system for people with serious health conditions.

Prevention of Dampness

By providing DPC (Damp Proofing Course) By surface treatment, by providing damp proof paint (emulsion asphalt) By integral water proofing method. By providing damp proof membrane. By avoiding leakage of water pipes. By avoiding condensation in the building.

By providing good roofing. By providing proper Ventilation

PREVENTIVE MEASURES BEFORE CONSTRUCTION

Before constructing any building it's always necessary to check all the possibilities that can cause future dampness problems. Generally, before construction we always check the level of ground water table which plays an important role in damaging the walls of a building due to capillary rise of water, also known as rising damp. The groundwater table typically needs to be within about 1.5 to 2 meters of the ground surface to cause rising damp in buildings. However, this can vary depending on factors such as soil type, building materials, and drainage systems. Other than ground water table there are several other sources that could cause dampness problems such as nearby ponds. Like groundwater, if the pond water level is high and the building lacks proper damp-proofing measures, moisture can rise through the porous materials of the foundation walls, causing rising damp issues.

Sewage pipelines can also contribute to dampness problems in buildings if they leak or if there are issues

with their installation or maintenance. When sewage leaks occur, it can lead to moisture seeping into the surrounding building structures, causing dampness, Mold, and other related issues. Additionally, if sewage pipelines are not properly insulated or ventilated, condensation can form on their surfaces, further contributing to dampness problems. Proper maintenance and inspection of sewage pipelines are essential to prevent these issues from occurring.

PREVENTIVE MEASURES AT THE TIME OF CONSTRUCTION

DPC in building construction is known as damp proof course and it is used to prevent moisture rising through the walls or floors of a structure. Moisture ingress can lead to various problems such as dampness, Mold growth, and structural deterioration. DPC typically consists of a 25 mm to 50 mm thick layer or barrier made of materials like bitumen, plastic sheets, slate or cement mortar, strategically placed within the walls or at ground level during construction. This barrier effectively blocks the capillary action of water, preventing it from seeping upwards. DPC is essential for maintaining the structural integrity and habitability of a building, as it helps to create a moisture-resistant barrier, safeguarding the interior spaces from the damaging effects of water infiltration. The best location or position of D.P.C. in the case of building without basement lies at plinth level or structures without any plinth level, it should be laid at least 15cm above ground level. The damp proof course is provided horizontally and vertically in floors, walls etc.

Water Proof Coating

Waterproofing is the process of making an object or structure waterproof or water resistant. Thanks to this process, the insulated surface or structure resists water ingress.

For Walls

Wall putty is a versatile material that is used in the construction process. It is a clay-type material that is white in colour and is majorly used as a primer on the walls or any other surface of the building before applying the final paint. There are different types of waterproof putty for interior walls, and exterior surfaces available

in the market. These include waterproof wall putty, waterproof silicone putty, cement wall putty, waterproof putty for pipes, removable waterproof putty, and so on. Wall putty is used as a protective layering for paints, as it helps in sticking the paint to the wall, and keeps it fresh and new, without it chipping off. Wall putty is a white cement-based powder that is made of polymer, and other minerals that make walls look smoother. It is mainly used for filling cracks and holes in walls and preparing an even surface before applying paint. Using waterproof exterior wall putty helps to provide better protection against stains, Mold & cracks for your walls. The waterproof sealing putty is used depending on the surface, and it may take 1-2 coats of putty coupled with sanding to make the surface ready for fresh paint.

Different Types of Waterproof Wall Putty

There are mainly two types of waterproof wall putty available in the market –

Cement Wall Putty: Cement wall putty is mainly used for repairing concrete and masonry surfaces and is available in powder form.

Acrylic Wall Putty: Acrylic putty can be used on plaster as well as drywall surfaces. It is available in either a ready-to-use or a powder form. Acrylic wall putty usually has a smooth finish.

For Roof

In buildings, waterproofing creates a barrier to prevent water passage on surfaces that have high contact with water such as foundations, roofs, and walls. Thanks to waterproofing, building surfaces are strengthened and waterproofed. In short, waterproofing is a protective measure that makes a surface water-resistant and prevents liquids from penetrating undesirable surfaces under external forces such as hydrostatic pressure and capillarity.

TREATMENT OF DAMPNESS

After Construction Treatment of Dampness

Waterproofing is a process aimed at protecting a building or structure by making it impermeable to water under several conditions. The building becomes impervious to the ingress of water. This process hinders water from

penetrating inside buildings, thereby reducing humidity that water penetration can cause.

Types of Water Proofing

Bituminous Waterproofing: Bitumen is a hydrocarbon that can occur naturally or be refined as one of the products from the fractional distillation of petroleum. It is a mixed substance of highly viscous organic black, sticky, and waterproof organic liquids. Bitumen waterproofing is basically used to protect residential areas and commercial structures; also used in some roof constructions, as seen in roll roofing and roof felt products.

Polyurethane Liquid Membrane: Polyurethane is widely known because it is quite easy to apply and requires less technical skills and observation, unlike the others. It comprises two basic components: the cyanide, which makes for the reactor component, and, polyol, which acts as the base. The mixture of these two in a particular ratio produces the liquid coating used in the application. They are used for some post-construction because their application is fast and gives a consistent finish with good resistance to wearing and high durability.

Cementitious Waterproofing: The cementitious waterproofing product is one of the easiest materials to use in waterproofing applications because they are quite easy to mix with a long hand brush, also commonly sourced by suppliers in the market. While using this type of waterproofing, it is recommended to introduce an acrylic additive to blend with the product to get a good bonding, more solid, and long-lasting coating. They can be used in marine cargo ports/docks, bridges, tunnels, toilets, railways/subways etc. Cement cannot stretch to any length, which is one of its disadvantages. It can withstand any movement of joints or cracks and handle water penetration perfectly.

Liquid Waterproofing Membrane: This waterproofing product is often used in the roof coating process in sealing off the roof from rain drops for all roofs, such as pitched, flat or domed roofs. It is applied in constructions before painting on the walls or placing tiles. Here a special monolithic, liquid base fully bonded coating is used, made up of artificial water-based resin or polymers, adhesives, emulsion, and sealants. Liquid waterproofing can be applied on asphalt, bitumen, and

concrete. After applied, it dries up to form an elastic rubber-like waterproof membrane that can stretch and relax without any fault. They can also be used in areas like water reservoirs, swimming pools, and machines to seal joint corners and gaps to prevent water from entering delicate areas and thereby disrupting operations.

Rising Damp Treatment

If you see tide marks or white salt deposits on the walls above the skirting, it means your property has dampness on walls. Dark patches on walls, flaking paint, musty smell, peeling wallpaper, plaster to bubble, discoloured plaster, and decaying wood are the common signs and alarming stages to fix the issues quickly. This is called rising dampness which can lead to deterioration of the property.

The common method used to fix rising damp is to install a new damp-course by cutting the walls or pressure injecting or gravity feeding water repellent materials (e.g. silicones) into the walls. The methods are expensive and complicated and may only be properly conducted by professional contractors.

Elastic Damp Treat

Damp Treat is a simple and expensive alternative. It is an innovative silane/siloxane cream formulated as a water based cream containing 80% active silicone that can effectively form a permanent silicone damp course within the masonry walls and surfaces.

Procedure to Damp Proof a Wall

Step 1: Identify the rising damp. Exclude any other types of damp that may be caused by penetrating damp or leaking pipes, roof or shower sources. These sources may require a different type of treatment. Locate a mortar joint 150mm above the ground level, mark holes approximately 110mm apart. Avoid drilling holes directly above vertical mortar joints of bricks.

Step 2: Set drilling length 3mm less than the wall thickness and drill 12mm holes into the mortar bed. Completely remove dust from holes and fit the plastic nozzle to the Damp Treat caulking tube.

Step 3: Once attached, fit plastic tube extension to nozzle. Cut to a proper length to suit the thickness. Inject Damp Treat cream slowly into each hole using a standard caulking gun.

Step 4: Extend the nozzle of the gun to the rear of the hole and slowly withdraw the nozzle as the cream fills the hole. Make sure holes are fully filled with the cream and avoid bubbles while filling. Once inserted, the damp proofing cream reverts to a liquid. This allows it to penetrate the bricks and achieve complete absorption. As it cures, it creates a powerful water-repellent barrier and a new chemical DPC that stops water from rising up the wall

RESULT

After conducting a comprehensive study on dampness in residential buildings, it is evident that dampness poses significant risks to both the structural integrity of the building and the health of its occupants. The study highlights the importance of proper ventilation, effective moisture barriers, and regular maintenance to prevent dampness. Implementing these measures can help mitigate the adverse effects of dampness, ensuring a safer and healthier living environment for residents.

The study identified that failure of not using damp-proof coarse and materials, water proofing techniques, regular plumbing maintenance and proper ventilation facilities are some of the causes of rising damp in complete building.

Recommendations for future work

Rising damp has been a very common problem in India especially when it comes to residential buildings. In our study we found that dampness cannot be completely eliminated after the construction of building, so its always better to take preventive measures before or at the time of construction to increase the life span of a building. Some necessary preventive measures that needs to be taken while or before construction are proper installation of DPC at the plinth level which restrains the capillary

rise of water from the base, various surface treatment methods can be used to avoid moisture penetration, water proofing is a good way to avoid seepage problems. When it comes to treatment of dampness Elastic Damp Treatment could be one solution that might solve the problem of dampness up to some extent, but it is a expensive treatment lasting only up to 5-10 years, if applied and maintained properly. Hence, it can be said

that prevention is always better than cure when it comes to increasing the life span and efficiency of a building.

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Two Critical Approaches to Reading Rupi Kaur's Digital Poetry: Can Insta-creativity be Accepted in Academic Research?

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ABSTRACT

e-Literature of which Insta-poetry is a branch has yet not accepted for academic research. Since creativity is connected to technology, it is not generally considered creative art. The paper presents findings on applicability of two important critical approaches (Reader Response Theory and New Criticism) to Rupi Kaur's work, Milk and Honey, using Reader Response Theory. Kaur, an Indo-Canadian author, connects with readers globally through her unique writing style and themes of love, grief, trauma, and healing. The paper discusses the evolution of Reader Response Theory, its case studies, its connection to other literary theories, practical applications in classrooms, and ongoing debates on subjectivity and objectivity in interpreting texts within this framework. The New Criticism (NC) emerged from a critique of modern capitalist society, emphasizing the importance of careful consideration in critical analysis.

INTRODUCTION

Rupi Kaur, an Indo-Canadian poet and artist, is known for her thought-provoking poetry and unique style. Her first poetry book, Milk and Honey, was published in 2014 and achieved New York Times bestseller status. In this section, we applied new criticism as approach to Rupi Kaur's work. Her unique style, featuring brief verses and simple illustrations, resonates with global readers and is widely accessible due to her use of free verse. The history of close critical practice often begins with Richards' emphasis on the poem in the analysis of any kind. Richards argued that the most important thing about works of literature was their aesthetic potential, which he saw as their ability to act as means by which readers can develop many of their most useful practical faculties. He believed that the work of literature was a kind of therapeutic technology, and the critic was a doctor of applied psychology, helping us to use that technology to improve our minds.

Richards' goal in Principles of Literary Criticism was to develop a general answer to the fundamental question

for criticism and aesthetics: "What is the value of the arts, why are they worth the devotions of the keenest hours of the best minds, and what is their place in the system of human endeavours?" He dismissed the entire body of writings on philosophical aesthetics since Kant, focusing on the art-for-art's-sake aestheticism of the 1890s.

New Criticism and Critical Models

Ransom, Tate, and Warren all critiqued Southern paternalism but each focused on different issues and formulations. Ransom limitedly opposed aesthetic activity and called for the end of industrial capitalism without offering political strategies. Tate focused on writer's social organization and the creation of a profession of letters. Warren's career, influenced by Agrarianism, focused on the writer's relationship with politics and social criticism.

New Criticism is often criticised for its misunderstood concepts of 'autotelic' and separation from history, culture, and personality, making it difficult for

academicians and researchers to practice well as pedagogical and research approaches.

The New Critics, a group of Southern intellectuals, were influential in the politics of aesthetics and Southern culture. They opposed the abstractions of capitalist will to power and associated it with the cash-nexus and scientific positivism. They believed that the South provided an alternative social order to modern society and that material productivity was the fundamental way of judging a social order.

Ransom, Tate, and Warren, the developers of the New Criticism (NC), were not part of the "Southern planter class" or concerned with protecting slavery. They started composing in the second and third decade of the 20th century and coordinated their literary and critical activities as a group in 1922 via the production of a poetry journal, *The Fugitive*. They argued for an alternative social structure, the traditional society, which had a greater awareness of the past and established methods of life that took into consideration material and historical restrictions.

In the mid-1930s, authors like Tate, Ransom, and Warren gave up on Agrarianism and focused on changing English instruction in the United States. Contemporary criticism has not remedied the ahistorical views of the New Critics, but tends to be more ahistorical, relying more on language analysis than the New Critics.

The discussion revolves around the moral diversion of the Humanists and Leftists in English studies, who argue that literature should serve the cause of loving-comradeship and revive the Aristotelian moral canon. The difficulty of being critical and exact simultaneously is highlighted, as history is firmer ground than aesthetics.

Ransom, Tate, and Warren were influential figures in the New Criticism movement, focusing on aesthetic activity and social organization. They criticized literary modernism as a loss of traditional ways of living and emphasized the importance of aesthetic forms being produced out of an active and creative engagement with their social and cultural context. Ransom's *Aesthetic Forms* are a technique of restraint, not efficiency, and he argued that humanity resided in its ability to move beyond purely economic needs and develop other interests.

Tate's contribution to the New Criticism is less clear than Ransom's but is fundamental. He focused on his status as a poet and maintained an uneasy relationship with the academy until the 1950s. Tate's *Reactionary Essays on Poetry and Ideas* focuses on Emily Dickinson and the destruction of traditional society caused by industrial capitalism. Warren's model of literature critique, influenced by Agrarianism, focuses on narrative fiction and social life representation.

Ransom, Tate, and Warren's work in the late 1920s and early 1930s aimed to provide an alternative to existing literary education, criticizing existing approaches to literature, including Neo-Humanism and Stalinized Marxism. Brooks' Model, a transitional figure in the late 1930s and 1940s, rely on social criticism from Ransom, Tate, and Warren but does not become involved in the Agrarian movement.

In Rupi Kaur's Insta-Poetry, the Right to Information (RTI) revolutionized the new democracy, providing authority to individuals, enhancing openness and responsibility in governmental activities, and curbing corrupt practices. The Right to Beautify theme in Kaur's Insta-Poetry emphasizes the importance of women's rights to beautify themselves and their desire for cleanliness.

1. Talking about sex, and love-hate feelings clearly
2. Taking initiatives to start relationship
3. Talking about beauty of one's body
4. Talking about satisfying and unsatisfying sexual relationships.
5. Talking about loss, depression, attempt to suicide feelings, failure in love
6. Talking about

In postmodern radical feminism asserts of freedom of one's body from every shackle of male-centric or phallogocentric patronships.

my eyes make mirrors out of
every reflective surface they pass
searching for something beautiful looking
back
my ears fish for compliments and praise

but no matter how far they go
 looking
 nothing is enough for me
 i go to clinics and department stores
 for pretty potions and new techniques
 i've tried the lasers
 i've tried the facials
 i've tried the blades and expensive creams
 for a hopeful minute they fill me
 make me glow from cheek to cheek
 but as soon as i feel beautiful
 their magic disappears suddenly
 where am i supposed to find it
 i am willing to pay any price
 for a beauty that makes heads turn
 every moment day and night (Kaur, The Sun
 and Her Flowers)

Woman as an object is described in the line bellow:

show me a picture
 I want to see the face of the woman
 who made you forget the one you had at home
 what day was it and
 what excuse did you feed me I used to thank
 the universe
 for bringing you to me
 did you enter her right as
 I asked the almighty
 to grant you all you wanted
 did you find it in her
 did you come crawling out of her
 with what you couldn't in me”
 “i notice everything i do not have
 and decide it is beautiful (Kaur, The Sun and
 Her Flowers)

DISCUSSION

Reader Response Theory to Rupi Kaur's Work: A Digital Humanities Perspective

The Reader Response Theory, developed by Louise Michelle Rosenblatt, emphasizes the reader's interpretation of a text influenced by their personal experiences, beliefs, and emotions. Critics argue that this theory lacks objectivity in interpretation and overemphasizes reader subjectivity. However, it has broadened the area of literary analysis by underlining the dynamic and participatory aspect of the reading experience. In this section, we discussed how reader response theory can be used as DH approach to Rupi Kaur's two collection of Insta-poetry Milk and Honey and Homebody.

Digital creative writing has evolved significantly due to the rapid development of digital technologies, combining technology, art, and literature. Digital humanities, a fusion of technology and humanities subjects, involves digitizing, analyzing, and presenting humanities information. The emergence of digital creative writing in the late 20th and early 21st centuries facilitated the blending of digital technology and approaches in art and literature research.

Post-digital writing, a modern approach to writing, acknowledges the impact of digital technology and aims to go beyond it, empowering collaboration and fostering a broader understanding of communication. It challenges the notion that "new" is always superior and emphasizes the thoughtful use of technology in writing, promoting inclusivity and seeking a harmonious coexistence between digital advancements and human expression.

Digital creative arts and writing encompass various forms and formats, including prose, poetry, drama, and fiction. The future of digital creative arts and writing holds promise for interdisciplinary collaboration, technological innovation, and cultural transformation. Challenges include access, inclusivity, and sustainability.

Reader-response theory, a theoretical approach that emerged in the late 20th century, emphasizes the continuous mental processes and reactions of readers, arguing that the meanings of a text are created by

individual readers. This approach differs from objective criticism in beliefs about factors influencing reactions, the line between objective and subjective responses, and the control of a text.

Rupi Kaur's *Milk and Honey* and *Homebody* explores themes of survival, violence, abuse, love, loss, and femininity, offering relief and joy in the midst of difficult times. The poem explores power dynamics in relationships, emphasizing the importance of understanding personal backgrounds and the impact of silence on self-expression.

Reader Response Theory has transformed literature studies by shifting focus from author intention to reader interpretation, suggesting that the meaning of a text is determined by the reader's interpretation, influenced by their personal experiences, beliefs, and emotions. Major models include Louise Michelle Rosenblatt's "transactional theory," Wolfgang Iser's "implied reader," and Stanley Fish's model. Future research should explore its impact on educational teaching, the relationship between Reader Response Theory and other literary theories, and the importance of empathy in influencing emotional engagement with a text.

CONCLUSION

The article argues that "close reading" in the US, often associated with the New Critics, is not the same as the approach adopted by Richards and Empson. New criticism can be applied as a research method to read literature, while Reader Response Theory has transformed literature studies by shifting focus from author intention to reader interpretation. Critics argue it lacks objectivity, overemphasizes reader subjectivity, and has cultural biases. Both can be applied on reading digital / e-Literature/ poetry of which Insta-poetry is a branch.

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