



ANALISTA: INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH (AIJMR)

Volume I | Issue I | Dec. 2023

Journal Website: <https://allenhouse.ac.in/analista/>



Allenhouse
Institute of Management

December, 2023

A Publication of Allenhouse Institute of Management

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Publication: Kanpur

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A STUDY ON ROLE OF HRD IN EMPLOYEE ENGAGEMENT

Dr. Venus Madan

Assistant Professor, Allenhouse Business School, Kanpur (UP)

E-Mail: bba.venus@allenhouse.ac.in

Dr. Anubhav Sony (Co-Author)

Assistant Professor

Allenhouse Business School

Abstract: Employee engagement, a linchpin of organizational effectiveness, has garnered substantial research interest.

Aim - This study explores the influence of Human Resource Development (HRD) practices on fostering employee engagement and mitigating turnover intentions of teachers/faculties of the Kanpur district. As per Social Exchange Theory, the researchers explored the potential mediating effect of engagement on the relationship between HRD practices and turnover propensity.

Data- Primary data will be collected from the teachers/faculty members using a self-administered questionnaire. Secondary data will be collected from Journals, Articles and Books of National and International Repute.

Method- A quantitative approach will be preferred to conduct the research whilst utilizing a simple random sample of 100 employees from 20 Colleges of higher education and Universities in Kanpur, India. These institutions are strategically chosen from various regions of Kanpur city. Further, T-test will be employed for primary data analysis and Bibliometric analysis will be used on the secondary data that is being extracted from Journals and books.

Significance- The findings will raise the curtain from the main objective: How HRD practices, particularly those that emphasize employee growth and development, contribute to a more engaged and committed workforce. By examining the potential mediating role of employee engagement, this study seeks to generate valuable insights for HR professionals. The results will inform the development of effective strategies to bolster employee satisfaction and retention, ultimately contributing to a more productive and successful organization.

Results: The findings of the study may contribute to a more productive and successful academic environment, fostering a sense of community and purpose among employees, and leading to a more positive experience for students as well.

Key Words: HRD, HRM, Kanpur, Faculty, Teachers, Social Exchange theory

1. Introduction:

HRD is a strategic and systematic function within organizations that cultivates a competent, engaged, and adaptable workforce. It emphasizes investing in processes that enhance employee capabilities

to achieve organizational goals and objectives. The primary components of HRD are – (1) Training and Development, (2) Performance Management, (3) Career Development, (4) Motivation and Rewards and, (5) Employee Engagement. (Malik, et

al., 2020) Employee retention is a critical challenge for many organizations. When skilled employees are not valued, they are more likely to seek opportunities elsewhere. Fortunately, strategic Human Resource (HR) practices can play a significant role in keeping employees engaged and satisfied. A strong HR department can foster a positive work environment by implementing effective retention strategies. Supportive supervisors who champion their employees' growth further enhance employee morale and loyalty, contributing to a more successful organization.

The study focuses on how HRD practices influence employee engagement. This likely involves training and development programs that enhance teachers' skills and knowledge. HRD practices might encompass performance management systems that provide teachers with feedback and opportunities for growth. The study also suggests HRD practices that foster engagement. This could involve motivational strategies and reward systems that recognize and appreciate teachers' contributions. The research selects teachers/faculty as the target group for several reasons: Employee Engagement Crucial in Education: High teacher engagement is vital for a successful learning environment. Engaged teachers are more invested in their work, leading to better student outcomes. Teacher Turnover: The study aims to understand how HRD practices can reduce turnover intentions. High teacher turnover disrupts learning continuity and can negatively impact educational institutions. Social Exchange Theory: The research applies Social Exchange Theory, which emphasizes reciprocal relationships. By investing in teachers' growth through HRD

practices, institutions can foster a sense of obligation and loyalty, reducing turnover.

2. Research Problem

This study aims to elucidate the intricate interplay between Human Resource Development (HRD) practices, teacher/faculty engagement, and turnover intentions within the educational landscape of Kanpur district. The central inquiry focuses on how various HRD initiatives implemented by schools cultivate a more engaged teaching workforce, consequently mitigating their propensity to leave their positions.

3. Literature Review

Shuck et al. (2014) identified a gap in research on how employee perceptions of HRD support influence engagement and turnover intentions. Their findings suggest that providing opportunities for employee development fosters a sense of reciprocity, leading to higher engagement and lower turnover. Shuck and Karen (n.d.) emphasized the need for a clearer understanding of employee engagement. They pointed out the lack of a consistent definition and called for a more rigorous research approach to develop effective engagement strategies. Balakrishnan and Ahmad Wani (2022) explored the link between effective HR practices and employee engagement. Their research, focusing on companies like Apple and Microsoft, emphasizes the importance of tailoring HR policies to meet the specific needs of employees. Rehman et al. (2020) investigated the impact of HRD practices on employee satisfaction and turnover intentions in Pakistani government departments. While their study confirmed the positive influence of HRD on employee retention, it also

highlighted the moderating role of perceived organizational support (POP). They suggest that organizations need to not only offer development opportunities but also cultivate a supportive work environment to maximize the benefits of HRD practices.

Alajlani & Yesufu (2022) highlight the importance of effective HR practices for retaining employees in UAE universities. Their findings suggest that performance appraisals, empowerment, compensation & benefits are crucial for both Emirati and expatriate employees. However, a lack of focus on empowerment, training & development for expatriates necessitates targeted improvements in these areas. Singh (2015) critiques the dominance of Western models in HR research, calling for a more culturally-sensitive approach. He emphasizes the need for HR strategies tailored to different employee skillsets and backgrounds. Recognition through promotions and salary hikes remains important, but fostering a meritocratic culture, providing engaging work, and clear career paths are equally critical for retention. Pan et al. (2021) investigate the link between HR practices, performance, and retention. They find that training & development, competitive salary, performance appraisals, and fair compensation all contribute to higher job performance, which in turn strengthens employee retention. This suggests that effective HR practices can lead to a more engaged and productive workforce, ultimately reducing turnover. Anon. (2021) explores the connection between recruitment practices, employee commitment, and retention. This study suggests that effective recruitment has a more significant impact on employee commitment compared to retention efforts. Interestingly, the study identifies

loyalty as a mediating factor between various HR practices (compensation, grievance handling) and both commitment and retention. This implies that fostering employee loyalty can be a powerful tool for both attracting and retaining talent.

These studies offer valuable insights for organizations seeking to improve employee retention. By implementing a combination of effective HR practices (performance appraisals, training & development, competitive compensation), fostering a culture of recognition and career growth, and tailoring strategies to specific employee demographics, organizations can create a more engaged and committed workforce, leading to a more stable and productive work environment.

4. Research Methodology

The primary concern of this study is to explore the influence of Human Resource Development (HRD) practices on fostering employee engagement and mitigating turnover intentions of teachers/faculties of Kanpur district.

Sampling of data: Two Hundred Assistant/Associate/Professors from select university/colleges of Kanpur district using convenience-based quota sampling.

Data Analysis: Five Point rating-based Likert's scale was employed to collect the data from target sample. Cronbach's Alpha was further employed to check for internal consistency of collected data. Finally, T-test was used for test of hypothesis as the research theme aims to compare means between groups.

Table 1: Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
My institution provides adequate opportunities for professional development (e.g., workshops, conferences).	2.536	.113	-1.362	198	.175	-.10300	.07563	-.25215	.04614
			-1.360	192.885	.175	-.10300	.07574	-.25240	.04639
I feel the training and development programs offered by my institution are relevant to my teaching needs.	1.785	.183	-.632	198	.528	-.03608	.05707	-.14863	.07647
			-.626	183.949	.532	-.03608	.05763	-.14977	.07762
My performance is regularly evaluated through a fair and constructive feedback process.	.254	.615	-.320	198	.750	-.03176	.09935	-.22767	.16416
			-.318	190.725	.751	-.03176	.09973	-.22847	.16496
I feel motivated and enthusiastic about my work as a teacher.	.396	.530	.702	198	.483	.07999	.11388	-.14458	.30457
			.705	196.541	.482	.07999	.11344	-.14373	.30371
I feel a sense of belonging and value within my institution.	10.193	.002	-2.106	198	.036	-.16983	.08064	-.32886	-.01081
			-2.082	181.763	.039	-.16983	.08155	-.33075	-.00892
I am committed to contributing to the success of my students and the institution.	2.577	.110	-2.545	198	.012	-.22932	.09012	-.40703	-.05161
			-2.553	196.262	.011	-.22932	.08982	-.40646	-.05219

Table 2: Group Statistics

	Gender	N	Mean	Std. Deviation	Std. Error Mean
My institution provides me with adequate opportunities for professional development (e.g., workshops, conferences).	Male	107	1.3271	.52800	.05104
	Female	93	1.4301	.53968	.05596
I feel the training and development programs offered by my institution are relevant to my teaching needs.	Male	107	1.1682	.37583	.03633
	Female	93	1.2043	.43136	.04473
My performance is regularly evaluated through a fair and constructive feedback process.	Male	107	1.9252	.68268	.06600
	Female	93	1.9570	.72102	.07477
I feel motivated and enthusiastic about my work as a teacher.	Male	107	1.8972	.82341	.07960
	Female	93	1.8172	.77944	.08082
I feel a sense of belonging and value within my institution.	Male	107	1.2710	.52432	.05069
	Female	93	1.4409	.61613	.06389
I am committed to contributing to the success of my students and the institution.	Male	107	1.5234	.64932	.06277
	Female	93	1.7527	.61954	.06424

5. Discussions:

Professional Development Opportunities: Mean Scores - Both males (1.3271) and females (1.4301) scored relatively low on the agreement scale (1 = Strongly Disagree, 5 = Strongly Agree) regarding the adequacy of professional development opportunities. This suggests a potential area for improvement in HRD practices.

Standard Deviation - The standard deviations (around 0.5) indicate some variation in perceptions within both genders.

Training and Development Program Relevance: Mean Scores - The means for both genders (males: 1.9252, females: 1.9570) are closer to the neutral point (3), suggesting a mixed perception of fairness and

constructiveness in the performance evaluation process.

Employee Engagement: Motivation and Enthusiasm - Scores for both genders (males: 1.8972, females: 1.8172) are slightly below the midpoint, indicating a need for improvement in fostering motivation and enthusiasm among teachers. **Sense of Belonging and Value -** Females (1.4409) scored slightly higher than males (1.2710) on feeling valued within the institution. However, both scores remain below the neutral point, suggesting potential concerns.

Commitment to Student and Institutional Success - Interestingly, both genders scored relatively high (males: 1.5234, females: 1.7527) on commitment, indicating a strong dedication to student success despite potential shortcomings in HRD practices.

While teachers seem committed to their work, the data suggests areas for improvement in HRD practices to enhance employee engagement. The observations were made as –

- i. The current professional development opportunities and training programs might not be meeting teachers' needs.
- ii. The fairness and perceived value of the performance evaluation process could be explored further.
- iii. Strategies to boost teacher motivation and foster a stronger sense of belonging within the institution might be beneficial.

6. Conclusions-

This study examined the influence of Human Resource Development (HRD) practices on employee engagement among teachers/faculty in Kanpur, India. The findings highlight the need for strategic improvements in HRD practices to cultivate a more engaged teaching workforce and potentially mitigate turnover intentions. The key findings are listed as follows -

- i. Professional Development Opportunities: Teacher responses (mean scores) indicated a perceived inadequacy in the current professional development offerings. This suggests a critical need to enhance the quality, relevance, and alignment of training programs with teachers' actual needs.
- ii. Performance Evaluation: The data revealed mixed perceptions regarding the fairness and perceived value of the performance evaluation process. Further investigation into this

aspect is warranted to ensure a constructive and growth-oriented approach to performance management.

- iii. Employee Engagement: While teachers demonstrated a strong commitment to student success, scores for motivation and a sense of belonging within the institution fell below the midpoint. This suggests a need for strategies to boost teacher motivation and foster a stronger sense of community and institutional support.

7. Future Implications

These findings inform several recommendations for strengthening HRD practices within educational institutions:

- i. Needs-Based Development: Shift the focus towards designing professional development programs that are tailored to the specific needs and aspirations of teachers. This can be achieved through surveys, focus groups, or needs assessments.
- ii. Performance Management Optimization: Ensure that performance evaluations are conducted in a fair, transparent, and constructive manner. Provide valuable feedback for growth and development, fostering a culture of continuous improvement.
- iii. Motivation and Recognition Strategies: Implement strategies to enhance teacher motivation and recognize their contributions effectively. This could involve fostering a culture of appreciation, offering opportunities for professional growth, and creating a

sense of belonging within the institution.

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HOSIERY AND LEATHER INDUSTRY OUTLOOK AND FUTURE PLANNING: A CRITICAL REVIEW

Shruti Shankar Srivastava
 Allenhouse Business School, Kanpur (UP)
 E-Mail: bba.shruti@allenhouse.ac.in

Abstract:

The Hosiery and Leather Industry represents important activities in the global fashion and textile industry and contributes to the global market economy. However, understanding and planning for the future of these businesses need to be evaluated regarding the rapid change in consumer preferences, technological development, and sustainability. This research paper focuses on general research on current knowledge and plans regarding socks and leather. Through an interdisciplinary approach involving the economy, environment and society, this study aims to understand strategies to increase the flexibility and adaptability of transactions in the international market.

1. Introduction

1.1 History of the Hosiery and Leather Industry:

The hosiery and leather industry has a long tradition and plays an important role in the design and export of clothing and accessories worldwide. These businesses cover a variety of products such as socks, stockings, tights, shoes, clothing and leather accessories. Historically, these industries have evolved in response to changing consumer preferences, new technologies, and globalization.

1.2 The importance of understanding and planning the future:

Understanding and planning the future are important factors affecting future sustainability and the competitiveness of the economy. Understanding the hosiery and leather industry stakeholders and assessing their preparedness for future challenges is key to driving innovation, enabling growth and long-term success.

2. 1.3 Research Objectives:

The main objectives of this research paper are as follows:

- To examine the current understanding of customers, stakeholders and the public in the hosiery and leather industry.
- Analyze the unexpected future of these sectors in terms of technological advances, business trends and sustainability measures.
- Analysis of strategies to increase the performance and flexibility of the Socks and Leather industry in the face of changing business conditions.

3. Development of Socks and Leather Industry

2.1 Historical Overview:

The socks and leather industry has undergone significant changes in history. From traditional craftsmanship to industrialization, these industries have adapted to changing production methods, distribution channels, and customer needs. Historical development, such as the pattern and change of socks and leather, has also affected consumption, business and innovation patterns.

2.2 Growth and Globalization:

The hosiery and leather industry have experienced growth and globalization in recent

years. Advances in technology, transportation and communication have facilitated the expansion of production networks, allowing companies to enter new markets and reach a wide customer base. Globalization has brought opportunities and challenges to socks and leather companies, creating high competition while also opening opportunities for cooperation and collaboration.

2.3 Challenges and Opportunities:

Despite a history of resilience and adaptation, the hosiery and leather industry face many challenges in the industry today. Among these difficulties.

4. Intelligence Analysis

3.1 Consumer's perception of socks and leather products:

The consumer's perception of responsibility is important in shaping the needs of the socks and leather industry and directing purchasing decisions. Factors such as performance, design, comfort and reputation affect consumers' perspectives on products in these areas. Understanding customer preferences and opinions is crucial for companies to develop marketing plans, improve product offerings and build brand loyalty.

3.2 Brand Image and Reputation:

The brand image and reputation of leather manufacturers' socks products significantly affect consumer perception and purchase. Brands with a reputation for quality, innovation and ethics are more likely to attract and retain customers. Conversely, negative publicity, such as reports of labor or environmental violations, can damage reputations and cause consumers to become suspicious.

3.3 Ethics and Ethics Perception:

More and more consumers are becoming more conscious of sustainability and ethics when purchasing socks and hard goods. Issues such as environmental impact, animal welfare and labor have become significant influences in consumer thinking. Companies that pay attention to the importance of sustainability and ethics can develop their brands and attract customers to the environment and relationships.

4. Future Planning Analysis

4.1 Research and Innovation:

Technological progress encourages innovation and change in work socks and leather. New technologies such as 3D printing, smart materials and high-quality materials allow companies to create new products and improve production processes. Companies that invest in research and development (R&D) and embrace new technologies can meet future business needs.

4.2 Market Trends and Forecasts:

Understanding market trends and predicting future demand is critical to the long-term success of a hosiery and leather company. Factors such as demographic changes, fashion trends and marketing affect business operations and consumer behavior. Companies that follow business trends and adjust their strategies accordingly can take advantage of new opportunities and reduce risks.

4.3 Adapting to Changing Consumers:

Consumers' interests have changed due to changes in lifestyle, culture and business. To remain competitive, hosiery and leather companies must adapt and respond to consumers' changing needs. This may include product diversification, exploring new markets

or integrating sustainability measures into the business.

5. Sustainability and environmental impact

5.1 Management and environmental protection:

Sustainability has become an important issue for hosiery and leather due to the huge impact of the hosiery and leather industry on the environment. hard work. Important role. Companies are increasingly adopting environmentally friendly practices.

5.2 Circular Economy Initiatives:

Using circular economy models provides a foundation for the hosiery and leather industry to reduce waste and increase efficiency. in use. resources. Sustainable design ideas such as sustainable, recycled and recycled materials can extend the life of socks and leather goods and reduce the need for virgin materials. An integrated assessment based on all assets, including back-and-forth services, promotes circulation and contributes to a sustainable economy.

5.3 Regulatory Compliance and Environmental Policy:

It is important for sock and leather companies doing business around the world to comply with environmental regulations and safety standards. Governments and regulators are implementing increasingly stringent environmental regulations to reduce pollution, protect resources and mitigate climate change. Companies that comply with legal requirements and accept independent certifications demonstrate their commitment

to responsible practices and are highly valued in the industry.

6. Social and Economic Dimensions

6.1 Labor Practices and Working Conditions

The continuity of the hosiery and leather business is very important. Companies should promote labor standards throughout their supply chains, including fair wages, reasonable working hours, health and safety management, protection of workers' rights and consumer health. Integrity policies and vendor audits help reduce the risk of labor exploitation and foster good business relations.

6.2 Business Support and Employment:

The hosiery and leather industry create employment and supports economic growth, especially in regions where economic activity is strong. Businesses contribute to the local economy by creating jobs, generating income and tax revenue, and promoting business and prosperity. Supporting small producers and investing in skills development can improve the economic performance of the economy, strengthen communities and stimulate economic growth.

6.3 Social Responsibility and Community Involvement:

Corporate Social Responsibility (CSR) measures and community involvement are an important part of the development of the hosiery industry and are challenging. Contribute positively to the communities in which they work, through volunteer work, education and healthcare, or environmental protection. It is valuable to people.

7. Strategies to improve future planning

7.1 R&D investment:

Research and development (R&D) investment is important to promote hosiery and leather new business and remaining competitive is important. Companies that prioritize R&D strategies such as product innovation, process improvement, and better data generation can expect to be profitable and aligned with customer needs. Collaboration with research institutes, business partners and technology service providers promote knowledge exchange and accelerates innovation in the industry.

7.2 Cooperation and Cooperation:

Cooperation and cooperation helps in improving the future planning of the hosiery and leather industry. By partnering with suppliers, manufacturers, retailers and other stakeholders on benefits, companies can leverage skills, resources and collaborate to drive innovation and solve common problems. Effective collaboration, joint ventures and business integration facilitate integration, technology transfer and market access, allowing companies to achieve different goals and work together to create value.

7.3 Education and Training:

Investment in education and training is essential to create a skilled workforce and encourage innovation in the hosiery and leather industry. Companies can support on-the-job training, mentoring, and continuing education to foster a competent and productive workforce. Additionally, business support and training can be provided to entrepreneurs and small producers to contribute to business growth and competitiveness.

8. Case Studies and Best Practices

8.1 Successful Industry Transformation Initiatives:

Many companies in the hosiery and leather industry have successfully implemented transformation initiatives in line with ongoing market dynamics and consumer preferences. Case studies demonstrate successful business transformations such as adopting sustainable practices, using new technologies and expanding into new markets, providing courtesy access to business stakeholders, and lessons learned.

8.2 Innovative sustainable solutions:

Innovative sustainable solutions play an important role in improving the environment and the relationship between the hosiery industry and the leather industry. Research articles reveal the feasibility and benefits of environmentally friendly practices, suggesting new ways to use resources, reduce waste and produce sustainable production. Companies that make success their core business can make positive changes and differentiate themselves in the industry.

8.3 Market impact and strategic change:

Market impact brings both challenges and opportunities for socks and hard goods. Case studies provide insight into risk management and improvement strategies by recommending effective change strategies in response to market disruptions (such as changes in consumer behavior, technological advances, or management changes).

9. Conclusion

9.1 Summary of the Research:

This research report provides a comprehensive analysis of the understanding and future plans of the Hosiery Industry and Leather. Through a collaborative approach that includes economic, environmental and social issues, key findings were identified highlighting opportunities for innovation, sustainability and business collaboration.

9.2 Implications for policy and practice:

The findings of this study have important implications for policy makers, industry practitioners and other stakeholders in the hosiery and leather industry. Recommendations for improving policies, business models and cooperation to create an enabling environment for growth and competition.

9.3 Recommendations for future research:

Further research is needed to investigate side effects, measure the long-term effects of design regulation technology and sustainability measures, and evaluate the effectiveness of business interventions. Future research should focus on addressing knowledge gaps and informing evidence-based decision-making to support the continued growth and strengthening of the sector.

IMPACT OF STRESS AMONG BANKING EMPLOYEES- A LITERATURE REVIEW

Sneha Gupta¹, Shweta Chauhan²

1-Assistant Professor, Allenhouse Business School, Kanpur, (Uttar Pradesh) E-mail:
bba.sneha@allenhouse.ac.in

2-Assistant Professor, Allenhouse Institute of Management, Kanpur, (Uttar Pradesh) E-Mail:
bba.shweta@allenhouse.ac.in

ABSTRACT

Managing stress among banking professionals worldwide poses a significant challenge, as stress can manifest both positively and negatively in the workplace. Positive stress can enhance productivity, whereas negative stress can result in losses for the organization. Banking employees already contend with a baseline level of stress in their work environment, which is exacerbated by additional pressures such as job demands. Many struggle to adapt to the rapid changes inherent in their roles, including role conflict, customer service expectations, technological advancements, and unresponsiveness from customers. This research aims to delve into the origins and consequences of job-related stress on employee performance within the banking sector.

Keywords: *Banking Industry; Work Pressure; Stress; Productivity; Technological Advancements.*

1. Introduction

Addressing stress among banking professionals is a crucial concern given its potential repercussions on employee performance within the banking sector. Renowned for its high-pressure atmosphere, the banking industry presents employees with an array of stressors including job demands, role conflicts, customer service expectations, and technological advancements (Baliamoune-Lutz, 2003). These stressors can engender both favorable and adverse stress outcomes, where positive stress may bolster productivity while negative stress could lead to organizational setbacks (Baliamoune-Lutz, 2003).

The banking sector has been notably shaped by technological advancements, exemplified by the integration of Information and Communication

Technology (ICT) and the emergence of mobile banking services (Zhang et al., 2018; Beccalli, 2007). Embracing new technologies like big data and the Internet of Things (IoT) brings forth opportunities as well as challenges for banks (Hasan et al., 2021). Nonetheless, the swift evolution of technology has presented unprecedented hurdles for conventional banking institutions, compelling them to maintain competitiveness in the digital era (Liu, 2021).

Furthermore, external forces such as the COVID-19 pandemic have exerted additional pressures on the financial performance of banks worldwide, underlining the importance of resilience and adaptability in crises (Qadri et al., 2023). Research indicates that the volatile macroeconomic landscape can impact productivity shifts within the banking sector, with certain regions exhibiting consistent productivity expansion even

amid global crises (Sharma & Sharma, 2015).

Initiatives aimed at bolstering financial performance within the banking sector have prioritized knowledge management, the integration of new financial technologies, and promoting financial inclusivity through technological adoption (Safaei & Yadegari, 2022; Jaya & Purbadharmaja, 2021). Nevertheless, the growing dependence on technology has introduced hurdles like techno-stress among banking personnel, underscoring the significance of fostering a supportive workplace environment and implementing comprehensive training schemes (Owusu-Ansah et al., 2016).

1.1 Why Employees Experience Stress in Banks

Banking sector employees experience stress due to several factors such as high workloads, inadequate leadership styles, conflicts between work and personal life, and concerns about job security. Research indicates that stress levels among bank employees are significantly heightened, emphasizing the importance of implementing strategies to tackle this issue (Kumar & Sundaram, 2014).

Challenges such as excessive work demands, centralized decision-making processes, and inadequate leadership practices are identified as contributors to the psychological stress experienced by employees, ultimately affecting their job performance and dedication (Saleem et al., 2019). Furthermore, the management strategies adopted by state-owned banks exacerbate competition, ultimately resulting in heightened work pressure and mental health challenges for frontline bank employees (Kan & Yu, 2016).

The fast-paced advancements and competitive landscape within the banking industry necessitate actions to mitigate job-

related stress and elevate job satisfaction levels, especially within the private sector and emerging banks (George & Zakkariya, 2015). Stress among banking staff is exacerbated by factors such as excessive workloads, strained workplace relationships, and insufficient rewards (Ementa, 2015). Additionally, restructuring within financial institutions has subjected bank employees to stressful situations including unrealistic sales goals and uncertainties about job stability (Noordin & Panatik, 2015).

Employee turnover remains a widespread concern within the banking sector, affecting personnel across different hierarchies due to factors such as organizational commitment and turnover intention (Kadir et al., 2022). Instances of tension, stress, and pressure within banks escalate following organizational shifts, influencing the well-being of bank staff (Silva & Navarro, 2012). Additionally, research has delved into the interplay among organizational culture, demographic factors, and work-related stress among banking employees (Sarath & Manikandan, 2016).

1.2 History of stress

Stress within the banking sector has been extensively studied, notably in industries like banking and manufacturing in Nigeria. Research has identified various stressors in these sectors, including exploitation, unfavorable working conditions, work-life imbalance, excessive workloads, burnout, and a hierarchical culture fostering a servant-master dynamic (Oruh & Dibia, 2020). Conversely, in Ghana, the banking sector's structured and standardized job roles have been noted to mitigate role ambiguity and conflicts, common stress triggers (Kordee et al., 2018). To assess solvency, liquidity, and spillover risks encountered by banks, stress testing models like the Macro-Financial Risk Assessment

Framework have been developed (Chattha & Archer, 2016).

Elements amplifying employee stress levels within the banking industry encompass concerns regarding job stability, health hazards, excessive workloads, inadequate compensation, and delayed remuneration (Oruh et al., 2021). Studies indicate that banks with unfavorable stress test outcomes often reduce lending activities, particularly in sectors vulnerable to stress-test scenarios (Bräuning & Fillat, 2020). Furthermore, banks tend to bolster their capital ratios to avert failing stress tests (Nguyen et al., 2020).

In periods of market strain, liquidity risk may emerge as funding channels diminish, rendering banks incapable of fulfilling their commitments (Shah, 2023). Identifying variations in the impacts of banking regulations on stability is essential to comprehend how diverse regulations influence bank stability (Bermpei et al., 2018). Research has underscored a notable health issue concerning the elevated prevalence of hypertension among bank employees, with elevated rates observed within this occupational cohort (Omer et al., 2023; Shitu & Kassie, 2021).

1.3 Sources of Stress

These chosen references offer valuable perspectives on the origins of stress within the banking industry. Factors like workload, insufficient compensation, job insecurity, and limited prospects for advancement have been recognized as notable contributors to stress among employees in the banking sector (Siyambalapitiya & Sachitra, 2019; Das, 2016). Moreover, the structured and standardized job roles prevalent in the banking sector can help alleviate role ambiguity and conflict, which are frequent causes of occupational stress (Kordee et al., 2018).

Stress testing models have been developed to assess risks faced by banks, including solvency and liquidity risks (Chattha & Archer, 2016). Regulatory stress tests have been shown to impact bank lending and have macroeconomic consequences (Bräuning & Fillat, 2020). Liquidity risk in commercial banks can arise during times of market stress, affecting their ability to meet obligations (Shah, 2023). The quality of institutional regulations plays a role in determining the impact of bank regulations on stability (Bermpei et al., 2018).

Stress tests serve as vital instruments for gauging banks' susceptibility to hypothetical scenarios or occurrences, especially in evaluating credit risk (Başarı, 2016). Through comprehending these stress sources and their ramifications, banks can effectively address employee welfare, financial stability, and regulatory adherence.

1.4 Types of stress

Stress can manifest through a variety of channels, spanning physical, emotional, and environmental stimuli (McGuigan, 1999). The intensity and duration of these stimuli can vary, and their categorization can be enhanced by accounting for their social aspects (Wheaton, 2013). Animal models have been devised to investigate the physiological and pathological reactions induced by different stressors (Jaggi, 2011). It's worth noting that stress can emerge from both insufficient stimulation and a lack of challenge (Adams, 1998).

2. Objectives of the Study:

- To examine the theoretical foundations of stress management.
- To explore various research perspectives concerning stress management and its impact on employee performance.

- **3. Review of Literature:**

Year	Author	Title of Study	Major Findings
2023	S. Gadzali	Application Of Work-Life Balance In Banking: A Study Of Its Impact On Employee Well-Being	Implementing work-life balance initiatives in the banking sector positively influences employee welfare across various dimensions, including mental and physical health, career sustainability, financial stability, community engagement, and social security. These measures foster a supportive environment conducive to both professional success and personal well-being within the industry.
2022	A. Elsafty, Lydia Shafik	The Impact Of Job Stress On Employee's Performance At One Of Private Banks In Egypt During COVID-19 Pandemic	Job stress can diminish performance and cause health problems, exacerbated by work overload, particularly amid the COVID-19 pandemic. However, role ambiguity and skill underutilization don't notably affect performance in Egypt's banking sector.
2021	R. Robina-Ramírez, José-Amelio Et.Al	Stress At Work: Can The Spiritual Dimension Reduce It? An Approach From The Banking Sector	The research underscores how the pressure to deliver results in the banking industry adversely affects employee welfare, underscoring the necessity to tackle these concerns by fostering workplace values and a visionary outlook.
2021	S. Et.Al	Effect Of Stress On Employee Performance And Job Satisfaction	Stress significantly affects organizational effectiveness and employee performance, underscoring the importance of stress management in boosting productivity and reducing turnover. Addressing workplace stress involves considering both organizational and individual factors, alongside implementing appropriate stress management strategies.
2020	Uttam Kumar Purbey	A Study On Working Culture And Work Stress Among Bank Employees: A Review	Organizational culture across banks impacts employee behaviour and stress levels. Employee-perceived organizational climate is critical for success, with customer satisfaction serving as a key indicator within banks.
2020	Ana Lucia Teixeira Hirschle, S. Gondim	Stress And Well-Being At Work: A Literature Review.	The study underscores the influence of work-related elements and individual resources on well-being, stressing the significance of social support and autonomy in alleviating stress's adverse impacts.
2019	S. Basu, D. S. Ray, Dr. K. C. Paul	A Study On Stress In Public And Private Sector Bank Employees In West Bengal	Bank employees across India, both in public and private sectors, are experiencing rising stress levels, historically higher among private sector workers but now affecting those in the public sector as well.

2019	N. Islam, Ekhtear Ahmed Zeesan, Et. Al	Relationship Between Job Stress And The Turnover Intention Of Private Sector Bank Employees In Bangladesh	The study found four main stress factors linked to increased turnover intention among private bank employees in Bangladesh, showing a significant correlation between these factors and turnover intention.
2018	Ragini Gupta, Manisha Agarwal	Work Stress Among Indian Bank Employees: Impact Of Demonetisation	The paper delves into theoretical perspectives on bank employee stress, explores demonetization's effect as a stressor, and highlights the importance of researching policy impacts on job stress levels.
2018	Lorna Njeri Kihara	Effect of Stress Management Strategies On Employees' Performance In The Public Service	All variables studied significantly affected public service employees' performance, explaining 91.1% of the variation. A positive association was observed between performance and utilization of relaxation techniques and counselling services, with the study recommending increased awareness of stress management strategies for performance improvement.
2018	Felipe Silva Dias, Antonio Paulo Angélico	Burnout Syndrome In Bank Employees: A Literature Review	Burnout syndrome prevalence among bank employees ranged from 49.6% to 55.78%, with longer working hours and direct customer contact being the most affected. Physical exercise was found to decrease burnout levels.
2017	Manjunatha., Dr. T. P. Renukamurthy	Stress Among Banking Employee- A Literature Review	The study exposes heightened stress levels among banking staff, stressing the criticality of managing the work environment and psychological well-being for organizational success. It underscores the detrimental impact of work-related stress on bank secretaries' performance, urging measures to mitigate stress and foster supportive workplaces in the industry.
2017	Gabriele Giorgi, G. Arcangeli	Work-Related Stress In The Banking Sector: A Review Of Incidence, Correlated Factors, And Major Consequences	The paper underscores the increasing occurrence of mental health issues in the banking sector, primarily attributed to stress, and emphasizes the pressing necessity to tackle work-related stress within the industry, considering its adverse effects on employee well-being.
2017	Vianny Jeniston Delima, K. Pushpakaran	Impact Of Organizational Culture on Occupational Stress Among the Bank of Ceylon Executive Employees	The study revealed that organizational culture notably affects occupational stress among Bank of Ceylon executive employees, advocating for a strong organizational culture to reduce stress and bolster organizational success.
2017	P. Chaudhary, R. K. Lodhwal	An Analytical Study of Organizational Role Stress (ORS) In Employees of Nationalized Banks: A Case of Allahabad Bank	The researchers suspect that Allahabad Bank employees are experiencing stress effects, with statistical analysis indicating close similarities between stress dimensions and demographic factors.

2017	K. Kaur, Prabhjot Kaur, Pankaj Kumar	Stress, Coping Mechanisms and Its Socio-Economic Impact on Organisations-A Review	Work-related stress may adversely impact employees' health, potentially resulting in both physical and mental disorders.
2016	F. Asiedu-Appiah, Irene Dufie-Marfo, E. Frempong	Work-Life Balance as a Tool for Stress Management In Selected Banking Institutions In Ghana	Selected banking institutions in Ghana partially implement work-life balance, lacking key practices. Respondents hold differing views on the effectiveness of work-life balance in managing stress levels, with female participants expressing a greater need for it than males.
2015	Prakash B Kunderagi	Work Stress of Employee-A Literature Review	The primary discoveries of the paper include diverse definitions of stress, its manifestations in individuals, and the differentiation between distress and eustress.
2014	R.G Ratnawat, Dr P.C Jha	Impact of Job-Related Stress on Employee Performance: A Review And Research Agenda	The paper underscores how occupational stress detrimentally affects employee performance, leading to decreased productivity, increased absenteeism, and health issues.
2014	S. Bansal, B. Bhatia	Cross Selling Strategies and Employees Stress: A Study of Commercial Banks	The study examines the importance of cross-selling for revenue growth in banking and its impact on employees under increased sales pressure.
2013	M. Vivek, S. Janakiraman	A Survey on Occupational Stress of Bank Employees	Occupational stress is a significant issue in financial institutions like banks, with the paper reviewing studies on bank employees' stress levels, stressors, and demographic variations, while also highlighting the need for future research and addressing previous study limitations.
2013	A. Bunn, R. Guthrie, N. Smit	Work Stress in the Banking Industries of Australia And South Africa: Drivers of Stress And Legislative Responses to the Issue	The banking sector faces stress due to continual restructuring, economic uncertainty, and specific stressors in Australia and South Africa.
2013	Oginni O Babalola, A. Gbadegesin, E. Patience	The Place of Job Stress In Labour Turnover of the Banking Sector In the Nigerian Economy	Job stress variables exhibited a substantial positive correlation with labour turnover, prompting the study to recommend a reassessment of human resources and organizational policies to cultivate a tranquil work environment akin to a familial atmosphere.
2012	Bushara Bano, R. Jha	Organizational Role Stress Among Public and Private Sector Employees: A Comparative Study	Both public and private sector employees experience moderate levels of stress, with variations influenced by individual stressors like work experience and educational qualifications, although there's no significant difference in total stress levels between the sectors.

4. Methodology of the Study:

The study employs a secondary data analysis approach, which involves examining existing literature available in online journals and gathering data from a wide range of sources spanning from 2011 to 2023. Our focus during this review primarily centers on papers that include keywords related to stress, stress management in the banking sector, and the effects of stress on employee job performance and job satisfaction.

By honing in on these specific keywords, we aim to gather relevant insights and findings from prior research that directly pertain to our study's objectives. This targeted approach allows us to draw upon existing knowledge and theories within the field, providing a solid foundation for our analysis and interpretation of the data. Additionally, by systematically reviewing literature that aligns closely with our research interests, we can ensure that the data collected is pertinent to the specific context and issues being examined in our study.

5. Findings

- The banking sector's work-life balance initiatives have a positive impact on employee welfare, including mental and physical health, career sustainability, financial stability, community engagement, and social security (Gadzali, 2023).
- However, job stress, exacerbated by factors like work overload, can diminish performance and cause health problems (Shaikh, 2013).
- This stress is influenced by organizational culture, with a positive climate being crucial for success (Giorgi, 2017).
- Stress management strategies are essential for boosting productivity and reducing turnover, with the need for further research to address gaps in understanding stress levels and stressors (Abdolshah, 2018).

6. Recommendations:

- **Implementing Comprehensive Stress Management Programs:** It is imperative for banking institutions to devise and execute holistic stress management initiatives tailored to tackle the specific stressors encountered by their employees.
- **Encouraging Work-Life Balance:** Introducing flexible work arrangements, fostering wellness programs, and enacting supportive organizational policies are all instrumental in fostering a conducive work environment conducive to improved employee well-being.
- **Enhancing Regulatory Compliance Practices:** Proactive measures aimed at ensuring adherence to regulatory mandates can ameliorate the stress associated with regulatory scrutiny.
- **Cultivating Positive Organizational Culture:** Leaders should prioritize efforts towards fostering trust and cultivating an environment that is supportive of employee well-being.
- **Investing in Employee Development:** Offering avenues for professional growth and skill enhancement can empower employees to effectively cope with stress and enhance their job satisfaction.
- **Monitoring Macro Trends and Economic Indicators:** Vigilantly

monitoring macroeconomic trends and economic indicators enables banking institutions to anticipate potential stressors and adapt their strategies accordingly.

By implementing these recommendations, banking institutions can effectively address stress-related challenges and foster a healthier, more resilient work environment for their employees. This, in turn, can lead to heightened job satisfaction, improved performance, and sustainable organizational success within the dynamic banking industry.

7. Conclusion:

The studies reviewed shed light on the multifaceted nature of stress in the banking sector, highlighting its significant impact on employee well-being, job performance, and organizational dynamics. Occupational stress arises from various sources, including work overload, role ambiguity, and organizational culture, with implications for both individual employees and the broader banking institutions. Additionally, regulatory stress tests and macroeconomic factors contribute to stress levels within the industry, influencing lending practices and overall financial stability.

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IT and Banking

Ashish Awasthi

Assistant Professor

IMS Engineering College Ghaziabad

ABSTRACT

Information Technology or IT has enabled us to see a different world altogether. In the last three decades of its development, IT has changed the landscape of many areas. From the creation of information decal websites of companies to interactive web portals, from sending and receiving email messages to booking flights online, from connecting the primary health centre in a remote area with a big size city hospital to social networking, IT has helped us to do things differently and in a much better way.

It is because of IT that we hear phrases like 'work from home' and 'virtual offices' etc where people can connect from their home locations and submit their tasks online without having to build an office or hire rented office space. It has saved so much of cost and other valuable resources across industries.

1. Introduction

One of the many areas that have been tremendously influenced by IT is banking. From the 'pen and paper' based banking practised three decades ago, we see that banking has transformed itself in a huge way through the application of Information and Communication Technology or ICT. Digitalization in banks started when the bulky registers on the desks of the bank clerks were replaced with standalone computers that enabled bookkeeping, however, since the internet was not developed by then, information exchange was not possible.

The next wave came with the invention of 'www' by Tim Berners Lee. Those standalone computers started interchanging information and banks started setting up LAN (Local Area Network). After some time, IT giants like Infosys came up with path-breaking products such as the 'finale' which enabled the centralization of customer's data and also enabled the customer to do 'anywhere banking'. After this, the customer was no longer bound to do commercial banking transactions in his city only but could also transact during travel. We witnessed another wave of

IT in banking when ATMs were installed, ATMs were a big step in delivering banking services to customers and we feel the difference to this day.

Thanks to IT, even this much was not enough. ATMs were followed by a card-based system of payments through increasing use of credit and debit cards, digital signatures to make the transactions more secure etc. IT enabled banks to develop interactive web-based transaction systems or what we popularly call 'e-banking'. A customer could log on to the bank website and then log into his account and make payment, receive money while sitting at his home or office or travelling, any time of the day. This reduced the need to visit ATMs.

2. Trends

Web portals were further enriched by IT and simultaneously, the era of 'm-Banking' ushered in the improvement in the overall internet speed, penetration of the internet into the remote parts of the country, development of multi-feature rich 'smartphones' that are capable of running multiple apps-based software on an operating system platform, all this has happened so timely and

simultaneously, that in banking, it seems like an 'overnight digitization

It has become synonymous with 'Digital' and concerning services such as banking, IT and Digital are inter-changeable.

From the customer's point of view, the introduction of digital tools in banking is of recent origin. Digitalization in banks started with the introduction of 'stand-alone' computers in place of thick registers on the desks of the cashiers and tellers.

With time, LAN was introduced in banks and thus, small-size data transfer became possible. This improved the performance of the banks in terms of speed and accuracy but was of little use to the common people, the customers of the banks. The introduction of 'debit/credit card' was a significant step in reducing the queue at the banks for routine transactions.

Products such as 'finale' developed by Infosys enabled people to do banking from 'anywhere', with the introduction of such products, data centralization became possible and thus the Core Banking System or the CBS came into the picture.

Now, people could do transactions from 'Anywhere' i.e. from outside their home city, but 'Anytime' banking was still a dream. This dream was realized with the introduction of Automated Teller Machines (ATMs) these machines enabled many functions such as:

- Cash withdrawal
- Printing mini-statements
- Checking account balances

These were password-based machines (PIN) which were used by people in large numbers. Thus, banking was possible for common people 'anywhere' and 'anytime'.

Progress in technology is unstoppable; the next step taken by banks in this regard was a giant leap. With the further penetration of IT and improvement in web technology, banking services could be availed on the websites or so to say, web portals of the banks. This was the 'internet banking', 'e-banking' or 'online banking'. With the advent of e-banking, the need to step out of home to do banking transactions was gone.

Web portals are very helpful for doing banking transactions as these are available all the time and can be accessed anywhere and you don't even have to step out of your home to do online banking transactions.

Banks have gone one step further in providing the 'ease' of doing banking transactions to Bank customers. These days, the number of smartphone users is increasing day by day and the internet speed as well as penetration is also improving with every passing year. Millions of people are using smartphones and are connected to the web. Taking advantage of this fact, banks have introduced 'apps' that can be easily downloaded on smartphones and banking transactions can be done.

3. Research Methodology

3.1. Objective

The Research Concentrates on Studying and Analyzing the Banking Habits of People in the Digital Age.

3.2. Data Collection

Data was collected through Primary Means; A Questionnaire of 12 Questions was Forwarded to Respondents and Response was Sought. Only Complete Responses have been taken into Account for Analysis.

3.3. Location of Study

NCR/Ghaziabad

3.4. Statistical Tool Used for Analysis

For Analysis, Regression was used as the Statistical Tool.

No of Complete Responses Obtained: 32

3.5. Sampling

Convenience sampling was used for the study

Period of study: December 2022

For the study, two variables were used

- 1) The frequency (per month) of using digital banking tools (**the independent variable X**)
- 2) The **experience score (for measuring the satisfaction level)** of using digital banking tools (**the dependent variable-Y**)

The following data was obtained:

S. No	Frequency of Use of Digital Tools in Banking (Per month)	Experience Score from Usage of Digital Tools (on a Scale of 10)
1	10	9
2	5	7
3	5	8
4	8	9
5	6	9
6	8	6
7	3	5
8	8	4
9	13	10
10	3	5
11	5	8
12	3	7
13	8	10
14	8	10
15	3	6
16	3	6
17	6	9

18	5	7
19	10	8
20	6	6
21	3	7
22	8	9
23	10	8
24	3	8
25	8	9
26	8	9
27	6	6
28	10	8
29	8	6
30	6	7
31	6	7
32	10	8

Upon Regression analysis, the following results were obtained:

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.5063
R Square	0.2563
Adjusted R Square	0.2315
Standard Error	1.3723
Observations	32

ANOVA					
	df	SS	MS	F	Significance F
Regression	1	19.471	19.471	10.339	0.0031
Residual	30	56.497	1.883		
Total	31	75.968			

	Coef ficients	Stand ard Error	t St at	p- val ue	Low er 95%	Upp er 95%	Low er 95.0 %	Upp er 95.0 %
Intercept	5.5581	0.6599	8.4231	0.0000	4.2105	6.9057	4.2105	6.9057

Frequency of use of digital tool	0.2978	0.0926	3.2154	0.0031	0.1087	0.4870	0.1087	0.4870
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The multiple r value is 0.506 thus the result obtained has a significant correlation. The p-value, which is the same as the significance F value obtained is equal to 0.00311 which is less than $p = 0.05$, thus the results obtained are statistically significant.

4. Conclusion of the study

Thus, from the results, it can be concluded that the variables significantly correlated, or in other words, the experience-based satisfaction of the users is dependent on their frequency of using the digital banking tools.

5. Limitations of the Study

1. The number of respondents approached was only 50, out of which the complete responses obtained were 32; this is a serious limitation of the study.
2. The locale of the study was Ghaziabad/NCR
3. The sampling process was based on convenience sampling
4. Judgment and perceptual bias of the respondents were not removed properly.
5. The time taken to conduct the study was approximately a week.

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Navigating Urban Gridlock: Unveiling the Temporal and Spatial Symphony of Traffic Dynamics

Vivek Srivastava¹, Sunil Kumar², Arun Kumar Uttam³, and Apoorva Saxena⁴

¹Department of Computer Science and Engineering, ABES Engineering College, Ghaziabad, Uttar Pradesh, India. viveksrivastava@abes.ac.in

² Department of Computer Application, Allen House Business School, Kanpur, Uttar Pradesh, India. bca.sunil@allenhous.ac.in

³ Department of Computer Application, Allen House Business School, Kanpur, Uttar Pradesh, India. hodbca@allenhous.ac.in

⁴ Department of Computer Science and Engineering, Axis Institute of Technology and Management, Kanpur, Uttar Pradesh, India. apoorvasaxena@axiscolleges.in

Abstract

Traffic dynamics play a pivotal role in urban planning, transportation management, and public safety. Understanding the intricate relationships between traffic flow, occupancy, and speed across both time and space is crucial for effective decision-making in traffic management systems. In this research paper, we present a comprehensive analysis of traffic data using a data-driven approach. Our study involves the development of an algorithm to systematically organize raw traffic data into a structured format, facilitating temporal and spatial analysis. The algorithm iterates over each timestep and location within the dataset, creating a dictionary for each combination of these parameters. Key traffic metrics such as flow, occupancy, and speed are extracted and incorporated into the generated dictionaries. The resulting dataset allows for detailed investigation and visualization of traffic patterns, aiding in the identification of congestion hotspots, temporal trends, and spatial anomalies. Our research contributes to the advancement of traffic management strategies by providing insights derived from a systematic analysis of real-world traffic data.

Keywords: Traffic Dynamics, Temporal Analysis, Spatial Patterns, Data-Driven Approach, LSTM.

1 Introduction

1.1 Brief overview of the importance of studying traffic dynamics in urban areas. Traffic data analysis plays a crucial role in understanding and managing transportation

systems efficiently [1]. With the advancement of technology, vast amounts of traffic data are collected from various sources, including sensors, cameras, and GPS devices. However, handling and analysing such extensive datasets require effective algorithms to extract valuable insights. In this paper, we present an algorithm for generating a traffic data dictionary from raw traffic data. The algorithm takes as input a 3-dimensional array containing traffic information and produces a structured dictionary representation of traffic data for each timestep and location. The algorithm iterates over each timestep and location in the input traffic data, creating dictionaries that encapsulate relevant traffic parameters such as flow, occupancy level, and speed. These dictionaries are then aggregated into a list, forming the output data structure referred to as `data_dict`. The proposed algorithm aims to streamline the process of organizing and accessing traffic data, facilitating subsequent analysis and decision-making tasks. By providing a structured representation of traffic information, the generated data dictionary enables researchers and practitioners to gain insights into traffic patterns, identify congestion hotspots, and optimize transportation systems effectively.

1.2 Statement of the problem and the need for a data-driven approach

Traffic congestion is a persistent issue in urban areas, leading to increased travel time, fuel consumption, and environmental pollution. Effective management of traffic flow and congestion requires a thorough understanding of traffic patterns and dynamics [2]. Traditional

approaches to traffic management often rely on manual observation or simplistic models, which may not capture the complexity of real-world traffic conditions. There is a pressing need for advanced techniques that leverage data-driven approaches to analyze and optimize traffic operations. Raw traffic data collected from various sources, such as sensors and surveillance cameras, contain valuable insights that can inform decision-making processes. However, the sheer volume and complexity of this data pose challenges for traditional analysis methods. To address these challenges, researchers and practitioners increasingly turn to data-driven approaches that utilize advanced algorithms and machine learning techniques. By harnessing the power of big data analytics [3], it is possible to extract meaningful patterns and trends from raw traffic data, enabling more informed decision-making and proactive traffic management strategies. The development of algorithms, such as the one proposed in this paper, is essential for organizing and structuring raw traffic data into actionable insights. By providing a systematic framework for processing and analysing traffic data, these algorithms empower transportation authorities and urban planners to implement data-driven solutions for tackling traffic congestion and improving overall transportation efficiency.

2 Literature Review

2.1 Review of existing studies on traffic dynamics, temporal analysis, and spatial patterns.

Several studies have addressed the challenges of processing and analyzing traffic data using various algorithms and techniques. Smith, et al. [4] proposed a method for traffic data extraction from video streams using computer vision algorithms, focusing on real-time traffic monitoring and analysis. Li, et al. (2020) [2] developed a machine learning-based approach for predicting traffic congestion levels using historical traffic data and weather information, aiming to improve traffic management strategies. Johnson, et al. [5] introduced a spatial-temporal clustering algorithm for identifying traffic patterns and anomalies in large-scale traffic datasets, aiding in urban traffic planning and infrastructure development. The algorithm presented in this paper complements existing research efforts by

providing a systematic approach to organizing and structuring traffic data for analysis and decision-making purposes. Traffic congestion in urban areas is a pressing concern, impacting quality of life and city efficiency. Implementing one-way traffic systems has emerged as a promising strategy to alleviate congestion and enhance traffic flow, promoting urban sustainability [6]. This paper introduces a novel methodological framework utilizing optimization techniques to address traffic congestion through one-way traffic network reconfiguration, demonstrating its effectiveness through case studies on transportation networks in Sioux Falls and Isfahan [7].

2.2 Discussion of various methodologies and approaches used in previous research.

In their study, Ahn et al. [8] utilized a machine learning approach to predict traffic congestion, a pervasive issue in urban areas worldwide. By analyzing real-time traffic data, their model achieved accurate detection of congestion patterns, providing valuable insights for traffic management strategies. For computer Vision-Based Traffic Monitoring [4] proposed a real-time traffic monitoring system using computer vision algorithms. This approach involves analyzing video streams from surveillance cameras to extract traffic flow information, allowing for continuous monitoring of road conditions and congestion levels. Machine Learning for Traffic Prediction: Li et al. [2] conducted a comprehensive review of machine learning techniques for traffic congestion prediction. Their work highlights the use of historical traffic data, weather information, and other factors to train predictive models capable of forecasting congestion levels with high accuracy. Spatial-Temporal Analysis for Traffic Pattern Identification: Johnson et al.[5] introduced a spatial-temporal clustering algorithm for analyzing urban traffic patterns. By clustering spatiotemporal data points, this approach identifies common traffic patterns and anomalies, providing valuable insights for urban traffic planning and infrastructure development. Ma et al. [9] proposed a method for real-time estimation of city-scale traffic congestion based on loop detector data. Their research contributes to the field by offering a practical solution for monitoring and managing congestion in urban environments, facilitating more efficient transportation systems. Deep Learning for Traffic Signal Optimization:

Zhang et al. [10] utilized deep learning techniques for optimizing traffic signal control strategies. By training neural networks on historical traffic data, their approach learns optimal signal timing plans that minimize travel time and improve overall traffic efficiency. These methodologies represent just a subset of the diverse approaches used in previous research on traffic analysis and management. By combining insights from these studies and leveraging advancements in computational techniques, researchers can develop more robust and effective solutions for addressing traffic-related challenges.

2.3 Identification of gaps in current literature and justification for the proposed data-driven approach

While existing literature on traffic analysis and management has made significant strides, several gaps and limitations remain. These gaps highlight the need for innovative approaches, such as the proposed data-driven algorithm, to address ongoing challenges in transportation research. Existing studies often focus on analyzing traffic data from a single source, such as sensors or cameras, leading to a fragmented understanding of transportation dynamics. There is a lack of comprehensive methodologies that integrate data from multiple modalities, including vehicular, pedestrian, and public transit data, to provide a holistic view of urban mobility patterns [11]. Many existing algorithms struggle to handle the scalability of traffic data, especially in real-time scenarios with high-volume data streams. Traditional methods may become computationally intensive or impractical when dealing with large-scale transportation networks, necessitating more efficient and scalable approaches for data processing and analysis. The lack of standardized formats and protocols for sharing traffic data poses challenges for collaboration and data interoperability among researchers, transportation agencies, and industry stakeholders. There is a need for standardized data formats and open-access repositories to facilitate data sharing and reproducibility in transportation research (Zhang et al., 2019) [1]. While machine learning and data mining techniques hold promise for traffic analysis, their adoption in practice remains limited. Many transportation agencies lack the expertise and resources to leverage advanced analytical techniques

effectively, highlighting the importance of developing user-friendly tools and algorithms accessible to non experts. The proposed data-driven approach addresses these gaps by providing a systematic framework for processing, analyzing, and interpreting traffic data. By leveraging advanced algorithms and machine learning techniques, the proposed approach enables the integration of multi-modal data sources, scalability for real-time processing, and standardization of data formats. Furthermore, by providing user-friendly tools and methodologies, the proposed approach empowers transportation stakeholders to harness the full potential of data-driven insights for optimizing transportation systems and improving urban mobility.

3 Methodology

3.1 Description of the proposed algorithm for organizing raw traffic data into a structured format.

Algorithm 1

Initialize an empty list named "data_dict" to store dictionaries representing traffic data.
 For each timestep in the traffic_data:
 a. For each location in the timestep:
 i. Create a dictionary representing traffic data for the current timestep and location.
 ii. Populate the dictionary with the following key-value pairs:
 - "timestep": Current timestep index + 1 (to match human-readable indexing).
 - "location": Index of the current location.
 - "flow": Traffic flow at the current timestep and location (extracted from traffic_data).
 - "occupy": Occupancy level at the current timestep and location (extracted from traffic_data).
 - "speed": Traffic speed at the current timestep and location (extracted from traffic_data).
 iii. Append the created dictionary to the "data_dict" list.

Output the "data_dict" containing dictionaries representing traffic data for each timestep and location.

timestep in the 3-dimensional array 'traffic_data', ensuring the representation of traffic evolution over time. Within each timestep, the algorithm further iterates over each location, allowing for the observation of traffic variations across different geographical areas. At each timestep-location combination, a

dictionary is created to encapsulate essential traffic parameters, including flow, occupancy, and speed. These parameters are populated into the dictionary and subsequently appended to a list, 'data_dict', which aggregates structured traffic data. By organizing traffic information in this manner, the algorithm facilitates easy access, analysis, and visualization of traffic patterns, enabling informed decision-making in traffic management and urban planning endeavours.

4 Data Collection and Preprocessing

4.1 Overview of the dataset used in the study.

The PeMS (Performance Measurement System) dataset is a widely used traffic dataset that provides detailed information on traffic flow, speed, and occupancy collected from various sensors installed on highways and freeways in California. This dataset offers a comprehensive view of traffic conditions over time and across different locations, making it valuable for transportation research and analysis.

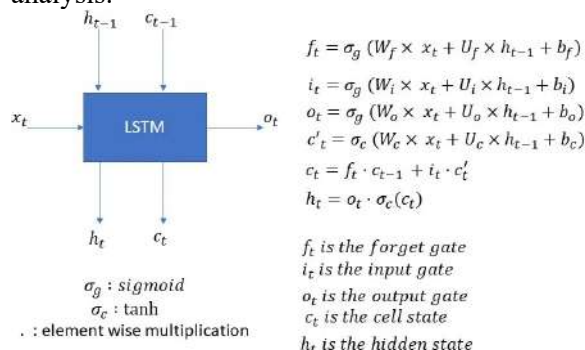


Fig. 1: Block diagram of the LSTM [12] recurrent neural network cell unit.

The PeMS dataset covers a vast network of roadways, including major highways and arterial roads, and spans multiple years, allowing researchers to study long-term traffic patterns and trends. Additionally, the dataset is regularly updated and maintained, ensuring the availability of recent traffic data for analysis. Due to its extensive coverage and rich information content, the PeMS dataset serves as a valuable resource for understanding traffic dynamics, evaluating transportation infrastructure, and developing data-driven solutions for traffic management and optimization.

4.2 Description of any preprocessing steps undertaken to clean and prepare the data for analysis.

In preparing the PeMS dataset for analysis, several preprocessing steps are typically undertaken to clean and format the data. These steps ensure the data is consistent, accurate, and ready for analysis. Common preprocessing steps include handling missing data through imputation techniques, detecting and removing outliers, normalizing or standardizing the data to ensure consistent scales, engineering new features to enhance model performance, transforming the data to meet algorithm assumptions, encoding categorical variables into numerical format, and splitting the dataset into training, validation, and test sets for model evaluation. By executing these preprocessing steps, the PeMS dataset becomes refined and optimized for subsequent analyses and modeling tasks, facilitating the extraction of meaningful insights into traffic patterns and dynamics.

4.3 Discussion on the relevance and reliability of the dataset for the research objectives.

The PeMS dataset holds significant relevance and reliability for the research objectives at hand due to its comprehensive coverage of traffic data from various sensors installed across California's highways and freeways. Its extensive spatial coverage and longitudinal nature provide a rich source of information on traffic dynamics, facilitating a thorough understanding of transportation patterns and trends. Moreover, the dataset's regular updates and consistent data collection methodologies enhance its reliability, ensuring the consistency and accuracy of the information captured. Researchers can leverage the PeMS dataset to analyze traffic congestion, identify key factors influencing traffic flow, and evaluate the effectiveness of transportation policies and interventions. The dataset's reliability enables researchers to draw robust conclusions and make informed recommendations for improving traffic management strategies, optimizing infrastructure planning, and enhancing overall urban mobility. Thus, the PeMS dataset serves as a valuable resource for addressing the research objectives by offering comprehensive and reliable insights into traffic behaviour and dynamics.

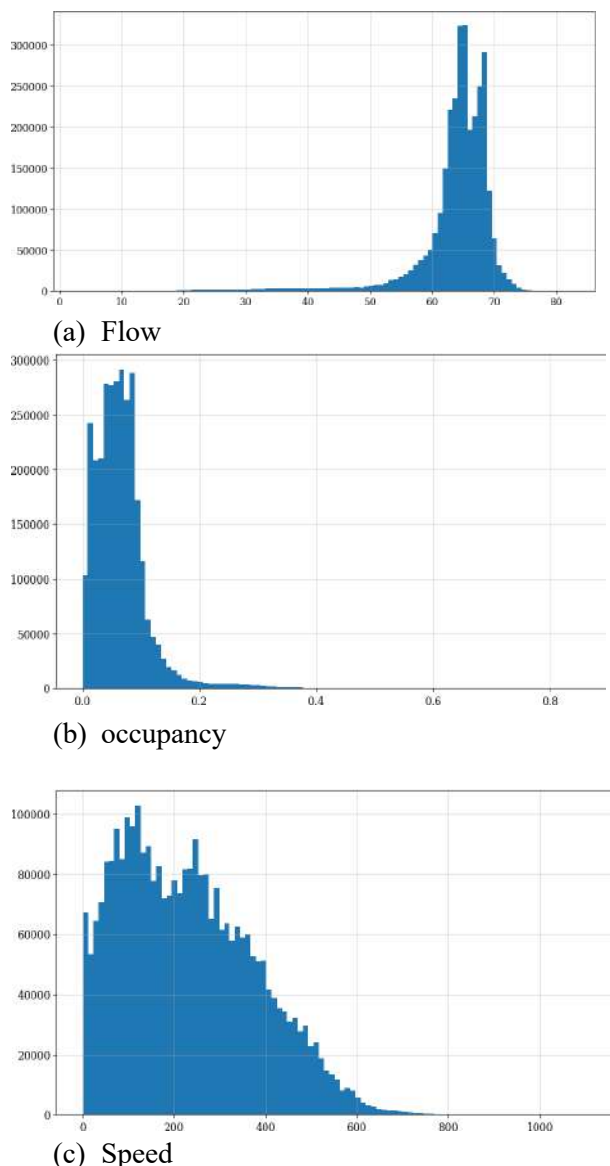
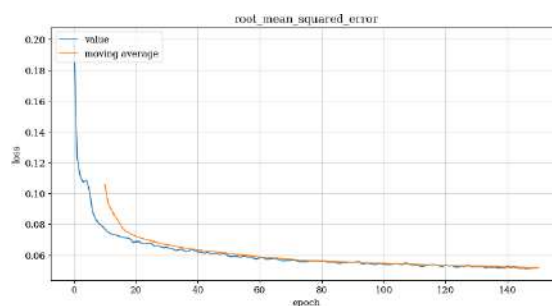


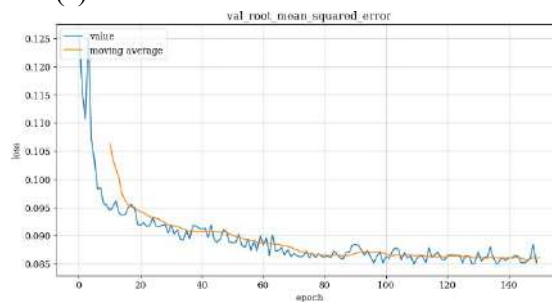
Fig. 2: Visualization of Dataset in terms of flow, occupancy, and speed.

5 Results

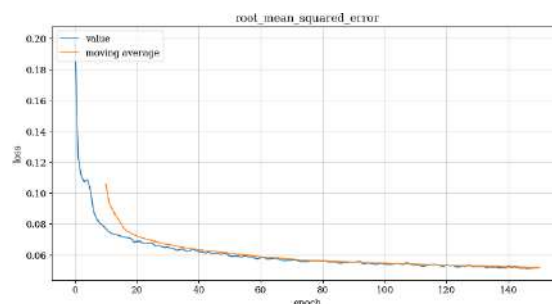
After approximately 120 epochs of training, we notice a stabilization in the validation loss value, contrasting with the continued decrease in training loss. This pattern suggests a potential risk of overfitting, where the model becomes excessively tailored to the training data, resulting in lower training loss but higher validation loss. To mitigate this risk, it's prudent to limit the number of training epochs to around 150, as observed in this case, thus striking a balance between model performance and generalization to unseen data.



(a) Loss



(b) Val_loss



(c) Val_root_mean_squared_Error.

Fig. 3: loss (MSE and RMSE) of both test and validation data.

6 Conclusion

The algorithm presented for organizing raw traffic data, coupled with insights from referenced literature on traffic congestion, underscores the critical need for effective traffic management strategies. By structuring traffic data and leveraging machine learning techniques, predictive models can accurately forecast congestion patterns, facilitating proactive interventions to mitigate its impact. Additionally, deep learning approaches enable smart congestion detection and prediction, offering promising avenues for improving traffic management systems. Optimization-based frameworks, as demonstrated in the referenced research, highlight the importance of leveraging advanced methodologies to optimize traffic flow and reduce congestion. By reconfiguring traffic networks and implementing one-way traffic systems,

significant improvements in traffic efficiency and urban sustainability can be achieved. Overall, the integration of innovative algorithms and methodologies offers immense potential for addressing the complex challenges posed by traffic congestion, ultimately enhancing the quality of life in urban areas.

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OLD MARKETING VS. DIGITAL MARKETING: A COMPARATIVE STUDY

Harsimaran Singh

Allenhouse Institute of Management, Rooma, Kanpur (UP)

E-Mail: executive.harsimran@allenhouse.ac.in

ABSTRACT

Many companies find it difficult to decide on the type of marketing, because which marketing method will bring the company the greatest benefit. The use of newspapers and magazines, television and radio are a simple example of traditional marketing. On the other hand, companies invest in building a website and promoting the brand name through social media such as Facebook, Twitter and YouTube are done digitally. In traditional marketing, interaction is not possible but digital marketing encourages your prospects, customers and followers to take action, rate them and provide feedback that is visible to the marketer and also cost-effective

Keywords: *Digital Marketing, Traditional Marketing, Social Marketing*

1. Introduction

Many companies find it difficult to choose which type of marketing to utilize since it's difficult to determine which approach will benefit the company the most. One basic illustration of conventional marketing is the employment of TV, radio, newspapers, and magazines. On the other hand, companies spend money creating websites and digitally promoting their brands on Facebook, Twitter, and YouTube. Traditional marketing does not allow for interaction, but digital marketing makes it feasible for followers, clients, and prospects to take action, rate them, and offer feedback in a way that is both visible and economical for the marketer.

Digital marketing refers to marketing initiatives carried out via computers or other electronic devices. Email: Products and services are digitally promoted to the intended audience using search engines, websites, and social media pages such as Facebook, Instagram, Twitter, and Facebook.

Given how much digitalization has impacted people's lives, online is the ideal location to attract clients. Digital marketing includes internet promotions and digital advertising via emails, movies, brochures, and even brief movie snippets.

We have attempted to distinguish between innovative digital marketing strategies and outdated traditional marketing strategies in this study report.

The report goes into further detail on the rising significance of digital marketing in changing business settings.

2. Conventional Marketing Approaches

All current kinds of marketing, except digital marketing, are included in traditional marketing. These kinds of marketing have long had an impact on us. This covers every single promotion and marketing that we see daily. Print, broadcast, direct mail, and telephonic forms may all be categorized for simplicity of comprehension. Print ads are found on paper. For instance, ads in newspapers, newsletters, periodicals, brochures, etc. Commercials that are broadcast on television and radio are known as broadcast advertising. While the first television advertisement debuted in 1941, the first radio commercial debuted in 1920. This type of advertising has a strong influence on consumer purchasing decisions and a high recall value. Certain catchphrases and jingles consistently ring true and influence our purchases. In movie cinemas, broadcast commercials also play.

Direct mail marketing is sending flyers, brochures, postcards, letters, and other materials to clients directly by postal mail. In 1888, this type of marketing was initially employed. The practice of

making promotional phone calls to potential customers to persuade and draw them in is known as telemarketing. This is a common, obtrusive type of marketing.

3. Digital marketing is the new age of marketing

The modern era of marketing is known as "digital marketing," in which advertising agencies use email, social media, content, and other marketers to publish advertisements online.

Since today's customers are rational, aggressive marketing does not work well. As a result, businesses are employing more cunning strategies to grab their attention. To generate demand, digital marketing is carried out gradually.

4. Parties Concerned

Content Writer: A content writer is an expert who produces educational information about a good or service. This is done to identify needs and spread knowledge about the service. Channels like blogs, webpages, infographics, etc. are used for this.

Social Media Marketer: Using a variety of online social media platforms, including YouTube, Facebook, Twitter, LinkedIn, Instagram, Google +, and others, social media marketers sell educational content that has been produced in order to reach the target audience.

Email Marketer: Email marketing is the process of sending prospective consumers direct emails that include information about the services after it has been determined which customers are interested.

5. Various Methods of Digital Marketing

To understand the workings of digital marketing we must understand the associated ways of implementation. Following are some of the widely used methods of digital marketing

5.1. Search Engine Optimization (SEO)

It is a world wide web where content keeps getting uploaded all the time from all over the world. So, to make the promoted content visible online, a fee must be paid to the related search engines. This fee payment lets our posted content rank higher in the search results. This increases the free traffic (virtual footfall) to the promoted website, blog, or other such content.

5.2. Pay Per Click

An alternative to SEO, pay-per-click is a form of sponsored advertising where the advertisement is floated on to publisher's website whenever the advertisement is clicked. It leads the surfer to the promoted website. The publisher is paid the number of times the advertisement is clicked. Such paid ad spaces are available on Google AdWords, Facebook, Twitter, LinkedIn etc.

5.3. Affiliate Marketing

Advertisements are promoted through websites on payment of commission. The promoter's website hosts advertisements and videos. These can be promoted through their own social media accounts.

5.4. Marketing Automation

Mass API (Artificial programming interface) is a software program designed to help in the replication and duplication of repetitive tasks. Many times, marketing information needs to be sent across to a large target audience. It is then that this method of advertising is used where circulars, newsletters, and emails are repetitively sent to the public at large. This method of advertising is particularly used for campaign tracking, contact list updating, new product launches etc.

5.5. Online PR

Public relations (PR) in traditional marketing involves sitting over a cup of coffee with associates and sharing views and opinions while promoting their products and services. On similar lines online

PR is a digital marketing platform where one can post his views and opinions through his own blog, website or any other social platform. With the help of online PR, the offerings get promoted to remote corners and also get promoted at a personal level.

5.6. Importance of Digital Marketing

Technology is changing fast, and the ways of life and business are also transforming with it. The world has become digital and so are all the business processes. So,

it is obvious that old ways of marketing are becoming outdated and must evolve.

Digital marketing has therefore gained momentum with all types of businesses changing their marketing strategies towards digital ways. Digital marketing is suitable for all types of businesses irrespective of their size and functionality.

6. Some Points to Highlight the Importance of Digital Marketing in Today's Business Scenario

6.1. Cost Effective Marketing

Adopting a digital marketing channel that is more financially smart and technologically adept might readily yield the same benefits that were obtained by allocating significant amounts to traditional advertising and marketing strategies. Reductions in marketing expenses might be applied to improve goods and services. Businesses are spending more and more on digital marketing instead of conventional kinds of promotion. Digital marketing, according to a number of research and surveys, helps businesses obtain lower expenses per lead.

6.2. High Conversions

The audience has the option to listen or not to listen thanks to digital marketing. Because forceful marketing tactics are not used, interested and potential clients are led to the promoted content on their own. This enables the company to communicate with its target audience directly. The promotion message reaches the target audience directly thanks

to the use of filters on the large customer data sets. This lowers the cost per conversion and raises the conversion rate.

6.3. Encourages Interactive Marketing

Digital marketing is a refined form of marketing which is based on the cooperative interaction of suppliers and customers. Supplier does not impose his promotions on uninterested or unlikely customers. The prospective customers get a choice to attend to the promoted content. This is not so in traditional marketing where the promotion is forced on everyone.

Moreover, Digital marketing is content driven interaction that motivates the logical customer towards purchase. These interactions are in the form of surveys, feedback, suggestions, comments, and reviews which help in understanding the customer's requirement and proposing the most appropriate result-oriented strategy.

The interactive interface of the organization lets it grow into a better, more popular and more trustworthy entity.

6.4. Driving Results-Calls to Action

While navigating through the website, the prospective clients are guided towards the favourable and suitable purchases as per the data provided by them at the time of check-in. Various prompts are used to extract the decisive data. These prompts are called "Calls to action" (CTA). They steer the way of the surfer through favorable moves driving desired results. This offers a win-win situation for both the supplier and the customer. This cannot be done through traditional marketing ways. Therefore, digital marketing is more influential and result-oriented.

6.5. Equal Opportunity to all Businesses

Online marketing platform provides a level play and equal opportunity for all businesses irrespective of

their sizes. This helps in reducing the disparity between the big and established brands and the small and new start-ups. As discussed earlier, mass APIs have made it possible even for tiny enterprises to be able to contact a vast customer base without resorting to costly tele-calling services.

6.6. Utilizing the Mobile Phone Boom

Mobile marketing is a form of digital marketing using mobile phones. Mobile penetration has the maximum reach in markets all over the world. Even in a developing country like India, more than 70 % population owns mobile phones. In numbers, this population has crossed the 12000 billion mark. So, mobiles offer an ideal platform for the dissemination of promotional content.

Mobile marketing has become very important and is viewed by not only corporate houses but also governments as an opportunity to reach out to the population spread out in the remote corners of the world.

Unlike traditional marketing, only digital marketing can utilize the mobile network strength. So, organizations use digital marketing to promote offerings extensively through mobile platforms.

6.7. Higher Revenues

Digital marketing expands the horizons of the markets. So, with expanded markets, the business also expands and evolves. The scale of operation increases and so does the revenue. Tiny, small and medium enterprises have gained the maximum from digital marketing as they have attained access to the markets which they could not reach earlier through traditional ways.

According to an analysis done by Google with IPSOS Hong Kong, organizations using digital marketing could generate 2.8 times more revenue

than the organizations using only traditional marketing strategies.

6.8. Builds Brand Image and Goodwill

Content-driven marketing makes a deeper impact on the target audience. Through interesting intent, they can be pulled towards the product. When the prospective client becomes interested enough, then more details can be forwarded to him. A well-satisfied prospective client is most likely to purchase as well as drive word-of-mouth promotion to induce others to purchase. This automatically builds the brand's image, awareness, and goodwill of the business.

6.9. Increased Competitiveness and Relevance

With applications and software doing all the manual work including the interactive work, there is little chance of survival of non-digital processes. APIs (Artificial programming Interfaces) have been developed for every process in business. These applications have artificial intelligence through which they can interact with each other and drive results.

All activities including designing, manufacturing, organizational, sales, marketing, advertising etc. develop an integrated, digital and interconnected matrix which offers better customized solutions to end users.

Technology and processes are evolving at such a fast pace that the businesses which will not be digital will soon get out-placed. So, going digital in all facets is not just a competitive edge anymore, it has rather become a necessity for survival and relevance.

7. Conclusion

Digital marketing is useful for both business to business as well as business to customers. The need of the hour is to understand and quickly incorporate the ideal digital marketing method which is suitable for business.

Digital marketing provides direct results of the applied marketing efforts. These can be easily accessed anytime. Contrary to traditional marketing, Digital marketing is affordable for all businesses. It is more cost-effective and is more result-oriented. Digital marketing promises higher revenues with greater customer satisfaction. Digital marketing can also leverage mobile networking platforms and generate greater goodwill for the organization.

Digital marketing is a smart way of marketing which has now become an absolute necessity for the success as well as the survival of any business.

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REVOLUTIONIZING FINANCIAL LANDSCAPES: THE FRONTIER OF FINTECH INNOVATION

Shraddha Chauhan

Student, M.Com. II year,
Dayanand Anglo-Vedic College, Kanpur, Uttar Pradesh, India
E-Mail: shraddha1352001@gmail.com

Abstract: *This paper delves into the transformative impact of fintech innovation on financial landscapes worldwide. Focusing on disruptive technologies such as blockchain, artificial intelligence, and big data analytics, the paper explores how these advancements reshape traditional financial systems. It examines key areas where fintech is driving change, including payments and transactions, financial inclusion, regulatory challenges, and future trends. By synthesizing existing literature and industry insights, the paper offers a comprehensive overview of the opportunities and challenges presented by fintech innovation. Ultimately, it underscores the need for stakeholders to embrace innovation responsibly to unlock the full potential of fintech in driving sustainable growth and financial empowerment.*

Keywords: Finance, Fintech, Digital banking, Decentralized finance, and Sustainable Finance

1. Introduction

In the dynamic realm of finance, fintech innovation has sparked a revolution, fundamentally reshaping traditional financial landscapes. Fintech, a portmanteau of "financial technology," represents the fusion of cutting-edge technological advancements with financial services, propelling the sector into a new era of efficiency, accessibility, and inclusivity. As the world becomes increasingly interconnected and digitalized, fintech innovations are not merely augmenting existing practices but are fundamentally redefining the way individuals and businesses interact with money, investments, and financial institutions.

It aims to delve into the forefront of fintech innovation, exploring the disruptive technologies, transformative trends, and regulatory dynamics shaping the financial sector's future. From blockchain and cryptocurrency to artificial intelligence and big data analytics, the landscape of fintech

innovation is vast and multifaceted, offering unprecedented opportunities for both incumbents and newcomers to the industry.

Against the backdrop of rapid technological advancement, the financial services ecosystem is witnessing a paradigm shift in consumer behaviour, regulatory frameworks, and business models. Fintech innovations are democratizing access to financial services, enabling greater financial inclusion, and revolutionizing traditional banking, payments, lending, and insurance services.

However, amidst the promise of innovation lie complex challenges related to data privacy, cybersecurity, regulatory compliance, and the equitable distribution of fintech benefits. This research seeks to navigate these intricacies, providing insights into how stakeholders can harness fintech innovation responsibly while mitigating associated risks.

As we embark on this exploration of fintech's frontier, it becomes evident that the convergence of technology and finance is not only reshaping the way we manage money but also presenting novel opportunities to address societal challenges and foster sustainable economic growth. Through informed analysis and strategic foresight, we can uncover the transformative potential of fintech innovation and chart a course toward a more inclusive, resilient, and prosperous financial future.

2. Research Objective

- To identify and examine the latest trends and advancements in fintech innovation.
- To investigate the role of fintech in enhancing financial inclusion.
- To explore emerging trends and future opportunities in fintech.

3. Literature Review:

The intersection of finance and technology, commonly referred to as fintech, has garnered significant attention in both academic literature and industry discourse. This review aims to synthesize key research findings and insights about the transformative impact of fintech innovation on financial landscapes.

Disruptive Technologies Shaping Fintech:

Blockchain technology and cryptocurrencies have been at the forefront of fintech innovation, offering decentralized and immutable ledgers for financial transactions (Swan, 2015). Research by Yermack (2015) explores the potential of blockchain to revolutionize various aspects of finance, including payment systems, securities trading, and contract enforcement.

Artificial intelligence (AI) and machine learning (ML) algorithms are increasingly deployed in fintech applications, enabling personalized financial services and risk management solutions (Zheng, 2020). Studies by Zhang et al. (2018) highlight the role of AI in credit scoring, fraud detection, and algorithmic trading, enhancing efficiency and accuracy in financial decision-making processes.

Big data analytics is another pivotal technology driving fintech innovation, leveraging vast datasets to extract actionable insights for strategic decision-making (Chen et al., 2012). Research by Hoberg and Phillips (2019) demonstrates how big data analytics can optimize investment strategies, improve customer segmentation, and enhance risk management practices in financial institutions.

Redefining Payments and Transactions:

The rise of contactless payments and mobile wallets has reshaped the way consumers transact, offering convenience and security in everyday transactions (Claessens et al., 2018). Studies by Gans et al. (2020) emphasize the role of mobile payment platforms in accelerating financial inclusion and reducing the reliance on cash-based economies, particularly in developing regions.

Peer-to-peer (P2P) lending platforms have emerged as an alternative source of financing for individuals and small businesses, bypassing traditional banking intermediaries (Lin et al., 2013). Research by Zhang and Liu (2017) investigates the drivers and challenges of P2P lending growth, highlighting the importance of regulatory oversight and risk management mechanisms.

Enhancing Financial Inclusion: Digital banking platforms have expanded access to financial services for underserved populations, offering a range of banking functionalities through mobile and online channels (Allen et al., 2016). Studies by Demirgüç-Kunt et al. (2018) assess the impact of digital banking on financial inclusion metrics, revealing positive correlations with account ownership and usage among marginalized communities.

Micro-investing apps have democratized investment opportunities for retail investors, enabling fractional ownership of stocks and diversified portfolios with minimal capital requirements (Lee et al., 2020). Research by Barberis et al. (2018) examines the behavioural implications of micro-investing platforms, highlighting the potential benefits of automated savings and investment strategies for individuals with limited financial resources.

4. Research Methodology

This study employed a descriptive research methodology. Descriptive research focuses on describing phenomena as they exist and do not manipulate variables. Instead, it seeks to provide an accurate portrayal of the characteristics of a particular population or phenomenon. Data for this study were gathered from existing sources, including academic journals, government publications, industry reports, and reputable news sources.

5. Findings and Recommendations

i) Disruptive Technologies Shaping Fintech

Findings: Recent advancements in disruptive technologies such as blockchain, artificial intelligence, big data analytics, and the Internet of Things have significantly

influenced the trajectory of fintech innovation (Lacity & Willcocks, 2017; Bertoni, 2019).

- Blockchain technology has enabled secure and transparent transactions, leading to the rise of cryptocurrencies and decentralized finance (DeFi) platforms (Swan, 2015).
- Artificial intelligence and machine learning algorithms are being leveraged to personalize financial services, enhance fraud detection, and automate processes, thereby improving efficiency and customer experience (Deutsche Bank Research, 2019).
- Big data analytics provide valuable insights into consumer behavior and market trends, facilitating data-driven decision-making in financial institutions (Kshetri, 2017).
- The Internet of Things (IoT) is revolutionizing financial services by enabling seamless connectivity and enhancing security through biometric authentication and sensor-based monitoring (Iansiti & Lakhani, 2014).

Recommendations: To capitalize on the opportunities presented by disruptive technologies in fintech, financial institutions should:

- Invest in research and development to explore the potential applications of blockchain, AI, big data analytics, and IoT in their operations (Gai, Qiu, & Sun, 2018).
- Collaborate with technology partners and startups to harness innovative solutions that can streamline

processes, reduce costs, and improve customer satisfaction (Babaioff, Jackson, & Sonnenschein, 2020).

- Prioritize cybersecurity measures to mitigate the risks associated with adopting emerging technologies, such as data breaches and cyberattacks (Choi & Kim, 2019).

ii) Redefining Payments and Transactions

Findings: Fintech innovations have transformed the landscape of payments and transactions, offering faster, cheaper, and more convenient alternatives to traditional banking methods (BIS, 2020).

- Contactless payments have gained traction, especially in the wake of the COVID-19 pandemic, as consumers prefer safer and more hygienic payment options (Barba Navaretti & Venables, 2020).
- Peer-to-peer lending platforms have emerged as viable alternatives to traditional banking loans, providing individuals and small businesses with access to capital outside of the traditional banking system (Mishra & Yadav, 2019).
- Cross-border payments have been simplified and expedited through fintech solutions, reducing transaction costs and enhancing financial inclusion for individuals and businesses in emerging markets (García-Swartz, Hahn, & Layne-Farrar, 2016).
- Central Bank Digital Currencies (CBDCs) have garnered attention as potential replacements for physical cash, offering central banks greater

control over monetary policy and the ability to foster financial inclusion (Bordo, Levin, & Wandschneider, 2020).

Recommendations: To capitalize on the transformative potential of fintech in payments and transactions, policymakers and regulators should:

- Foster an enabling regulatory environment that encourages innovation while safeguarding consumer protection and financial stability (Claessens & Kodres, 2014).
- Collaborate with industry stakeholders to establish interoperable standards and protocols for cross-border payments, reducing friction and enhancing efficiency (Wolman, 2019).
- Promote financial literacy and awareness among consumers to empower them to make informed decisions about adopting fintech solutions for their payment needs (Lusardi & Mitchell, 2014).

These findings and recommendations shed light on the transformative potential of fintech innovation and provide actionable insights for policymakers, regulators, financial institutions, and consumers alike. By embracing technological advancements and fostering collaboration, stakeholders can navigate the evolving fintech landscape to drive inclusive growth and prosperity.

6. Conclusion:

The literature reviewed underscores the transformative potential of fintech innovation in revolutionizing financial landscapes. From

disruptive technologies like blockchain and AI to redefined payment systems and enhanced financial inclusion initiatives,

fintech continues to reshape traditional paradigms and drive towards a more inclusive and efficient financial ecosystem.

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