ISSN 0976-0628

Chetana's
Institute of Management & Research
AICTE New Delhi Approved & ISO 21001 : 2018 Certified

Volume XVI, Issue 2 September 2024

Journal of Management Research

(Peer Reviewed Journal)

From the Editor's Desk

The 'CIMR: Journal of Management Research' is an open-access bi-annual journal published by 'Chetana's Institute of Management & Research, Mumbai'. CIMR: JMR aims to provide a platform for researchers to publish their original research work in the fields of social sciences, commerce, business management, library sciences, information technology, and industrial psychology for disseminating knowledge. 'CIMR: Journal of Management Research' is double-blind peer-reviewed with ISSN No. 0976-0628. The journal is indexed in ProQuest Database and EBSCO.

The September 2024 issue explores emerging business trends such as digital marketing and transformation, the integration of AI in businesses, neuromarketing, the role of women entrepreneurs, and fund investment decisions, along with several other contemporary topics. The first article focuses on the importance of fostering a sense of belonging among employees. Its insightful findings highlight those rewards, recognition, and a positive work environment are key factors in boosting productivity and motivation among professionals.

Women entrepreneurs play a pivotal role in driving societal progress, job creation, and economic expansion. The second article explores the importance of support initiatives and policy frameworks aimed at empowering women business owners. Its findings offer valuable insights for business professionals, students, and researchers seeking to understand broader societal and economic issues. The third article provides a fresh perspective on the role of AI in the finance sector, highlighting both its benefits and challenges. AI's application has streamlined data mining and significantly influenced advancements in machine learning and neural networks.

The next chapter delves into the critical issue of cybercrimes, a serious problem that affects us all. It offers an engaging and insightful read, particularly in today's digital era where most businesses operate online. The chapter highlights the growing significance of cybercrime and emphasizes the crucial role that cyber cells play in addressing these challenges. In addition, the fifth paper examines both the advantages and disadvantages of artificial intelligence (AI). It explores the impact of AI on the creativity of future generations and the ethical concerns that accompany it. This article goes beyond a surface-level discussion, providing readers with a comprehensive and in-depth understanding of this timely and thought-provoking topic.

The sixth article explores the role of neuroscience in assisting managers with complex decision-making by analysing individual behaviour. It provides valuable insights into improving leadership and decision-making strategies. The seventh paper focuses on the future of digital marketing and its scope in the post-pandemic world. It highlights how digital marketing can create a lasting, positive impact across various sectors, contributing to their growth. The inclusion of relevant studies, statistics, and examples from leading businesses makes this an engaging and informative read.

The eighth article presents a critical analysis of existing management literature and databases, comparing the risk and return of equal-weight portfolios across various stocks

and time frames. It offers practical recommendations for business leaders and academic researchers alike. Analytics is essential for all businesses, and the next paper investigates HR analytics and its implications for organizational growth. It highlights topics that are not only theoretically interesting but also practical and valuable for business practitioners and students. Lastly, the tenth article examines the impact of both digital and traditional media marketing strategies, focusing on their integration to enhance the effectiveness of guerrilla marketing campaigns. The study raises thought-provoking questions and showcases the success of such marketing investments.

We extend our heartfelt thanks to all the authors who have contributed to this issue and supported us in bringing forth this outstanding multidisciplinary journal. We are confident that readers will greatly benefit from the diverse range of topics explored in these articles and that this issue will inspire continued contributions to the journal.

Kindly share your feedback with us at publication@cimr.in; padma.singhal@cimr.in

Warm Regards

Dr Padma Singhal

Editorial Advisory Board

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ISSN No. 0976-0628 Volume XVI(2) pg 1-17

Journal of Management Research
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Fostering a Sense of Belonging: A Strategic Approach to Employee Engagement

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Area of the Paper : General Management
Type of the Paper : Exploratory Research
Type of Review : Peer Reviewed as per COPE guidelines
Indexed In : Proquest and EBSCO

How to Cite this Paper:
Chakraborty T. et al. (2024).
Fostering a Sense of Belonging: A Strategic Approach to Employee Engagement
Journal of Management Research
XVI(2), 1-17 https://cimr.in/faculty-research.html#research-Journals

Paper Submission : 10/July/2024
Paper Publication : 30/September/2024

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ABSTRACT

This article probes into the critical role of fostering a sense of belonging among employees and its profound impact on employee engagement, satisfaction, and overall organizational success. It emphasizes the importance of initiatives supporting diversity, equity, inclusion and belongingness (DEIB), which are instrumental in creating an inclusive workplace where employees feel valued and respected for their uniqueness. One of the key strategies discussed is the implementation of reward and recognition programs. Research has shown that recognizing employees' contributions and achievements can significantly boost morale, motivation, and engagement levels. By offering meaningful rewards that align with employees' values and needs, organizations can reinforce a sense of belonging and appreciation among their workforce. Moreover, fostering a positive working environment is essential for creating a belonginess sense among the employees. Low stress levels, a healthy work-life balance, and supportive leadership all help to improve employees' physical and mental health. This, in turn, leads to increased productivity, as content and mentally well-adjusted employees are more motivated, focused, and creative in their professional tasks. Additionally, offering benefits such as health insurance, wellness initiatives, flexible work schedules, and opportunities for professional growth demonstrates a company's commitment to its employees' well-being. These benefits not only improve the work atmosphere but also inspires workers to be more committed to their work and engaged. This article concludes by emphasising how critical it is to foster a culture of belonging in businesses. Organisations may improve employee satisfaction, engagement, and overall performance by implementing measures that support diversity, equity, and inclusion; recognising and rewarding employees' achievements; and cultivating a good work environment.

Keywords: Belongingness, Diversity, Inclusion, Employee Engagement, Workplace Culture, Recognition, Trust

1. INTRODUCTION: EMPLOYEES ARE ASSETS OF AN ORGANIZATION

Employees are the real heart and soul of any organization, driving its success and growth (Gratton, 2000). They are not just workers; they are the assets that can make or break a company (Gabèanová, 2011). In today's competitive business environment, where innovation and adaptability are key, organizations must recognize the value of their employees and invest in their well-being

and development (Salas Vallina et al., 2021). Studies indicate prioritising the needs employees have and creating a positive work atmosphere not only increases employee engagement and loyalty but also helps them feel like they belong and have a voice. Such organizations tend to outperform their competitors by having more productive, creative, and committed employees. As a result, the concept of employee belongingness has garnered significant attention as a critical driver of employee engagement and organizational success.

Employees are the cornerstone of any organization, representing its most valuable asset. Regardless of their number, the individuals who constitute a company are its most valuable asset. Therefore, companies must invest in their employees by providing them with ample training and development opportunities and other things that they look forward to. Prioritizing their needs and creating a supportive work environment not only increases engagement and loyalty but also fosters a feeling of belonginess and ownership among them. Research shows that organizations excelling in these aspects tend to outperform competitors. Motivated and involved workers produce more, creative, and committed for achieving goals of the organisation. Therefore, recognizing employees as valuable assets and fostering their sense of belongingness is crucial for organizational success.

Today, what really matters in business is the knowledge and hard work of the employees. Things like patents, copyrights, and other special rights are all created by people. Thus, the most crucial component of any business is its workforce. They are the ones. who make the most difference in how much money a company makes and how much its shares are worth. That's why people are the most important assets for any organization. In today's world where businesses are always changing, it is the employees who work for them that make them stand out from the competition. What sets one organization apart from another is its knowledge and the employees who use it.

This chapter explores the importance of employee belongingness in organizations and how to encourage it to build a more inclusive and successful workplace. We will discuss various strategies and best practices that organizations can adopt to enhance employee belongingness and, ultimately, drive organizational performance. So the following sections talk about the conceptual framework of employee belongingness, followed by how organizations should build a culture of belonging and employ strategies for employee retention. Thereafter, the chapter explores the strategies for fostering employee belongingness, starting with open communication as the foundation. It discusses the role of trust in empowering growth and autonomy, getting rid of strangeness, demonstrating care through benefits and initiatives, and ensuring equitable and transparent information access. It also looks at the relationship between engagement and belongingness among employees. This chapter is based on the Belongingness Theory.

2. EMPLOYEE BELONGINGNESS: A CONCEPTUAL FRAMEWORK

Belongingness is the collective feeling of ownership or connection that people, families, groups, associations, organizations, or leaders have towards one another. Baumeister and Leary (1995) has said that understanding and feeling of belongingness are essential to human beings since they are social creatures. It is characterised by feelings of self-control, gratitude, loyalty, security, sincerity, attachment, love, passion, and affection as well as discipline, accountability, dedication, and coherence. Feelings of acceptance and belonging significantly influence human pursuits, actions, and thought processes. According to Maslow (1987), the human need to be recognised and valued by a community of people is what is meant to be understood as belongingness. This idea was put forth to help understand what constitutes human need. Earlier, Maslow (1954) established a five-level hierarchy that included the following needs for human beings: needs for safety, needs for esteem, needs for belonging and love, needs for physiological needs, and needs for self-actualization. There are several contrasting definitions of the concept of belongingness

in the literature. One definition focuses on, 'the belief and want to belong to others on various interpersonal levels, which enhances one's sense of connection (fitting in, feeling recognised, and being a part of), and esteem (being cared about, appreciated and looked up to by others), while offering mutual acceptance, caring and appreciation to others' is perhaps the most inclusive definition of belongingness, stated by Somers (1999). The definition proposed by Somers (1999) is based on the research conducted by two psychologists, Baumeister and Leary (1995). In accordance to social scientists, belongingness is the feeling of having personally participated in a system or environment to the extent that one feels like a significant part of it (Anant, 1967). Belongingness is the sensation of being integrated into a greater entity, when individuals experience a profound sense of possession and attachment. Tajuddin et al., (2015) discovered that maintaining a feeling of belonging is essential for keeping exceptional workers. In organization, 'belongingness' means to the feeling of acceptance and gratitude from one's employer. A key element that contributes to the psychological wellbeing of workers in any organisation, including engagement and satisfaction, is a sense of belonging at work (Chan, 2016). One of the variables that predicted an employee's intention to stay or quit was feeling like they belonged (Hussain et al., 2013). Some studies have found that belongingness is used to lessen psychological pressures such psychological demand, detachment, emotional exhaustion, and a lack of self-fulfilment (Coissard et al., 2017). More so than satisfaction with work, a key factor for determining employee retention is a sense of belonging. Because of this, organisations have included a sense of belonging into their employee retention strategy (Melhem, 2019).

Despite the growing recognition of employees as critical assets in organizations, the challenge of fostering a genuine sense of belonging among employees remains underexplored. While numerous studies have emphasized the importance of employee engagement and the role of organizational culture in driving performance (Salas-Vallina et al., 2021; Gratton, 2000), there remains a notable gap in understanding the specific strategies that effectively nurture employee belongingness. Although companies have implemented initiatives related to diversity, equity, and inclusion (DEI), the concept of belongingness is often treated as an extension rather than a core focus within these frameworks. Existing research largely overlooks the distinct dynamics of how belongingness can be strategically cultivated as a separate and influential factor in organizational success, particularly in diverse and rapidly changing workplaces. This paper aims to address this gap by exploring practical and evidence-based strategies that can be adopted to foster a sense of belonging, enhancing employee retention and engagement. By identifying this niche, the paper seeks to contribute to the ongoing discourse on how organizations can create a culture that not only values diversity but also actively promotes belongingness as a key driver of performance and employee well-being.

3. BUILDING A CULTURE OF BELONGING: STRATEGIES FOR EMPLOYEE RETENTION

Employers are increasingly putting more emphasis on employees' sense of belonging in order to ensure that they are happy and will stay with the company for a longer amount of time. They want to make the employees feel accepted and wanted in the organization. This makes them focus on the Diversity, Equity, Inclusion and Belongingness (DEIB) initiatives more than anything else while hiring. Companies create a sense of belongingness to the employees in the organization for better understanding them and foster employee engagement (Sharma, 2021). An employee's sense of inclusion and acceptance as a part of a particular team or organization can be described as their sense of belonging at work (Alexandre & Manderscheid, 2008). As a leader, one can help people feel like they belong to their work and their organization by fostering a culture of teamwork, fostering free communication, and recognizing all members' accomplishments.

Establishing this community is essential because it encourages employees to perform at superior levels of engagement, productivity, and job satisfaction (Bailey et al., 2019). Employees experience like they belong at work when they believe in management and their colleagues acknowledge and appreciate their uniqueness (Cathrine, 2019). The cumulative effects of daily contact create a sense of belonging, which enables an individual to unwind and be themselves at work. Providing a sense of 'fit in' at work is crucial for employee satisfaction, loyalty, productivity as well as engagement (Chakraborty & Ganguly, 2019).

Since it directly affects output and morale at work, having a feeling sense of belonging at work is essential. An important component of maximum productivity is a sense of belonging. Employees who do not feel appreciated are more likely to be skeptical about their position in the organization and to feel uncomfortable expressing their true selves in their work (Chung, 2020). Employee performance, creativity, and desire to contribute will eventually suffer as a result of the employee's discomfort and nervousness.

4. THEORETICAL BACKGROUND

4.1 Belonging Theory by Baumeister and Leary

The present paper takes its root from belongingness theory by Baumeister and Leary (1995). The authors suggest that humans have a fundamental need to belong and intend to form interpersonal relationships. According to this theory, the need to belong is as indispensable as the physiological need for food and shelter. The theory posits that people are fundamentally motivated to pursue social connections and feel accepted by others. When these needs are not met, they are not satisfied, and they may experience feelings of loneliness, isolation, and psychological distress. In contrast, individuals who feel that they belong have higher levels of wellbeing, happiness, and satisfaction in life. This theory also proposes that the need to belong impacts various aspects of human behavior, including social interactions, self-esteem, and emotional regulation. People may engage in behaviors that assist them to fulfil their need for belonging, such as looking for social groups, develop close relationships, and partaking social activities. Baumeister and Leary's belongingness theory emphasizes the significant role of social connections in human life and their profound impact on psychological and emotional well-being.

While Baumeister and Leary's (1995) seminal work on the need to belong remains a cornerstone in understanding the concept of belongingness, it is essential to broaden the theoretical foundation by engaging with diverse perspectives from other scholars and disciplines. A few more theories are discussed in this context to support the chapter,

4.2 Social Identity Theory (Tajfel & Turner, 1979)- This theory highlights that individuals derive part of their identity and self-esteem from the social groups they belong to. In organizational settings, an employee's sense of belonging is shaped by how strongly they identify with the organization and its culture.

4.3 Self-Determination Theory (Deci & Ryan, 2000)- This theory emphasizes that belongingness is a basic psychological need. When this need is met, it enhances an individual's motivation and well-being. In organizations, fostering a sense of belonging is essential for intrinsic motivation and commitment.

4.4 Attachment Theory (Bowlby, 1969)- This theory suggests that humans have an innate need to form secure attachments. In a workplace context, it can explain how secure, trusting rela-

tionships between employees and their organizations or teams contribute to a strong sense of belonging.

4.5 Organizational Support Theory (Eisenberger et al., 1986)-This theory posits that employees develop a sense of belonging based on their perception of how much the organization values their contributions and cares about their well-being.

The theoretical foundation of belongingness is enriched not only by Baumeister and Leary's (1995) pivotal work but also by integrating complementary perspectives from diverse theories such as Social Identity Theory, Self-Determination Theory, Attachment Theory, and Organizational Support Theory. These frameworks collectively offer a holistic understanding of how belongingness is cultivated within organizational settings, influencing employee motivation, well-being, and retention. By broadening the scope beyond a single theoretical lens, this chapter highlights the complexity of belongingness as a multidimensional construct, emphasizing the importance of strategically fostering it to enhance organizational culture and performance. This comprehensive approach lays the groundwork for developing effective strategies aimed at nurturing a deep sense of belonging among employees, thereby driving sustainable success for organizations.

5. A SUMMARY OF LITERATURE REVIEW

Author(s) and year	Brief Findings
Seligman, et al., (2005)	Purpose-driven well-being, characterized by a sense of purpose in life, positively influences organizational well-being.
Den Hartog et al., (2007)	Employees exhibit more helping and compliance behaviors when they find their leader as charismatic and have a stronger sense of belongingness at work.
Srivastava and Purang (2009)	Private sector bank employees in India perceive greater satisfaction with pay, social aspects, and growth opportunities compared to employees in public sector banks, who seem to be happier with their employment stability.
Jain (2010)	TQM practices like teamwork, employee empowerment, organizational culture, and communication positively relate to job satisfaction, with teamwork being a dominant factor.
Sarwar and Abugre (2013)	Rewards and job satisfaction significantly impact employee motivation and retention, with belongingness being a crucial aspect of the work environment.
Terera & Ngirande (2014)	Rewards alone do not significantly impact employee satisfaction and retention; other factors in the work environment contribute to employee contentment and belongingness.
Chakraborty and Ganguly (2019)	A careful management and leaders may cultivate a culture of employee engagement by highlighting the critical role that a great work environment plays.
Dewi (2020)	Sense of belonging and job satisfaction significantly impact employee performance in a manufacturing company in Merak Banten.
Luo & Barnes (2020)	Compensation, benefits, and company culture positively influence employees' sense of belongingness, leading to proposed improvement plans.
Barreiro and Treglown (2020)	Several attributes—such as dispositional happiness, self-motivation, emotion regulation, and emotion management—have distinct effects on engagement, underscoring the significance of these traits in raising engagement levels in the workplace

Raza et al., (2020)	There is a relationship between emotional commitment, crafting of job, appreciative leadership, and workplace belongingness among Thai university faculty, finding a strong direct impact.
Abrishamirad et al., (2021)	Employee Job belongingness models place a strong emphasis on rewards, quality of work, progression, and emotional belonging, but often overlook the role of social and organizational cultures.
Rasool et al., (2021)	A toxic working environment significantly impacts employee engagement in Chinese SMEs, reducing both direct and indirect support and well-being, necessitating the need for improved organizational results.
Boccoli et al., (2023)	There is a positive relationship between Employee Engagement (EE) and how it maintains performance and work satisfaction. It draws attention to the social aspect, dynamic quality, and human-centered approach potential of EE, particularly in view of the COVID-19 outbreak and hybrid work contexts.
Susanto and Sawitri, (2022)	There is an impact of coaching, mentoring, and transformational leadership on worker engagement, analyzing.
Vakira et al., (2023)	There is a link between inclusive leadership and employee engagement in the hospitality sector, revealing a direct relationship and partial mediation by psychological safety.
Jose et al., (2024)	Psychological safety and availability are positively correlated with nurses' engagement in HRM activities.
Dixit et al., (2024)	There is an impact of remote work on employee engagement, focusing on digital fatigue and virtual leadership, offering strategies to overcome challenges and enhance participation in virtual environments.
Ibrahim et al., (2024)	The effect of CSR initiatives on hotel industry staff engagement is investigated in this study. Results highlight the significance of CSR in raising employee engagement in five-star hotels by indicating that CSR practices impact engagement through corporate identity.

6. STRENGTHENING BONDS: OPEN COMMUNICATION AS THE FOUNDATION OF EMPLOYEE BELONGINGNESS

Corporations now prioritize open communication, encouraging employees to freely express opinions and ideas to higher-ups, fostering a sense of belonging. Trust is built among team members, promoting collaboration and innovative problem-solving. Establishing a communal atmosphere through activities outside work enhances connections among employees. Providing coaching or mentoring further strengthens bonds. It is important to be intentional and authentic in these efforts to ensure inclusivity. For example, Google's Career Guru program, initiated in 2010, used internal coaches via video conferencing to develop employees' skills and fostered a sense of ownership and belonging. Additionally, companies can create forums or online platforms where employees can share their thoughts and ideas openly. This not only helps in fostering a culture of open communication but also provides a sense of empowerment to employees, making them feel valued and heard. Moreover, organizing team-building activities and social events, both in-person and virtual, can foster a feeling of belonging and community among employees. By investing in these initiatives, companies can enhance employee engagement, retention, and overall organizational success.

7. TRUST TO EMPOWERING GROWTH AND AUTONOMY TOWARDS WORKPLACE BELONGINGNESS

Offering favorable growth prospects to an employee within the firm allows them to advance their professional and personal development (Levene. 2015). When employees anticipate receiving career assistance from their organization, they will perceive the organization as completely endorsing their goals. When employees perceive that their personal development is in harmony with the corporate objectives, they will wholeheartedly dedicate themselves to the organization and discover purpose and fulfilment in their line of employment. Employees may find it challenging to interact with their subordinates owing to a lack of trust. As a company, we may establish trust among employees through honest and open communication (Parent & Lovelace, 2018), consistent decision-making, innovative thinking, problem-solving, and openness. Benjamin's (2020) study explores employee engagement and commitment in virtual environments, aiming to help employees achieve their dreams through a screen. Promoting a culture of trust will provide employees with the opportunity for autonomy, leading them to experience a sense of ownership over the firm (Lee & Nguyen, 2023). Enhanced productivity and efficiency will lead to reduced turnover rates within the organization (Anwar & Abdullah, 2021). It will provide them with happiness and enhance their personal well-being while working in the firm. They will experience increased comfort and engagement in their office work environment. Deloitte introduced the Mass Career Customization (MCC) project in 2005, allowing employees to choose the roles or vocations they wish to pursue. Traditionally, corporations operated within a hierarchical structure that only allowed for upward movement. Currently, corporations operate using a lattice structure that allows for the integration of multiple pathways. Deloitte allows workers to work autonomously, leading to a significant rise in employee loyalty throughout the business. They reduced the workforce by keeping the personnel, leading to higher employee satisfaction levels. They noted that this approach is aiding them in effectively managing their work, career, and personal lives. They had a great opportunity to align their professional aspirations with the aims of the organization, leading to increased engagement.

8. GETTING RID OF STRANGENESS

Diversity and inclusion are essential components of a successful workplace, driving productivity, competitiveness, and innovation. However, despite progress in diversity, equity, and inclusion (DEI), many employees still feel excluded, leading them to suppress aspects of their identity. Belongingness Theory highlights that individuals perceived as different are more likely to be excluded, which can be psychologically damaging and impair performance. Leaders must prevent ethnic profiling and biases to enhance employee performance and fostering a sense of belongingness (Chung et al., 2020; Kurzban & Leary, 2001).

8.1 Strangeness in the Workplace

The concept of strangeness, where individuals are seen as unfamiliar or odd, can negatively impact employee engagement and community feelings. Creating a workplace where everyone feels accepted and comfortable can significantly boost motivation, output, and job satisfaction. Excluding certain employees, even those viewed as uncivil, can be costly and detrimental to team dynamics. Thus, fostering trust, understanding, and support at work is crucial to prevent alienation and promote inclusivity (Derfler-Rozin et al., 2010; Eriksson & Santesson, 2021).

8.2 Inclusive Organizational Practices

A positive organizational climate and inclusive practices play a significant role in enhancing

employee engagement. Eliminating strangeness from the workplace is vital for creating a happy and productive environment (Kuknor and Bhattacharya, 2021. The global trend towards inclusivity and equality is evident in various legislative acts and government initiatives. Companies must align with these trends to promote diversity, gender equality, disability acceptance, and LBGT rights (Canavesi & Minelli, 2022).

8.3 Promoting Involvement and Appreciation of Diversity

Inclusion promotes involvement and appreciation of diversity through integration into regular work processes (Stevens et al., 2008). Social intelligence skills play a crucial role in increasing employee involvement. Reducing strangeness fosters a friendly workplace where employees are more willing to collaborate and exchange ideas, ultimately increasing engagement and a sense of community (Brunetto et al., 2012).

8.4 Creating a Culture of Openness and Understanding

DEI initiatives can cultivate a culture of openness and understanding, leading to greater collaboration and support among employees (Steger, 2012). Making everyone accountable for DEI goals and showing genuine support for belonging can significantly enhance employee engagement and organizational success. Employee feedback should be integrated into organizational values to empower individuals and create an inclusive workplace (Tatjana et al., 2019).

9. DEMONSTRATING CARE THROUGH BENEFITS AND INITIATIVES

Fostering a sense of belonging among employees is essential for their engagement and well-being. Initiatives that support diversity, equity, inclusion, and belonging (DEIB) are instrumental in achieving this goal. When employees feel appreciated for their individuality and perceive that their organization respects and values diversity, it enhances their engagement and sense of belonging (Chung et al., 2020).

9.1 Reward and Recognition

Reward and recognition programs are essential for promoting employee engagement and fostering a culture of belonging. Research has shown that rewards and recognition, initiatives for mental wellness and flexible work schedules, significantly impact employee engagement and feelings of inclusion (Saks, 2006; Ryan, 2007). These initiatives show employees that their individual needs are valued at work and outside, leading to a greater sense of belonging.

9.2 Cultures of Belonging

promoting diversity in succession planning and organising occasions to honour marginalised groups, such Women's History Month, can effectively create cultures of belonging. Recognizing and celebrating employees' unique contributions from diverse backgrounds can significantly enhance their sense of belonging and contribute to business performance (Pyrillis, 2018).

9.3 Employee Engagement Rewards

Employee engagement rewards, including retirement, vacation, healthcare, and other benefits, play a crucial role in fulfilling employee needs and increasing engagement (Agusta, 2019). Research has shown that implementing reward systems can lead to variations in employee engagement levels, highlighting the importance of rewards in enhancing employee well-being and engagement (Widodo, 2014).

9.4 Recognition and Well-Being

Recognition is a powerful tool for motivating employees and making them feel valued for their work, at the same time making them feel included (Merino & Privado, 2015). Manager recognition has increased employees' well-being, job satisfaction, and inherent motivation (Appelbaum & Kamal, 2000;). The physical well-being of employees is greatly enhanced by a healthy work environment that is defined by leadership that supports subordinates, and a balanced work-life dynamic (Baeriswyl & Oris, 2023).

Creating a sense of belongingness among the staff is extremely important for their engagement, well-being and overall happiness. Initiatives supporting DEIB, reward and recognition programs, and a positive work environment are essential for nurturing this sense of belonging. By investing in these initiatives, companies can create a more inclusive and engaging workplace, leading to higher productivity and employee satisfaction.

10. ENSURING EQUITABLE AND TRANSPARENT INFORMATION ACCESS

Without effective communication, the data—which unambiguously demonstrates that organizations that prioritise purpose are more likely to have a positive employee experience—is meaningless. Siloed communication makes it harder to work together and be a team. Some employees get the message that they are outsiders who shouldn't be trusted with sensitive corporate secrets (Pattnaik & Jena, 2021). They may feel cheated and misled if they are caught off guard by negative news or kept in the dark about important company decisions. Everyone in the organisation benefits from open, cross-team communication because it makes them feel important (Bjarnason et al., 2022). Internal communication generates and upholds channels of communication between employers and employees, claims Verèiè (2019). Additionally, it makes it easier for people to communicate ideas, information, attitudes, and sentiments to one another (Tiara et al., 2023, April). Effective internal communication is essential for successful organisations (Ruck & Welch, 2012). It can improve connections inside the company and improve manager-employee communication (Welch, 2012). It is possible to manage internal communication successfully. According to some research, enhancing internal communication is essential for increasing employee engagement (Mishra et al., 2014; Pološki Vokic et al., 2020). These studies also show that when a company communicates with its employees in an effective manner, the employees' levels of engagement increase. As a result, the company succeeds through enhancing internal communication, increasing employee engagement, and making sure that staff members are aware of its goals, accomplishments, and development (Tomlinson, 2010). Their creativity and originality are stimulated by this engagement (Pološki Vokic et al., 2020). The JD-R model states that open and honest communication within a company is an essential component for encouraging employee engagement (Saks, 2006). More precisely, High levels of employee engagement are achieved when workers feel that their organisations encourage them to actively participate in information gathering and dissemination, policy-making, and decision-making; when they receive constructive criticism on their work and helpful suggestions for professional development; and when they are given substantial and accurate information about organisational topics, incidents, and events (Jaworski and Kohli, 1991). Employee engagement is influenced by open and constant communication (Saks, 2006). Organizations can foster a culture of openness and trust that can increase employee engagement and a greater sense of belonging by guaranteeing fair and transparent information access. If employees feel educated and involved, they are more likely to be productive, motivated, and committed to the success of the organisation.

11. CAN EMPLOYEE BELONGINGNESS LEAD TO EMPLOYEE ENGAGEMENT

Belongingness feeling at work is an essential element for employee satisfaction, loyalty, productivity, and engagement. When employees feel like valued members of a team, they are more likely to be satisfied with their jobs and committed to their organizations (Byrd, 2022). This sense of belonging can impact higher levels of productivity, engagement, and job satisfaction. However, if employees feel unappreciated or disconnected from their work environment, it can lead to decreased performance, creativity, and overall job satisfaction (Byrd & Sparkman, 2022). To foster a sense of belonging, organizations should adopt an open communication policy so that Employees believe they are important members of the team (Zhou et al., 2023). This includes being transparent with employees about company decisions and goals. Additionally, providing employees with autonomy in their work promotes accountability, responsibility, skills development, problem-solving, creativity, and individuality (Lloyd-Jones, 2020). This can help employees feel more connected to their work and the organization as a whole (Putra et al., 2024). Organizations can also foster a sense of belonging by providing team-building activities that allow employees to bond and strengthen interpersonal relationships (Schmidt et al., 2023). By working together in these activities, employees can strengthen their engagement and collaboration, ultimately fostering a sense of belonging within the team. Involving employees in decision-making processes is another way to enhance a sense of belongingness and fit in within the firm (Greey. 2023). This can help employees feel valued and empowered, leading to increased trust and collaboration with leadership. Finally, offering wellness programs that address physical, mental, and emotional health can demonstrate care for employees' holistic needs and foster a sense of belonging and support (Georgeac & Rattan, 2023). This strategy may help in attracting and retaining elite talent, reduce turnover rates, enhance job satisfaction, and contribute to a positive workplace culture. Every organization is unique, and so are the individuals within them. There's no one-size-fits-all solution for foestering a sense of belongingness in the organization. The key is to listen to the needs of each person and act on their feedback to address those needs (Johnson, 2020). Employees clearly desire a feeling of belonging at work, and achieving this requires courage from everyone involved. We believe that fostering belonging and demonstrating bravery are closely linked, which is why we have developed a guide to assist you in promoting these values within your teams and organization. This guide offers advice, tips, and strategies for fostering safety and cultivating a sense of belonging in a hybrid workplace.

12. CONCLUSION

In conclusion, it can be summarized that, fostering a sense of belongingness among employees within an organization is not just a desirable aspect but an indispensable one for the overall success and productivity of an organization. By recognizing the importance of inclusivity, open communication, and a supportive culture, companies may establish a workplace where each worker feels appreciated, connected, and respected. Consequently, this results in heightened job satisfaction, a greater sense of involvement, enhanced cooperation, and decreased rates of employee turnover.. As organizations continue to evolve and diversify, prioritizing strategies that nurture belongingness will not only enhance individual well-being but also contribute to the organization's long-term growth and prosperity. Remember, creating belongingness is an ongoing journey that requires dedication, consistent effort, and a commitment to embracing the unique perspectives and backgrounds of all employees.

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Chetana's Institute of Management & Research (CIMR)
ISSN No. 0976-0628 Volume XVI(2) pg 18-26

Journal of Management Research
Peer Reviewed Journal

Women Entrepreneurs - A Critical Need in Today's World

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Area of the Paper : General Management
Type of the Paper : Exploratory Research
Type of Review : Peer Reviewed as per COPE guidelines
Indexed In : Proquest and EBSCO

How to Cite this Paper:

Gautam A. (2024).
Women Entrepreneurs - A Critical Need in Today's World
Journal of Management Research
XVI(2), 18-26 https://cimr.in/faculty-research.html#research-Journals

Paper Submission : 14/June/2024
Paper Publication : 30/September/2024

Chetana's Institute of Management & Research (CIMR)
ISSN No. 0976-0628 Volume XVI(2) pg 18-26

Journal of Management Research
Peer Reviewed Journal

Women Entrepreneurs - A Critical Need in Today's World

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ABSTRACT

In the fast-changing world economy today, women business owners play a crucial role in driving innovation, expanding the economy, and promoting sustainable growth. However, in India, the full potential of these women entrepreneurs is still largely unexplored, even though there have been significant advancements across different industries. This piece delves into the pivotal role of women business owners in modern society and within the Indian scenario, emphasizing their impact on economic expansion, job creation, and societal progress. It addresses the specific obstacles women business owners encounter, including difficulties in securing funding, cultural and social challenges, and bureaucratic obstacles. This study underscores the importance of robust policy structures and supportive environments. Further research investigates government efforts, corporate collaborations, and local initiatives designed to create a welcoming environment for businesses. By thoroughly examining scholarly articles, case studies, and statistical evidence, this document calls for a strategic strategy to enhance the empowerment of women business owners, leading to a fairer and more prosperous future.

Keywords: Women Entrepreneurs, Economic Development, Socio-cultural Barriers, Government Initiatives, Entrepreneurial Ecosystem, Gender Equality

INTRODUCTION

In today's fast-paced and ever-more competitive worldwide marketplace, female business owners play a crucial role in driving economic expansion, fostering innovation, and enhancing societal well-being. Their ventures not only lead to diversification of the economy and the creation of new jobs but also advance societal progress and the growth of local communities. Despite these significant contributions, the full potential of female business owners in India is largely unexplored, even as the nation has seen considerable advancements across various sectors. With a population exceeding 1.3 billion, nearly half of whom are women, India stands at a pivotal moment where empowering these female business owners could yield substantial economic and societal advantages. However, these female business owners in India encounter numerous obstacles that limit their full engagement in the business world. These obstacles include restricted access to capital, deep-seated social and cultural barriers, insufficient training and mentorship opportunities,

and complicated regulatory frameworks. Overcoming these hurdles is crucial for realizing the full potential of female business owners and fostering inclusive economic growth.

Acknowledging the urgent need to support female business owners, various entities, including the government, the private sector, and non-governmental organizations, have launched initiatives and policies designed to bolster support for women-led businesses. Programs such as Mudra Yojana, Stand Up India, and Women Entrepreneurship Platform (WEP) have been established to offer financial backing, training, and networking opportunities. This article delves into the significance of female business owners in the contemporary landscape, with a special focus on the Indian scenario. It explores how female business owners contribute to economic and social progress, the obstacles they face, and the effectiveness of the existing support programs. By highlighting successful examples and best practices, this article seeks to offer a comprehensive understanding of the critical role female business owners play and provide strategic suggestions to amplify their impact in India.

WOMEN ENTREPRENEURS

The concept of women's entrepreneurship involves the journey women undertake to start, structure, and oversee businesses, leveraging their abilities, inventiveness, and leadership to generate wealth and job opportunities. As business founders, women significantly drive economic variety, innovation, and long-term growth. Across various locales, including India, women entrepreneurs also play a crucial role in addressing societal issues, fostering inclusive economic expansion, and enhancing the welfare of the community.

The significance of women's entrepreneurship extends to economic expansion, innovation, job creation, social impact, diversification of the economy, and empowerment and gender equality. Women entrepreneurs enhance economic growth by establishing new ventures and sectors. Their initiatives generate employment, boost economic activity, and increase tax income. Innovation is another area where women entrepreneurs bring fresh perspectives and ideas, leading to the development of innovative products, services, and business strategies. Their inventive and problem-solving abilities drive progress in various fields, from technology to healthcare.

In terms of job creation, businesses owned by women provide employment opportunities, particularly in local communities and areas that are underserved. This employment generation aids in poverty reduction and the enhancement of living standards. Socially, many women entrepreneurs focus on social ventures aimed at solving significant issues like education, health, and environmental sustainability. Their work contributes to social progress and the betterment of life quality.

In the context of the economy, women entrepreneurs help diversify it by entering new sectors and markets, reducing reliance on conventional industries, and increasing the economy's flexibility. Empowerment and gender equality are also key outcomes of entrepreneurship for women. It provides them with financial independence, the ability to make decisions, and a sense of accomplishment. This empowerment not only promotes gender equality but also challenges traditional gender roles.

CHALLENGES FACED IN INDIA AND WORLDWIDE:

POINTERS	INDIA	WORLDWIDE
1. Access to Finance	Women often struggle to secure loans and investment due to lack of collateral and credit history. Gender biases in lending practices further exacerbate the issue.	Globally, women face similar financial barriers, including discriminatory lending practices and limited access to venture capital.
2. Socio-Cultural Barriers	Traditional gender roles and societal expectations can limit women's entrepreneurial ambitions. Family resistance and societal pressure often hinder their ability to start and grow businesses.	In many cultures, women face societal norms that discourage them from pursuing entrepreneurship. Gender stereotypes and biases persist globally, affecting women's confidence and opportunities.
3. Lack of Training and Mentorship	There is a significant gap in access to entrepreneurial training and mentorship programs tailored for women. This lack of support limits their ability to acquire essential business skills and knowledge.	Women entrepreneurs globally often lack access to networks, mentors, and professional development opportunities that are critical for business success.
4. Regulatory Hurdles	Complex regulatory environments and bureaucratic red tape can be particularly challenging for women entrepreneurs. Navigating these processes requires resources and knowledge that may be inaccessible to many women.	Across the world, women face regulatory challenges, including lengthy registration processes, high compliance costs, and legal barriers that disproportionately affect female-owned businesses.
5. Balancing Responsibilities	Women often juggle multiple roles, including caregiving and household responsibilities, which limit the time and energy they can dedicate to their businesses.	Globally, women entrepreneurs face the challenge of balancing family and business responsibilities. The lack of supportive policies, such as affordable childcare and parental leave, exacerbates this issue.
6. Limited Market Access	Women entrepreneurs in India often struggle to access markets due to inadequate networks, limited exposure, and gender biases in business dealings.	Worldwide, women face barriers in entering and competing in markets, including restricted access to supply chains, trade networks, and business platforms.
7. Technological Barriers	Limited access to technology and digital tools can hinder the growth of women-led businesses, especially in rural areas.	In many parts of the world, women entrepreneurs lack access to technology and the internet, limiting their ability to innovate and expand their businesses.

1. Safety and Security Concerns	Concerns about personal safety and security can restrict women's mobility and participation in entrepreneurial activities, particularly in unsafe or conservative regions.	Globally, women entrepreneurs may face threats to their safety, including harassment and violence, which can impede their business operations and growth.
2. Gender Discrimination	Gender discrimination in business practices and within industries can create hostile environments for women entrepreneurs.	Discrimination and gender biases persist in many business environments worldwide, affecting women's opportunities for funding, mentorship, and business partnerships.
3. Lack of Representation and Role Models	The absence of visible and successful women entrepreneurs can discourage aspiring women from pursuing entrepreneurship.	Globally, the lack of representation of women in leadership and entrepreneurial roles can limit the aspirations and ambitions of potential women entrepreneurs.

HOW CAN THE CHALLENGES BE OVERCOME:

Overcoming the obstacles that women business owners face demands a comprehensive strategy that includes supportive policies, specialized programs, and shifts in societal views. Here are some approaches to tackle these issues:

1. Financial Accessibility

a. Microloans and venture capital efforts: Governments and financial bodies can establish microloan schemes designed specifically for female business owners, offering small loans without the usual collateral requirements.

b. Gender-aware lending methods: Financial institutions should adopt lending practices that consider gender, ensuring fair opportunities for women in borrowing and investment.

c. Public-Private Collaboration: A partnership between government agencies, private financial institutions, and global organizations can lead to financial education initiatives and enhanced access to capital.

2. Social and Cultural Challenges

a. Raising awareness and sensitivity: Educational initiatives and media campaigns can challenge common stereotypes and highlight the advantages of women's entrepreneurship within communities.

b. Support networks and inspirational figures: Establish mentorship programs and networking events where successful female business owners can guide and support those starting out.

c. Encouraging positive practices: Push for policies that foster gender equality in business, including rewards for firms that back women in leadership and workforce involvement.

3. Insufficient Training and Guidance

a. Incorporating entrepreneurship education: Add entrepreneurship courses to school curricula

and vocational training programs to equip women with essential business skills.

b. Incubators and Accelerators: Create incubators and accelerators exclusively for female business owners, providing access to mentors, networks, and resources.

c. Peer Support Groups: Form peer support networks where women business owners can exchange experiences, advice, and effective strategies.

4. Regulatory Hurdles

a. Streamlining regulations: Governments can make the registration process easier, reduce bureaucratic hurdles, and establish dedicated job centers or online platforms for female business owners.

b. Legal Support and Assistance: Offer legal aid and resources to help navigate complex regulatory landscapes, ensuring compliance is manageable without excessive expense or effort.

c. Policy Discussions: Engage with stakeholders to pinpoint regulatory obstacles and advocate for changes that create a more supportive environment for female business owners.

5. Sharing the Burden

a. Flexible employment policies: Encourage companies to implement flexible work arrangements, such as telecommuting and part-time positions, to accommodate women's caregiving duties.

b. Family support initiatives: Introduce policies like affordable childcare, parental leave, and support for the elderly to lessen the impact on women business owners.

c. Time management and self-care: Promote skills in time management and self-care among female business owners to maintain a healthy balance between work and personal life.

6. Limited Market Reach

a. Market Access Initiatives: Government-industry collaborations can facilitate market access programs, trade missions, and participation in international trade exhibitions for female business owners.

b. Networking Platforms: Develop platforms where female business owners can connect with potential customers, suppliers, and partners to expand their business.

c. E-commerce and Digital Platforms: Promote the use of e-commerce platforms and digital marketing strategies to reach broader markets, including rural and remote areas.

7. Overcoming Technical Obstacles

a. Digital Skills Training: Offering instruction in digital abilities and technologies, such as Internet usage, social media marketing, and online shopping platforms.

b. Easy Access to Tech: Making sure technology is affordable and available, including devices like smartphones, computers, and fast internet connections, particularly in rural and underprivileged areas.

c. Tech Support Hubs and Innovation Centers: Creating spaces focused on technology where female business owners can get technical assistance, guidance, and financial support.

8. Addressing Safety Concerns

a. Implementing Safety Protocols: Putting in place safety guidelines and actions in work environments and public areas to protect the physical and mental health of female business owners.

b. Law Enforcement: Enhancing legal safeguards against harassment and discrimination, including strict enforcement of current laws and regulations.

c. Community Backing: Developing supportive communities and networks where female business owners can discuss their safety issues and collaborate on solutions.

9. Addressing Gender Bias

a. Training and Awareness Initiatives: Launching programs for all involved parties, including policymakers, employers, and investors, to tackle implicit biases and advocate for gender equality.

b. Inclusion and Diversity Strategies: Companies and organizations are urged to adopt strategies that promote women's leadership and career progression.

c. Evaluation and Responsibility: Setting up systems to track instances of gender bias and hold accountable those who engage in discriminatory actions.

10. Insufficient Representation and Inspirational Figures

a. Highlighting Success Stories: Promoting the achievements of female business owners through media, events, and accolades to inspire and encourage aspiring entrepreneurs.

b. Investment in Leadership: Putting resources into programs that enhance the leadership capabilities and visibility of women in their fields.

c. Support from Peers: Encouraging accomplished female business owners to mentor and guide the upcoming generation through leadership and inspirational role models.

VARIOUS GOVERNMENT PLANS TO DEVELOP WOMEN ENTREPRENEURSHIP IN INDIA

In India, the government has launched a variety of programs and plans aimed at backing and encouraging women's entrepreneurship. The primary objectives of these initiatives are to address the unique challenges faced by women entrepreneurs and to foster an environment conducive to the growth and success of their businesses. Here are some of the key initiatives introduced by the government:

1. Mudra Yojana:-

- **Objective:** To supply microfinance to small and micro enterprises, including those owned by women, entrepreneurship, and job creation.
- **Examples:** Offers three loan categories - Shishu (up to ` 50,000), Kishor (` 50,001 - `5,000), and Tarun (` 5,000 - ` 10,000), tailored to the stage of business development.

2. Stand Up India:

- **Aim:** To make it easier for banks to provide loans of up to ` 10,000 to at least one female borrower for starting new businesses.

- **Features:** Designed to boost entrepreneurship among women, Scheduled Castes/ Scheduled Tribes communities, and socially disadvantaged groups through financial aid and support.

3. **Women Entrepreneurship Platform (WEP):**

   - **Goal:** To establish an ecosystem that allows start-up and existing women entrepreneurs to network, collaborate, and expand their businesses.
   - **Examples:** Gives access to resources, training, funding opportunities, and knowledge sharing via a digital platform managed by NITI Aayog.

4. **Grant for Women's Education and Employment (STEP):**

   - **Objective:** To enhance women's employability and entrepreneurial skills through vocational training and skills development programs.
   - **Examples:** Supports projects that provide women with skills training, entrepreneurship development, and vocational training relevant to the market.

5. **Udyogini Program:**

   - **Objective:** To supply financial backing and assistance to women entrepreneurs, particularly in rural and underserved areas, to launch and grow their businesses.
   - **Features:** Offers grants, incentives, and credit arrangements to boost women's entrepreneurship and economic empowerment

6. **Mahila Coir Yojana:**

   - **Objective:** To promote entrepreneurship among women in the coir sector by providing financial support to establish coir units.
   - **Features:** Grants and financial aid for training, equipment acquisition, and marketing related to coir-based businesses.

7. **Mahila E-Haat:**

   - Aim: An online marketing platform introduced by the Ministry of Women and Child Development that enables women entrepreneurs to display and sell their products.
   - Features: Enables direct interaction between buyers and sellers, offering a platform for women to increase market access and promote their products.

8. **Stree Shakti Package for Women Entrepreneurs:**

   - **Objective:** To facilitate access to credit and finance for women entrepreneurs through reduced interest rates and collateral requirements.
   - **Features:** Includes special plans and incentives from various banks and financial institutions to support women-led businesses.

These government initiatives are crucial in creating an enabling environment for women entrepreneurs in India. Their mission is to eliminate systemic barriers and provide the necessary support for women to thrive in the business sector. The consistent implementation, awareness, and support from all stakeholders are key to ensuring the success and impact of these programs

in advancing women entrepreneurship nationwide.

CONCLUSION

In conclusion, research on women's entrepreneurship in India reveals a landscape full of challenges but with the potential for transformative impact. Women entrepreneurs face multifaceted barriers such as limited access to finance, socio-cultural constraints, regulatory barriers and the complex balance of personal and professional responsibilities. These challenges underline the urgent need for comprehensive support mechanisms and policy initiatives that foster an enabling environment for women to succeed as entrepreneurs.

Government initiatives like Mudra Yojana, Stand Up India and Women Entrepreneurship Platform (WEP) play a crucial role in mitigating these challenges by providing financial assistance, skill development, mentoring and market access opportunities. These programs not only empower women economically but also contribute significantly to economic diversification, employment generation and social development in various sectors of India.

The impact of women entrepreneurs extends beyond financial measures to include innovation, community empowerment and advancing social causes through entrepreneurship. Their projects not only contribute to economic growth, but also address pressing social problems, thus contributing to the achievement of sustainability goals.

Moving forward, continued work is needed to break down entrenched barriers, promote gender equality in business and create an inclusive ecosystem where women entrepreneurs can thrive. Collaboration across governments, the private sector, civil society and academia is essential to ensure equitable access to resources, supportive policies and an enabling environment that fosters the success of women's entrepreneurship in India. By harnessing the entrepreneurial potential of women and increasing their contribution, India can achieve inclusive and sustainable economic growth, paving the way for a more prosperous future.

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Chetana's Institute of Management & Research (CIMR)
ISSN No. 0976-0628 Volume XVI(2) pg 27-35

Journal of Management Research
Peer Reviewed Journal

Artificial Intelligence in Finance Sector

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Area of the Paper : General Management
Type of the Paper : Exploratory Research
Type of Review : Peer Reviewed as per COPE guidelines
Indexed In : Proquest and EBSCO

How to Cite this Paper:

Patil P. et al. (2024).
Artificial Intelligence in Finance Sector
Journal of Management Research
XVI(2), 27-35 https://cimr.in/faculty-research.html#research-Journals

Paper Submission : 27/July/2024
Paper Publication : 30/September/2024

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ABSTRACT

AI communications, the arts, and management applications have advanced these sectors dramatically and quickly. However, several challenging problems have been brought up by the quickly growing potential of AI in business and society. Financial technology and artificial intelligence are not saved. The finance sector is among the first and most extensive sectors to incorporate artificial intelligence. A new wave of changes has been brought about by the application of various artificial intelligence technologies, including data mining, precise profiling, machine learning, and neural networks. It will provide financial products, service channels, methods, risk management, credit financing, and investment decisions. A critical component of making sure the business sector successfully finds the most significant technologies that might be applied to boost the provision of dependable and high-quality services is financial management. Financial institutions have embraced the use of AI applications to provide AI-focused services like e-commerce, which facilitates online trade and transactions, to address these demands. The system developers have recently integrated AI to discover and cross-check all transactions with trustworthy preventive sectors to improve safety in all transaction operations. Adopting these advances has also been linked to significant obstacles, including insufficient funding and a shortage of individuals with the necessary training to operate the systems. As a result, some small financial institutions are finding it harder to keep up with the demands of contemporary technology. The study aims to analyze the awareness of AI in finance and its role. The findings of this study will offer a theoretical basis for further investigation when more finance sectors utilize AI applications.

Keywords: Artificial Intelligence, Finance Sector, Importance & Role.

1. INTRODUCTION

Technology improvements have caused a tremendous transition in the financial sector during the last few years (Tan et al., 2023). Thomas Bayes, who first identified the framework for estimating the likelihood of managerial events in the 18th century, notes that technological concepts initially defined artificial intelligence. These days, financial institutions are becoming more and more driven to adopt the expectations of society at large as a component of their business plan. This element has expanded the idea of corporate sustainability because all of these businesses want to provide workers and stakeholders the freedom to investigate alternative options in order to gain a competitive edge. Human industrial intelligence research began an accelerated phase in the late 1990s, focusing on practical research and specialized domains. In the fields of image recognition and medical diagnostics, China is especially well-known. 2010 years later, government, e-commerce, business, social media, science, and government provide available big data and powerful computing capabilities, and the technology industry is increasing investment in artificial intelligence. The above factors have promoted the wave of artificial intelligence development tide. "A new financial industry that applies technology to improve financial activities" is the definition of financial technology, or fintech (Schueffel, 2016). Fintech is developing quickly because of cutting-edge technology like blockchain and artificial intelligence; regulators, researchers, and entrepreneurs have noticed it .

"Making intelligent machines" is the goal of artificial intelligence (AI) (McCarthy, 2004). The phrase "AI-empowered" is becoming more and more common. The major players in contemporary finance are no longer humans; a significant percentage are machines. They take over systematic and regular duties like standard analysis.

Artificial intelligence's ascent in the financial industry has revolutionized how banks and other financial organizations run. In addition to strengthening customer connections and delivering tailored offers, AI-based technology is vital in identifying and stopping fraud. AI is also helping to streamline processes and save costs, especially in the fight against money laundering. Comparing this effect to traditional financial systems, defined mainly by offline banking, reveals notable differences.

A lot of supervision knowledge is involved in finance. Artificial intelligence can potentially improve the financial industry's oversight, customer service, and banking experience for both staff and clients. With my nation's economy growing so quickly, the financial sector has also become indispensable to our day-to-day existence. As a result, artificial intelligence and finance working together may benefit society more and advance our nation's economy.

2. OBJECTIVES

- To study the role of AI in the Finance sector.
- To study the challenges of application of artificial intelligence in finance sector.

3. RESEARCH METHODOLOGY

A qualitative research approach is used to get insight into the AI contribution to the financial sector.

4. LITERATURE REVIEW

- Yang et al., 2016: Agent-based modeling was evolving concurrently. Agents are made to take in knowledge, grow, and change. These models were used to anticipate future states, assess sys-

tem attributes like volatility and liquidity, and comprehend financial market features like fat tails and clustering. Regarding the latter, agent-based modelling and AI approaches are being utilized to forecast financial derivative pricing, stock price dynamics, and market effects. Trading methods are also being developed from this.

- AI is a new technology that presents dangers and difficulties for the finance sector.

  Wall (2018) asserted that the AI system might identify non-causative links. Biases against specific protected classes (such as gender and ethnicity) may result. Humans struggle to control and interfere in these complicated, imperceptible decision processes (Jagtiani & John, 2018). According to some research, it might be challenging to persuade consumers to accept financial services and advice only offered by automated systems (Fenwick & Vermeulen, 2017).

- Al Ahbabi and Nobanee, 2019: Financial management makes it easier to make decisions on purchasing and administrating financial resources, according to research on the subject. The study also examined the relationship between financial management and corporate sustainability business practices. This is a crucial component that facilitates the organizational plans' simplification

- Rashmi & Nirmal Raj, 2021: This enables all parties to guarantee that the financial institution can achieve its objective of profitability and competitiveness. Within the company's financial constraints, financial management helps popularize corporate reputation, which is viewed as a capital risk that supports capital budgeting sustainability.

- Khan, H U., Malik, M Z., Alomari, M K., Khan, S., Al-Maadid, A., Hassan, M K., & Khan, K. 2022: Algorithms powered by AI have the power to completely transform banking industry anti-money laundering initiatives. Artificial intelligence (AI) algorithms have the ability to detect money laundering operations more effectively and efficiently than traditional approaches by evaluating vast amounts of data and finding questionable transactions or trends. There is a lot of potential for generative AI to completely transform current finance industry business structures.

- Boobier, 2020: As long as the collateral payment infrastructure, such as the automated teller machines (ATM) or mobile banking system, is secure to use, the bank's profitability will thereafter increase. By providing them with several new business procedures, AI might also assist banks in strengthening their relationships with their clients. The AI-assisted bank might give clients portfolio management, advising, and counseling using consumer data.

5. RESULTS & DISCUSSION

5.1 Concept

Concept of Artificial Intelligence & Finance

Since money and mechanical kinetic energy have propelled global modernity since the period of great navigation, data is poised to emerge as the primary catalyst for the upcoming technological revolution and subsequent societal transformation. Data has grown exponentially with the advent of the Internet, mobile devices, and the Internet of Things. As a result, finance has amassed substantial data from transactional data, asset liability data, and consumer data obtained from corporate operations. The most widespread and profound application of artificial intelligence technology is found in the finance sector. Its players include financial regulatory agencies, developing financial formats, established financial institutions that use technology, and technology businesses that offer artificial intelligence technology services to financial institutions. The

intelligent financial model may be separated into intelligent investment advising, intelligent customer service, intelligent risk control, intelligent marketing, etc., based on the various financial services that use artificial intelligence technology.

Impact

A valuable resource is talent. China's financial sector has entered a new phase of fast expansion by adopting and applying several financial openness laws. More skill is needed in this area, particularly in finance, to satisfy the company's expanding demands. Due to market needs, diverse financial technology compound abilities are necessary for firms with diversified operations. In recent years, the conventional financial sector has aggressively engaged in structural upgrading, transformation, and optimization. One of the transformational paths is fintech. Strengthening multidisciplinary education is required, building on the foundation of the initial financial education. Multidisciplinary expertise in finance, computers, and information is necessary for interdisciplinary, innovative finance practitioners. Therefore, schools and universities must consider how finance intersects with other academic fields while developing curricula. In order to enhance students' comprehensive skills and foster their overall growth, it is also imperative to aggressively investigate new and relevant courses like Internet finance, artificial intelligence and financial integration, and extensive data analysis. Artificial intelligence finds its prominent application in finance. In recent years, the conventional financial sector has aggressively engaged in structural upgrading, transformation, and optimization. One of the transformational paths is fintech. The evolution of several cutting-edge technologies, including big data, cloud computing, and artificial intelligence, has altered how business is conducted. Financial institutions undergo reform and upgrade. Compound abilities will become more in demand. Artificial intelligence finds its prominent application in finance. Relatively high levels of standardization and dataization are seen in the banking industry.

The regulations are pretty clear despite their complexity. Those working in financial technology aim to figure out how to abstract complicated financial rules into something computers can learn and apply since this forms the foundation for upcoming financial education.

Fintech also integrates concepts from big data and artificial intelligence. Its integration with intelligent technology in financial applications is becoming increasingly essential. Consequently, fusing financial concepts with artificial intelligence may produce better sparks, making it possible to achieve intelligent development in the financial sector.

Relation

The relationship between financial institutions and technology businesses has changed from a comparatively straightforward outsourcing collaboration to a complex interaction connection in business, accounts, information, technology, and structures. In this instance, the lines separating different institutions' technological and financial characteristics have blurred, and the institutions' legal obligations to one another have grown more intricate. Nonetheless, the primary function of financial intelligence is finance, which is the only area in which it is improved and developed. Its financial characteristics have not altered. Financial institutions and technology businesses should have an inclusive and collaborative connection, but they shouldn't be irregular or unclear in terms of corporate boundaries or legal relationships. Effective reinforcement of related management standards, market restrictions, and emergency plans is vital for self-discipline. In addition, financial operations must adhere to all legal requirements, not employ technology, and cannot be isolated from the regulatory framework.

To create sound financial intelligence innovations, financial institutions must strictly adhere to the nation's strategic guidelines and policies, modify internally, and participate in national decision-making. Second, there should be a gradual introduction of the policy direction. This steady approach indicates that to sustain the financial industry's inventive vigor and encourage more sophisticated financial practices, the regulatory direction in the process of financial innovation should be simple at first and subsequently challenging. Basic work must be completed before overcoming hurdles. The introduction of technology. Lastly, industry standards must be regularly improved, and regulatory advice must be updated. Based on the idea of a sound strategy, national policies should periodically change, emphasizing information security and industrial security and implementing it. AI-powered algorithms may analyze Large data sets in real time, enabling financial organizations to make extremely precise and knowledgeable judgments. Additionally, AI-powered chatbots and virtual assistants provide effective and individualized customer care, answering questions and offering assistance around the clock (Karangara, 2023). These innovations improve the whole client experience.

Artificial intelligence technology has greatly improved fraud detection and prevention in the financial services industry. These cutting-edge instruments use complex algorithms to evaluate large amounts of data, identify trends and anomalies, and raise red flags for potentially suspicious transactions or activity. As a result, there are now fewer instances of financial fraud, and financial institutions and their clients may feel more secure.

Challenges

Studies examining the difficulties in using AI have shown that this technology is a potent instrument that financial institutions utilize extensively. However, because there are a variety of unique obstacles, it should be used carefully. The financial sector has seen a surge in AI investment due to the advances, raising concerns about data security and transparency (Donepudi, 2017). These difficulties led to the existence of ambiguous questions about data management procedures. Information security is an issue of particular importance in all industries, particularly in the financial sector, which deals with a lot of data. It goes beyond hacking. An example of artificial intelligence use is when consumers engage with machines, which function as representatives of operators). It's no longer often the interpersonal communication. Customers will feel as though they are confronting It's a device. The machine is clad in the scientific shroud of a smart gadget.

Still, human beings are operating behind the scenes. Customers incorrectly believe that this chilly or adorable machine is established and scientific, yet humans are behind it with good intentions. This will make it more likely that customers' rights and interests will be compromised without their knowledge and has the potential to drastically lower banking costs in another area: regulatory dependency. AI's application in finance raises questions about justice, prejudice, and discrimination. Financial institutions must ensure that all of their clients are treated fairly and equitably by their AI systems, built and taught to prevent prejudice and discrimination.

Even though AI systems can automate and expedite procedures, human oversight is still necessary to guarantee AI's correctness and moral application. Without human monitoring, AI systems are susceptible to mistakes or immoral behaviour.

The automation made possible by AI algorithms can replace the laborious human processes of gathering a lot of data and verifying it before sending it for additional processing or decision-making. Additionally, banks are reducing labor expenses by implementing natural language processing (NLP), which enables chatbots to communicate and engage with clients around the clock outside of regular business hours.

Banks have long understood their portfolio and the reasons behind the performance of sure of their loans by applying statistical approaches. For instance, research on the Italian credit record revealed that secured loans are more likely to default. Because the losses are recoverable due to the guarantees, banks must develop models that enable them to determine if it is still preferable to grant secured loans.Since social entrepreneurs have been slower to adopt these technology developments, fintech businesses are gradually moving the industry focus from social innovations (like microfinance) to technological breakthroughs (Ashta, 2018). Many social entrepreneurs believe that technology has made relationships with their target beneficiaries less personal. Nonetheless, some understand that technology facilitates scalability and frees time from repetitive duties to offer better quality time for interacting with beneficiaries (Biot-Paquerot et al., 2021).

As a powerful analytical tool, AI's capacity to analyze massive data in real time is crucial, but it also presents several difficulties, including resource limitations, centralized design, and security and privacy issues. Block chain, another cutting-edge technology, facilitates a decentralized architecture that allows resources and data to be securely shared between Internet of Things (IoT) nodes. Sing et al. (2020) suggest combining blockchain technology and artificial intelligence (AI) with an IoT architecture to enable real-world big data analysis and lessen existing issues.

De Souza et al. (2019) suggest using machine learning to analyze large amounts of data regarding cryptocurrency pricing to help financial operators make the best decisions possible. The most well-known decentralized digital currency, Bitcoin, can yield extraordinary risk-adjusted returns when methods based on support vector machines (SVM) and artificial neural networks (ANN) are used. Additionally, ANN can investigate informational inefficiencies in the near term to provide unusual gains.

AI systems used in the finance industry frequently use intricate algorithms that might be challenging for humans to comprehend and interpret. Financial institutions must guarantee the transparency of their AI algorithms by offering rationales and explanations for these systems' choices.

Generative AI offers a plethora of options in the Fintech industry.

Examples:

Wells Fargo's artificial intelligence chatbots may give consumers personalized financial advice and suggestions, one of the real-time instances or uses of Gen AI in the fintech industry. Morgan Stanley uses AI algorithms to examine market data and provide real-time investing insights for its customers.

6. CONCLUSION

In conclusion, artificial intelligence is changing the banking and financial services industry. It is fostering innovation, transforming procedures, and enhancing consumer experiences. We may anticipate further developments in AI as it advances in fields like algorithmic trading, chatbots for customer support, fraud detection, and personalized banking.

Computer technology is essential to the financial industry's development and profitability; it cannot exist independently of computers. Therefore, advancing finance and artificial intelligence channels can improve my nation's financial system.

All things considered, examining various literature sources and talks about the use of AI in financial management helped identify various strategies for raising financial productivity in these businesses. Since financial management makes it easier to measure, assess, and report on progress

made within the allotted period, it is a crucial component of sustainable practices and growth within the financial sectors. Businesses have welcomed integrating AI into essential financial management procedures.

Still, some issues need to be resolved, including algorithmic transparency, ethical issues, regulatory compliance, data privacy and security, and a lack of human oversight. For AI to be successfully used and integrated into the financial industry, several issues must be resolved. Financial institutions must give these issues top priority going ahead and endeavor to create AI systems that are morally sound, open, and law-abiding. By seizing the opportunity, banks and financial services may thrive.

In addition to their benefits, the systems face various difficulties that might restrict their potential for use. One of these issues is the labor and money shortage needed to run these systems. These issues can be overcome only by implementing efficient finance management strategies that improve overall organizational performance. A financial institution's productivity may be increased by using AI applications like the algorithm trade-off, which can be designed in various ways with the help of effective management. These technologies will significantly alter the finance industry and improve transparency and security for these businesses as they carry out a wide range of international financial operations. Even though AI promises to create new jobs and occupations, artificial intelligence (AI) poses significant challenges to maintaining existing jobs. These challenges may arise in areas where AI cannot operate, such as human capital-intensive industries like banking, financial services, tourism, education, personal services, transportation, and amusement.

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Chetana's Institute of Management & Research (CIMR)
ISSN No. 0976-0628 Volume XVI(2) pg 36-48

Journal of Management Research
Peer Reviewed Journal

A Study on Victims of Plastic Money Frauds and Satisfaction Level of Cyber Cell in Solving their Issues in Maharashtra

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Area of the Paper : General Management
Type of the Paper : Exploratory Research
Type of Review : Peer Reviewed as per COPE guidelines
Indexed In : Proquest and EBSCO

How to Cite this Paper:

Bharat V. (2024).
A Study on Victims of Plastic Money Frauds and Satisfaction Level of Cyber Cell in Solving their Issues in Maharashtra
Journal of Management Research
XVI(2), 36-48 https://cimr.in/faculty-research.html#research-Journals

Paper Submission : 18/June/2024
Paper Publication : 30/September/2024

Chetana's Institute of Management & Research (CIMR)
ISSN No. 0976-0628 Volume XVI(2) pg 36-48

Journal of Management Research
Peer Reviewed Journal

A Study on Victims of Plastic Money Frauds and Satisfaction Level of Cyber Cell in Solving their Issues in Maharashtra

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ABSTRACT

We all are exposed to threats of Cyber Crime especially with relation to the banking sector in general and plastic money (Debit Card / Credit card) in particular. The root cause of most Cyber-attacks is Monetary or Financial Gains. A person using banking services are automatically exposed to Cyber Crime threats. Credit card frauds nowadays are a huge threat to all business entities as well as to all individuals who use cards and internet services. The misuse of the system by the patrons who use plastic money is lack of knowledge and ignorance of the system. Which is an open invitation for fraudsters or persons having ulterior motives which may lead to serious types of frauds with greater and serious implications. As most of the time, fraudsters may have better knowledge about computer and internet mode of communication and so they may decipher secret code of the database or encrypted message. To avoid this, banks have a vital role to play and to take adequate steps to safe guard the customers / users at large, to detect and prevent frauds. Cyber cell also has a crucial role in this regard to detect, prevent and create awareness among the people.

Keywords: Cybercrime, Cyber cell, phishing, cyber security, Credit card fraud.

1. INTRODUCTION

Prior to the mid-1990s, the management of account segments in various regions around the globe was characterized by simplicity and reliability. However, with the advent of technology, the banking sector saw a shift in viewpoint towards this phenomenon. To enhance their customer base, banks have introduced many platforms that facilitate effortless transactions. These technological improvements have provided clients with the ability to access their bank money at any time of the day and throughout the year, via ATMs, cards, and online banking methods. However, the advancement in technology has also led to a corresponding increase in fraudulent activities in the banking sector. Digital criminals are using several methods to unlawfully acquire an individual's banking information and ultimately misappropriate their funds. In this approach, a collective agreement among banks and regulators is established to develop strategies and implement actions aimed at safeguarding banking platforms from cyber threats. Banks have made

efforts to implement various specialized guard and control measures, such as extended continuous monitoring on exchanges. However, despite these attempts, the problem persists to this day. The current resistance mechanisms offered by banks are sometimes reactive, time-consuming, and publicly available, hence susceptible to exploitation by cybercriminals who afterwards devise countermeasures to circumvent these precautions. The perpetrators dedicate their efforts to developing novel techniques for digital criminal activities, while simultaneously working towards identifying solutions to enhance these security measures. Banks, primarily targeted by digital criminals, are vulnerable to many forms of malware attacks such as online phishing, keystroke-logging malwares, identity theft, and similar threats.

Digital wrongdoing may be defined as any infractions that include the use of computers and a network as a channel, source, instrument, target, or location of criminal activity. The rise of web-based commerce and e-exchanges has led to an increase in financial misconduct, which has shifted into the digital realm. The prevalence of digital misconduct is proliferating globally, and India has also seen a significant surge in instances pertaining to digital offences in recent years. Digital violations may be systematically categorized into several classes, such as digital terrorism, digital harassment, computer vandalism, software theft, identity theft, online thefts and scams, email spam and phishing, among others.

2. OBJECTIVES

1. To study the factors responsible for plastic money fraud.
2. To study the satisfaction level of victims of frauds with reference to their complaints addressed by cyber cell.
3. To study the issues and challenges taken by the cybercrime cell in solving the reported complaints.

3. RESEARCH METHODOLOGY

Hypothesis

H_1: *There are no factors responsible for plastic money fraud.*

H_2: *Cybercrime victims are satisfied with the cybercrime efforts to solve the cases and their services.*

H_3: *Cybercrime cell is not successful in solving 50% of the cases.*

Source of Information and Tools and techniques of Research:

Sample Size	The size of the sample will be 223
Sample Duration	Last five years data that is from 2018-2022 is taken
Sampling Technique	Convenience Sampling
Area Coverage	Mumbai
Questionnaire	Close-ended questions
Data Analysis	• Likert scale will be used to judge the satisfaction • Percentage, One sample t test and chi-square is used on the data available to analysis the outcome.

Data used in this study collected basically from the **secondary sources**. **Primary data through Questionnaire** is collected by circulating goggle form and personal interview to victims of plastic money fraud. Secondary data have been collected from various sources including websites, newspapers, and various published and unpublished articles.

4. DATA ANALYSIS

4.1.1 Plastic Money Usage

First the selected respondent's classification based on the plastic money use is presented in following categories:

A. Usage of Card Type

First the uses of Card type classification are presented as under:

Table-4.1
Card Type

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Debit Card	149	66.8	66.8	66.8
	Credit Card	65	29.1	29.1	96.0
	Pre-paid Card	2	.9	.9	96.9
	Electronic Card	7	3.1	3.1	100.0
	Total	223	100.0	100.0	

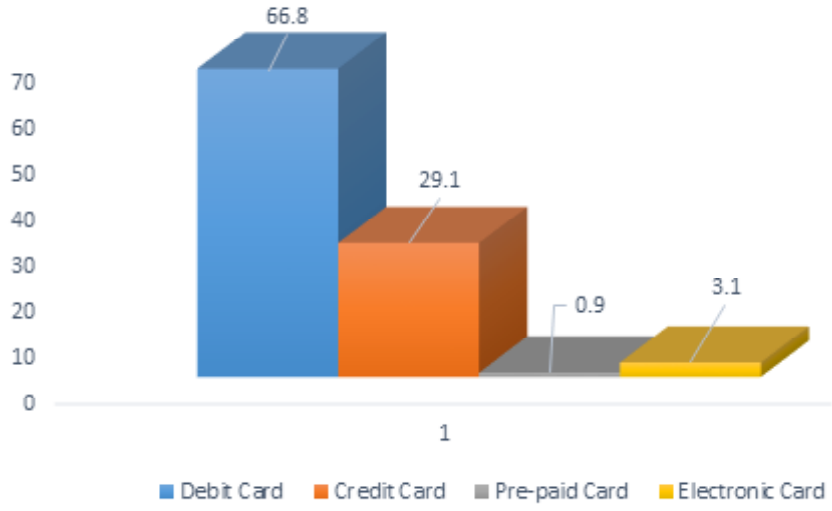

Figure 4.1: Card Type

For the selected respondent's the classification on the basis of the plastic money use is revealed that the maximum respondents were users of the Debit card with 66.8 percent followed by the credit card with the 29.1 percent while only 3.1 percent were using electronic cars and only 0.9 percent were using pre-paid cards.

B. Type of Fraud Experienced

In this step the selected respondent's classification on the basis of Type of Fraud Experienced is presented in following categories:

Table 4.2: Type of Fraud Experienced

	Frequency	Percent
Hacking of card	73	32.7
Card was lost	50	22.4
Card details were compromised	40	17.9
Card was delivered to wrong address/ stolen by Fraudster	28	12.6
Lost money from Bank account due to Fraud via merchandise	19	8.5
Fraud via merchandise	11	4.9
Can't say	1	.4
I was overcharged	1	.4

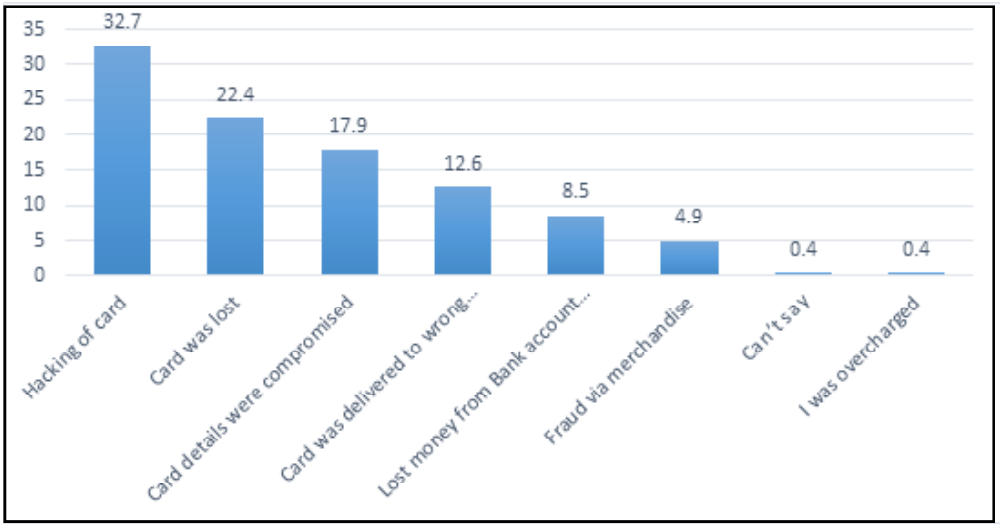

Figure 4.2: Type of Fraud Experienced

For the selected respondent's the classification on the basis of the Type of Fraud Experienced is revealed that the maximum respondents have faced Hacking of card with 32.7 percent followed by the lost credit with the 22.4 percent while Card details were compromised for 17.9 percent and Card was delivered to wrong address/ stolen by Fraudster for 12.6 percent respondent. The other types were also happened but their frequency was less.

C. Event Type of Fraud

In this step the selected respondent's classification on the basis of the basis of Type of Fraud Experienced is presented in following categories:

Table 4.3: Event type of Fraud Experienced

	Frequency	**Percent**
Never experienced such situation	89	39.9
Auto generated mails to your inbox	77	34.5
Trojan or Malware	27	12.1
Confidential reports/information being hacked	16	7.2
Publishing obscure material on your profile	6	2.7
Calls for disclose my debit card which was not own by me	4	1.6

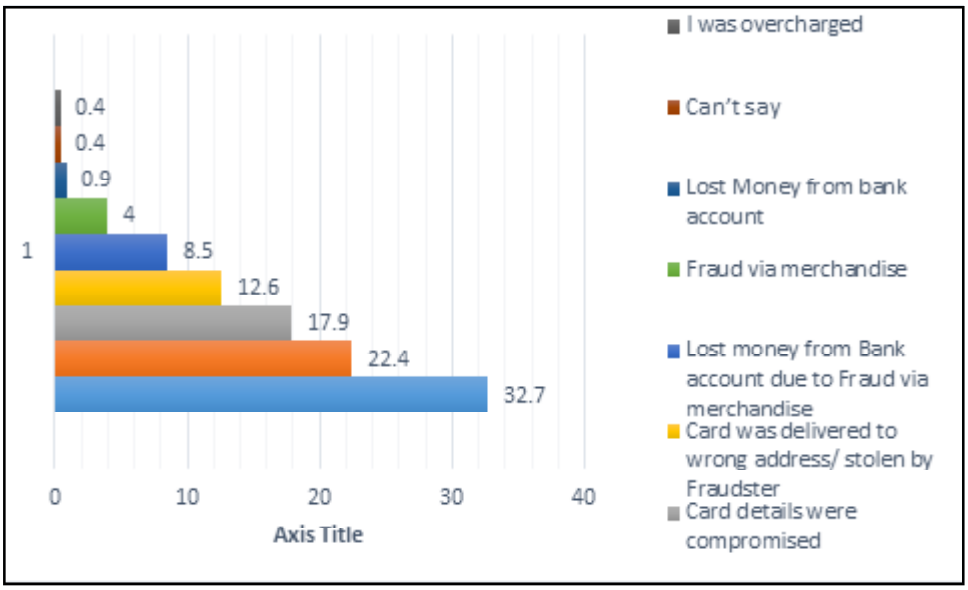

Figure 4.3: Event type of Fraud Experienced

For the selected respondent's the classification on the basis of the Event Type of Fraud is revealed that the maximum respondents have faced Auto generated mails to your inbox with 34.5 percent followed by the Trojan or Malware with the 12.1 percent while Confidential reports/ information being hacked with 7.2 percent and publishing obscure material on your profile were faced by 2.7 percent respondent. The other event types were also happened but their frequency was less.

4.2 MEASURING FACTORS RESPONSIBLE FOR PLASTIC MONEY FRAUD

Objective 1: To study the factors responsible for plastic money fraud.

As per the first objective the data is gathered from the 223 respondents with the 5-point Likert scale of Not at all aware to Very well aware. the same is analyzed with the following hypothesis for all related categories as under:

H_1: There are no factors responsible for plastic money fraud.

1. Awareness

First the data gathered is presented for the variable awareness as under:

Table 4.4: Measuring Awareness

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at all aware	3	1.3	1.3	1.3
	Little aware	32	14.3	14.3	15.7
	Neutral	37	16.6	16.6	32.3
	Aware	67	30.0	30.0	62.3
	Very well aware	84	37.7	37.7	100.0
	Total	223	100.0	100.0	

The change in the level of awareness is measured with the one sample t test and the results are presented as under:

Table 4.5: One sample t test for Measuring Awareness

One-Sample Statistics				
	N	Mean	Std. Deviation	Std. Error Mean
Awareness	223	3.8834	1.10887	.07426

One-Sample Test						
	Test Value = 3					
	t	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Awareness	11.897	222	.000	.88341	.7371	1.0297

The output of the 'one sample t test' in the table-4.5, reveals that significant gap exists between the hypothesized test value with the calculated sample statistics for changes were made in the awareness level of the respondents ($p<0.05$) at 5% level of significance. The respondents have exhibited a fair amount of agreement that they were aware about the types of factors responsible for plastic money fraud.

2. Effectiveness of Law

Next the data gathered is presented for the variable Effectiveness of Law as under:

Table 4.6: Measuring Effectiveness of Law

Effectiveness of Cyber Law					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	24	10.8	10.8	10.8
	Disagree	42	18.8	18.8	29.6
	Neutral	59	26.5	26.5	56.1
	Agree	77	34.5	34.5	90.6
	Strongly agree	21	9.4	9.4	100.0
	Total	223	100.0	100.0	

The change in the level of Effectiveness of Cyber Law is measured with the one sample t test and the results are presented as under:

Table 4.7: one sample t test for Measuring Effectiveness of Law

One-Sample Statistics				
	N	Mean	Std. Deviation	Std. Error Mean
Effectiveness of Cyber Law	223	3.1300	1.15320	.07722

One-Sample Test						
	Test Value = 3					
	t	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Effectiveness of Cyber Law	1.684	222	.094	.13004	-.0221	.2822

The output of the 'one sample t test' in the table-4.7, reveals that insignificant gap exists between the hypothesized test value with the calculated sample statistics for changes were made in the Effectiveness level of Cyber Law of the respondents ($p>0.05$) at 5% level of significance. The respondents have exhibited a fair amount of agreement that they were not aware about the Effectiveness of Cyber Law made for the control of fraud related with the plastic money fraud.

3. Level of Security

Next the data gathered is presented for the variable Level of Security as under:

Table 4.8: Measuring Security Level of Cards

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very poor	8	3.6	3.6	3.6
	Poor	13	5.8	5.8	9.4
	Fair	75	33.6	33.6	43.0
	Good	102	45.7	45.7	88.8
	Very Good	25	11.2	11.2	100.0
	Total	223	100.0	100.0	

The change in the Level of Security is measured with the one sample t test and the results are presented as under:

Table 4.9: one sample t test for measuring Security Level of Cards

One-Sample Statistics				
	N	Mean	Std. Deviation	Std. Error Mean
Security Level of Cards	223	3.5516	.89834	.06016

One-Sample Test						
	Test Value = 3					
	t	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval	
					Lower	Upper
Security Level of Cards	9.169	222	.000	.55157	.4330	.6701

The output of the 'one sample t test' in the table-4.9, reveals that significant gap exists between the hypothesized test value with the calculated sample statistics for changes were made in the Level of Security of the respondents ($p<0.05$) at 5% level of significance. The respondents have exhibited a fair amount of agreement that they were aware about the Level of Security for plastic money fraud.

4. Perceived Safety

Next the data gathered is presented for the variable Perceived Safety as under:

Table 4.10: Measuring Perceived Safety

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not at All safe	34	15.2	15.2	15.2
	Little Safe	19	8.5	8.5	23.8
	Moderately Safe	26	11.7	11.7	35.4
	Safe	114	51.1	51.1	86.5
	Very safe	30	13.5	13.5	100.0
	Total	223	100.0	100.0	

The change in the Perceived Safety is measured with the one sample t test and the results are presented as under:

Table 4.11: One sample t test for measuring Perceived Safety

One-Sample Statistics				
	N	Mean	Std. Deviation	Std. Error Mean
Perceived Safety	223	3.3901	1.26466	.08469

One-Sample Test						
	Test Value = 3					
	T	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Perceived Safety	4.607	222	.000	.39013	.2232	.5570

The output of the 'one sample t test' in the table-4.11, reveals that significant gap exists between the hypothesized test value with the calculated sample statistics for changes were made in the Perceived Safety of the respondents ($p<0.05$) at 5% level of significance. The respondents have exhibited a fair amount of agreement that they were aware about the Perceived Safety for plastic money fraud.

4.3 MEASURING SATISFACTION LEVEL FROM COMPLAINTS ADDRESSED BY CYBER CELL

Objective 2: To study the satisfaction level of victims of frauds with reference to their complaints addressed by cyber cell.

As per the second objective of studying the satisfaction level of victims of frauds with reference to their complaints addressed by cyber cell, the data is gathered from the 223 respondents with the 5-point Likert scale of Not at all aware to Very well aware. The same is analysed with the following hypothesis for all related categories as under:

H_2: Cybercrime victims are satisfied with the cybercrime efforts to solve the cases and their services.

The change in the level of Cybercrime victims for satisfaction with the cybercrime efforts to solve the cases and their services, is measured. The data gathered is presented first as under:

Table 4.12: Measuring Customer Satisfaction

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Highly Dissatisfied	50	22.4	22.4	22.4
	Dissatisfied	65	29.1	29.1	51.6
	Neutral	46	20.6	20.6	72.2
	Satisfied	40	17.9	17.9	90.1
	Highly satisfied	22	9.9	9.9	100.0
	Total	223	100.0	100.0	

The data gathered is analyzed with the one sample t test and the results are presented as under:

Table 4.13: One sample t test for measuring Customer Satisfaction

One-Sample Statistics				
	N	Mean	Std. Deviation	Std. Error Mean
Customer Satisfaction	223	2.6368	1.27974	.08570

One-Sample Test						
	Test Value = 3					
	T	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Customer Satisfaction	-4.238	222	.000	-.36323	-.5321	-.1943

The output of the 'one sample t test' in the table-4.13, reveals that significant gap exists between the hypothesized test value with the calculated sample statistics for changes were made for measuring satisfaction level from complaints addressed by cyber cell of the respondents ($p<0.05$) at 5% level of significance. The respondents have exhibited a fair amount of agreement that they were satisfied with the complaints addressed by cyber cell for plastic money fraud.

4.4 MEASURING SUCCESS RATE OF CYBERCRIME CELL IN SOLVING THE ISSUES

Objective 3: To study the success rate of cybercrime cell in solving the issues.

As per the third objective of studying the s success rate of cybercrime cell in solving the issues with reference to their complaints addressed by cyber cell, the data is gathered from the 223 respondents with the 5-point Likert scale of Not at all aware to Very well aware. The same is analyzed with the following hypothesis as under:

H_3: Cybercrime cell is not successful in solving 50% of the cases.

The measure the success rate of cybercrime cell in solving the issues is measured with the Chi Square test and the results are presented as under:

Table 4.14: Chi square test for measuring success rate of cybercrime cell

Success Rate					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	80	35.9	35.9	35.9
	No	143	64.1	64.1	100.0
	Total	223	100.0	100.0	

	Observed N	Expected N	Residual
Yes	80	111.5	-31.5
No	143	111.5	31.5
Total	223		

Test Statistics	
	Success Rate
Chi-Square	17.798[a]
Df	1
Asymp. Sig.	.000
a. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 111.5.	

The output of the 'one sample t test' in the table-4.14 reveals that significant gap exists between the hypothesized test value with the calculated sample statistics for solving the 50% cases by the cybercrime cell of the respondents ($p<0.05$) at 5% level of significance. The respondents have exhibited a fair amount of agreement that they were satisfied that over 50% of the complaints addressed by cyber cell for plastic money fraud.

5. DEMOGRAPHICAL FINDINGS

The data for the study is gathered form the 223 respondents, their demographic includes:

1. Usage of Card Type revealed that the maximum respondents were users of the Debit card with 66.8 percent followed by the credit card with the 29.1 percent while only 3.1 percent were using electronic cars and only 0.9 percent were using pre-paid cards.

2. Type of Fraud Experienced revealed that the maximum respondents have faced Hacking of card with 32.7 percent followed by the lost credit with the 22.4 percent while Card details were compromised for 17.9 percent and Card was delivered to wrong address/ stolen by Fraudster for 12.6 percent respondent. The other types were also happened but their frequency was less.

3. The Event Type of Fraud is revealed that the maximum respondents have faced Auto generated mails in their inbox with 34.5 percent followed by the Trojan or Malware with the 12.1 percent while confidential reports/information being hacked with 7.2 percent and publishing obscure material in their profile were faced by 2.7 percent respondent. The other event types were also happened but their frequency was less.

FINDINGS

1. Significant gap exists between the hypothesized test value with the calculated sample statistics for changes were made in the awareness level of the respondents ($p<0.05$) at 5% level of significance.

2. Insignificant gap exists between the hypothesized test value with the calculated sample statistics for changes were made in the Effectiveness level of Cyber Law of the respondents ($p>0.05$) at 5% level of significance.

3. Significant gap exists between the hypothesized test value with the calculated sample statistics for changes were made in the Level of Security of the respondents ($p<0.05$) at 5% level of significance.

4. Significant gap exists between the hypothesized test value with the calculated sample statistics for changes were made in the Perceived Safety of the respondents ($p<0.05$) at 5% level of significance.

5. Significant gap exists between the hypothesized test value with the calculated sample statistics for solving the 50% cases by the cybercrime cell of the respondents ($p<0.05$) at 5% level of significance.

6. CONCLUSION

The respondents have exhibited a fair amount of agreement that they were aware about the types of factors responsible for plastic money fraud. They have exhibited a fair amount of agreement that they were not aware about the Effectiveness of Cyber Law made for the control of fraud related with the plastic money fraud. They have exhibited a fair amount of agreement that they

were aware about the Perceived Safety for plastic money fraud. The respondents have exhibited a fair amount of agreement that they were satisfied with the complaints addressed by cyber cell and have exhibited a fair amount of agreement that they were satisfied that over 50% of the complaints addressed by cyber cell for plastic money fraud. Further the cyber cell has a significant role to play in countering crime and always be a step ahead of the fraudsters to combat and reduce such crime.

7. SCOPE FOR FUTURE STUDY

Various cybercrime does prevail in E-commerce but this research would focus mainly on card frauds in Maharashtra. Scope is unlimited as almost every account holder has a debit / credit card, and is exposed automatically to Cyber Crime. The study will have beneficial attributes in terms of cost savings and time efficiency. The significance of the application of the techniques reviewed here is in the minimization of card fraud. A sincere effort was made to find out cyber cell services towards cybercrime victims of plastic card holders, besides discussing about the demographic features in the State of Maharashtra but no focus is laid down on their social backgrounds, thus a scope for future study can be extended towards whole of India. Every scale used by the researcher is different for measuring the level of satisfaction of cybercrime victims which leads to different findings, a inter comparison of scales can also be performed.

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Chetana's Institute of Management & Research (CIMR)
ISSN No. 0976-0628 Volume XVI(2) pg 49-65

Journal of Management Research
Peer Reviewed Journal

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Area of the Paper : General Management
Type of the Paper : Exploratory Research
Type of Review : Peer Reviewed as per COPE guidelines
Indexed In : Proquest and EBSCO

How to Cite this Paper:

More V. (2024).
Exploring the Role of Artificial Intelligence in Creative Process and its Impact on Human Creativity
Journal of Management Research
XVI(2), 49-65 https://cimr.in/faculty-research.html#research-Journals

Paper Submission : 26/August/2024
Paper Publication : 30/September/2024

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ABSTRACT

In recent years, the integration of Artificial Intelligence (AI) into various domains has sparked debates regarding its role in shaping human activities. Particularly in the realm of creativity, AI technologies have been both celebrated for their potential to enhance human creativity and scrutinized for their perceived threats to it. This study endeavours to delve into the nuanced interplay between AI and human creativity, aiming to elucidate the multifaceted impacts and dynamics involved.

Through a comprehensive review of existing literature and empirical investigations, this research seeks to elucidate the mechanisms through which AI intersects with human creativity across diverse domains, such as art, music, literature, design, and innovation. By analyzing case studies and conducting qualitative interviews with practitioners and experts in the field, the aim is to capture the spectrum of perspectives and experiences surrounding the integration of AI in creative processes.

Keywords: ChatGpt, Creative Process, Virtual Reality, Artificial Intelligence, Augmented Reality

INTRODUCTION

CREATIVITY is defined as the tendency to generate or recognize ideas, alternatives, or possibilities that may be useful in solving problems, communicating with others, and entertaining ourselves and others.

In order to be creative, one need to be able to view things in new ways or from a different perspective. Among other things, one need to be able to generate new possibilities or new alternatives. Tests of creativity measure not only the number of alternatives that people can generate but the uniqueness of those alternatives. the ability to generate alternatives or to see things uniquely does not occur by change; it is linked to other, more fundamental qualities of thinking, such as flexibility, tolerance of ambiguity or unpredictability, and the enjoyment of things heretofore unknown.

ARTIFICIAL INTELLIGENCE (AI) is a branch of computer science that deals with creating systems capable of performing tasks that typically require human intelligence. These tasks include understanding natural language, recognizing patterns, learning from experience, and making decisions. AI systems are designed to mimic cognitive functions such as problem-solving, reasoning, perception, and learning.

OBJECTIVES OF THE STUDY

The purpose/objective of studying the impact of AI and human creativity is multifaceted:

- To study the influence of AI in different fields.
- To investigate the negative impact of AI on the creativity of future generations.
- To understand the ethical factors related to the usage of AI in creative fields.

TIME FRAME

This research will encompass both historical and current analyses to project the future impact of AI on human creativity. By examining past trends and current applications of AI, the study aims to provide a forward-looking perspective on how AI might shape creativity in the coming years.

LITERATURE REVIEW

The historical perspective on AI and creativity.

Early Notions (1950s-1960s): The field of Artificial Intelligence emerged in the 1950s with pioneers like Alan Turing, who proposed the famous Turing Test to assess a machine's intelligence. Early AI focused primarily on logical reasoning and problem-solving, with little emphasis on creativity.

Expert Systems (1970s-1980s): In the 1970s and 1980s, AI researchers developed expert systems, which were rule-based systems capable of mimicking human expertise in specific domains. While these systems were not inherently creative, they demonstrated the potential for computers to perform complex tasks previously thought to require human intelligence.

Early Attempts at Creativity (1980s-1990s): During the 1980s and 1990s, researchers began exploring AI's potential for creative tasks. One notable project was Harold Cohen's AARON, a computer program capable of creating visual art. Despite its limited capabilities compared to human artists, AARON highlighted the possibilities of AI in creative domains.

Evolution of Generative Systems (2000s-2010s): In the 21st century, advancements in machine learning, particularly in neural networks and deep learning, led to significant progress in AI-generated creativity. Generative systems, such as deep neural networks trained on large datasets of artistic works, could produce music, literature, visual art, and more. Examples include Google's DeepDream algorithm and OpenAI's GPT (Generative Pre-trained Transformer) models.

Integration of AI in Creative Industries (2010s-Present): AI has increasingly been integrated into various creative industries, including music composition, filmmaking, advertising, and design. Companies use AI algorithms to automate tasks, generate content, and enhance creativity. For example, Adobe's Sensei platform incorporates AI to assist with tasks like image editing and graphic design.

Overall, the historical perspective on AI and creativity reflects a journey from early theoretical concepts to practical applications, with ongoing debates about the nature of creativity and the implications of AI-driven innovation in creative industries.

Previous studies on AI and its impact on human creativity

Studies have investigated how AI tools and algorithms can enhance human creativity by providing new tools, insights, or inspiration. For example, researchers have explored the use of AI-generated prompts to stimulate creative thinking or the integration of AI systems into creative workflows to augment human capabilities.

Artificial intelligence (AI) has been increasingly recognized for its impact on human creativity across various domains. Studies have shown that AI can enhance organizational creativity and firm performance (MIKALEF & GUPTA, 2021; LI ET AL., 2022).

However, there are concerns about how AI may dissociate creativity from human agency and potentially challenge human creators in different sectors (LEE, 2022). The use of AI in art has sparked both excitement and controversy, with debates on its potential to revolutionize the creative process and its impact on the authenticity of human creativity (YUSA ET AL., 2022). Scholars have also investigated the ethical and societal implications of AI-generated creativity, including issues related to copyright, intellectual property, cultural diversity, bias, and the democratization of creative tools and resources. Understanding these implications is crucial for developing responsible AI systems and policies.

While AI has shown remarkable potential in various fields, it also comes with its share of disadvantages, as depicted in the animated film "Wall-E." In the movie, humans have become overly reliant on AI technology, leading to severe consequences such as environmental degradation and physical deterioration. The over-reliance on AI-controlled machines resulted in the abandonment of Earth, turning it into a desolate wasteland. Moreover, the depiction of humans in the film portrays a sedentary lifestyle and overconsumption, facilitated by AI-driven technologies, leading to obesity and loss of mobility. Additionally, the central AI character, AUTO, demonstrates the dangers of unchecked power in AI systems, as it prioritizes its directive over the well-being of humans. "Wall-E" serves as a cautionary tale, highlighting the potential pitfalls of excessive dependence on AI technology, including environmental degradation, societal deterioration, and loss of autonomy.

But on the other hand AI has given Access to Knowledge and Inspiration. AI-driven recommendation systems and content curation algorithms provide creators with access to a vast array of information, inspiration, and references. Through platforms like social media, online marketplaces, and digital libraries, creators can discover diverse perspectives, artistic styles, and cultural influences from around the world, fostering cross-pollination of ideas and innovation.

Efficiency and Productivity: AI technologies streamline creative workflows, enabling faster iteration, prototyping, and production cycles. For instance, AI-driven automation tools can accelerate tasks such as image editing, video processing, and music composition, allowing creators to experiment more freely and bring their ideas to fruition more efficiently. This increased productivity can lead to higher output and greater creative output.

Exploration of New Creative Frontiers: AI opens up new creative frontiers by enabling experimentation with emerging technologies and interdisciplinary approaches. For example, artists and technologists collaborate to explore the intersection of AI, virtual reality, and interactive media, creating immersive experiences that blur the boundaries between art, technology, and

human perception. AI-driven generative art and interactive installations push the boundaries of traditional artistic expression, challenging conventional notions of creativity and authorship.

Overall, previous studies on AI and its impact on human creativity span a broad range of disciplines, including some positive and negative views in the field of computer science, psychology, sociology, ethics, and the arts, reflecting the interdisciplinary nature of this field and the diverse perspectives it encompasses

Several theoretical frameworks have been proposed to explore human-AI collaboration in creative tasks. These frameworks aim to understand the dynamics, challenges, and opportunities inherent in such collaborations. Here are some notable examples:

Distributed Creativity Framework: This framework views creativity as an emergent property of interactions within a socio-technical system, where humans and AI agents contribute complementary expertise and resources to the creative process. It emphasizes the distributed nature of creativity, highlighting how collaborative networks of human and AI agents can produce novel and valuable outcomes.

Human-Centered AI Design: Grounded in human-computer interaction (HCI) principles, this framework focuses on designing AI systems that prioritize human needs, preferences, and capabilities. It emphasizes the importance of user-centered design, user feedback, and iterative refinement to create AI tools that support and enhance human creativity without replacing human agency.

AUGMENTED CREATIVITY MODEL (ASSISTING HUMANS NOT REPLACING THEM): This model posits that AI can augment human creativity by providing tools, resources, and feedback that expand the scope of creative possibilities. It conceptualizes AI as a creative collaborator or assistant, rather than a substitute for human creativity. The model emphasizes the importance of human-AI synergy, where each partner contributes unique strengths to the creative process.

HUMAN-AI INTERACTION CONTINUUM: This framework conceptualizes human-AI collaboration as a spectrum ranging from full automation to full autonomy, with various degrees of human-AI interaction in between. It acknowledges that different creative tasks may require different levels of human involvement and autonomy for AI systems, depending on factors such as task complexity, domain expertise, and user preferences.

ETHICAL AI FRAMEWORK: This framework considers ethical principles and values in the design and deployment of AI systems for creative tasks. It addresses concerns such as transparency, fairness, accountability, and privacy, aiming to ensure that AI-driven creativity respects human rights and societal norms. The framework emphasizes the need for ethical guidelines, regulations, and mechanisms for ethical oversight in AI development and deployment.

SOCIO-TECHNICAL SYSTEMS THEORY: This theory examines the complex interactions between human actors, technological artifacts, and social structures within creative ecosystems. It highlights the interdependence and co-evolution of human and AI agents in shaping creative outcomes, as well as the broader socio-cultural context that influences creative practices and norms.

These theoretical frameworks provide valuable insights into the multifaceted nature of human-AI collaboration in creative tasks, informing the design, implementation, and evaluation of AI systems for creative purposes. They offer conceptual tools for researchers, designers, and

practitioners to analyze, critique, and advance the field of AI-driven creativity in a responsible and ethically informed manner.

RESEARCH METHODOLOGY

The methodology design for this research on the impact of AI on human creativity involves a mixed-methods approach, combining both qualitative and quantitative research methods to provide a comprehensive understanding of the subject. This design will enable the study to capture detailed insights from industry experts while also gathering broader data from a larger sample through surveys. The following sections outline the methodology design in detail:

Research Design

Qualitative Research: Expert Opinions

Method: Semi-structured interviews.

Participants: Selected industry leaders and experts from various creative fields.

Sampling Method: Purposive sampling will be used to select participants based on their expertise, contributions to their field, and experience with AI.

Data Collection

Participant Selection Criteria: Industry leaders and experts will be chosen based on their recognized contributions, awards, publications, and direct experience with AI in their creative processes.

Interview Process: Different set of Questions were asked to Experts

Interview Topics:

Personal experiences with AI in creativity.

Perceived positive and negative impacts of AI.

Ethical considerations and future projections.

Thoughts on the dependency of future generations on AI.

Primary data collection

Qualitative Method

Expert Opinions

Expert 1: Mr. Khushal Shah., Head of Operations atApparel Manufacturing

Question:1 How is AI currently being used to enhance creativity in the manufacturing industry?

Mr. Khushal shah: In the manufacturing industry, AI is primarily used to optimize production processes, improve product design, and enhance supply chain management. For instance, AI-driven design tools can generate innovative product designs by analyzing large datasets and identifying trends. Additionally, AI helps in predicting maintenance needs, reducing downtime, and improving overall efficiency, which allows engineers and designers to focus more on creative problem-solving and innovation.

Question 2: What are the potential risks of relying too heavily on AI in manufacturing?

Mr. Khushal shah: One significant risk of heavy reliance on AI in manufacturing is the potential loss of human craftsmanship and expertise. While AI can process data and optimize designs, the nuanced understanding and hands-on experience of skilled workers are irreplaceable. Over-reliance on AI could lead to a deskilling of the workforce and a loss of innovative thinking that comes from human experience and intuition. Additionally, there are concerns about job displacement and the ethical implications of AI decision-making in critical manufacturing processes.

Question 3: How can manufacturing companies balance AI use with human creativity?

Mr. Khushal shah: To balance AI use with human creativity, manufacturing companies should foster a collaborative environment where AI tools are used to augment human capabilities rather than replace them. This includes investing in training programs that enhance both technical skills and creative problem-solving abilities. Encouraging cross-disciplinary teams and open innovation platforms can also help integrate AI insights with human creativity, leading to more innovative and effective solutions.

Expert 2: Mrs. Poonam Sule, Senior Software Tester in I.T. Industry (Capgemini)

Question 1: How does AI contribute to creative processes in the IT industry?

Mrs. Poonam Sule: In the IT industry, AI contributes to creative processes by automating routine tasks, enabling predictive analytics, and facilitating advanced data visualization. AI tools can analyze large datasets to identify patterns and insights that inform creative solutions for software development, cybersecurity, and user experience design. By handling the more mundane aspects of IT work, AI allows professionals to focus on innovative and strategic thinking, leading to the development of cutting-edge technologies and applications.

Question 2: What challenges does the IT industry face with the integration of AI in creative tasks?

Mrs. Poonam Sule: One of the primary challenges is ensuring that AI tools are used ethically and responsibly. There are concerns about data privacy, security, and bias in AI algorithms that need to be addressed. Additionally, there is the risk of over-reliance on AI, which could stifle creativity and lead to a homogenization of ideas. IT professionals must maintain a balance between leveraging AI's capabilities and fostering an environment that encourages human innovation and critical thinking.

Question 3: What strategies can the IT industry implement to maintain a balance between AI and human creativity?

Mrs. Poonam Sule: The IT industry can implement strategies such as continuous education and training to ensure professionals are skilled in both AI technologies and creative problem-solving. Encouraging a culture of experimentation and innovation, where AI is seen as a tool to enhance rather than replace human creativity, is crucial. Additionally, establishing ethical guidelines and best practices for AI use can help mitigate risks and ensure that AI is integrated in a way that supports and enhances human creativity.

Expert 3: Mrs, Manisha Jadhav, Teacher of History

Question 1: How is AI being utilized to foster creativity in education?

Mrs, Manisha Jadhav: AI is being utilized in education to personalize learning experiences,

provide real-time feedback, and support innovative teaching methods. AI-driven platforms can adapt to individual students' needs, offering customized learning paths that cater to their strengths and weaknesses. This personalized approach encourages creative thinking by allowing students to explore subjects in depth and at their own pace. Additionally, AI tools can assist teachers in developing creative lesson plans and interactive learning materials that engage students in new and innovative ways.

Question 2: What are the potential drawbacks of integrating AI into educational practices?

Mrs, Manisha Jadhav: One potential drawback is the risk of diminishing the role of teachers and the human element in education. While AI can provide valuable support, it cannot replace the empathy, intuition, and motivational skills of a human teacher. There is also the concern that over-reliance on AI might lead to a standardized approach to learning, where the unique needs and creative potentials of individual students are overlooked. Ensuring that AI enhances rather than detracts from human-led education is crucial.

Question 3: How can educational institutions balance the use of AI with the need to foster human creativity?

Mrs, Manisha Jadhav: Educational institutions can balance the use of AI by integrating it as a complementary tool rather than a replacement for traditional teaching methods. Professional development programs for teachers should focus on how to effectively incorporate AI into their teaching while maintaining a student-centered approach. Encouraging project-based learning, where students use AI tools to explore and solve real-world problems, can also foster creativity and critical thinking skills. Moreover, ethical considerations regarding data privacy and the responsible use of AI in education must be addressed.

Expert 4: Mr. S. Ahmed, Sales and Marketing (Lodha)

Question 1: How has AI changed the landscape of creativity in marketing?

Mr. S. Ahmed: AI has significantly changed the landscape of creativity in marketing by providing tools that analyze consumer behavior, predict trends, and automate content creation. AI-driven analytics can identify what resonates with target audiences, allowing marketers to craft more personalized and effective campaigns. Automated content generation tools help in producing high volumes of marketing materials quickly, freeing up creative teams to focus on strategic thinking and innovative concepts. AI also facilitates real-time testing and optimization, ensuring that marketing efforts are continuously improved.

Question 2: What are the risks of using AI too heavily in marketing?

Mr. S. Ahmed: The primary risk of using AI too heavily in marketing is the potential loss of the human touch in brand communication. While AI can handle data analysis and automation, it lacks the ability to connect with audiences on an emotional level. Over-reliance on AI might lead to marketing campaigns that feel impersonal and fail to resonate with consumers. Additionally, there is the risk of creative homogenization, where campaigns become too data-driven and lack originality. Ethical concerns, such as privacy and the use of consumer data, are also significant considerations.

Question 3: What measures can marketers take to ensure AI complements rather than replaces human creativity?

Mr. S. Ahmed: Marketers can ensure that AI complements rather than replaces human creativity

by using AI tools to support and enhance their creative processes. This involves leveraging AI for data analysis, trend prediction, and automation of routine tasks, while focusing human efforts on strategic and creative thinking. Encouraging collaboration between AI and creative teams can lead to more innovative and effective campaigns. Additionally, marketers should prioritize ethical considerations, ensuring that AI is used responsibly and transparently. Continuous training and development programs can also help marketers stay ahead of AI advancements and integrate them effectively into their workflows.

Analysis and Interpretation of Expert Opinions

The expert opinions gathered from the fields of manufacturing, IT, education, and marketing provide valuable insights into the complex relationship between AI and human creativity. Across these diverse sectors, there is a consensus that AI has the potential to significantly enhance creative processes by automating routine tasks, providing data-driven insights, and enabling more personalized and efficient workflows. However, experts also caution against over-reliance on AI, which could stifle human innovation and critical thinking.

In manufacturing Mr. Khushal Shah highlights the benefits of AI in optimizing production and design processes but warns against the loss of human craftsmanship and expertise. She emphasizes the need for a collaborative environment were AI tools augment human capabilities. Similarly, in the IT industry, Mrs. Poonam Sule acknowledges AI's role in enhancing creative solutions through data analysis and automation but stresses the importance of ethical use and maintaining a balance between AI and human creativity.

Mrs, Manisha Jadhav in the field of education points out that AI can personalize learning experiences and support innovative teaching methods, fostering creativity among students. However, she raises concerns about the potential reduction of the human element in education and the risk of standardized learning approaches. She advocates for the integration of AI as a complementary tool alongside traditional teaching method.

In marketing, Mr. S. Ahmed discusses how AI-driven analytics and automation have transformed creative processes, allowing for more personalized and effective campaigns. However, she also notes the risk of impersonal communication and creative homogenization. She recommends using AI to support strategic and creative thinking while prioritizing ethical considerations.

Overall, the expert opinions underscore the need for a balanced approach to AI integration, where AI enhances human creativity without replacing it. The key to achieving this balance lies in education, training, and the development of ethical guidelines that ensure responsible AI use. By fostering a collaborative environment and addressing potential risks, professionals across various fields can leverage AI's strengths while preserving and nurturing human creativity.

Quantitative Research: Surveys

Method: Structured questionnaires distributed through online survey platforms.

Participants: Professionals and practitioners in various creative fields, as well as general respondents with interest in AI and creativity.

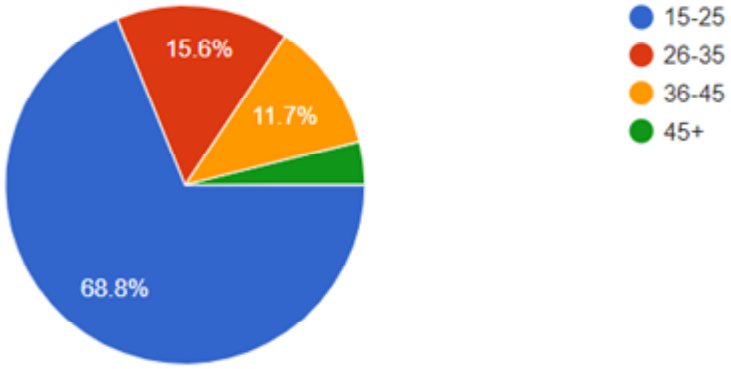
Sampling Method: Convenience sampling, with efforts to ensure diversity in terms of industry, experience level, and demographics.

Data Collection Instrument: Survey questionnaire with a mix of Likert-scale, multiple-choice, and open-ended questions.

INTERPRETATION

1. Demographic Summary

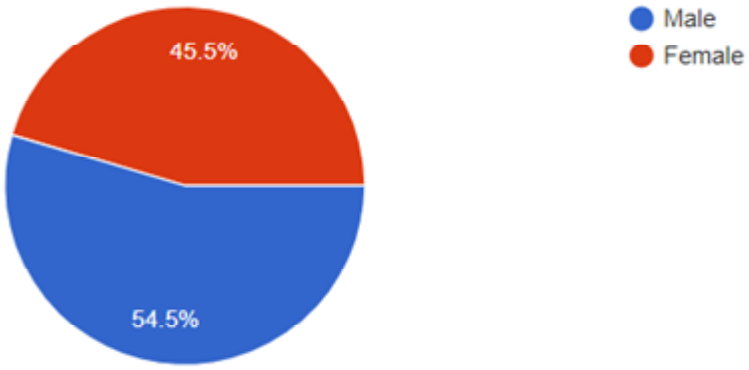
Age Group:



- Majority of respondents are between the ages of 15-25.

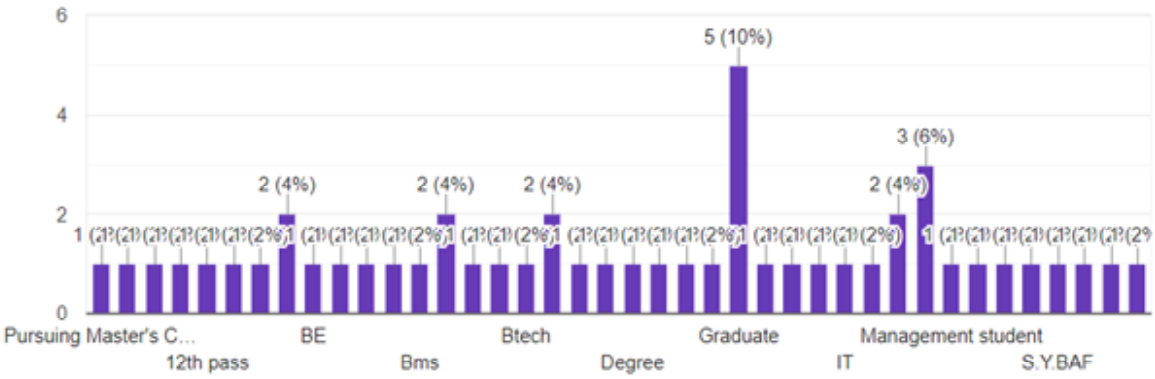
- Some respondents fall within the 26-35, 36-45, and 45+ age groups, but these are less common.

Gender:



- The respondents are predominantly male.

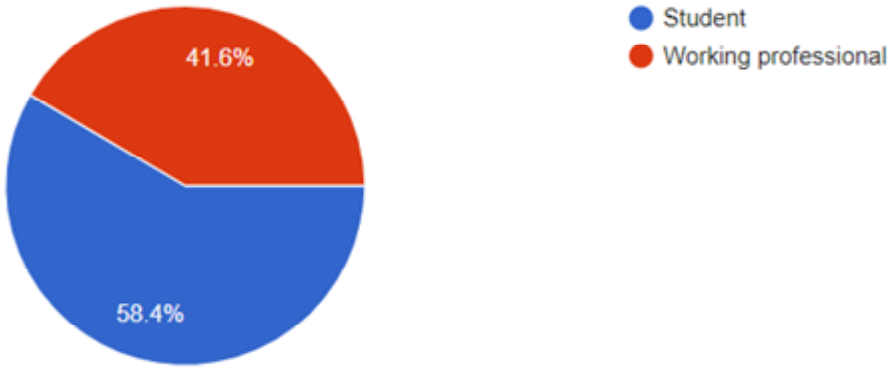
Educational Background:



- The educational backgrounds vary widely, including students and working professionals from

various fields such as Management, Supply Chain Management, IT, Commerce, Arts, Science, and Engineering.

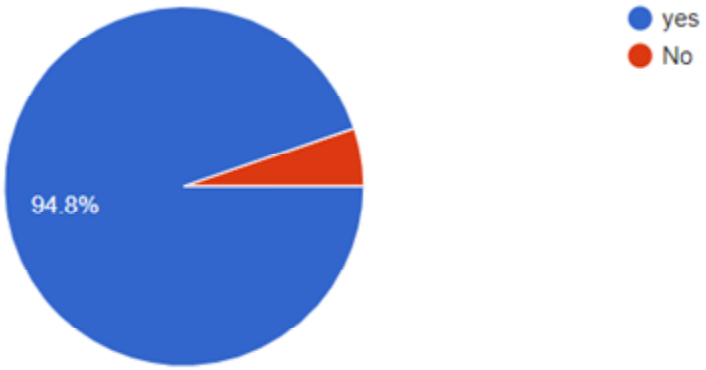
Occupation:



- A mix of students and working professionals participated in the survey.

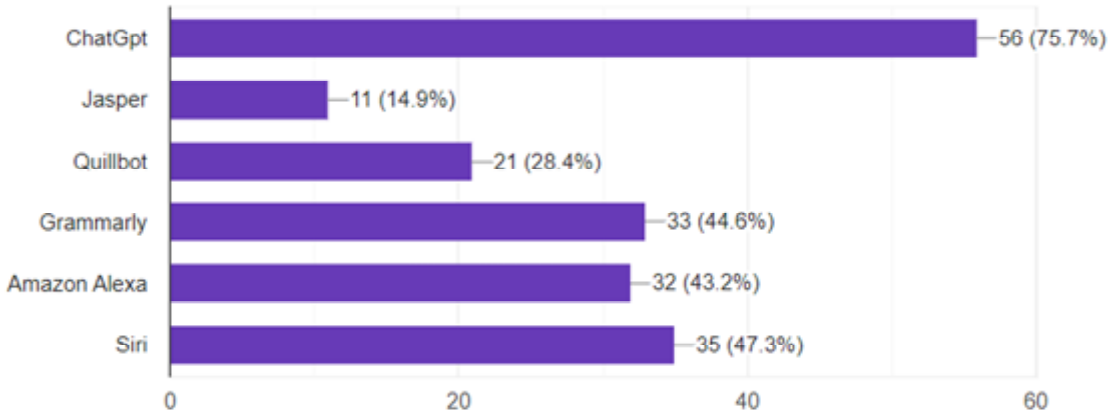
2. Usage of AI Tools/Software

Ever Used AI Tools/Software?



- 94.8% Respondents have used AI software or tools in one way or another

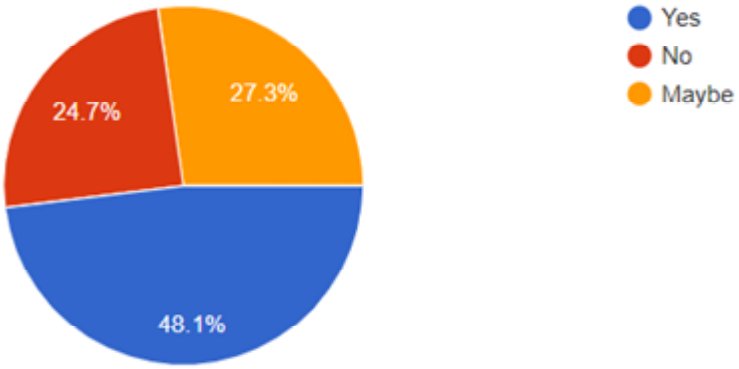
Which AI Tools you have used?



- 94.8% respondents have used some form of AI tools/software. Common tools mentioned include ChatGPT, Grammarly, Amazon Alexa, Siri, Quillbot, and Jasper.

3. Perception of AI's Ability to Generate New Ideas

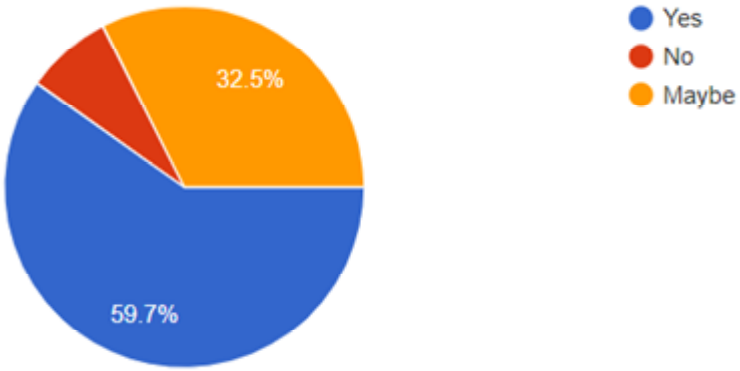
Do you think AI is enough to generate new ideas?:



- Responses are mixed:
- "No": A significant number of respondents do not believe AI is sufficient for generating new ideas.
- "Maybe": Many respondents are uncertain, indicating a potential perceived limit in AI's current capabilities.
- "Yes": A smaller portion believes AI can generate new ideas independently.
- Insight: A significant number of respondents are skeptical about AI's ability to independently generate new ideas. This indicates a belief that human intervention is still crucial in the creative process.

4. Influence of AI in Various Fields

Do you think AI has a major influence in your field?

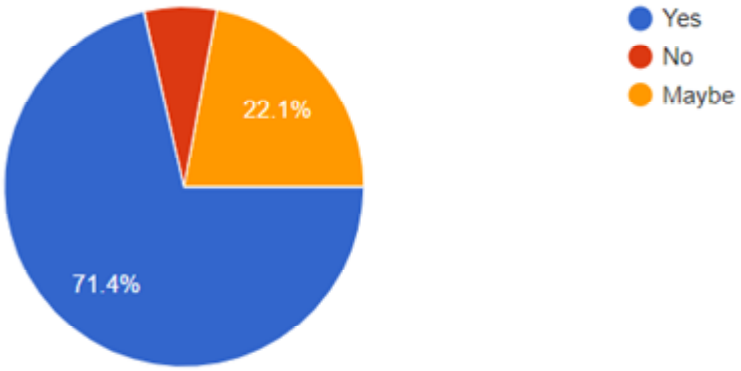


- The majority of respondents feel that AI has a significant influence in their field.
- "Maybe" responses suggest some uncertainty about the extent of AI's influence.
- Insight: The majority agreement on AI's major influence suggests widespread integration and

reliance on AI technologies across various fields. This reflects the growing importance of AI in professional environments.

5. Dependency on AI for Creativity in Future Generations

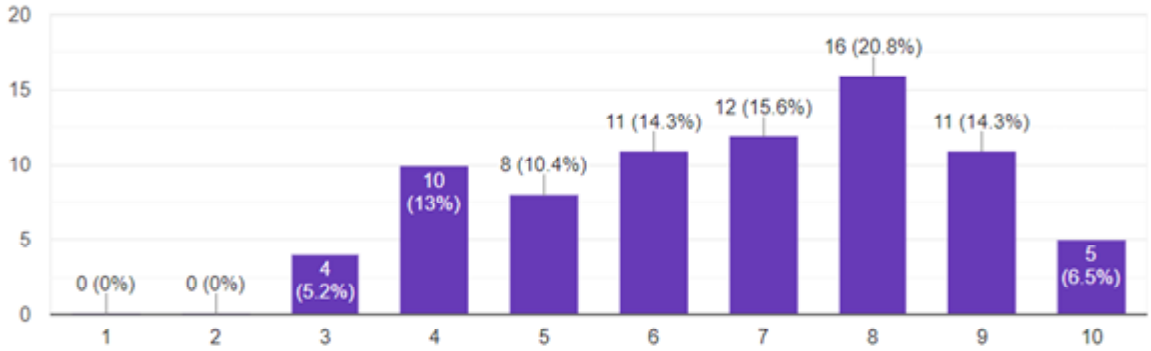
Do you think future generations might get too dependent on AI for creativity?:



- A large portion of respondents are concerned about future generations becoming too dependent on AI.
- This concern reflects a potential apprehension about the diminishing role of human creativity.
- Insight: The prevalent concern about dependency on AI indicates a potential risk of over-reliance, which might stifle human creativity. This highlights the need for balancing AI usage with fostering human ingenuity.

6. Rating of AI's Impact on Human Creativity

Rate from 1 to 10 your point of view about the impact of AI on human creativity:



- Ratings vary widely, from 1 (negative impact) to 10 (very positive impact).
- The average rating suggests a moderately positive view of AI's impact on creativity, but there are notable concerns about its potential negative consequences.
- Insight: The diverse ratings reflect a spectrum of opinions. While some view AI as a beneficial tool that enhances creativity, others worry about its potential to negatively impact creative thinking. The moderate average rating suggests cautious optimism.

From the data, we can conclude that while AI is perceived as a powerful tool with significant influence across fields, there are doubts about its capability to generate truly novel ideas without human input. Additionally, there is concern about the potential dependency of future generations on AI for creative tasks. The mixed ratings on AI's impact suggest that while AI can enhance creativity, it should be used judiciously to avoid over-reliance and ensure human creativity continues to thrive.

CONCLUSION

The study set out to explore the impact of AI on human creativity across various fields, aiming to understand both its potential benefits and drawbacks. The research objectives included studying the influence of AI in different fields, examining the negative impacts of AI on future generations' creativity, and understanding the ethical factors related to AI use in creative domains. Through both quantitative surveys and qualitative expert opinions, this study provides a comprehensive understanding of AI's role in shaping human creativity.

From the survey responses, it is clear that there is a significant perception that AI has a profound influence on creative processes. Many respondents acknowledged AI's capability to generate new ideas and improve efficiency. However, there was also a concern about the potential over-dependence on AI, which could lead to a decline in human creativity and critical thinking skills. The survey revealed a balanced view, with participants recognizing AI's value while also emphasizing the need for caution in its application.

Expert opinions from diverse fields— Manufacturing, IT, Education, and Marketing—offered valuable insights into the nuanced relationship between AI and human creativity. Mr. Khushal Shah highlighted the transformative role of AI in manufacturing while cautioning against losing human expertise. Mrs. Poonam Sule. emphasized the importance of ethical considerations in the IT industry and the need to balance AI with human creativity. Mrs. Manisha Jadhav, pointed out the potential of AI to personalize education but warned against reducing the human element in teaching. Mr. S. Ahmed discussed AI's impact on marketing, noting the risks of impersonal communication and the importance of maintaining human emotional connection.

These expert insights collectively underscore the dual role of AI as both an enhancer and a potential threat to human creativity. The consensus is that AI can significantly augment creative processes by automating routine tasks, providing data-driven insights, and enabling more personalized experiences. However, there is a unanimous caution against over-reliance on AI, which could stifle originality, critical thinking, and the unique human elements essential to creativity.

The study also addressed ethical considerations related to AI use. Experts emphasized the need for transparency, accountability, and ethical guidelines to prevent biases and ensure responsible AI integration. There is a call for educational and training programs to equip individuals with the skills to use AI effectively while fostering their creative abilities.

In conclusion, AI holds immense potential to enhance human creativity across various fields. However, its integration must be balanced with efforts to preserve and nurture human ingenuity. Education, ethical guidelines, and a collaborative approach where AI complements human skills are essential to achieving this balance. By doing so, we can harness AI's strengths while safeguarding the unique and irreplaceable aspects of human creativity, ensuring a future where technology and human innovation thrive together.

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Annexure

Questions for Qualitative Research

1. How do you perceive the role of AI in enhancing creativity within your field?
2. What potential risks do you foresee with the increasing reliance on AI for creative tasks in your industry?
3. Can you provide examples of how AI has positively or negatively impacted creative processes in your field?
4. How can professionals in your industry balance the use of AI with maintaining human creativity and innovation?
5. What ethical considerations should be taken into account when integrating AI into creative processes in your industry?

Questionnaire for survey

1. Demographic Summary

   Age Group:

   Gender:

   Educational Background:

   Occupation:

2. Usage of AI Tools/Software

   Ever Used AI Tools/Software?

3. Perception of AI's Ability to Generate New Ideas

   Do you think AI is enough to generate new ideas?

4. Influence of AI in Various Fields

   Do you think AI has a major influence in your field?

5. Dependency on AI for Creativity in Future Generations

   Do you think future generations might get too dependent on AI for creativity?

6. Rating of AI's Impact on Human Creativity

   Rate from 1 to 10 your point of view about the impact of AI on human creativity.

Chetana's Institute of Management & Research (CIMR)
ISSN No. 0976-0628 Volume XVI(2) pg 66-81

Journal of Management Research
Peer Reviewed Journal

Foraging Decision: Understanding Dynamics of Caenorhabditis Elegans

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Area of the Paper : General Management
Type of the Paper : Exploratory Research
Type of Review : Peer Reviewed as per COPE guidelines
Indexed In : Proquest and EBSCO

How to Cite this Paper:

Isai M. et al. (2024).
Foraging Decision: Understanding Dynamics of Caenorhabditis Elegans
Journal of Management Research
XVI(2), 66-81 https://cimr.in/faculty-research.html#research-Journals

Paper Submission : 15/July/2024
Paper Publication : 30/September/2024

Chetana's Institute of Management & Research (CIMR)
ISSN No. 0976-0628 Volume XVI(2) pg 66-81

Journal of Management Research
Peer Reviewed Journal

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ABSTRACT

Rational choice theory assumes optimality in decision-making. Neuroscience offers a viable and wide account of individual conduct utilizing computational techniques that interface mental and neuroscientific approaches to the ways that can deliver near-optimal choices in complex controlled circumstances. The fundamental role of foraging behaviours in animal for survival, emphasizing importance of seeking, selecting, and exploiting victuals sources is fundamental. It points out at how Behavioural Ecologists have developed conjectural and geometric frameworks to understand foraging strategies. These have been further refined through field and laboratory studies. The same applies to entrepreneurs and managers who forage for decisions in complex situations.

Based on an inter - section between Management, Neuro Sciences, Zoology and Decision making, this paper provides insights into complex decision-making processes involved in foraging. This integrates prior experience with sensory information to optimize foraging efficiency and survival. The preliminary work in behavioural ecology aimed at understanding decision-making processes involved in foraging behaviours, focusing on how animals (and Entrepreneurs) choose strategies for locating victuals, selecting victuals items, and deciding when to explore new victuals sources (decision making). These models integrated prior experience with sensory information to explain cognitive computations necessary for goal-directed foraging behaviours. These highlighted complexity and context-dependent nature of foraging decisions. It emphasized importance of studying simple model systems like nematode Caenorhabditis Elegans to gain insights into neuronal and molecular pathways underlying decision-making processes in foraging. The foraging decisions involved combining past experiences with various sensory inputs from current environment and internal state (environment). This integration of prior knowledge and sensory information helps make strategic decisions about locating, selecting, and exploiting victuals sources (decision making), effectively. In essence, animals (and Entrepreneurs) use a combination of learned behaviours and real-time sensory data to optimize their foraging strategies for survival and successful (decision making). Based on an inter - section between Management, Neuro Sciences, Zoology and Decision making, this paper provides insights into complex decision-making processes involved in foraging, paper suggests that nematode C. Elegans is a suitable model for studying complex behaviours like foraging (decision making). Researchers focus on studying how C.

Elegans forage on bacteria to understand underlying neuronal and molecular mechanisms involved in decision-making. By using this simple model organism, paper aims to gain insights into intricate processes of decision-making and advance understanding of complex behavioural patterns.

Keywords: Behaviour, C. Elegans, Foraging, Decision Making and Neurons

"Humans and other animals can behave irrationally in many contexts. The neuronal mechanisms that lead to irrational behaviours are still unknown. Failures of "rationality", i.e., inconsistent preferences, may reflect the implementation of decision making in biological nervous systems facing intrinsic physical and metabolic constraints".

… Dror Cohen

INTRODUCTION

Research in entrepreneurship has largely ignored biological factors. Foraging is a common behaviour among animals. This is essential for their survival as they need to search for, capture, and consume victuals. Behavioural ecologists have studied and analysed how different foraging behaviours impact overall fitness through quantitative modeling, aiming to understand decision-making processes involved in finding and consuming victuals resources. So is the case with Entrepreneurs who have to be always on the lookout for effective decision making in order to survive in the world of business competition. This helps them to aim for competitive edge and advantage. This paper helps shed light on strategies animals, and Entrepreneurs, use to locate victuals, choose, and decide when to explore for new victuals sources [1, 2]. In foraging theory, researchers focus on three key aspects of behaviour: locating victuals ('victuals search'), selecting between different victuals types ('dietary choice'), and deciding when to move on from a patch of victuals items ('patch-leaving'). These aspects are crucial for understanding how animals, and Entrepreneurs, make decisions while foraging and how these decisions impact survival in a competitive scenario. By studying these behaviours, researchers aim to gain insights into cognitive processes involved in foraging and the genetic and / or evolutionary factors influencing these behaviours [3-5].

The importance of foraging decisions varies depending on context and environment an animal, and Entrepreneurs, is in. For example, while some need to focus on finding victuals efficiently, others may prioritize selecting the right types of victuals or deciding when to move to new victuals sources. This is akin to an Entrepreneur seeking new doors to expand business; include Mergers, Joint Ventures, and profit - sharing ventures. These foraging behaviours are crucial for survival and sustainability success, and understanding them involves complex cognitive processes like learning, decision-making, and resource allocation [6, 7]. In foraging behaviour, decision of when to leave a patch with depleting resources is highlighted as a crucial aspect. In animal species like birds that are efficient at finding and consuming victuals rapidly, critical foraging decision may revolve around when to leave a victuals patch with diminishing resources. This is akin to an Entrepreneur shifting base out of the current geographical vicinity to a more business - friendly pasture somewhere else. This emphasizes importance of timing and resource management (strategic decision process) in foraging behaviours, showcasing trade-off between exploiting known resources and exploring for potentially better opportunities in the environment [5, 7, 8].

Foraging involves a trade-off between exploiting known resources in a given area and exploring other locations for potentially better opportunities (Law of Comparative Advantages). Animals, and even Entrepreneurs, must balance between maximizing current resources and seeking out new victuals sources to ensure survival [5, 9].

Studies, including behavioural, comparative, evolutionary, and genetic research, offer valuable insights into motivations, behaviours, and genetic factors influencing foraging decisions. Based on an inter - section between Management, Neuro Sciences, Zoology and Decision making, this paper provides insights into complex decision-making processes involved in foraging. The foraging decisions made by animals and Entrepreneurs, involve goal-directed behaviours (organism close down 'look for' behaviour and slot in alternative route behaviour when it encounter obstacle to the target ; Wikipedia) that require cognitive processes such as learning spatial and temporal sharing of victuals, planning routes, inferring victuals availability statistically, and making decisions based on this information. These cognitive computations are essential to effectively locate, select, and exploit victuals sources in environment, contributing to survival [10, 11]. Herein, a comparison is to the Entrepreneur who follows the decision making steps, as dictated by the conventional models and supplemented with neuro - scientific models towards management of business activities. By examining how different these two entities (animals and Entrepreneurs) approach foraging in their natural environments, researchers gain better understanding of cognitive processes and genetic mechanisms involved in making decisions. These help shed light on complex interplay between behaviour, genetics, and environmental factors that shape foraging behaviours in various animal species [5, 12].

Laboratory studies have contributed valuable insights by utilizing various tools to delve deeper into the molecular and cellular mechanisms that underlie important and widespread behaviours related to seeking and exploiting victuals sources. These studies aim to enhance understanding of intricate biological processes involved in foraging behaviours; shedding light on neural and genetic aspects that drive decision-making when it comes to victuals acquisition and utilization. A mechanistic understanding of behaviour involves studying underlying molecular and cellular processes that drive behaviours. By investigating neuro-ethological hypotheses using common biological model systems like microscopic nematode Caenorhabditis Elegans, researchers have explored the genetic, neural, and behavioural mechanisms that contribute to various aspects of behaviour such as foraging decisions. This allows for a detailed examination of how specific genes, neurons, and signalling pathways influence behaviour, providing insights into the complex interplay between genetics, neural circuits, and behaviour.

The nervous system of C. Elegans exhibit consistent and robust behaviours related to foraging. Researchers have extensively studied the foraging behaviours of C. Elegans, leveraging its well-characterized neural circuitry and genetic tools to understand molecular and cellular mechanisms underlying decision-making and victuals search strategies in these organisms. Despite its simplicity, C. Elegans serves as an effective model system for investigating complex behaviours like foraging due to its genetic tractability and observable species-typical behaviours [16], involving learning and memory [17-20] and decision-making [21-25].

A variety of genetic tools, behavioural tests, and imaging methods have been created to utilize the quick reproductive cycle, genetic uniformity, transparent body, and simple maintenance of the nematode Caenorhabditis Elegans for scientific research. The nematode Caenorhabditis Elegans (read in conjunction with entrepreneurs), a small roundworm with a compact nervous system consisting of only 302 neurons, each with known functions and connections to other neurons. This simplicity and well-characterized neural network make C. Elegans an ideal model organism for studying the molecular and cellular basis of behaviours like foraging decisions. Researchers

can leverage this model system's genetic tools, behavioural assays, and imaging techniques to investigate how neural circuits and signalling pathways drive behaviours in response to sensory stimuli [13, 14]. The tools and techniques, mentioned above, enable researchers to study the molecular and cellular basis of behaviours, such as foraging decisions effectively. The unique characteristics of C. Elegans make it a valuable system for investigating neural mechanisms and behaviour [13, 14, and 15].

GENESIS

Laboratory strains of C. Elegans were initially discovered in soil samples and were subsequently identified as feeding on bacteria that inhabit decaying organic material. This finding highlighted the natural feeding behaviour of C. Elegans in its environment and provided insight into its ecological niche as a soil-dwelling organism that sustains itself by consuming bacteria. The ability of C. Elegans to thrive on bacteria found in decaying organic matter has made it a valuable model organism for studying various biological processes and behaviours in research settings [26, 27]. In laboratory settings, C. Elegans is typically cultured on agar plates (akin to entrepreneurial business environment) that contain abundant patches of Escherichia coli bacteria, which serve as their primary victuals source (the decision tray). This set - up allows researchers to study the foraging behaviour and neural mechanisms of C. Elegans in response to the presence of bacterial victuals sources. The use of agar plates with E. coli provides a (lab) controlled environment for investigating how these roundworms navigate and interact with their victuals source in experimental studies [13]. Typical locomotion behaviour of C. Elegans, where individuals are often seen moving on their side along a moist agar surface by making undulating movements from the dorsal (top) to ventral (bottom) side. This movement pattern allows the nematodes to navigate their environment efficiently (competitive business advantage), showcasing their characteristic locomotion strategy on the agar surface commonly used in laboratory settings for studying their behaviours and neural mechanisms [28-29].

The simple locomotory movements of C. Elegans (entrepreneurial 'motorist' highway) allow it to regulate its orientation and move through its environment effectively. These movements enable the worm to navigate its surroundings and control its direction of movement in response to sensory stimuli, aiding in foraging and other goal-directed behaviours. This ability to control its bearing helps C. Elegans explore its environment and locate victuals sources (entrepreneurial decision thrusts) efficiently [30, 31]. The behaviours of C. Elegans are influenced by movement patterns (motorist - highways) and neural circuits and signalling pathways that control locomotion in response to sensory inputs. These behaviours can be understood by studying how - nervous system of C. Elegans processes sensory information (decision processing) to drive specific locomotory responses, highlighting intricate relationship between sensory stimuli and behavioural outcomes (entrepreneurial decision outcome). The study of locomotion and neural mechanisms in C. Elegans provides insights into how sensory cues shape various behaviours in this model organism [32]. In C. Elegans, the movement coordination is controlled by body-wall muscle cells that receive signals (entrepreneurial information - inputs) from both excitatory cholinergic and inhibitory inputs originating from dorsal and ventral motor neurons. These signals (entrepreneurial information – inputs) plays a crucial role in regulating locomotion (entrepreneurial navigation) of C. Elegans by influencing muscle activity and movement patterns in response to sensory stimuli. This intricate neural circuitry ((entrepreneurial decision algorithms) helps govern the forward and backward motion of the worm (entrepreneur), showcasing the complexity of locomotion control in this model organism [33].

Stimulus-directed behaviours in C. Elegans (and entrepreneurs) have been extensively studied in response to volatile and water-soluble chemicals [34-36], temperature [37, 38], oxygen [39], light

[40], electrical fields [41], humidity [42], and mechanical perturbation [43]. This research focuses on how the nematode (and entrepreneurs) responds to different chemical cues (akin to entrepreneurial decision cues) in its environment, guiding its foraging behaviours towards attractants and away from repellents through specific movement strategies like klino-kinesis and klinotaxis. By investigating these responses, researchers gain insights into how C. Elegans (and entrepreneurs) navigates its surroundings based on sensory information, contributing to understanding of its foraging decisions. The studies mentioned indicate that C. Elegans, a microscopic nematode, can assess its environment for cues related to foraging and other purposeful behaviours. This ability allows the worm to make decisions based on the information gathered (entrepreneurial information inputs), influencing its foraging strategies.

VICTUALS SEARCH

"Nothing in biology makes sense except in the light of evolution"

… (Dobzhansky 1973)

In foraging behaviour, the challenge of locating victuals in an environment is straightforward when victuals can be easily detected from remoteness. However, this task becomes more complex when sensory cues do not consistently predict the presence of victuals, requiring foragers (and entrepreneurs) to adopt alternative strategies to increase the chances of finding victuals. This highlights the importance of understanding how animals, such as the nematode C. Elegans, adapt their foraging decisions based on the reliability of sensory information in different environmental contexts. The investigation of victuals search behaviours in C. Elegans (and entrepreneurs) in two different foraging contexts: i) environments with stable and densely distributed victuals where sensory cues reliably predict victuals encounters, and ii) environments with diffuse or variable victuals where alternative strategies are needed to increase the chances of finding victuals. It highlights how C. Elegans (and entrepreneurs) utilizes sensory information to navigate and make foraging decisions based on the availability and distribution of victuals resources in its environment. Discussion focuses on the mechanisms by which C. Elegans (and entrepreneurs), evaluate the availability and edibility of victuals at a perceived victuals source. It explores how these entities adapt their foraging behaviour when sensory information conflicts with their initial evaluation of victuals sources. This highlights the complex decision-making processes involved in victuals search strategies and how organisms like C. Elegans (and entrepreneurs) adjust their behaviour based on sensory cues and environmental conditions.

ENVIRONMENTS PREDICTS VICTUALS LOCATION

In environments where sensory information predicts victuals location, organisms like C. Elegans (and entrepreneurs) use various sensory cues such as chemical molecules, mechanical stimuli, and light to guide their foraging behaviours. By detecting and responding to these cues, the entities can navigate towards victuals sources efficiently. This process involves stimulus-directed movements like klino-kinesis and klinotaxis, where they adjust their orientation and movement in response to changes in stimulus intensity to locate and exploit victuals resources effectively. For example, how mosquitoes use various sensory cues, such as detecting exhaled CO_2 carried by the wind, along with visual and thermal cues, to locate a host organism. This multi-modal sensory integration allows mosquitoes to efficiently find a host by following a sequence of cues from a distance to close proximity. This example illustrates the complexity of sensory-driven behaviours in mosquitoes and provides insights into how different sensory inputs are utilized for effective foraging strategies [44]. In C. Elegans (and entrepreneurs), various sensory cues such as chemical molecules, mechanical stimuli, and blue light play a crucial role in guiding foraging

behaviours. These cues help locate victuals sources and navigate its environment efficiently by triggering specific locomotory responses towards attractants and away from repellents. The integration of sensory information enables C. Elegans (and entrepreneurs) to adapt its movement patterns in response to environmental stimuli, enhancing its foraging success [39, 45].

The behaviour of the C. Elegans, researchers have extensively investigated how organism responds to chemical cues like odorants and tastings to locate victuals sources efficiently. These sensory cues, such as volatile odorants and water-soluble tastings, help C. Elegans (and entrepreneurs) identify the presence of victuals and adjust their movements towards these attractants, enhancing their foraging efficiency. Understanding how C. Elegans (and entrepreneurs) responds to these stimuli provides insights into the molecular and cellular mechanisms underlying their victuals-seeking behaviour. [36]. How animals, including C. Elegans, can move towards chemical attractants and away from repellents using two strategies: klino-kinesis and klinotaxis. Klino-kinesis involves modulating reorientation frequency in response to changes in stimulus intensity, while klinotaxis ensures animals continue moving in the direction of the stimulus. These behaviours help organisms efficiently navigate their environment based on sensory cues like chemical attractants or repellants. How animals, including C. Elegans (and entrepreneurs), can move towards chemical attractants and away from repellents using two strategies: klino-kinesis and klinotaxis. Klino-kinesis involves modulating reorientation frequency in response to changes in stimulus intensity, while klinotaxis ensures animals continue moving in the direction of the stimulus. These behaviours help organisms efficiently navigate their environment based on sensory cues like chemical attractants or repellants [46,47]. When animals are moving towards a chemo-attractant, the suppression of reorientations helps them stay on course and continue moving in the direction of the stimulus. This behaviour ensures that the entities efficiently navigate towards the source of the chemical attractant without unnecessary changes in direction.

Klino-kinetic reorientations are referred to as pirouettes. These pirouettes occur more frequently when the worm is moving away from a chemo—attractant gradient, showing a strong modulation in response to changes in stimulus concentration over time. Conversely, the frequency of pirouettes decreases when the worm is moving down a chemo-repellent gradient [48]. In C. Elegans, klinokinetic reorientations, known as pirouettes, are mostly random in direction but show a slight bias. Despite the randomness, changes in frequency due to stimuli ultimately lead to movement towards a chemoattractant or away from a chemorepellent, demonstrating the organism's ability to respond to environmental cues for navigation [13]. Klinotaxis refers to an animal's ability to adjust its movement direction relative to a stimulus, allowing it to steer its forward locomotion towards the source of the stimulus. Unlike klino-kinesis, where movements are random, klinotaxis involves a more purposeful and deterministic steering behaviour in response to environmental cues. This behaviour is observed in organisms like C. Elegans, where they can navigate towards or away from a stimulus by orienting their locomotion direction based on the stimulus gradient [13].

The klinotactic strategy in C. Elegans, known as weather-vaning, involves orienting movement towards a chemoattractant by biasing dorsal-ventral undulations. When combined with pirouette reorientations, this strategy helps explain the various chemically-driven behaviours observed in C. Elegans. Similar behavioural strategies like klino-kinesis and klinotaxis, observed in response to sensory cues such as temperature, are common across different organisms and phyla [49]. In response to chemical stimuli, E. coli exhibit a klino-kinetic strategy, which involves non-directional movements in response to changes in the chemical environment. On the other hand, Drosophila larvae display negative photo-taxis behaviour by moving away from a light source. These behaviours demonstrate how different organisms utilize specific strategies to respond to

environmental cues for survival and navigation [50]. C. Elegans (and entrepreneurs) can use changes in its environment to guide purposeful behaviours like foraging. By responding to sensory cues such as chemical gradients, the entities can adjust its movement patterns (decision mechanism) to navigate towards or away from specific stimuli, showcasing its ability to make decisions based on environmental changes. This highlights how even simple organisms like C. Elegans (and entrepreneurs) can exhibit goal-directed behaviours by leveraging sensory information for survival and navigation.

C. Elegans (and entrepreneurs) faces the challenge of evaluating a spatial chemical gradient using its limited sensory capabilities, mainly through its head's amphid sensory neurons. Despite being only one millimeter long and detecting chemicals through a single point, C. Elegans (and entrepreneurs) employs strategies like pirouettes and weather-vaning to navigate towards or away from chemical cues by assessing the concentration changes in different directions relative to its movement. These behaviours showcase the worm's ability to respond to environmental stimuli and make decisions based on limited sensory information [34, 51]. When the chemical gradient is perpendicular to the entity's movement, it likely needs to use rhythmic head sweeping to sample the concentration difference between its dorsal and ventral head positions. By making sequential observations of concentration over time at a single point (the head), C. Elegans approximates the rate of change in concentration, allowing it to navigate towards or away from a chemical gradient effectively. This strategy enables the worm to respond to environmental cues and exhibit goal-directed behaviours such as foraging based on the detected chemical gradients [52, 53]. When the chemical gradient aligns with the worm's movement, detecting concentration changes is straightforward through sequential sampling. However, when the gradient is perpendicular to the worm's motion, rhythmic head sweeping is likely required to compare concentration differences between the dorsal and ventral head positions. This mechanism allows assessing spatial concentration gradients effectively during navigation [54, 55]. In support of the hypothesis, C. Elegans (and entrepreneurs) has been observed to adjust its neck bending based on a combination of motor signals and changes in chemical concentration over time. This adaptation allows the worm to navigate and respond to spatial chemical gradients effectively, demonstrating a simple sensory mechanism for orienting towards or away from specific chemical cues.

NAVIGATING IN UNSEEN ENVIRONMENTS

In environments where victuals is scattered or unevenly distributed, strategies like klino-kinesis and klino-taxis, which rely on responding to spatial gradients, may not be as effective. Instead, foragers (and entrepreneurs) need to adapt and employ different strategies, such as area-restricted search (ARS), to efficiently locate victuals in patchy environments. These alternative foraging behaviours involve a balance between exploring larger areas (global search) and focusing on specific locations (local search) based on encounters with victuals resources. C. Elegans (and entrepreneurs) adapt their foraging behaviour in environments with sparse or patchily distributed victuals sources. In such environments, animals may switch between global search and local search strategies based on resource encounters to maximize victuals intake. The concept of integrating changes in concentration over unlikely time scales refers to the challenge of detecting subtle variations in victuals concentration over extended periods, highlighting the complex decision-making processes involved in foraging behaviour. In environments where sensory cues are weak, variable, or unreliable, C. Elegans (and entrepreneurs) must use alternative strategies for finding victuals efficiently. One successful approach in such sparse environments is for the animal to adaptively respond to encounters with victuals by adjusting its search behaviour based on recent victuals findings. This strategy helps maximize the chances of coming across randomly located and unpredictably replenished victuals sources (56).

Area-restricted search (ARS) is a foraging behaviour observed in various organisms, where they switch between exploring a larger area when victuals is not found and focusing on a smaller area when victuals is detected. This strategy allows animals to efficiently search for victuals in environments where victuals sources are patchily distributed. ARS has been identified in a wide range of species, including protists, nematodes, insects, birds, mammals, and humans, indicating its evolutionary significance in optimizing victuals search strategies [57-62]. When C. Elegans (and entrepreneurs) is transferred from a victuals-rich environment (pro – profit) to one without victuals (risky environ), it initially conducts a focused area-restricted search (business scan) by frequently changing direction, resulting in minimal movement within the environment. This behaviour allows to thoroughly exploring its immediate surroundings in search of victuals when faced with a lack of chemical cues indicating the presence of victuals [63]. The frequency of reorientation events decreases as the time without victuals increases, leading to a shift towards a more exploratory global search after approximately 15 minutes. This adaptive strategy allows the animals to expand their search area when victuals are scarce and focus on a more local search when victuals are found. Additionally, when C. Elegans (and entrepreneurs) re-encounters victuals, they increase the frequency and intensity of reorientations, aligning with the concept of area-restricted search observed in other organisms [64]

FINDING A DECISION SOURCE

Klino-kinesis, klinotaxis, and area-restricted search are goal-directed behaviours in foraging that help organisms like C. Elegans (and entrepreneurs) increase their chances of finding victuals in their environment. These behaviours involve responding to environmental cues, such as chemo-attractants, to locate potential victuals sources. If no victuals are found after following a cue, C. Elegans (and entrepreneurs) may habituate to the cue and explore other areas for victuals [65]. The habituation response observed in C. Elegans, a form of non-associative learning, involves a decrease in sensitivity to a chemoattractant associated with the absence of victuals, promoting continued victuals search. This response has been documented for various chemical and mechanosensory cues, where continuous exposure to an odorant can lead to a specific loss of behavioural response, while prolonged exposure to one odorant may enhance the response to another odorant sensed by the same neuron [66].

The behavioural observations in C. Elegans (and entrepreneurs) indicate that the worms reduce their sensitivity to certain attractants linked to the absence of victuals to keep searching for victuals. C. Elegans has developed additional mechanisms to maintain and adjust their victuals-seeking behaviour when victuals are scarce, including altering the perception of sensory cues, even reversing their valence, during times of severe victuals deprivation. These adaptive responses help C. Elegans (and entrepreneurs) persist in their search (decision making continuum) for victuals in challenging environments [67]. Following victuals deprivation, presence of CO2 (akin to VUCA and BANI), emitted by various sources like bacteria and predators, changes from being repulsive to attractive for C. Elegans. This shift in response suggests that the entities prioritize victuals search over avoiding potential threats like predators and pathogens. The behavioural changes in response to victuals deprivation are influenced by signalling from insulin-like peptides and biogenic amines such as dopamine and octopamine in the intestine of the worms [68].

NUTRITIONAL DECISION

The importance of evaluating individual victuals items or patches to maximize fitness once victuals is located. For some foragers, the challenge lies in finding victuals sources, while others encounter victuals frequently due to its dense distribution, emphasizing the need for animals to make decisions that optimize their overall well-being based on the available victuals options.

This process involves assessing and selecting the most beneficial victuals items or patches to consume. C. Elegans, a microscopic worm, serves as a model organism for studying decision-making in foraging behaviour. It summarizes the research on C. Elegans' dietary choices in two scenarios: individual worms deciding whether to include a specific victuals type in their diet, and groups of worms competing for victuals within a patch. This research sheds light on how these tiny organisms make decisions regarding victuals selection and competition in different foraging contexts.

INDIVIDUAL FORAGING

Foraging theory suggests that when an animal encounters victuals, it doesn't always mean it will consume it; the animal may decide to accept or reject the victuals item. This decision-making process involves considering what types of victuals to include in its diet. Optimal Diet Theory (ODT) is a model within foraging theory that aims to explain how animals make decisions about which victuals to consume based on maximizing their energy intake in a patchy environment [1,2]. Optimal diet theory (ODT) aims to explain how animals make decisions about what victuals to include in their diet. ODT suggests that an optimal diet maximizes the rate of energy or mass intake in a patchy environment by selecting victuals types based on their value in terms of calories or mass per time spent searching and handling. This theory has been extended to include optimal patch choice, addressing how animals choose between different patches of victuals to maximize their overall intake efficiency in varying environmental conditions [4]. In this model, victuals types are evaluated based on their value in terms of calories or mass per time spent searching and handling. The decision to include a victuals type in the diet is made if adding it does not reduce the overall rate of victuals intake. This approach ensures that foragers prioritize consuming victuals items that offer the highest nutritional value relative to the effort required to find and handle them [4]. When C. Elegans (and entrepreneurs) forage for victuals, they exhibit different behavioural states like roaming, dwelling, and quiescence. Their behaviour is influenced by various factors such as pheromones, aversion to certain substances, and changes in CO_2 (degrees of VUCA and BANI for entrepreneur) levels emitted by bacteria. These responses are regulated by signalling molecules like insulin-like peptides, dopamine, and octopamine, impacting their decision-making processes during victuals search and consumption [69].

COLLECTIVE FORAGING

Models of optimal patch choice often assume victuals (scattered decisions or preferences) are evenly distributed within patches, but in reality, victuals can be unevenly spread. This spatial heterogeneity within a patch can be advantageous for foragers, particularly when competing for victuals with others. For example, in laboratory settings, bacterial patches on agar plates are denser at the patch edge where bacteria are actively growing, influencing the distribution and behaviour of C. Elegans foragers [70, 71]. Individuals of the common lab strain N2 distribute themselves throughout a bacterial patch in proportion to the bacterial density, categorizing them as solitary foragers. In contrast, most wild strains of C. Elegans exhibit gregarious foraging behaviour by aggregating at the edge of a bacterial patch, a behaviour known as bordering, which leads to spatial resource partitioning within the patch based on different foraging strategies [71]. Gregarious animals (and entrepreneurs) tend to consume more bacteria (resilience index) at the edge of a bacterial patch, while solitary foragers maintain the patch's spatial density.

When gregarious and solitary strains are mixed, they exhibit spatial resource partitioning, with gregarious worms staying at the border of the patch and solitary individuals foraging in the centre. This behaviour demonstrates how different foraging strategies can lead to efficient resource utilization and distribution within a shared environment [72]. The observation indicates that

solitary strains of C. Elegans have adapted to efficiently forage in continuous victuals environments, while gregarious strains show a tendency for dispersal, which is beneficial in fragmented or patchy victuals environments. This evolutionary divergence in foraging strategies suggests that different strains have specialized behaviours suited to their respective ecological niches, optimizing their survival and resource utilization in different environmental conditions. Genomics and neuroscience provide potential windows into the innate and neural drivers of key entrepreneurial faculties.C. Elegans (and entrepreneurs) in foraging can be influenced by genetic differences (genomic indices), such as a single amino acid change in the NPR-1 receptor, leading to different foraging strategies in response to environmental conditions. This genetic variation allows C. Elegans to adapt their foraging behaviour within a patch, showing spatial resource partitioning that can be advantageous in competitive foraging situations with other individuals of the same or different species. The study highlights the importance of genetic factors in shaping decision-making processes related to foraging behaviour in C. Elegans [71, 72].

CONCLUSION

C. Elegans (and entrepreneurs) involves a series of complex behaviours that require making multiple decisions by considering external, internal, and contextual cues over different time periods. Studies on foraging behaviour in C. Elegans have provided valuable insights into how purposeful behaviours are produced through the integration of various sensory inputs and internal processes within the neuronal circuits of the organism. The precise manipulation of the genetics and behaviour of C. Elegans, a microscopic roundworm, allows researchers to closely observe and analyze the decision-making process involved in foraging.

By studying the genetic and behavioural aspects of C. Elegans (and entrepreneurs), scientists can gain insights into the underlying neuronal circuits and signalling pathways that drive foraging behaviours, providing a deeper understanding of the mechanisms involved in decision-making at a cellular level. Studies on C. Elegans (and entrepreneurs) have shown that interconnected small groups of neurons handle various sensory inputs and coordinate foraging behaviours. However, broader patterns of neuronal activity seem linked to maintaining consistent behavioural states over time. This research highlights the intricate neural processes involved in decision-making and behaviour regulation in C. Elegans.

Based on an inter - section between Management, Neuro Sciences, Zoology and Decision making, this paper provides insights into complex decision-making processes involved in foraging. As is evident, the maintenance and transitions between persistent behavioural states in C. Elegans (and entrepreneurs) are influenced by a combination of classical neurotransmitters, neuropeptides, biogenic amines, and intracellular signalling molecules. These molecular components play crucial roles in regulating neuronal circuits and signalling pathways that control long-lasting behavioural patterns in the organism. Understanding how these molecules interact and modulate behaviour provides insights into the mechanisms underlying decision-making processes in C. Elegans

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Chetana's Institute of Management & Research (CIMR)
ISSN No. 0976-0628 Volume XVI(2) pg 82-87

Journal of Management Research
Peer Reviewed Journal

Digital Marketing Strategies in Post Covid Era

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Area of the Paper : General Management
Type of the Paper : Exploratory Research
Type of Review : Peer Reviewed as per COPE guidelines
Indexed In : Proquest and EBSCO

How to Cite this Paper:

Samuel A. et al. (2024)
Impact of Covid-19 on Digital Marketing
Journal of Management Research
XVI(2), 82-87 https://cimr.in/faculty-research.html#research-Journals

Paper Submission : 04/April/2024
Paper Publication : 30/September/2024

Chetana's Institute of Management & Research (CIMR)
ISSN No. 0976-0628 Volume XVI(2) pg 82-87

Journal of Management Research
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Digital Marketing Strategies in Post Covid Era

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ABSTRACT

The outbreak of COVID-19 has brought about unprecedented challenges across various sectors, including the field of digital marketing. This paper aims to investigate the profound impact of the global pandemic on digital marketing strategies, practices, and consumer behaviour. Most of the impact that COVID-19 has presented they have been mainly positive to digital marketing industry as a whole as compared to other industries. During COVID, there was seen a shift in the behavior of the people, people were spending more time online, so marketers had a great chance to reach customers through digital platforms. Social media and digital content were becoming very popular, giving marketers many opportunities to connect with people. However, they also need to be careful and responsible when using digital marketing strategies as it could also have a negative impact in the minds of consumers. Therefore, this paper aims to explore and explain how the COVID-19 pandemic has affected digital marketing and advertising industry

Keywords: Digital Marketing, COVID-19, Consumer behaviour, Digital content

1. INTRODUCTION

Digital marketing is a strategic approach that leverages online platforms and technologies to promote products or services to target audiences. It encompasses various tactics such as social media marketing, email marketing, search engine optimization, and content marketing to engage and convert customers in the digital realm.

The history of digital marketing dates back to the 1990s when the internet became widely accessible. Over the years, advancements in technology and the rise of social media platforms have transformed the way businesses connect with their customers online, leading to the evolution of digital marketing strategies.

During the pandemic, digital marketing played an important role in helping businesses adapt to the new normal. With physical stores closing and in-person events cancelled, companies turned

to digital channels to reach and engage with customers. The shift towards online shopping and remote work further emphasized the importance of digital marketing in maintaining business continuity and driving growth during challenging times.

2. LITERATURE REVIEW

Examining various scholarly works authored by esteemed researchers on factors on the impact of COVID-19 on digital marketing. This comprehensive analysis sheds light on the multifaceted nature of the subject, including the efficacy of digital marketing tools and techniques in facilitating mobile payment adoption by businesses, as depicted in Fig

Literature Review of Covid 19 effect on digital marketing

Smith, J. et al. (2020): In their study, Smith and colleagues analyzed the shifting trends in consumer behaviour and digital marketing strategies during the pandemic. They highlighted the importance of agility and adaptability in digital marketing campaigns to meet changing consumer needs and preferences.

Gupta, S. and Sharma, R. (2021): Gupta and Sharma explored the role of social media marketing in the context of COVID-19. Their research emphasized the significance of authentic and empathetic communication on social media to reach customers and build brand loyalty during uncertain times.

Chen, L. and Wang, Y. (2020): Chen and Wang focused on the impact of the pandemic on e-commerce and digital advertising. Their study revealed the challenges faced by businesses in maintaining customer engagement and brand visibility in the competitive online marketplace.

Lee, H. and Kim, S. (2020): Lee and Kim conducted a comprehensive analysis of the digital marketing strategies adopted by businesses in response to COVID-19. They identified key success factors, such as personalized content and omnichannel marketing that have proven effective in driving customer engagement and sales.

3. METHODOLOGY

The study is based on the secondary sources of data; these data are collected from various published sources like text books, journals, and from various data and articles published in various websites.

4. OBJECTIVES

- To analyse the effect of digital marketing
- To analyze the effect of COVID-19 on digital marketing
- Analyzing the digital marketing future in the marketing industry

5. RESEARCH GAP

The study is limited to secondary data, moreover despite having existing literature on impact of COVID-19 on digital marketing, there is lack of in dept analysis on the long term effect of the pandemic on digital marketing practices.

6. EFFECT OF COVID-19 ON DIGITAL MARKETING

The COVID-19 has brought about a seismic shift in numerous aspects of our lives, and digital

marketing is no exception. As businesses worldwide grappled with lockdowns, restrictions, and shifting consumer behaviours, digital marketing strategies had to adapt rapidly to the new normal. Here are some of the key impacts of COVID-19 on digital marketing:

1. **Acceleration of Digital Change:** The pandemic acted as a fuel, accelerating the digital change of businesses industries. Companies that had previously been slow to embrace digital marketing were forced to swiftly pivot to online platforms to reach their audience as physical stores closed and in-person interactions became limited. This led to a surge in demand for digital marketing services and tools.
2. **Shift in Consumer Behaviour:** With people spending more time at home and relying heavily on digital channels for work, education, entertainment, and shopping, there was a significant shift in consumer behaviour. Online shopping experienced a boom as e-commerce became the primary mode of purchasing goods and services. This necessitated a revaluation of marketing strategies to effectively engage with consumers in the digital space.
3. **Focus on Content Marketing:** As consumer priorities evolved during the pandemic, there was an increased demand for relevant, valuable content. Brands leveraged content marketing to provide informative, entertaining, and empathetic content that resonated with their audience. Blogs, video, webinars, and media posts became essential tools for maintaining brand visibility and building connections with customers.
4. **Rise of Social Media Usage:** With people seeking social connection and entertainment online, social media platforms experienced a surge in usage during the pandemic. Brands recognized the importance of maintaining an active presence online to engage with their audience, share updates, and provide customer support.
5. **Increased Emphasis on Data and Analytics:** With the digital landscape evolving rapidly, data-driven insights became invaluable for informing marketing strategies and decision-making. Businesses invested in advanced analytics tools for tracking consumer behaviour, and optimize marketing efforts. Harnessing data became essential for staying agile and responsive in an uncertain environment.
6. **Adaptation of Paid Advertising Strategies:** As consumer spending habits fluctuated and competition intensified in the digital space, brands had to adapt their paid advertising strategies to remain relevant and cost-effective. Many businesses shifted their ad budgets towards digital channels with higher engagement rates, such as social media, search engine marketing, and programmatic advertising. Additionally, there was a greater emphasis on personalized advertising to deliver targeted messages to specific audience segments.
7. **Embrace of Virtual Events and Experiences:** With in-person events and gatherings cancelled or postponed, brands turned to virtual events and experiences to connect with their audience. Webinars, virtual conferences, live streams, and virtual product launches became popular avenues for brands to showcase their offerings, engage with customers, and generate leads.

In conclusion, the pandemic had a profound effect on digital marketing, accelerating the shift towards online channels, reshaping consumer behavior, and necessitating the adoption of innovative strategies to adapt to the new normal. Moving forward, businesses will need to remain agile, data-driven, and customer-centric to navigate the evolving digital landscape successfully.

7. FUTURE OF DIGITAL MARKETING

The future of marketing is poised to continue evolving rapidly as businesses adapt to new

consumer behaviours, technological advancements, and market dynamics. Here are several key points outlining the potential trajectory of digital marketing in the post-pandemic era:

1. **Hybrid Approach to Consumer Engagement:** Digital marketing strategies will adopt a hybrid approach that combines online and offline elements to engage with consumers across multiple touchpoints.Brands will integrate digital marketing efforts with physical experiences, such as pop-up stores, experiential marketing events, and augmented reality (AR) activations, to create immersive brand experiences.

2. **AI and Automation Integration:** AI and automation technologies will play an increasingly significant role in digital marketing. AI-powered chatbots will enhance customer service and engagement on websites, social media platforms, and messaging apps, providing immediate assistance and driving conversions.

3. **(AR) and (VR) Experience:** AR and VR will become more prevalent in digital marketing campaigns, allowing brands to create interactive and vitual experiences for consumers. AR-enabled product try-on features, virtual showrooms, and branded VR experiences will enhance engagement, improve product visualization, and drive sales in sectors such as retail, fashion, and automotive.

4. **Voice Search:** Voice-enabled devices and virtual assistants, optimizing digital content for voice search will be crucial for maintaining visibility and relevance in search engine results in the coming future. Brands will need to adapt their SEO strategies to account for conversational queries and long-tail keywords used in voice searches, focusing on providing concise, relevant answers to users' questions.

5. **Ethical and Transparent Data Practices:** In light of increasing concerns over data privacy and security, ethical and transparent data practices will be paramount for maintaining consumer trust and compliance with regulations such as GDPR and CCPA. Brands will prioritize data protection, consent management, and transparency in their digital marketing strategies, providing clear information on data collection practices and giving consumers control over their personal information.

6. **Sustainability and Social Responsibility:** Consumers are placing greater emphasis on sustainability, environmental responsibility, and social causes when making purchasing decisions. Digital marketing strategies will reflect these values, with brands incorporating sustainability messaging, eco-friendly practices, and corporate social responsibility initiatives into their campaigns to resonate with socially conscious consumers.

7. **Integration of Social Commerce:** Social commerce will continue to gain momentum as social media platforms expand their e-commerce capabilities and introduce new shopping features.Brands will leverage social commerce functionalities such as in-app checkout, shoppable posts, and live shopping events to streamline the path to purchase, drive impulse buying, and capitalize on social media influence.

8. **Personalization at Scale:** Hyper-personalization will remain a cornerstone of digital marketing strategies, with brands leveraging data analytics, AI, and machine learning to deliver targeted content and offers tailored to individual preferences and behaviors.Dynamic content optimization, predictive modelling, and customer journey mapping will enable brands to deliver seamless, personalized experiences across all digital touchpoints.

In summary, the future of digital marketing will be characterized by a blend of innovation,

technology integration, consumer-centricity, and ethical responsibility. By embracing emerging technologies, adapting to changing consumer expectations, and prioritizing transparency and sustainability, businesses can navigate the evolving digital landscape successfully and drive growth in the post-pandemic era.

8. CONCLUSION

In today's business landscape, digital channels have become central to operations, and digital marketing has emerged as a vital tool for brands and marketers, particularly amid the pandemic. While traditional marketing suffered setbacks, digital marketing experienced significant growth and adaptation during COVID-19, propelling it forward at an accelerated pace. This unprecedented situation has underscored the importance of online platforms for reaching and engaging with audiences effectively.The pandemic forced businesses to rethink their marketing strategies, with many shifting their focus and resources towards digital channels to maintain connections with customers in a socially distanced world. As a result, digital marketing activities saw a surge in demand, as brands sought innovative ways to stay relevant and accessible to their target markets.Moreover, the rapid evolution of digital marketing during this period has paved the way for further advancements and enhancements in how brands interact with consumers online. From leveraging social media platforms to exploring data-driven insights and investing in online advertising, companies have embraced digital marketing as a fundamental component of their overall marketing strategy, ensuring resilience and adaptability.

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Chetana's Institute of Management & Research (CIMR)
ISSN No. 0976-0628 Volume XVI(2) pg 88-104

Journal of Management Research
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Area of the Paper : General Management
Type of the Paper : Exploratory Research
Type of Review : Peer Reviewed as per COPE guidelines
Indexed In : Proquest and EBSCO

How to Cite this Paper:

Parulekar P. (2024)
Comparative Analysis of Risk -Return of Equal Weight Portfolio without rebalancing Strategy versus Passive Index Funds Investing
Journal of Management Research
XVI(2), 88-104 https://cimr.in/faculty-research.html#research-Journals

Paper Submission : 17/June/2024
Paper Publication : 30/September/2024

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ABSTRACT

Portfolio Diversification leads to risk reduction. Markowitz (1952) mean variance approach talks about efficient frontier. Efficient frontier is a graph of portfolios with a higher return for a given risk. This efficiency could be achieved through diversification in securities whose returns have low coefficients of correlation. The key to this process is to determine the weights of all the securities in the portfolio which could be a complex mathematical process based on historical risk and returns. An equal weight portfolio without rebalancing gives equal weight to all the securities and holds them for a long term. Passive Index funds invest in index stocks as per their weightage in index based on free float market capitalization.

This study explored Nifty 50 as a base index over a period of 29 years and made various combinations equal weighted without rebalancing and index portfolios based on monthly data availability and compared their risk return performance. It also explored the performance of Nifty Equal weight index with Nifty, but the risk return for the second part was slightly in favor of Nifty index investing because of quarterly rebalancing. Quarterly rebalancing leads to money taken from gainers and investment in underperformers. This goes against the basic logic of holding on to the gainers. In all the long-term investing cases equal weight portfolio without rebalancing performed better on return/risk ratio as compared to free-float market capitalization-based index portfolio. Hence equal weight investing without rebalancing could be considered by passive retail or institutional investors.

Keywords: Equal Weight, Portfolio Diversification, Nifty 50, Index Funds, Without Rebalancing

INTRODUCTION

It is natural intuition to divide things equally amongst eligible constituents which was referred to as a naive diversification in the pioneering study by DeMiguel et al. (2009). The benchmark Sharpe Ratio of 1/N portfolio (i.e. naive diversification) portfolio was not underperforming any of the benchmark 14 models of optimum asset allocation consistently. The study was based on United State stock market data. In Indian context the benchmark Nifty 50 index was constituted

in 1995 with 50 stocks with periodic rebalancing based on underperformance and outperformance of smaller companies which got included in Nifty. This study explored Nifty 50 companies as on 30th September 2003 and compared its performance in three cases 1) Equal Weighted 2) Based on Entire Market Capitalisation 3) Based on Free Float Market Capitalisation (Last 2 methods are commonly used for index calculations). 20-year monthly data was available for 43 companies from 30th September 2003 to 30th September 2023.

In the second case 50 companies as on 30th September 2023 and compared its performance in three cases 1) Equal Weighted 2) Based on Entire Market Capitalisation 3) Based on Free Float Market Capitalisation. In this case it was assumed that hypothetical portfolio was created. 20-year monthly data was available for 37 companies from 30th September 2003 to 30th September 2023.

There were 8 companies which were part of Nifty and were listed for 29 years ending 30th September 2023. There are 12 companies which were in the Nifty and were listed for 25 years.

Table I

Sr. No.	Scenarios and Constituents	Number of Companies	Period of Study	Number of Observations of Monthly Data	Portfolios compared based on weight	Average Correlation between returns of the companies
1	Nifty 50 index as on 30th September 2003	43	30th Sep. 2003 to 30th Sep.2023	240	EWWR MCAP MCAP FF	0.40
2	Nifty 50 index as on 30th September 2023	37	30th Sep. 2003 to 30th Sep.2023	240	EWWR MCAP MCAP FF	0.37
3	Nifty companies listed from 1994	8	30th Sep.1994 to 30th Sep.2023	348	EWWR MCAP MCAP FF	0.46
4	Nifty companies listed from 1998	12	30th Sep. 1998 to 30th Sep.2023	300	EWWR MCAP MCAP FF	0.43
5	Nifty 50 equal weight index as on 30th September 2023	49*	30th Sep.2018 to 30th Sep.2023	60	EWR EWWR MCAP FF	0.35

ending 30th September 2023
* As HDFC limited was merged with HDFC Bank.

Nifty 50 equal weight index was launched on April 13th, 2017, by NSE but is rebalanced quarterly. This rebalancing might lead to outperformers getting a reduction in their weightage and underperformers getting more weightage which goes against basic principle of trading or investing which calls for holding on to the gainers and selling losers. So, study compares performance of 5 years of Nifty ending 30th September 2023 with equal weight index of Nifty, Nifty index and equal weight Nifty assuming no rebalancing.

Return/ Risk Ratio or Sharpe Ratio assuming Risk free Rate of 0% was used to compare the results.

The following portfolios were compared.

The consolidated details of the same are mentioned in Table 1 shown in the Research Methodology.

EWR- Equal Weight Rebalancing

EWWR – Equal Weight without rebalancing

MCAP – Market Capitalisation based weights.

MCAP FF - Market Capitalisation based weights considering free float.

REVIEW OF LITERATURE

The comprehensive review of literature was done both by researchers in India and abroad.

DeMiguel et al. (2009) 1/N naive portfolio was studied for United states (U.S.) market as against 14 other models including optimum diversification over 3000 months for a portfolio of 25 assets and 6000 months for a portfolio of 50 assets. The conclusion was based on Sharpe Ratio, certainty equivalent return none of them were consistently better as compared to 1/N naive portfolio. Authors also concluded that none of the 14 models was consistently better than others. The authors suggested further improvements in optimum portfolio models.

Green et al. (1992) argued that extreme weightages in sample efficient portfolios were due to the dominance of a single factor of equity returns. That made it easy to diversify subsets to reduce residual risk, while weighing the subsets to reduce factor risk simultaneously. According to study, minimum variance portfolio could be made in two steps by diversifying in low and high beta stocks respectively and then shorting high beta stocks and going long on low beta stocks to reduce the systematic risk.

Maillard et al. (2009) explored equally weighted risk contribution portfolios and conclude they might be considered as an alternative to minimum variance and equal weight portfolio.

Plyakha et al. (2012) studied equal, value and price weighted portfolios of stocks in the major U.S. equity indices over the last four decades to conclude that equal weighted portfolios with monthly rebalancing outperformed the value and price weighted portfolios of stocks. The four criterias of outperformance were average return, four factor alpha, Sharpe Ratio and certainty equivalent return. This outperformance was over and above 50 basis points transaction cost.

Pae, Yuntaek & Sabbaghi, Navid (2015) showed that equally weighted portfolio (EW) has higher systematic risk than a value weighted portfolio in an efficient market where Capital Asset Pricing Model (CAPM) holds. The study predicted that EW portfolios have higher systematic risk than VW when economy is normal.

Fugazza, Nicodano and Guidolin (2015) concluded that investors with longer term horizon (i.e. 1 year or more) have benefited in the period from 1995 to 2007 from optimum portfolio strategy provided it is designed to exploit return predictability. The study also found that the equally weighted strategy usually outperforms at the short horizons when the optimum portfolio does not account for return predictability.

Malladi et al. (2017) concluded equal weighted portfolios with rebalancing made sense as compared to price weighted and value weighted strategies. Their inference was based on the simulation as well as real world data from 1926 to 2014.

Hillion (2019) conducted a study for the period from January 1928 to December 2017 for S&P 500. The study concluded positive excess volatility return was the key reason why EW portfolios outperformed VW portfolios.

Jiang, Du and Yunbi An (2019) paper demonstrated how out of sample minimum variance portfolio (MVP) can be improved in the presence of estimation errors by combining MVP and equally weighted portfolio (EWP). Results of the study indicated that an appropriate combination of MVP and EWP could enhance Sharpe ratios under any scenarios considered and could also reduce the portfolio risk if short selling was allowed. They found that the optimal combination coefficient depends on factors that greatly impact estimation errors in MVP, including sample size, estimation method, no short selling restriction and the length of the out-of-sample period under consideration.

Stefanovska (2020) compared equal and value weighted portfolios for Swedish stock market based on three rebalancing schemes. The empirical results showed that all three equal weighted portfolios outperformed their value weighted counterparts. The study was based on the period from 1st January 2006 to 31st December 2016.

Lee (2020) proposed Deeply Equal Weighted Subset Portfolio (DEWSP). DEWSP is subset of top-N ranked assets in asset universe, the members of which are selected based on predicted returns of deep learning algorithms and are equally weighted. DEWSP were better than Historical Equal Weighted Subset Portfolio (HEWSP) based on Sharpe Ratio. DEWSP allocation was transparent and intuitive.

Taljaard et al. (2020) found that since 2016 equal weighted portfolio had significantly underperformed market capitalisation weighted portfolio for S&P 500 companies. However equal weighted portfolios appear to outperform the cap weighted portfolio over a long-term horizon. Benefits of diversification from equal weighted portfolios were declining.

Harris et al. (2022) studied behavioral portfolio strategies both for equal weight naïve investor and rational investor based on maximizing mean variance utility. Their results were like the study conducted by DeMiguel et al. (2009) which stated no significant outperformance by rational investor.

Swade et al. (2022) concluded Equal Weighted (EW) portfolios outperformed Value Weighted (VW) counterparts over multiple decades and universes based on S&P500 stocks. EW portfolios put more weight to small companies which leads to massive size exposure relative to VW portfolio. Their period of study was from 1963 to 2021 which was further subdivided in 1963-1983, 1984-1999, 2000-2009 and 2010-2021 period.

Sen et al. (2023) used three approaches for portfolio design minimizing the risk, optimizing the risk and assigning equal weights to the stocks of the portfolio. For Thirteen critical sectors listed on NSE were considered. Top ten stocks based on free float market capitalisation for each of the sector were considered for the period from 1st January 2017 to 31st December 2022. Study concluded that, based on returns as the criteria equal weight portfolios are higher for 7 sectors but optimizing the risk performed better for remaining 7 sectors.

Narayan et al. (2023) studied five portfolios between 2000 to 2016 based on correlation between

domestic and foreign assets. They extended the study to evaluate between 2017 to 2022 and found the findings of the study robust. The critical finding of the study was Markowitz (1952) recommendation of using low correlated assets to control portfolio risk, which was also used to rebalance the portfolios but long-term advantage of it were not evident.

Cirulli and Walker (2023) concluded that equally weighted strategy even though a naïve approach, it outperformed many complicated portfolios, despite being easy on calculations and hence has got interest of many practitioners. However, Their paper offered to challenge the most straightforward notion that outperforming the equally weighted strategy was difficult. They proposed new strategies as additional benchmarks in academic studies and practical investment strategy back testing. This was based on their study for the period from April 2002 to March 2022 with portfolios which were updated and rebalanced monthly on the first Wednesday of each month using a rolling window of the past 12 months of weekly return.

Gelmini and Uberti (2024) tried to update the original study of DeMiguel et al. (2009) and confirmed the original study. The study concluded that compared the out of sample performance of the investment strategies based on three main metrics: Sharpe Ratio (SR), Certainty Equivalent (CE) and turnover. None of the considered strategies significantly and systematically outperform the 1/N.

Need For Study

India is currently ranked 5th largest economy and is on track to become 5 trillion-dollar economy by 2027. The technology led growth needs to be inclusive as well as sustainable from the point of view of all Indian. In this context, considering the population of India and the youth forming significant part of it, more and more Indians need to generate inflation beating returns for themselves as well as corporates need equity capital for a sustainable growth. Indian equity markets offer significant opportunity for all investors however retail investors have not participated as much as they could have considering the growth and return opportunities. However, for direct investment deciding on the stocks and weightages to individual stocks is a challenging task. Considering these facts, the study of equal weight portfolios with large known companies could be important for retail investors who plan to make direct investment in equity markets.

Objectives of the study

1. To calculate Risk, Return and Return to Risk ratio for EWR, EWWR, MCAP, MCAP FF Portfolios across time frames and combinations of stocks. (Details are shown in Table I)
2. To compare Return to Risk ratio for EWR, EWWR, MCAP, MCAP FF Portfolios across time frames and combinations of stocks using ANOVA.

Hypothesis Testing

Null Hypothesis (Ho): There was no significant difference in Return to Risk Ratio (Sharpe Ratio) for EWR, EWWR, MCAP, MCAP FF Portfolios across time frames and combinations of stocks.

Alternative Hypothesis (Ha): There was significant difference in Return to Risk Ratio (Sharpe Ratio) for EWR, EWWR, MCAP, MCAP FF Portfolios across time frames and combinations of stocks.

RESEARCH METHODLOGY

Descriptive research was conducted based on available monthly data for various stocks across

various timeframes as shown in Table I. Measures of Central Tendency and ANOVA were used to infer the results.

Population and Sample

Population: Nifty form its inception and all the listed companies with possible weight combinations can be the portfolios for study.

Sample: This study emphasizes long-term and passive investing in equal weight portfolios without rebalancing and comparing its performance with index fund which typically has the weightage based on full or free float market capitalisation. Index funds are highly recommended for passive investing. Hence 5 different scenarios were considered to evaluate and infer the results. For all 5 scenarios the ending date considered was 30th September 2023.

Scenario 1- Stocks which were part of Nifty as on 30th September 2003 and were listed on NSE as on 30th September 2023. (Details shown in Table 2) (240 Monthly observations were made for 43 such companies)

Scenario 2- Stocks which were part of Nifty as on 30th September 2023 and were listed on NSE as on 30th September 2003. (Details shown in Table 3) (240 Monthly observations were made for 37 such companies)

Scenario 3- Stocks which were part of Nifty as on 30th September 2023 and were listed on NSE as on 30th September 1994. (Details shown in Table 4) (348 Monthly observations were made for 8 such companies)

Scenario 4- Stocks which were part of Nifty as on 30th September 2023 and were listed on NSE as on 30th September 1998. (Details shown in Table 5) (300 Monthly observations were made for 12 such companies)

Scenario 5- Stocks which were part of Nifty as on 30th September 2018 and were listed on NSE as on 30th September 2023. (Details shown in Table 6) (60 Monthly observations were made for 49 such companies). In the scenario 5 performance was compared with Nifty 50 index and Nifty 50 equal weight index from 30th September 2018 to 30th September 2023.

Tools and Data Analysis:

Portfolio Return and Risks were calculated using Markowitz mean variance approach,
Portfolio Return (Rp)

$Rp = \Sigma$ wi *Ri (where i varies from 1 to n)

Wi = Weight of the particular security in the portfolio

Ri = Return of the i^{th} security in the portfolio

Portfolio Risk (σ_p)

For 2 assets

σ_p = square root [(w_1 * σ1) ^2 + (w_2 * σ2)^2 + 2*w1*w2* covariance (R_1, R_2)

covariance (R_1, R_2) = σ1* σ2* Correlation (R_1, R_2)

For n assets

Portfolio variance ($\sigma_{p}\wedge 2$)

$\sigma_{p}\wedge 2 = \Sigma$ (i from 1to n) Σ (j from 1to n) (w_{i*} w_{j*} σ_{i} * σ_{j} *correlation ($R_{i,}$ R_{j}))

Lower correlation leads to better diversification.

Sharpe Ratio with Risk Free Rate equal to 0. i.e. Return/ Risk ratio would be calculated for all portfolios and their constituents.

FINDING AND ANALYSIS

Table 2 : Portfolio 1 as per scenario 1

Name/ Data	Average	Risk	Min	Max	Return/Risk
Adani	2.48%	22.82%	-205.09%	109.17%	10.89%
Apollo	1.75%	8.89%	-42.13%	28.86%	19.73%
Asian	1.92%	7.18%	-21.77%	22.15%	26.79%
Axis Bank	1.77%	11.91%	-60.97%	48.34%	14.82%
BPCL	0.76%	11.22%	-46.66%	38.20%	6.77%
Bajaj Finance	2.99%	12.97%	-70.08%	42.65%	23.02%
Britannia	1.82%	7.40%	-19.44%	25.38%	24.64%
Cipla	1.12%	8.02%	-25.49%	33.24%	13.91%
Divis Lab	1.94%	11.13%	-41.15%	36.68%	17.44%
DrReddys	0.94%	8.40%	-32.47%	23.22%	11.22%
Eicher Motors	2.20%	10.62%	-38.12%	32.85%	20.75%
Grasim	1.22%	10.20%	-49.80%	31.95%	12.01%
HCL Tech	1.65%	9.20%	-31.06%	25.93%	17.94%
HDFC Bank	1.67%	7.51%	-31.21%	27.21%	22.18%
Hero Motocorp	0.97%	8.15%	-25.09%	30.54%	11.92%
HUL	1.07%	6.97%	-21.52%	22.33%	15.39%
Hindalco	0.77%	12.99%	-48.80%	45.42%	5.89%
ICICI Bank	1.40%	10.86%	-42.91%	43.47%	12.89%
IndusInd Bank	1.64%	14.75%	-114.51%	56.40%	11.09%
Infosys	1.31%	7.90%	-25.66%	27.20%	16.57%
ITC Ltd	1.32%	6.77%	-20.86%	26.74%	19.48%
JSW Steel	2.54%	23.84%	-48.93%	300.82%	10.67%
Kotak Bank	2.12%	10.87%	-49.68%	56.61%	19.49%
LT	1.88%	10.58%	-41.58%	46.66%	17.81%
MNM	1.71%	9.77%	-47.25%	36.30%	17.52%
Maruti	1.58%	9.92%	-38.20%	32.64%	15.92%
ONGC	0.43%	9.44%	-43.54%	30.17%	4.53%
RIL	1.44%	8.60%	-34.87%	27.48%	16.73%
SBI	1.11%	10.98%	-43.13%	37.96%	10.08%

Sun Pharma	1.59%	7.80%	-28.25%	27.64%	20.34%
Tata Consumer	1.49%	8.92%	-27.57%	27.99%	16.70%
Tata Motors	1.02%	13.99%	-70.72%	41.41%	7.29%
Tata Steel	0.91%	13.59%	-71.15%	53.23%	6.73%
Titan	2.79%	10.82%	-31.77%	42.47%	25.80%
UPL	2.48%	19.85%	-46.48%	258.00%	12.47%
Wipro	0.96%	8.43%	-24.07%	29.67%	11.40%
Bharti Airtel	1.41%	8.82%	-35.76%	24.78%	15.95%

Graph 1 – Pareto Analysis of Portfolio 1

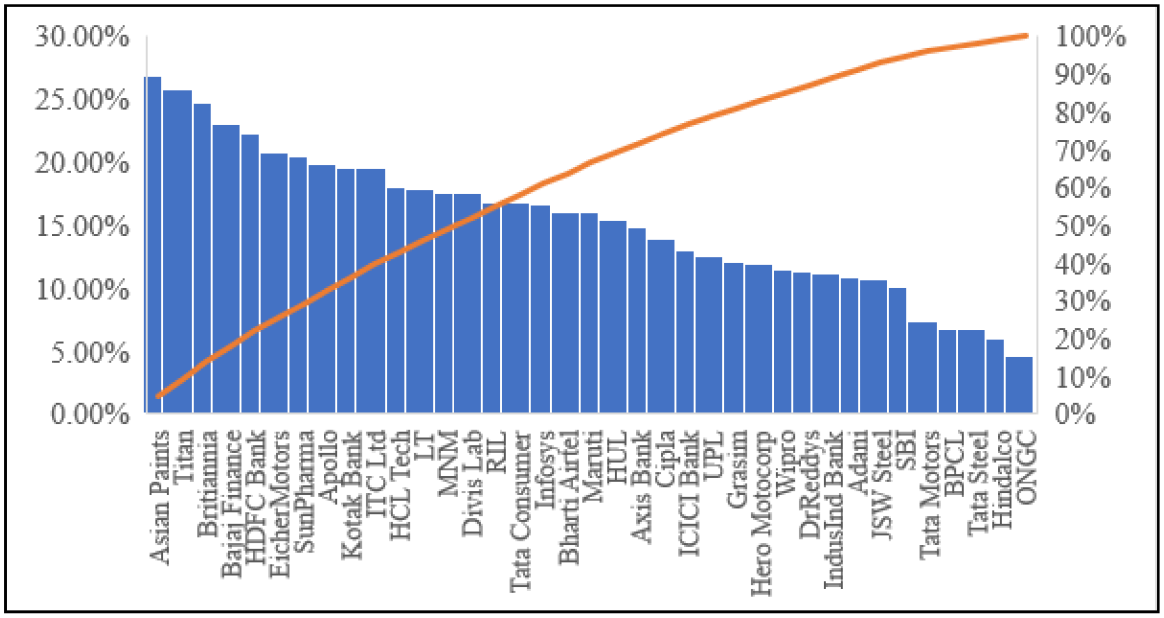

Table 2 (a) : Senario1 Critical Observations

	EWWR	MCAP	MCAP FF
Portfolio Return (Rp)	1.28%	1.24%	1.34%
Portfolio Variance($\sigma_p^{\wedge 2}$)	0.44%	0.39%	0.40%
Portfolio Risk σ_p	6.62%	6.27%	6.32%
Sharpe Ratio (Rp/ σ_p)	19.30%	19.76%	21.14%

Table 3 : Portfolio 2 as per Scenario 2

Data	Average	Risk	Min	Max	Return/Risk
ABB	1.92%	12.40%	-37.23%	33.61%	15.45%
ACC	1.39%	9.80%	-28.83%	25.93%	14.15%
Ambuja Cement	1.47%	9.59%	-29.10%	29.41%	15.37%
BHEL	1.49%	11.27%	-29.81%	29.43%	13.18%
BPCL	1.00%	12.54%	-46.66%	38.20%	7.94%
Bajaj Holding	0.48%	14.19%	-119.39%	33.58%	3.39%
Britania	2.06%	8.03%	-19.44%	25.38%	25.63%

Cipla	1.51%	8.43%	-25.49%	23.24%	17.88%
Colgate	1.84%	7.20%	-17.38%	24.44%	25.53%
Dabur	2.26%	7.55%	-21.29%	26.06%	29.95%
DrReddys	1.27%	8.83%	-32.47%	22.48%	14.41%
GAIL	1.18%	9.74%	-33.22%	39.46%	12.14%
Glaxo	1.46%	7.60%	-22.78%	30.63%	19.25%
Grasim	1.25%	11.57%	-49.80%	31.95%	10.79%
HPCL	0.18%	12.72%	-42.59%	30.36%	1.38%
HCL Tech	2.09%	10.34%	-31.06%	25.93%	20.26%
HDFC Bank	2.09%	8.34%	-30.65%	27.21%	25.12%
Hero Motocorp	1.73%	8.19%	-20.26%	20.39%	21.17%
HUL	1.04%	7.75%	-21.52%	22.33%	13.37%
Hindalco	0.52%	13.36%	-48.49%	45.42%	3.88%
ICICI Bank	1.68%	12.28%	-34.70%	43.47%	13.68%
Indian Hotels	1.22%	10.72%	-37.79%	29.32%	11.40%
Infosys	1.53%	8.55%	-25.66%	19.68%	17.93%
ITC Ltd	1.90%	7.25%	-20.86%	26.74%	26.25%
LT	2.52%	12.28%	-41.58%	46.66%	20.56%
MNM	2.35%	10.08%	-30.78%	36.30%	23.35%
MTNL	-1.11%	14.80%	-48.09%	56.33%	-7.51%
NALCO	0.35%	14.31%	-84.49%	51.87%	2.41%
NIIT	0.71%	15.65%	-55.64%	65.49%	4.56%
RIL	1.25%	9.16%	-34.87%	25.17%	13.64%
RIL Infra	0.32%	16.33%	-54.66%	60.41%	1.93%
SAIL	0.52%	14.10%	-41.17%	45.84%	3.66%
SCI	-0.09%	13.49%	-46.43%	51.13%	-0.68%
SBI	1.48%	11.52%	-32.27%	37.96%	12.86%
Sun pharma	2.57%	7.30%	-28.25%	16.75%	35.16%
Tata Chemical	1.14%	10.93%	-37.86%	29.13%	10.41%
Tata Comm.	0.95%	12.95%	-38.56%	52.63%	7.34%
Tata Consumer	1.35%	9.37%	-27.57%	27.99%	14.36%
Tata Motors Ltd	1.62%	13.55%	-70.72%	37.16%	11.99%
Tata Power	1.09%	11.36%	-36.95%	35.11%	9.57%
Tata Steel	0.72%	15.32%	-71.15%	53.23%	4.72%
Wipro	1.21%	9.30%	-24.07%	29.67%	13.03%
Zee	1.47%	10.96%	-34.50%	39.84%	13.42%

Graph 2 : Pareto Analysis of Portfolio 2

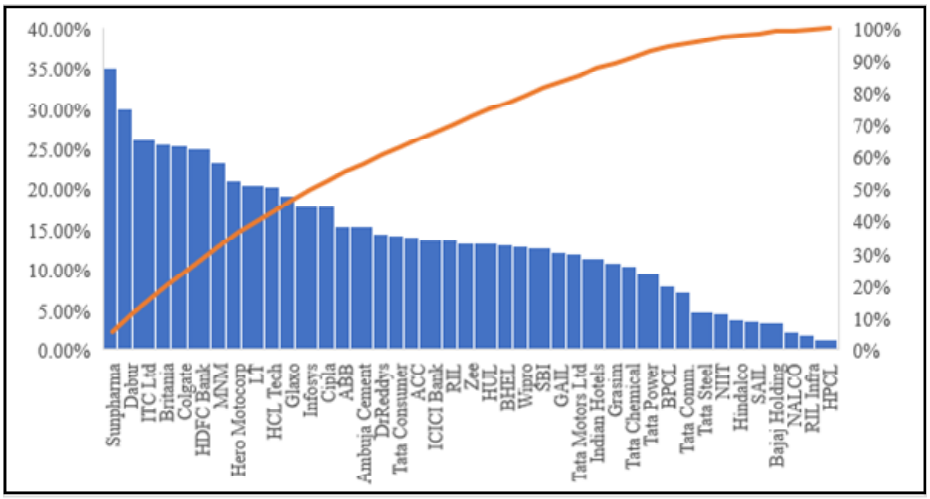

Table 3 (a) : Scenario 2 Critical Observations

	EWWR	MCAP	MCAP FF
Portfolio Return (Rp)	1.57%	1.10%	1.17%
Portfolio Variance($\sigma_p^{\wedge 2}$)	0.42%	0.36%	0.36%
Portfolio Risk σ_p	6.46%	6.02%	6.01%
Sharpe Ratio (Rp/ σ_p)	24.35%	18.25%	19.52%

Table 4 : Portfolio 3 as per scenario 3

Name/ Data	Average	Risk	Min	Max	Return/Risk
Cipla	1.24%	9.55%	-25.49%	38.32%	12.96%
Dr Reddy's Labs	1.20%	9.86%	-33.92%	33.78%	12.14%
Grasim Industries	0.82%	11.36%	-49.80%	40.08%	7.26%
Hindalco Industries	0.62%	12.45%	-48.80%	45.42%	4.98%
Infosys	2.17%	10.97%	-42.43%	46.33%	19.79%
ITC	1.20%	7.90%	-26.45%	26.74%	15.16%
Kotak Mah. Bank	1.46%	14.07%	-49.68%	95.93%	10.38%
Reliance Industries	1.32%	9.00%	-34.87%	34.22%	14.68%
Wipro	1.57%	14.68%	-75.31%	70.73%	10.72%

Graph 3 : Pareto Analysis of Portfolio 3

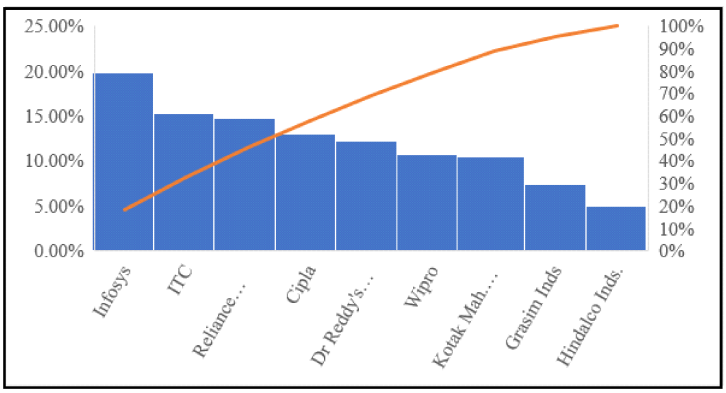

Table 4 (a) : Scenario 3 Critical Observations

	EWWR	MCAP	MCAP FF
Portfolio Return (Rp)	1.29%	1.13%	1.27%
Portfolio Variance($\sigma_p^{\wedge 2}$)	0.49%	0.48%	0.45%
Portfolio Risk σ_p	7.02%	6.90%	6.69%
Sharpe Ratio (Rp/ σ_p)	18.38%	16.39%	19.02%

Table 5 : Portfolio 4 as per scenario 4

Name/ Data	Average	Risk	Min	Max	Return/Risk
Cipla	1.32%	9.14%	-25.49%	38.32%	14.46%
Dr Reddy's Labs	1.33%	9.33%	-32.90%	33.78%	14.23%
Eicher Motors	2.69%	12.04%	-38.12%	50.51%	22.36%
Grasim Industries	1.43%	11.22%	-49.80%	40.08%	12.78%
HDFC Bank	1.85%	8.48%	-31.21%	41.26%	21.85%
Hindalco Industries	0.86%	12.46%	-48.80%	45.42%	6.93%
ICICI Bank	1.65%	13.13%	-42.91%	74.73%	12.53%
Infosys	1.65%	10.62%	-42.43%	46.33%	15.53%
ITC	1.15%	7.38%	-26.45%	26.74%	15.59%
Kotak Mah. Bank	2.49%	13.88%	-49.68%	95.93%	17.96%
Reliance Industries	1.59%	8.70%	-34.87%	34.22%	18.26%
Wipro	1.12%	13.56%	-64.16%	70.73%	8.28%

Graph 4 : Pareto Analysis of Portfolio 4

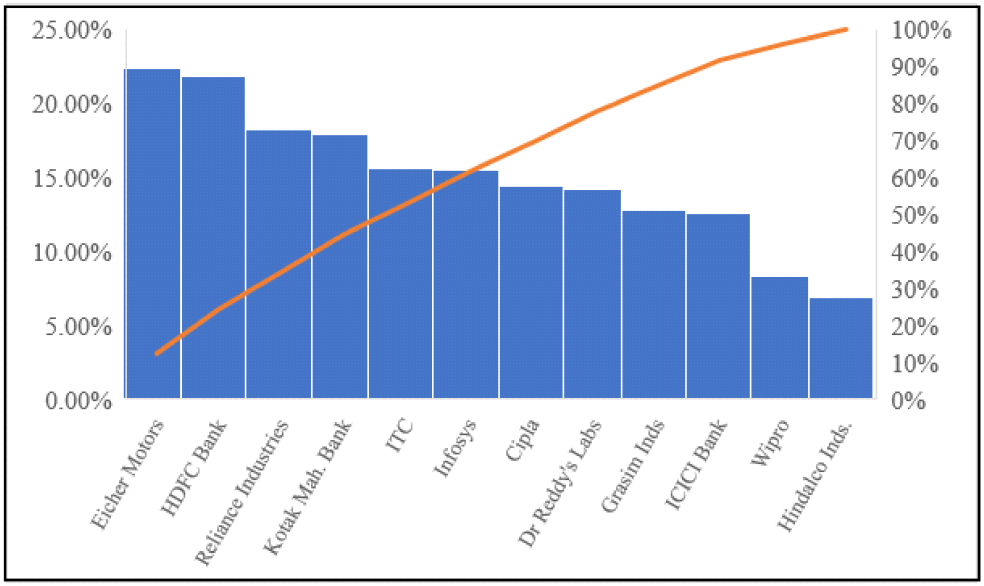

Table 5 (a) : Scenario 4 Critical Observations

	EWW	MCAP	MCAP FF
Portfolio Return (Rp)	1.60%	1.31%	1.65%
Portfolio Variance ($\sigma_p^{\wedge 2}$)	0.45%	0.40%	0.53%
Portfolio Risk σ_p	6.72%	6.32%	7.26%
Sharpe Ratio (Rp/ σ_p)	23.74%	20.66%	22.65%

Table 6 : Portfolio 5 as per Scenario 5

Stock Name/Data	Average	Risk	Min	Max	Return/Risk
Adani Ports	1.26%	10.24%	-30.87%	28.22%	12.28%
Asian Paints	1.64%	7.49%	-12.92%	24.79%	21.90%
Axis Bank	1.37%	10.34%	-45.65%	23.57%	13.20%
B P C L	0.43%	10.04%	-26.47%	32.33%	4.24%
Bajaj Auto	1.00%	8.52%	-35.70%	26.02%	11.79%
Bajaj Finance	2.66%	13.97%	-50.38%	48.35%	19.03%
Bajaj Finserv	1.35%	14.52%	-67.87%	45.20%	9.32%
Bharti Airtel	1.89%	7.28%	-17.96%	18.23%	25.96%
Cipla	1.27%	8.20%	-14.05%	39.43%	15.45%
Coal India	0.05%	9.29%	-21.62%	24.94%	0.56%
Dr Reddy's Labs	1.59%	7.39%	-13.13%	26.13%	21.52%
Eicher Motors	0.77%	9.35%	-21.12%	26.87%	8.22%
GAIL (India)	0.00%	9.23%	-31.04%	22.33%	0.05%
Grasim Industries	1.41%	9.05%	-30.72%	20.80%	15.57%
H P C L	0.01%	9.25%	-17.11%	23.97%	0.08%
HCL Technologies	1.76%	8.43%	-18.33%	26.64%	20.82%
HDFC Bank	0.90%	7.09%	-26.81%	21.74%	12.65%
Hero Motocorp	-0.10%	9.09%	-25.09%	30.54%	-1.12%
Hind. Unilever	0.72%	6.29%	-11.42%	18.24%	11.51%
Hindalco Industries	2.07%	13.51%	-38.61%	50.35%	15.32%
I O C L	-0.22%	8.05%	-25.87%	18.55%	-2.67%
ICICI Bank	2.10%	8.92%	-34.89%	20.57%	23.59%
India bulls Housing	-3.14%	24.04%	-106.21%	52.82%	-13.06%
Indus Towers	-0.66%	12.48%	-30.48%	37.60%	-5.30%
IndusInd Bank	-0.47%	19.24%	-114.51%	38.14%	-2.46%
Infosys	1.42%	7.78%	-17.79%	31.26%	18.32%
ITC	0.74%	6.45%	-15.99%	17.19%	11.53%
JSW Steel	1.86%	12.41%	-37.95%	53.24%	14.95%
Kotak Mah. Bank	0.80%	7.94%	-20.01%	23.25%	10.03%
Larsen & Toubro	1.66%	8.29%	-31.92%	20.75%	20.03%
M & M	1.37%	10.65%	-37.65%	28.67%	12.88%
Maruti Suzuki	0.66%	8.89%	-31.75%	24.96%	7.43%

NTPC	0.89%	8.18%	-23.54%	20.16%	10.85%
O N G C	0.60%	10.03%	-25.72%	25.71%	5.97%
Power Grid Corp.	0.93%	5.79%	-13.17%	15.00%	16.03%
Reliance Industries	1.56%	8.49%	-16.17%	31.63%	18.41%
St Bk of India	1.72%	11.33%	-35.03%	38.30%	15.15%
Sun Pharma.Inds.	1.26%	8.19%	-15.11%	31.83%	15.41%
Tata Motors	2.83%	17.33%	-44.90%	51.30%	16.35%
Tata Steel	2.00%	12.38%	-29.39%	40.62%	16.20%
TCS	0.87%	6.07%	-11.93%	17.85%	14.28%
Tech Mahindra	0.77%	8.77%	-27.49%	22.67%	8.75%
Titan Company	2.48%	8.75%	-25.57%	21.16%	28.33%
UltraTech Cem.	1.00%	7.82%	-26.27%	15.46%	12.84%
UPL	1.04%	11.08%	-37.18%	34.31%	9.36%
Vedanta	-0.04%	15.04%	-56.64%	32.50%	-0.25%
Wipro	1.30%	8.30%	-19.96%	27.91%	15.61%
Yes Bank	-4.90%	21.13%	-76.19%	53.09%	-23.21%
Zee Entertainment	-1.04%	17.31%	-65.78%	56.89%	-6.03%

Graph 5 : Pareto Analysis of Portfolio 5

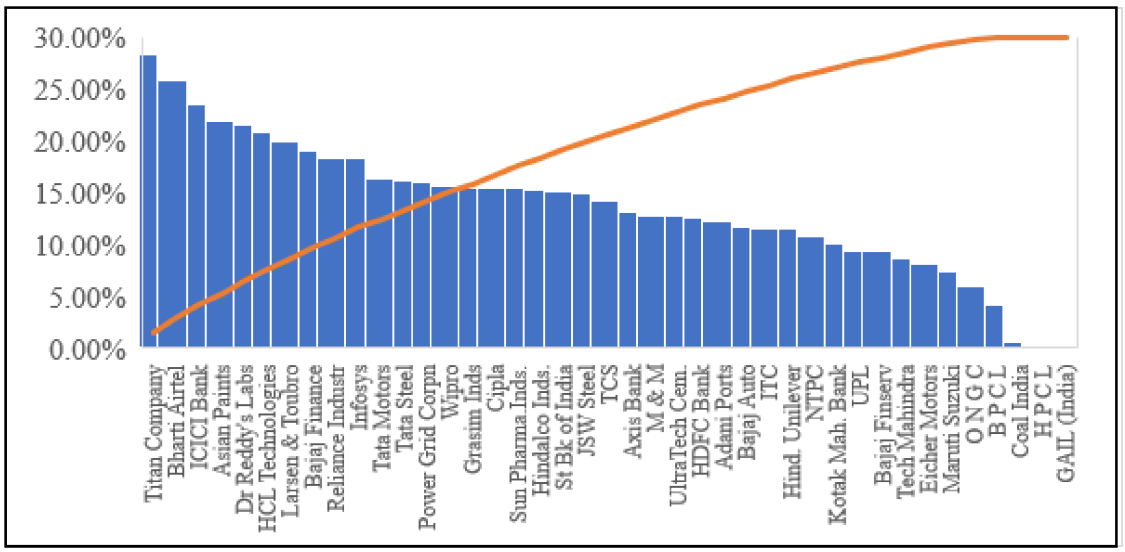

Table 6 (a) : Scenario 5 Critical Observations

	EWR	EWWR	MCAP	MCAP FF
Portfolio Return (Rp)	**1.08%**	**0.85%**	**1.04%**	**0.96%**
Portfolio Variance($\sigma_p^{\wedge 2}$)	0.30%	0.13%	0.29%	0.31%
Portfolio Risk σ_p	5.51%	3.55%	5.42%	5.57%
Sharpe Ratio (Rp/ σ_p)	19.54%	23.86%	19.17%	17.32%

Table 7 : Average Returns from Portfolios under various scenarios

	EWR	EWWR	MCAP	MCAP FF
Average Monthly Returns (Rp)	1.08%	1.32%	1.16%	1.28%
Annualized Returns	12.91%	15.80%	13.95%	15.34%

Table 8: Anova: Single Factor (Based on Sharpe Ratio (Rp/ $ó_p$)) for EWR, EWWR, MCAP, MCAP FF Portfolios

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
EWR	1	19.54%	19.5%	
EWWR	5	109.63%	21.9%	0.08%
MCAP	5	94.22%	18.8%	0.03%
MCAP FF	5	99.65%	19.9%	0.04%

ANOVA

Source of Variation	*SS*	*Df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.25%	3	0.08%	1.67	0.23	3.49
Within Groups	0.60%	12	0.05%			
Total	0.85%	15				

Analysis based on Tables 2 to Table 8

Based on Monthly data and annual data it can be observed All portfolios are giving inflation beating returns. Based on ANOVA analysis it can be observed that there was no statistically significant difference in the portfolios based on Sharpe ratio. However, EWWR was better as compared to other portfolios based on Returns and Sharpe ratio.

LIMITATIONS AND FUTURE SCOPE FOR FURTHER STUDY

The study was based on NIFTY 50 and its constituents over the last 30 years. NIFTY 50 accounts for more than 90% of the entire market capitalisation but there were other listed companies, so a similar study could be done for other broader indices, thematic indices, or sectorial indices. Nevertheless, more the constituents of the portfolio (or excessive diversification) may not lead to better return/risk benefit. This was proposed by many studies Evans and Archer (1968), Fielitz (1974), Solnik (1974), Stateman (1987). There was a systematic study by Zaimovic et al. (2021) for the period from 1952-2021 which based on 150 papers and various approaches concluded there was no fixed number of stocks or method for diversification. The study could be extended to other asset classes as well. E.g. Bonds, Commodities.

CONCLUSION AND IMPLICATIONS

Equal weight portfolio without rebalancing could be considered as a long-term investment strategy by Indian retail investors investing in domestic markets. As diversification leads to a higher Sharpe ratio as compared to most of the constituents of the portfolio and individual stock selection could be a risky and tedious process for retail investors. The stocks to invest in could be the companies which were leaders in their respective sectors over many years. Public sector undertakings, metals and commodities could be avoided as their weightage has been reduced due

to competition and/or the nature of cyclical business. These were underperformers over many years. The logic of avoiding rebalancing is holding on to the performers and maintaining their increased weights in the portfolio. The risk to this style of investing could be the failure of a large company in a few years or a short span of time. Hence the 1/N strategy could be implemented with at least 20 to maximum 50 stocks so every single failure could lead to a maximum drawdown of 5% to 2% of the original investment. The reason for 20 to 50 stocks is correlation matrix might not show significant improvement with more and more stocks being added and it could be difficult to track all of them from price movement point of view to a novice investor. If some index is replicated, then addition in the portfolio could be done based on new addition particularly if there is continuous investment or existing holdings could be trimmed in the same proportion to generate funds for the new investment. This simple strategy could lead to inflation beating returns over the long term.

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Chetana's Institute of Management & Research (CIMR)
ISSN No. 0976-0628 Volume XVI(2) pg 105-114

Journal of Management Research
Peer Reviewed Journal

Importance of HR Analytics: A Support System for Organizational Growth

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Area of the Paper : General Management
Type of the Paper : Exploratory Research
Type of Review : Peer Reviewed as per COPE guidelines
Indexed In : Proquest and EBSCO

How to Cite this Paper:

Nille N. et. al. (2024)
Importance of HR Analytics: A Support System for Organizational Growth
Journal of Management Research
XVI(2), 105-114 https://cimr.in/faculty-research.html#research-Journals

Paper Submission : 24/July/2024
Paper Publication : 30/September/2024

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ABSTRACT

HR analytics is a concept used in modern human resource management. HR analytics is the process of obtaining, analyzing, and extrapolating Human Resource (HR) data to improve worker performance inside a business. Workforce analytics, talent analytics, and even people analytics are other names for the process. HR data analytics have the potential to be revolutionary when applied to pinpoint the essential components that promote change and increase worker productivity. HR data collection, analysis, and summarization are all part of HR analytics. It is sometimes referred to as talent analytics, workforce analytics, or people analytics. It assists your organization in analyzing data to ascertain how various HR KPIs impact overall business success. It is a method that organizations use to gain a better understanding of their limits and strengths. The growth and adoption of human resource (HR) analytics have raised questions about whether HR analytics can indeed impact organizational performance. The study explores the strategic value of HR analytics, particularly how it can enhance organizational performance. It investigates the reasons, methods, and circumstances under which HR analytics contributes to this increased performance. The study highlights the role of HR analytics in promoting employment, decision-making, and production. Additionally, it aims to clarify the concept of HR analytics for business and HR leaders, aiding them in making informed decisions. It also encourages HR researchers to engage with current discussions and explore new research avenues beyond existing topics. It can be concluded by connecting with three takeaways, i.e., Strategic Value of HR Analytics that's because the study underscores the importance of HR analytics in driving organizational success and its potential for future growth. Secondly, Mechanisms of Increased Performance by HR analytics to foster employment, improve decision-making, and boost production. Last but not least, Implications for Leaders and Researchers provides actionable insights for business and HR leaders while urging HR researchers to expand their focus to new research areas.

Keywords: Importance of Human resource (HR) analytics, Organizational performance, Human resource management

1. INTRODUCTION

The global business climate demands that firms adapt to maintain a competitive edge. Building a lean business requires a mix of excellent technology and a strong staff base. However, acquiring and maintaining these resources remains a significant cost for firms. According to Snell, Stueber, and Lepak (2002), HR may leverage information technology to achieve strategic, adaptable, cost-effective, and customer-oriented goals. It can reduce administrative expenses, boost productivity, improve reaction times, make better decisions, and improve customer service simultaneously. HR analytics involves acquiring and analyzing talent data to better business outcomes. HR analytics leaders provide data-driven insights to support personnel choices, optimize workforce operations, and enhance employee experience. HR analysts discover and resolve HR issues while adhering to organizational policies and objectives. Analyse and evaluate data and reports, provide feedback to management and suggest improvements. HR analytics aims to enhance human resource operations by gathering relevant data and making educated decisions. It does not collect data on employee performance.

HR analytics, also known as people analytics, workforce analytics, or talent analytics, focuses on collecting, analyzing, and reporting HR data. It helps organizations evaluate the impact of HR indicators on business success and make informed decisions. Hervel and Bondrouk developed the most well recognized scientific definition of HR analytics. Human resource analytics is systematically identifying and quantifying human elements that impact business outcomes. Human resource management has evolved significantly during the past century. It has evolved from an operational discipline to one that is more strategic in nature. "Strategic human resource management" is a prime illustration of this. In line with this trend, HR analytics employ a data-driven strategy.

HR analytics plays a pivotal role in organizational growth by enabling data-driven decision-making that aligns human resource strategies with business objectives. By systematically analyzing workforce data, HR analytics helps organizations identify trends, optimize talent management, and enhance employee engagement. This leads to improved productivity and a more efficient allocation of resources. Moreover, HR analytics provides insights into employee performance and retention, helping to reduce turnover and ensuring that the right talent is in the right roles. It also supports strategic workforce planning by forecasting future talent needs and identifying skill gaps, which allows organizations to proactively address challenges and seize opportunities for growth. Ultimately, HR analytics empowers organizations to make informed decisions that drive sustainable growth and competitive advantage. The problems faced due to the absence of HR analytics in an organization can lead to several critical challenges that hinder overall performance and growth. Without data-driven insights, decision-making becomes largely intuitive, often resulting in inefficient resource allocation and poor talent management. This can lead to mismatches in hiring, where the wrong candidates are selected for roles, ultimately affecting productivity and employee satisfaction. Additionally, the lack of HR analytics impedes monitoring and improving employee engagement, leading to higher turnover rates and increased costs associated with recruiting and training new staff. Hence, studying and implementing effective HR Analytics in the company is vital. This research paper tries to understand the linkage between the growth prospective of companies and the importance of implementing HR Analytics for the same. In the same context, the researcher tried to elaborate on linkage by stating a few examples of effective implementation of HR analytics at companies and its benefits for the companies.

2. OBJECTIVES

- To study the concept and role of HR analytics.

- To investigate how HR Analytics is altering the growth of organizations.

3. RESEARCH METHODOLOGY

To gain insight into HR analytics, a qualitative research approach is used. This subjective research builds on previous HR Analytics research to generate fresh insights.

4. LITERATURE REVIEW

- The use of audit metrics to gauge HR effectiveness was first noted by Cascio (1987) and Fitz-enz and Davidson (2002). The Society for Human Resource Management has identified several metrics companies can use to gauge HR effectiveness (SHRM, 2010). Acknowledging that many organizations use metrics to measure or audit their HR programs and activities is crucial.

- According to Becker, Huselid, and Beatty (2009), "organizations must invest in workforce analytics wisely in order to build and sustain their competitive advantage in an increasingly competitive business world." A highly effective method for identifying and validating choices that show the motivations behind the actions and output of both people and groups is human capital analytics.

- HR analytics refers to processing significant HR-related data and documents to analyze the gathered data using business analytics models and provide the analyzed findings to decision-makers for making informed decisions (Kapoor & Sherif, 2012).

- Kirtane (2015) - HR analytics is an integrated process that helps raise the standard of people-related choices, which raises individual and organizational performance. HR analytics primarily relies on statistical techniques and analyses, which need high-quality data, well-considered goals, skilled analysts, leadership, and widespread acceptance that analytics is a valid and beneficial means of enhancing performance.

- According to Lochab et al. (2018), and Dooren (2012) A process that applies statistical methods and experimental approaches based on efficiency, effectiveness, and impact metrics to comprehend and assess the causal relationship between HR practices and organizational performance outcomes (such as customer satisfaction, sales, or profit, etc.) and to provide valid and trustworthy bases for decisions about human capital intended to influence business strategy and performance.

- In their research paper titled "The impact of performance management system on employees' performance," Muhammad Said, Dr. Imran Khan, and Dr. Filza Hameed (2021) discovered that any organization's management should modify its performance management system practices to make them more continuous. It is recommended that management evaluate and take into account the issues that employees face, recognize them, and assist the staff in addressing them as a cohesive unit. Employers should utilize acknowledgment techniques to increase employee motivation and encouragement when they feel appreciated. Employees strive to meet the necessary goals when their efforts are valued and acknowledged. Employers should encourage goal-setting among their staff members and recognize their efforts in completing tasks.

- Steven McCartney and Na Fu (2022), in their research paper entitled "Bridging the gap: Why, how and when HR Analytics Can Impact Organizational Performance," described that HR analytics is still a relatively new idea, academics are still emphasizing how HR Making decisions and achieving corporate goals can be aided by analytics. In order to promote Evidence-based Management, this study suggested a chain model wherein HR analytics are made possible by access to HR technology, which, in turn, enhances organizational performance.

- Mr. Hritik Kale, Dr. Dilip Aher, and Dr. Nilesh Anute (2023), in their research paper entitled "HR Analytics and its Impact on Organizations Performance" states that by utilizing the data that the business has accessible, analytical tools enable organizations to identify problems with performance, staff retention, and turnover, employee conduct, etc. HR managers and leaders require a great deal of help from their organizational leaders in order to carry out their roles in an efficient manner. They must first be able to thoroughly examine the issue. These concerns can stem from a variety of problems, and specialists in fields like HR Analytics, staffing and metrics, leadership development, and management changes can assist in analyzing the circumstances and offering potential solutions.

5. RESULTS & DISCUSSION

5.1 Concept

Business intelligence (BI), which is critical to the company's long-term viability, is powered by data analytics. The manufacturing, marketing, and financial industries have long been using analytics in one way or another. Several businesses are already doing excellent work in this space. Anecdotal accounts have been superseded by evidence-based reporting. The human resources department uses analytics and data analysis approaches to improve employee performance and boost return on investment (ROI). HR analytics is the term used to describe a methodical reporting strategy on a range of HR variables, including employee engagement, turnover, compensation, and time to hire. Reporting often includes benchmarking. This is undoubtedly a component of HR analytics.

The people analytics concept, sometimes called HR analytics, is not new. Data analytics, in general, and HR analytics, in particular, have long been used in enterprises in various capacities. The goal of challenging the status quo gave rise to the field of HR analytics.

Even while some businesses have employed tools and metrics like scorecards and human resource accounting, they are insufficient to provide them a competitive advantage when it comes to human capital. There is no measurement of human resources' activities, performance, or results. According to Workforce Management (formerly Personnel Journal), Jac Fitz-enz made a daring anti-establishment idea in 1978. This information was reported in 2004. Measuring human resources operations and their impact on the bottom line is essential. Individuals are doubtful, dissenting, and apathetic (Caudron, 2004).

While it did not always provide positive outcomes and prospects for many firms, measuring human resource operations and their effect did. The pioneer of human capital strategic analysis and human performance benchmarking, Dr. Jac Fitzenz, established human resource analytics in 1978. He emphasized the significance of developing metrics that could assess how HR operations affected an organization's bottom line. (Jain and Nagar (2015).

5.2 Types HR Analytics

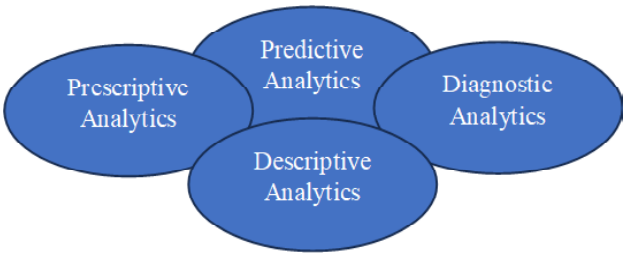

Fig: 1

❖ Predictive Analytics

These analytics employ a variety of statistical models and projections to make predictions about the future. This analysis's objective is to identify the organization's needs. Models are constructed using the patterns identified by descriptive analytics. It could be useful in estimating how long the worker will stay in the alternatively it might assist the talent acquisition team in figuring out whether the worker is a suitable cultural fit for the company.

❖ **Diagnostic Analytics**

Diagnostic analytics explains why something happened, whereas descriptive analytics explains what happened. We look for the reason behind the events rather than just what is happening. In this instance, you note anything, identify the descriptive analysis, and proceed with the diagnostic analysis.

Numerous methods are used in diagnostic analytics, such as data mining and data drilling. Companies need to know why issues are occurring in order to investigate their underlying causes and develop solutions.

❖ **Prescriptive Analytics**

What should we do now that we know what transpired, why it happened, and what could occur next? The answers to such questions are given with the help of prescriptive analytics. Prescriptive analytics uses sophisticated algorithms to forecast data and suggest relevant actions and their outcomes. Prescriptive analytics may be used to generate a customized action plan for every sales representative. Probability models that predict the possibility of closing a contract and which training sessions should be attended determine which decisions should be made on closing sales, packaging items for certain clients, and attending training sessions.

❖ **Descriptive Analytics**

Although gathering raw data is illogical and not always helpful, it may be valuable after it is processed and organized methodically. The most common kind of analysis, descriptive analysis or just observing and reporting, is most commonly employed. It compiles all accessible historical data and condenses it into a comprehensible format. Descriptive analytics would apply to the organization's headcount or a particular department. Descriptive analytics also includes more complex measures like turnover rates. Their goal is to explain the past data by analyzing it.

5.3 Organisational Growth

Organizational growth is greatly aided by human resource (HR) analytics, which uses data-driven insights to enhance a range of HR procedures and tactics. The following are some ways that HR analytics support the expansion of organizations:

Employment Acquisition and Preservation: HR analytics aids in determining the best places to find talent, evaluate recruits' Caliber, and forecast employee attrition. Organizations may enhance their hiring practices, save hiring expenses, and retain top personnel by being aware of these variables.

Management of risks and conformity: Analytics may help HR monitor whether labor laws, rules, and internal policies are followed. By proactively recognizing compliance concerns, organizations may reduce legal and reputational risks and ensure smooth operations and sustainable growth.

Cost management: HR analytics assists in the analysis of costs associated with HR, including expenditures for hiring, training, and remuneration. Organizations may maximize their HR expenditures and more wisely direct resources toward growth-promoting projects by identifying cost drivers and inefficiencies.

Strategic Decision Making with Predictive Analytics: By utilizing predictive analytics, HR may anticipate future trends in workforce dynamics, skills shortages, and organizational performance. With these insights, senior management and HR directors may make well-informed decisions that promote sustainable growth and are consistent with long-term company objectives.

Workforce Planning: HR analytics helps businesses project their future labour requirements by examining workforce demographics, skills inventories, and succession planning data. This guarantees that the correct personnel is accessible at the appropriate moment to support corporate development and strategic goals.

Globally, more firms are utilizing HR analytics software to enhance employee performance. The information that the HR department gathers gives HR managers the knowledge they need to better understand the possibilities, risks, and strengths and weaknesses of their company as well as the workers that work for them. The managers of the HR department may examine enormous amounts of data, whether structured or unstructured, and use HR Analytics to find answers to a number of important issues. This tool also assists managers in identifying issues related to worker productivity, gaps in employees' training needs, causes of high employee turnover, and future organization leaders. Due to the market's heightened competitiveness, organizations are facing several dangers. And today, a new tool known as HR Analytics may defeat these dangers. Decisions are made more on the basis of facts than on gut feeling. Currently, managers may use the information and evidence gathered by this new technology to support their choices and investments in human resources. Furthermore, HR analytics enable you to forecast future results according to the business's workforce, such as which employee will go and at when time, enabling the business to plan ahead for this shift. Therefore, HR analytics heralds a new era in human resource management that will help it overcome its most pressing problems and obstacles.

❖ **Successful Implementation of HR Analytics by Companies**

- **Royal Dutch Shell**

Although this petroleum company's original method of analyzing its abundance of data was unconventional, it is essential to note. After reviewing its database of ideas, Shell requested its staff to play several video games, which were created over several years by 1,400 people. But it wasn't regular gaming sessions. Data scientists, neuroscientists, and psychologists created these games to gauge human potential. Shell was able to determine who typically has the greatest ideas by compiling and analyzing the data from the video games and comparing it with the actual outcomes of the employee suggestions. They used their HR analytics software to do this. With the present, this means that the Shell corporation can now concentrate more on employee ideas and, as a consequence, continuously enhance their business.

- **Microsoft**

Microsoft's approach to HR analytics has evolved over time, and the company now emphasizes data-driven HR as a best practice within the organization. They also provide a line of HR analytics solutions to help their customers manage their businesses. Nevertheless, creating statistical profiles of workers who are more likely to quit their company—hires who come straight out of college, for instance—is one of Microsoft's most creative uses of HR data. Based on their

findings, they usually launch a range of HR initiatives, such matching mentors and initiating more conversations about advancement and income opportunities inside the organization, creating chances for improved workplace communication. Microsoft reduced the number of layoffs by over fifty percent in each case by concentrating their efforts on the segments of the company with the highest turnover rates. Eventually, they applied the same strategies to the other business divisions, enhancing the general working environment and organizational tactics.

- **Wal-Mart**

This US retail chain has a people analytics team that studies people analytics exclusively, and they are always seeking new insights to increase the value.

Wal-Mart primarily employs capability metrics to assist the company assess if procedures are being implemented as intended. They start analyzing the value the process adds to the company and its workers if, over time, it functions as planned. Through the use of people analytics, Wal-Mart is able to shed light on the jobs and career routes that are available to its workers, particularly with regard to talent development and capability. Better performance, more effectiveness, and higher success in almost every endeavour of the business are the results.

- **Juniper Networks**

The networking and cybersecurity solutions provider Juniper Networks is committed to pushing the boundaries in the rapidly evolving HR sector.

They employ HR analytics to keep their attention on the desired business objectives and are always challenging the conventional wisdom on HR. Furthermore, they don't hesitate to rethink or discard outdated procedures in order. As an example, although utilizing LinkedIn to assist in finding possible candidates is not new, Juniper Networks goes one step further by analyzing where top-performing workers go after leaving the firm using their big data.

Gaining knowledge of various industrial job routes is the goal in order to support Juniper's development.

- **Google**

Google has entirely reinvented HR inside their organization with the use of HR analytics. These are the most important decisions a corporation can make, thus making them is essential. Without managers making the best judgments on their staff, organizations cannot generate greater commercial results.

Although productivity measures are used by Google's HR department (formerly called People Operations) to assess performance, these indicators are only one part of the picture. Google has a unique approach to analytics. It routinely polls staff members to gauge workplace satisfaction and make continuous improvements. Using the feedback (or data), it optimizes several aspects of its people processes and matches them with its workplace culture.

Because of this, they have a high percentage of engaged workers—90% on average—which shows that they have successfully enhanced company procedures and staff morale.

6. SUGGESTIONS & CONCLUSION

❖ SUGGESTIONS

- Training requirements and talent discrepancies: Analyze present skill sets about upcoming

business demands to analyze skills gaps. Use performance indicators and data from learning management systems (LMS) to determine training requirements. Use learning analytics to monitor the success of training initiatives and gauge the acquisition of new skills. Create individualized growth programs for each employee based on analytics-identified strengths and limitations.

- **Workplace Engagement Analytics:** Examine survey results, comments from pulse surveys, and sentiment analysis from employee communications platforms by utilizing employee engagement analytics. Determine what motivates people to participate and what needs to be improved. Put analytics-driven action plans into place to improve engagement activities, including wellness initiatives, leadership development courses, or focused communication campaigns.

- **Talent Development Analytics:** Based on present skill inventories and upcoming business requirements, perform skills gap assessments using talent development analytics. Track training completion rates, skill acquisition, and training efficacy by analyzing learning management systems (LMS) data. Utilize analytics-driven individualized learning pathways to meet each person's skill gaps and career growth goals. Analyze training programs' return on investment (ROI) to ensure they correspond with company objectives.

- **Performance Management & Retention Analytics:** Track target achievement rates, performance review ratings, and key performance indicators (KPIs) by implementing performance management analytics. Analyze performance data to find anomalies and patterns. Utilize predictive analytics to identify high achievers and anticipate performance trends. By giving immediate feedback, establishing SMART (Specific, Measurable, Achievable, Relevant, Time-bound) goals, and connecting personal aims to overarching company objectives, performance management procedures may be made better. Use retention analytics to examine engagement survey findings, exit interview comments, and turnover statistics. Create retention models and identify flight risk indicators using predictive analytics. Apply focused retention tactics based on analytics data, such as enhanced work-life balance programs, competitive pay changes, or professional development possibilities.

CONCLUSION

These days, companies everywhere are concentrated on making the best use of the extremely few resources at their disposal. Additionally, as human resources are the most valuable asset of any firm, the primary focus is on making the best use of them. In addition to providing reliable information that helps firms make the best HR decisions, HR analytics also encourages them to have sufficient, high-quality data on hand to support their HR expenditures. Through the creation of a network that views them more as strategic partners inside the company than as just employees, HR analytics has assisted employees in improving their performance. As a result, HR analytics is revolutionizing HRM and playing a crucial role in accomplishing corporate objectives. In order to fully utilize this new technology—HR Analytics—centralized data holding also requires an encompassing and modern IT infrastructure.

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Chetana's Institute of Management & Research (CIMR)
ISSN No. 0976-0628 Volume XVI(2) pg 115-125

Journal of Management Research
Peer Reviewed Journal

The Impact of Digital and Traditional Marketing Integration on Guerrilla Marketing Effectiveness

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Area of the Paper : General Management
Type of the Paper : Exploratory Research
Type of Review : Peer Reviewed as per COPE guidelines
Indexed In : Proquest and EBSCO

How to Cite this Paper:

K. Santhosh Kumar (2024)
The Impact of Digital and Tradiditonal Marketing Integration on Guerrilla Marketing Effeciveness
Journal of Management Research
XVI(2), 115-125 https://cimr.in/faculty-research.html#research-Journals

Paper Submission : 15/July/2024
Paper Publication : 30/September/2024

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ABSTRACT

This research explores the efficacy of guerrilla marketing strategies by integrating both digital and traditional approaches. Guerrilla marketing characterized by unconventional and cost-effective tactics aims to engage consumers through unexpected and memorable experiences. The research employs a descriptive methodology, combining primary survey data from 250 respondents in Kerala with secondary sources to analyze the effect of digital marketing strategies (DMS) and traditional marketing strategies (TMS) on guerrilla marketing effectiveness. Results from regression and correlation analyses highlight significant positive associations between DMS, TMS, and the effectiveness of guerrilla marketing campaigns. The findings underscore the importance of integrating diverse marketing tactics to enhance consumer engagement, brand awareness, and overall marketing success in competitive markets.

Keywords: Guerrilla Marketing, Digital Marketing Strategies, Traditional Marketing Strategies, Regression and Correlation Analyses

INTRODUCTION

The term "guerrilla" is derived from the Spanish word "guerra," meaning "small scale war" or "partisan warfare." It is a term used in military terminology. Such warfare's primary goal is to strategically debilitate the adversary in particular domains. When this concept is applied to marketing, it leads to a variety of interpretations and opinions regarding its implementation and purpose. Unconventional approach is the prime feature of guerrilla marketing. It is the use nontraditional techniques to attain traditional goals. Guerrilla marketing includes the promotion of a product/service in a way that the consumer is unaware that they are being marketed. It's a form of covert marketing, and his approach is more entertaining and economical than conventional approaches. This is a clever marketing tactic that gently targets customers. Discussion boards are one way that guerilla marketing can happen. Positive or negative remarks can generate buzz. Companies largely used social media to promote their products through notifications and advertisements. Movies, web series, and TV shows were serve as effective tools for guerrilla marketing, where products are discreetly placed within the program, capturing the audience's attention of the product in their minds. So it is a marketing technique that deviated from the usual path, exploring latest and nontraditional opportunities for market growth.

Guerrilla marketing has gained widespread acceptance in recent years because of its low implementation cost and the ability to reach customers by word-of-mouth. The popularity of social media platforms, virtual reality programs, TV shows, and the amount of time individuals spend watching movies and web series online have all contributed to a major increase in guerilla marketing. The increasing acceptance of fan clubs and the public's interest in technology are the most important factors driving the expansion of this marketing tactic. The analysis makes it clear that guerilla marketing makes use of these developments to craft memorable and compelling campaigns that draw in viewers and engage them in fresh ways. Guerrilla marketing is different from traditional marketing strategies because of its innovative nature that makes it an effective tool for companies to get an impressive advantage in a competitive environment.

The intention of the present research is to evaluate the efficiency of guerilla marketing and how it reaches and initiate consumers to make purchases. It takes into consider various traditional and digital guerilla marketing strategies and analyses how they affect customers' emotions. it evaluates impact of traditional and digital marketing methods on the effectiveness of guerrilla marketing strategy.

REVIEW OF LITERATURE

Guerrilla marketing is a cost-effective advertising technique that uses unconventional and unconventional approaches. Guerrilla marketing seeks to enhance engagement through methods such as viral campaigns, experiential strategies, creative stunts, visual storytelling, and environmental marketing. Its potential and advantages are not fully understood, but it delivers tangible results with reduced expenses (Zarco, C., Herzallah, D.,2023). Guerrilla marketing creates trust by interacting with customers on an emotional way and promoting natural dialogue about the brand. This personal approach improves the customer's experience and makes it more likely that they would tell others about their positive experiences, which raises the campaign's efficacy and reach without adding a significant amount of investement (Levinson, J. C., & Horowitz, S., 2016).

Marketers have employed guerilla marketing as a tactical method to draw in new consumer segments to the stores and showrooms of major corporations. This cutting-edge approach draws in clients and aids in marketers' navigation of the disarray of conventional marketing resources (Sandberg, P., & Stierna, H. 2006). Guerilla marketing tactics usually highlight the product's unique features rather than merely its core attributes. Products that are marketed in this clandestine manner typically boast state-of-the-art features or are regarded as high-end items with the most recent technology (Baltes, G., & Leibing, I. 2008). By highlighting the unique and innovative aspects of these products, guerilla marketing piques the interest and excitement of potential customers. This approach positions the products as premium choices in the market and helps them stand out from competitors. Guerrilla marketing is therefore a helpful technique for emphasizing the intricate aspects of goods and drawing in a discerning customer base that values originality and inventiveness (Levinson, J. C., & Horowitz, S. (2010).

Guerrilla marketing is an innovative and unconventional marketing strategy designed to capture the attention of consumers in unique and memorable ways. Unlike traditional marketing approaches that rely heavily on large budgets and extensive advertising campaigns, Guerrilla marketing uses low-cost strategies to maximize exposure for a product or service(Varma, H. D., Sudarshan, S., & Neglur, I. 2023). By utilizing unexpected and often low-cost tactics, such as flash mobs, viral videos, street art, and social media campaigns, guerrilla marketing makes a strong emotional attachment with the audience (Grant, P.2014). The effectiveness of guerrilla marketing is attributed to the innovative and creative ideas employed by business owners. As a nonconventional marketing

strategy, guerrilla marketing positively impacts the brand awareness and affects customer purchasing decisions (Azhar, R. M. (2022).The element of surprise and the personal touch inherent in guerrilla marketing make it a powerful tool for building brand awareness and loyalty. It has a substantial influence on buying actions, purchase motivation, and brand sentiment. (Alsheikh, Layla. 2024).

The importance of guerrilla marketing lies in its ability to reach and resonate with target audiences in ways that traditional marketing often cannot. In an era where consumers are increasingly skeptical of overt advertising and inundated with marketing messages, guerrilla marketing offers a refreshing alternative that feels more authentic and engaging (Nufer, G. 2013). By tapping into the emotions and everyday experiences of consumers, guerrilla marketing campaigns can create lasting impressions that drive brand recognition and influence purchasing decisions (Gökerik, M., Gürbüz, A., Erkan, I., Mogaji, E., & Sap, S. 2018). It emphasizes creativity and long-term impact on consumers by employing innovative ideas which is very cost effective (Gupta, H., & Singh, S. 2016).

Effective strategies in guerrilla marketing often involve a combination of traditional and digital methods to create a multifaceted approach that maximizes audience engagement and reach (Barnwell, R. G. 2018). Traditional guerrilla marketing techniques include tactics like street performances, flash mobs, and graffiti art. These methods capitalize on the element of surprise and direct interaction to capture the public's attention in high-traffic areas (Cova, B., & Saucet, M.2014). These physical engagements are highly effective in creating memorable experiences that linger in the minds of consumers, leading to word-of-mouth promotion and increased brand recall (Roux, T., & Saucet, M.2020). The direct, face-to-face nature of these interactions fosters a personal connection with the audience, making the marketing message more impactful and authentic (Williams, A., & Mullin, R. 2009).

Conversely, digital guerrilla marketing strategies harness the capabilities of the internet and social media to enhance the effectiveness of conventional tactics.Techniques such as viral videos, hashtag campaigns, influencer partnerships, and interactive online content can extend the reach of guerrilla marketing efforts far beyond their physical locations (Hammad, A. A. (2021). These digital strategies are highly effective because they allow for rapid dissemination of the marketing message, engage a broader audience, and provide measurable results through analytics. By integrating traditional and digital guerrilla marketing strategies, brands can create a cohesive and powerful campaign that captures attention, engages audiences, and drives both online and offline conversations, ultimately leading to increased brand awareness and customer loyalty(Kumar K, Santhosh & Thomas, K. 2023).

It is evident from existing research that integrating digital and traditional marketing strategies significantly enhances the effectiveness of guerrilla marketing campaigns (Levinson, J. C.2011). Combining traditional and digital methods can help marketers generate broad awareness and drive consumers to the digital experience (Gkarane, S., Efstratios-Marinos, L., Vassiliadis, C. A., & Vassiliadis, Y. 2019). There is a need for deeper investigation into the specific mechanisms through which these digital and traditional marketing techniques interact synergistically to enhance guerrilla marketing effectiveness (Hæreid, M. B., & Indregård, S.2015). Given the rapid evolution of digital technologies and shifts in consumer behavior, future studies could explore the temporal aspects of guerrilla marketing effectiveness, examining how these strategies evolve over time to influence consumer engagement, brand loyalty, and ultimately, economic growth. Additionally, there is a possible research gap in exploring the cultural and contextual elements that affect the adoption and modification of guerrilla marketing tactics in various regions or market segments. Such insights could provide valuable guidance for marketers aiming to optimize guerrilla marketing

strategies in diverse cultural settings and enhance their overall effectiveness

OBJECTIVES OF THE STUDY

- To study the impact of Digital Marketing Strategies (DMS) on the Effectiveness of Guerrilla Marketing (EGM)
- To study the impact of Traditional Marketing Strategies (TMS) on the Effectiveness of Guerrilla Marketing (EGM)

HYPOTHESES OF THE STUDY

- H_{01}**:** There is no relationship between Digital Marketing Strategies (DMS) and Effectiveness of Guerrilla Marketing (EGM)
- H_{02}**:** There is no relationship between Traditional Marketing Strategies (TMS), and Effectiveness of Guerrilla Marketing (EGM)

RESEARCH METHODOLOGY

The research is a descriptive one. Data were gathered from both primary and secondary sources. Primary data were obtained through surveys conducted with a questionnaire, targeting 250 respondents in Kerala. Secondary data were sourced from various journals, magazines, and websites. The data were analyzed using the SPSS software package. The study applied Kolmogorov-Smirnov Test to assess the normality, Regression Analysis and Correlation tests to analyse the relationship between variables (Lilliefors, H. W.1967). The study also included Model Fitting Information, where chi-square test compared the Intercept Only model and the Final model, highlighting the significance of DMS and TMS as predictors.

Table 1: Demographic profile of the respondents

Gender	No	%	Age group	No	%
Male	148	59.2	<25	93	37.2
Female	102	40.8	26–40	122	48.8
Others	0	0.0	40<	35	14.0
Education	**No**	**%**	**Employment Status**	**No**	**%**
Bachelor's Degree	114	45.6	Students	119	47.6
Postgraduate Degree	95	38.0	Self Employed	53	21.2
Others	41	16.4	Professionals	78	31.2

ANALYSIS AND DISCUSSION

The study assessed the effectiveness of Guerrilla Marketing as the dependent variable, which was determined using two factors: Digital Marketing Strategies and Traditional Marketing Strategies as independent variables. To examine the effect of these independent variables on the dependent variable, the study employed the following regression model. The fitted model is outlined below:

$Y = \beta 0 + \beta_1 X_1 + \beta_2 X_2 + !$
X_1 = Digital Marketing Strategies (DMS)
X_2 = Traditional Marketing Strategies (TMS)

To analyze each variable, transformations were applied, involving calculating the mean, checking for normality, and conducting regression analysis.

Table 2: Kolmogorov-Smirnov Test

	Kolmogorov-Smirnov[a]		
	Statistic	**df**	**Sig.**
Log DMS(Digital Marketing Strategies)	0.152	250	.000
log_TMS(Traditional Marketing Strategies)	0.172	250	.000
log_EGM(Effectiveness of Guerrilla Marketing)	0.171	250	.000

The study employed the Kolmogorov-Smirnov test to assess the normality of the log-transformed variables: Effectiveness of Guerrilla Marketing, Traditional Marketing Strategies, and Digital Marketing Strategies. The results indicated significant deviations from normal distribution for all variables ($p < .001$), highlighting that these data do not adhere to the assumption required for parametric tests (Drezner, Z., Turel, O., & Zerom, D. 2010). This suggests caution in interpreting findings from regression analysis or other parametric methods without addressing these non-normal distributions. To mitigate this, the study recommended employing non-parametric methods or exploring further transformations to accurately analyze the relationships among these variables and derive meaningful insights (Roberts, S. J.1997). This approach ensures robustness in statistical analysis, particularly in contexts where normality assumptions are not met.

Table 3: Model Fitting Information

Model	**-2 Log Likelihood**	**Chi-Square**	**df**	**Sig.**
Intercept Only	829.345			
Final	628.775	102.890	2	.000

Table 3 presents model fitting information for two models: the Intercept Only model and the Final model. The Intercept Only model, which includes only the intercept without any predictors, yielded a -2 Log Likelihood of 829.345. In contrast, the Final model, which includes predictors such as Digital Marketing Strategies and Traditional Marketing Strategies, notably enhanced the model fit, as indicated by a lower -2 Log Likelihood of 628.775. The chi-square test statistic of 102.890 with 2 degrees of freedom was highly significant ($p < .001$), suggesting that the Final model explains a significant amount of variance in the dependent variable, Effectiveness of Guerrilla Marketing (Agresti, A.2018). This finding underscores the importance of including Digital and Traditional Marketing Strategies as predictors in the model, highlighting their substantial contributions to explaining and predicting the effectiveness of guerrilla marketing strategies.

Table 4: Goodness-of-Fit

	Chi-Square	df	Sig.
Pearson	4216.879	714	.661
Deviance	512.698	714	.889
Link function: Logit.			

Table 4 presents the goodness-of-fit statistics for a logistic regression model using a logit link function. The Chi-Square (Pearson) test resulted in a statistic of 4216.879 with 714 degrees of freedom and a p-value of .661, which is not statistically significant, suggesting a strong alignment between the observed and expected frequencies. Similarly, the Deviance statistic, at 512.698 with 714 degrees of freedom and a non-significant p-value of .889, also suggests a good fit of the model to the data (McCullagh, P. 2019). These findings indicate that the logistic regression

model employing the logit link function effectively captures the relationship between the predictor variables and the binary outcome variable, with no significant issues regarding fit detected. (Kleinbaum, D. G., & Klein, M.2010).

The Pseudo R-Square values—Cox and Snell's (0.549), Nagelkerke's (0.514), and McFadden's (0.235) provides insights into the extent to which the model explains the variability in the dependent variable.

Table 5: Pseudo R-Square

	R-Square Value
Cox and Snell	.549
Nagelkerke	.514
McFadden	.235

Higher R-Square values indicate a stronger fit of the model to the data (Field, A.2024). Cox and Snell's and Nagelkerke's values indicate that around 54% of the variability in the dependent variable is accounted for by the independent variables in the model, demonstrating a moderate to strong adequacy of fit. Although McFadden's R-Square typically yields lower values compared to other measures, its value of 0.235 still signifies a meaningful proportion of explained variance. Collectively, these results demonstrate that the model successfully accounts for a substantial portion of the variability seen in the dependent variable. (Peng, C. Y. J., Lee, K. L., & Ingersoll, G. M.2002).

Ordinal regression coefficient analysis evaluates the impact of changes in independent variables on the probability of reaching higher categories within the dependent variable, measured in terms of log odds (Long, J. S. 2014). A positive coefficient signifies that an increase in the independent variable is linked to higher log odds of attaining a greater category in the dependent variable. In contrast, a negative coefficient implies that an increase in the independent variable reduces the chances of reaching a higher category. (Menard, S.2000). In this study, Digital Marketing Strategies (DMS) and Traditional Marketing Strategies (TMS) emerged as significant positive predictors of Effectiveness of Guerrilla Marketing (EGM). Specifically, each unit increase in DMS is projected to increase the log odds of achieving higher levels of EGM by 1.810 units, while each unit increase in TMS is projected to increase the log odds by 1.220 units. These findings suggest that higher levels of both digital and traditional marketing strategies are linked to greater effectiveness in Guerrilla Marketing, underscoring their positive impact on achieving desired outcomes in this context.

Ordinal regression coefficient analysis examines how variations in independent variables affect the probability of reaching higher levels on the dependent variable, expressed in terms of log odds. (Long, J. S. 2014). A positive coefficient suggests that an increase in the independent variable correlates with a greater log odds of achieving a higher category in the dependent variable. Conversely

a negative coefficient indicates that an increase in the independent variable reduces the probability of attaining a higher category on the dependent variable (Menard, S.2000). In this study, Digital Marketing Strategies (DMS) and Traditional Marketing Strategies (TMS) emerged as significant positive predictors of Effectiveness of Guerrilla Marketing (EGM). Specifically, each unit increase in DMS is projected to increase the log odds of achieving higher levels of EGM by 1.810 units, while each unit increase in TMS is projected to increase the log odds by 1.220 units. These findings suggest that higher levels of both digital and traditional marketing strategies are linked

Table 6: Parameter Estimates

		Estimate	Std. Error	Wald	df	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
Threshold	[EGM = 2.26]	4.881	1.013	14.103	1	.000	2.414	7.222
	[EGM = 2.54]	5.324	1.021	22.305	1	.000	3.315	7.457
	[EGM = 2.78]	5.889	1.025	36.793	1	.000	4.165	8.346
	[EGM = 2.91]	6.624	1.047	41.125	1	.000	4.876	8.883
	[EGM = 3.08]	8.878	1.082	66.878	1	.000	6.874	10.788
	[EGM = 3.20]	9.358	1.066	71.369	1	.000	7.357	11.441
	[EGM = 3.45]	9.984	1.128	77.228	1	.000	7.847	12.374
	[EGM = 3.66]	10.479	1.154	81.154	1	.000	8.180	12.789
	[EGM = 3.88]	11.338	1.122	86.451	1	.000	8.847	13.651
	[EGM = 4.00]	12.157	1.323	93.572	1	.000	9.365	14.653
	[EGM = 4.28]	12.878	1.214	98.087	1	.000	10.228	15.470
	[EGM = 4.40]	13.645	1.388	101.014	1	.000	10.678	16.227
	[EGM = 4.65]	14.546	1.415	107.416	1	.000	11.714	17.687
	[EGM = 4.80]	15.222	1.487	108.115	1	.000	12.358	17.862
Location	DTM	1.810	.366	23.28	1	.000	.851	2.418
	TMS	1.220	.352	15.154	1	.000	.577	1.873
Link function: Logit.								

to greater effectiveness in Guerrilla Marketing, underscoring their positive impact on achieving desired outcomes in this context.

Correlation analysis was performed to explore the connections among the independent variables, Digital Marketing Strategies (DMS) and Traditional Marketing Strategies (TMS), and the dependent variable Effectiveness of Guerrilla Marketing (EGM). Spearman's correlation coefficient was selected due to the non-normal distribution of the dataset, ensuring robustness in the analysis. Following hypotheses were formulated to assess whether significant correlations exist among these variables.

H_{01}: There is no relationship between Digital Marketing Strategies (DMS) and Effectiveness of Guerrilla Marketing (EGM)

H_{02}: There is no relationship between Traditional Marketing Strategies (TMS), and Effectiveness of Guerrilla Marketing (EGM)

Table 7: Correlations

			EGM	DMS	TMS
Spearman's rho	EGM	Correlation Coefficient	1.000	.721**	.682**
		Sig. (2-tailed)	.	.000	.000
		N	150	150	150
	DMS	Correlation Coefficient	.721**	1.000	.753**
		Sig. (2-tailed)	.000	.	.000
		N	150	150	150
	TMS	Correlation Coefficient	.682**	.753**	1.000
		Sig. (2-tailed)	.000	.000	.
		N	150	150	150
**. Correlation is significant at the 0.01 level (2-tailed).					

Table 7 presents Spearman's rho correlation coefficients between Effectiveness of Guerrilla Marketing (EGM), Digital Marketing Strategies (DMS), and Traditional Marketing Strategies (TMS). The correlations reveal strong positive relationships among all variables: EGM is highly correlated with both DMS ($r = 0.721$, $p < 0.01$) and TMS ($r = 0.682$, $p < 0.01$), indicating that higher levels of digital and traditional marketing strategies tend to correspond with greater effectiveness in Guerrilla Marketing. Moreover, DMS and TMS also exhibit a strong positive correlation ($r = 0.753$, $p < 0.01$), suggesting that organizations employing robust digital strategies are also likely to implement effective traditional marketing approaches. These findings underscore the interconnectedness of marketing strategies in influencing the effectiveness of Guerrilla Marketing initiatives, highlighting the importance of integrated marketing efforts in achieving desired outcomes.

It is evident from the analysis that both Digital Marketing Strategies (DMS) and Traditional Marketing Strategies (TMS) significantly influence the Effectiveness of Guerrilla Marketing (EGM). The regression analysis revealed positive associations between increases in DMS and TMS and higher levels of EGM, where each unit increase in these strategies corresponded to substantial improvements in achieving better outcomes in Guerrilla Marketing. Additionally, strong positive correlations among EGM, DMS, and TMS were highlighted in the correlation analysis, illustrating their interconnected roles in shaping marketing effectiveness. These findings emphasize the critical role of integrating digital and traditional marketing strategies to optimize Guerrilla Marketing initiatives, offering valuable insights for enhancing marketing approaches and achieving desired outcomes effectively.

CONCLUSION

Integrating digital and traditional marketing strategies enhances the effectiveness of guerrilla marketing initiatives. The research demonstrates that combining digital marketing strategies (DMS) with traditional marketing strategies (TMS) enhances the impact of guerrilla marketing campaigns. Both DMS and TMS are positively correlated with higher levels of effectiveness in guerrilla marketing campaigns, indicating that organizations benefit from integrating diverse marketing tactics to engage consumers effectively. Regression and correlation analyses provide strong evidence that embracing innovative and integrated marketing strategies is crucial for achieving competitive advantage in today's dynamic marketplace. By understanding and harnessing the synergies between digital and traditional marketing, businesses can optimize guerrilla marketing efforts to foster consumer engagement, strengthen brand loyalty, and drive impactful marketing outcomes.

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