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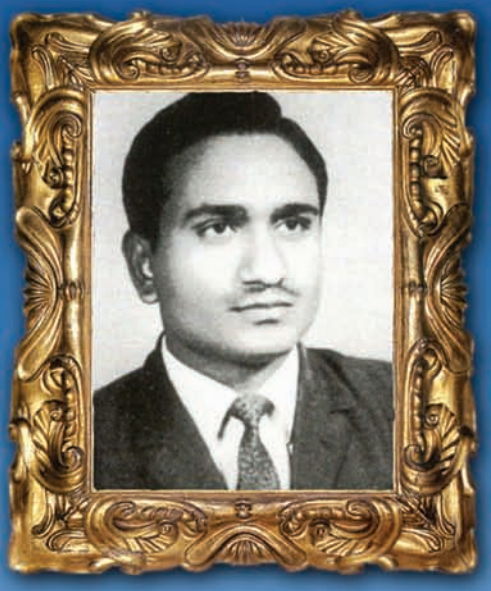
A TRUE VISIONARY

"You see things and you say **Why***? But I dream of things that never were and say* **Why** *not?"*

- George Bernard Shaw



Shri Jagannath Gupta
(1950 - 1980)

Also a true visionary...who dared to dream!
He lives no more but his dreams live on....and on!

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And more dreams to come!

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Editor's Desk

Navigating Change: Technology, Leadership, and Economic Dynamics

In an era where the only constant is change, the interplay between technology, leadership, and economic dynamics has emerged as the defining force shaping our professional, societal, and personal landscapes. Today, we are not merely witnesses to change—we are active participants in a fast-moving, interconnected ecosystem where decisions made in boardrooms, laboratories, and policy circles ripple instantly across continents.

Technology continues to redefine the boundaries of possibility. From artificial intelligence and blockchain to green energy solutions and advanced manufacturing, disruptive innovations are transforming industries at an unprecedented pace. Yet, technology alone cannot guarantee progress. The ability to harness these tools effectively depends on visionary leadership—leaders who can anticipate change, inspire teams, and create adaptive, resilient organizations that thrive amid uncertainty.

Economic dynamics further complicate this picture. Geopolitical shifts, climate imperatives, and fluctuating markets demand strategies that balance agility with long-term sustainability. Businesses, governments, and academic institutions must collaborate in fostering innovation while ensuring inclusivity and equitable growth. This requires an acute awareness of how technological adoption and leadership decisions influence economic patterns—from global supply chains to local employment landscapes.

As we navigate the complex currents of change, one lesson stands out: adaptability is no longer a competitive advantage—it is a survival imperative. The convergence of technology, leadership, and economic dynamics will continue to test our ingenuity, ethics, and resolve. It is our hope that the research presented here not only deepens understanding but also inspires our readers to lead with foresight, innovate with responsibility, and act with purpose.

Prof. Ram Kumar Mishra

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EMPLOYEES' PERCEPTIONS AND PREFERENCES FOR METAVERSE IN THE WORKPLACE: EVIDENCE FROM AN INDIAN IT FIRM

Prof. (Dr.) Seema Singh*
Dr. Muhammadriyaj Faniband**
Ms. Mayura Pathak***

The adoption of Metaverse technology is evolving as a strategic initiative in Indian IT firms as it will enable engaged collaboration, innovative service delivery, and enhanced customer engagement, while positioning this industry at the cutting edge of digital transformation. The paper addresses an unanswered question: Can the Metaverse be introduced in Indian Industries in general, and the Indian IT industry in particular? In this context, this study explores the employees' perception and preferences for Metaverse adoption in the workplace with reference to an Indian IT firm. We follow the quantitative research approach to determine employees' willingness to use the Metaverse to do work. With a structured questionnaire, we gather the data from the employees working in a reputed Indian IT firm in a Hybrid mode. Our study comes up with interesting results. We find that the majority of respondents are ready to opt for Metaverse for various work environments, namely, talent selection and retention, team collaboration and enhanced communication, employee engagement, training and development, performance management, and wellbeing and stress management. Based on our findings, we strongly recommend that the IT companies' policymakers consider introducing the Metaverse for work-related aspects.

Keywords : *Metaverse, Virtual Universe, Perception, Hybrid Mode, IT Industry, India*
JEL Code: *M15, O33, J24*

I. Introduction

India is a fast-developing country and has been the IT hub of the world for decades. It is undergoing a significant digital transformation and has unlimited possibilities and tremendous potential to harness the latest technologies for social and economic development (Narayanan & Ramaswamy, 2022). Keeping this point in mind, the biggest Indian tech giants, such as Tata Consultancy Services, Infosys, Wipro, etc., are treating this as an opportunity and are investing their resources into Virtual Universe (VU) technologies, also known as Metaverse. Meta means 'more comprehensive' or 'transcending'; the word universe means a fantasy, an artificial environment linked to the physical world. The origin of the Metaverse is found in the novel "Snow Crash," by Neal Stephenson. Figure 1 shows the Metaverse development over a period of time. The Metaverse concept has seven terminologies: Artificial Intelligence (AI), IoT, blockchain, Brain Computer Interface, 3D Modelling, Spatial Edge Computing, and Extended Reality. It further gained popularity when Facebook changed its name to "Meta." VU is a very new technology and can revolutionize various business functions (Marabelli & Lirio, 2024). It is tough to forecast what our digital future will be, what will be the next revolution in the digital era, and how it is going to impact our day-to-day living. The researchers are continuously thinking about the Metaverse as the solution for the same. In a report published by Outlook Business (July 2022), India stands fifth in the list of countries driving the Metaverse. In this context, it is extremely important that Indian organisations should grab this opportunity backed by skilled employees and the relevant infrastructure.

COVID–19 has opened the doors of the Metaverse for

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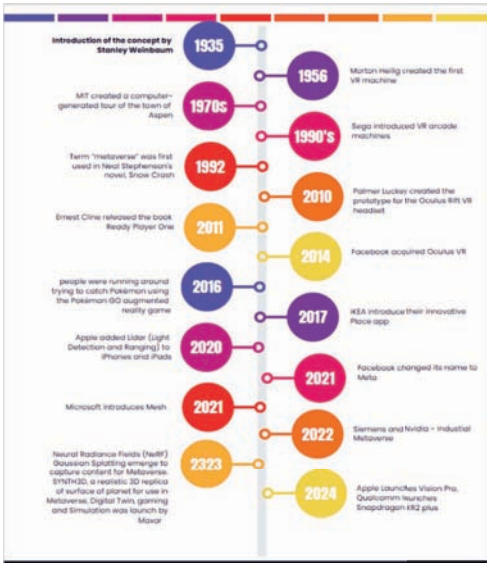
business applications, such as creating virtual work environments as hybrid and remote workspaces, which have changed the belief set across all industrial sectors. Metaverse introduction will help provide businesses with collaborative and cost-efficient solutions (Calderón-Fajardo et al., 2024). As per the report published by Deloitte[1] India has the capability of becoming the 3rd biggest economy by 2030 because of its digitally connected young population, which is ready for the metaverse.

There has been a lot of research in the area of Metaverse '(Aydın & Karaarslan, 2023; Dhingra, 2024; Dwivedi et al., 2022; Knox, 2022; Polyviou & Pappas, 2023; Rashid, 2024; Ritterbusch & Teichmann, 2023). These studies emphasize the embarrassing virtual environments as a contemporary tool for traditional workplaces; organizations can create a more vibrant, connected, and fulfilling experience for their employees in the post-COVID-19 era. It is evident that Metaverse research is mainly done in developed countries, and less focus has been given to developing countries. Previous studies have been carried out mainly using systematic literature review or bibliometric research. However, the possibility of Metaverse adoption in the Indian IT industry has not been investigated by past studies. Therefore, this study fills this research gap.

The above scenario motivated us to address an unanswered question: Can the Metaverse be introduced in Indian Industries in general, and the Indian IT industry in particular? In this context, we investigate the possibility of introducing Metaverse in the Indian IT industry because, according to the Strategic Review 2024[2] published by Nasscom, the IT industry in India is projected to generate US$254 billion in revenue in the financial year 2024, as GenAI and emerging technologies are poised to fuel growth.

Our research contributes to the existing literature in various ways. First, to the best of our knowledge, this is the first attempt to investigate the possibility of the Metaverse's introduction in the Indian IT sector. Second, our result will be helpful to the policy makers of Indian IT firms to make informed decisions about introducing various Metaverse applications for work-related activities.

The remaining paper is structured as follows. Section 2 reviews the previous studies. Section 3 covers data and methodology. Section 4 provides results and discussion. Section 5 concludes the paper.



Source: Compiled by the researchers

Figure 1: Metaverse Timeline

II. Literature review

This section covers an extensive review of various aspects of the Metaverse, such as the inception of the Metaverse, various enabling technologies of the Metaverse, and its applications in various sectors.

2.1 Work from Home & Hybrid workplace:

(Chanana & Sangeeta, 2021) suggested that the COVID–19 pandemic and Work from Home have put forth some challenges, such as the absence of organisational climate, which leads to work–life conflict, or not feeling engaged with the team. They have used the secondary data collection method to gather the information. They have suggested that the companies must adopt innovative and creative engagement practices to keep employees motivated, inspired, dedicated, satisfied, and blissful. "(Oppong Peprah, 2024) suggested that many service organisations are still operating in a hybrid workplace even after COVID–19 restrictions are over. The study was done using qualitative and quantitative data collected from professional service organisations from Africa. They observe that organisations are not so successful in terms of team management and learning while working in hybrid mode. According to Burnett & Lisk (2019), it is high time organisations should rethink innovative ways to

[1] Please refer to https://www2.deloitte.com/in/en/pages/technology-media-and-telecommunications/articles/the-metaverse-in-asia.html

[2] Please refer to Information Technology Industry Outlook: nasscom Strategic Review 2024

measure employee engagement; moreover, how digital tools can be implemented to increase job productivity, employee retention, and overall job satisfaction. (Naqshbandi et al., 2024) in their study explain that work on Hybrid Mode positively affects work performance. The research was conducted on 277 employees working in Nigerian universities. A review paper by De-La-calle-durán & Rodríguez-Sánchez, (2021) reveals that effective communication, work transparency, work recognition, growth opportunities, and, most importantly, employee well-being are the key concerns during the COVID-19 pandemic. They stated that these challenges require an innovative and out-of-the-box approach. They have also suggested a model to boost employee engagement and well-being.

2.2 Virtual Universe / Metaverse - an Innovative Way Forward

"–(Mehta, 2024) find that the metaverse can be a helpful tool to strike a balance while working in a hybrid mode. (Ritterbusch & Teichmann, 2023) discuss important features of Metaverse using literature review, where they found 28 definitions/descriptions based on which they presented 2 definitions, the first one is more focused on the Metaverse environment where users communicate with one another in a virtual universe using avatars, the digital world, which is disengaged from the physical world. The second one is more dependent on current technological development and its applicability. They also discussed important prerequisites for the successful deployment of the Metaverse.

2.3 Enabling Technologies of Metaverse

To provide theoretical grounding, this paper is grounded in the Technology Acceptance Model, the Unified Theory of Acceptance and Use of Technology (Davis, 1989; Venkatesh et al., 2003, 2012; Venkatesh & Davis, 2000). These approaches highlight that perceived benefit, simplicity of use, social impact and facilitating conditions affect patterns of technology adoption. Anchoring these theoretical insights, this paper interprets employee preferences toward Metaverse adoption in the workplace. (Lee et al., 2021) propose a plan for the development of the metaverse using 8 enabling technologies (Cloud computing, AI, Blockchain, IoT, Extended reality, Computer vision, User interactivity, future mobile networks) and 6 factors: creation of the content, digital avatar, digital economy, data privacy and security, trust and social recognition, and accountability. (Menon et al., 2023) provides an overview of digital twin technology, its evaluation, why it became so popular, and applications, along with the advantages and disadvantages of using them. '(Huynh-The et al., 2023) provide an overview of the applications of blockchain for the metaverse, along with the inspirations behind its use. They also discuss the challenges of the metaverse and then how blockchain can help. (Dwivedi et al., 2022) acknowledge possible use of the metaverse to extend the real world using augmented reality (AR) and virtual reality (VR), which will allow users, using holograms and avatars, to communicate effortlessly within real and simulated environments. They also suggest that this will be transformational to see that the distinct lines getting somewhat blurred between the virtual and real universe.

2.4 Use of Metaverse technologies in various sectors

(Šímová et al., 2024) highlight the potential use of the metaverse in the workplace. They suggest that to enhance collaboration and creativity, organizations can use the metaverse for employee satisfaction and increased productivity in the workplace. They also specify the use of immersive environments and avatars for employee training. A review paper by Dhingra & Abhishek (2024) states that the metaverse adoption in education, health, entertainment & tourism sectors is affected by various factors. They also reveal that China and the USA have the highest publications in the field of Metaverse. (Farooq et al., 2023) provided a gist about the latest happenings in the Metaverse technologies, along with an overview of possible applications of the technology in various business domains. They also discussed various opportunities and challenges that the Metaverse might face during the development and implementation phase. (Buhalis et al., 2023) conduct detailed research on how the introduction of the Metaverse can completely change the travel and tourism sector. The study provides guidelines to help the tourism industry understand the Metaverse's abilities and new opportunities emerging, along with the future challenges. (Koohang, 2023) provide a detailed viewpoint on how VU is rapidly combining its place as a big-scale industrial workspace. It has presented important details from a polymathic perspective by highlighting insights related to the opportunity and the challenges of adopting the VU from the perspective of various industries such as Manufacturing, Operations, Human Resources, Education, Retail, Telecom, Banking, Healthcare, etc.

2.5 Metaverse for Human Resource Management:

'(Lim et al., 2024) provide the perspective on Metaverse using a narrative review approach, which has the potential to redesign companies' culture and employee engagement.

Research also provides an overview of the potential applications of HR development and highlights the importance of these for organisational and employee development. (Aydın & Karaarslan, 2023) suggest that Metaverse can be used for automating various HR applications to improve decision-making, using a survey of 158 participants who have academic specialization in HR. (Lim et al., 2024) conduct a survey on 553 people in the USA and highlight the concerns people have regarding presenting themselves on Virtual or mixed reality platforms. (Novel et al., 2024) highlights how further development of Metaverse requires a strong innovative leadership style and mindset, and competencies, along with the technology.

2.6 Metaverse in Indian Organisations:

(Dhingra & Abhishek, 2024) find that most of the research on VU implementation was done in the USA and China, and comparatively less research was conducted in developing nations like India, Kenya, and South Africa. Based on a 344 sample, Ahmad et al. (2024) conclude that in the adaptation of Metaverse in the Indian hospitality and tourism industry, marketing campaign on social media platforms plays an important part. (Darbari & Hall, 2022) suggest that India can play a very important role in building the Metaverse. Similarly, the PwC[3] also stated that leaders from Indian businesses are in complete knowledge of the Metaverse's potential. One of the important reasons for many companies to invest in and embrace the metaverse is to target the young and technology-savvy future generations of Indian consumers.

III. Data and Methodology

This research is based on primary data collected from the employees of one of the reputed Indian IT companies using the convenience sampling method. The total population size is 304. Our sample size comes to 171 using the Yamane (1967) sample size formula. Since the sample size is more than 50%, the adequacy of the sample is maintained. Although convenience sampling has limitations such as sample selection bias, response bias, over-representation of certain groups, and homogeneity risk, this sampling method is suitable for our research due to the accessibility of the respondents from the selected IT company, the exploratory nature of this research, and the requirement of early insights into Metaverse adoption.

We prepare a structured questionnaire wherein questions related to perception and preferences about the Metaverse adoption for team collaboration, recruitment, employee-engagement activities, training sessions, innovative communication tools, performance review process, and job satisfaction level. We apply a Likert Scale for the survey, with a 5-point measurement scale ranging from 1 (Not at all interested) to 5 (Definitely Interested). To ensure internal consistency of the instrument, we calculate Cronbach's alpha for a multi-item construct. The value stands at 0.90, which exceeded the recommended threshold of 0.70, conforming to satisfactory reliability.

We use the Chi-Square test to understand whether gender has an association with employee perceptions toward various Metaverse applications.

IV. Analysis and Discussion

This section includes 11 sub-sections of analysis of various aspects of Metaverse adoption.

4.1 Demographic Profile

In our study, 44% are male respondents and 56% are female respondents. The maximum population belongs to the age group between 21-30 years, i.e., 97 % and only 3 % respondents are from the age group of 31 – 40 years. We also checked their marital status. 90.6 % respondents are unmarried, and 9.4 % respondents are married. We noticed that 83% respondents are graduates and 17% respondents are postgraduates. With regard to work experience, 95.9 % respondents have less than 5 years of work experience, 2.3 % respondents are between 5 and 10 years, and 1.8 % respondents are between 10 and 15 years. It is interesting to know that 98.8 % respondents are still working in Hybrid mode and only 1.2 % respondents are working from the office.

4.2 Adaptability of Metaverse applications or platforms

We analyse the employees' adoptability towards Metaverse applications. Our results reveal that the majority of the respondents showed their interest in using applications or platforms that are part of VU. This result is plausible, maybe because of the following reasons. First, VU or Metaverse

[3] Please refer to embracing-the-metaverse.pdf (pwc.in)

often offer an innovative work environment, advanced tools for teamwork, which include virtual meeting rooms, real-time communication features, and 3D workspaces, which led to enhanced collaboration (Šímová et al., 2024; Dhingra & Abhishek, 2024). Second, VU platforms offer an opportunity to network with professionals and experts around the world, which creates an opportunity for knowledge exchange and career growth. These platforms also help in reducing operational costs and travel time (Buhalis et al., 2023). As this immersive technology is comparatively new, continuously evolving, and a bit complex, using it might be overwhelming for 20 %respondents. This is because of concerns regarding the data handling (Chen et al., 2022).

4.3 Virtual collaboration for teamwork

We investigate to what extent the employees want to have virtual collaboration for teamwork, as the COVID–19 pandemic has accelerated the shift towards remote and hybrid work models. In this context, a significant portion of respondents (83%) want a virtual collaboration space to work together with their teams. This result is reasonable, which may be because it allowed their teams to work from anywhere, which led to increased flexibility compared to earlier work from office scenario. Various projects require working with international, multi-disciplinary and cross-functional teams, virtual collaboration tools might help bridging the gaps by enabling real-time communication and coordination (Šímová et al., 2024; Purdy Mark, 2022). Further, it also enables seamless knowledge sharing across different disciplines and locations (Peukert et al., 2024). These platforms also offer easy scalability with the growth of teams and projects.

In the coming future, the Indian Market will be flooded with various VU applications and tools providing diverse features, interfaces, and functionalities. Selecting the correct option might create confusion in 17% respondents' minds.[4]

4.4 Metaverse for selection process

It is pertinent to state that a very large majority of employees have shown their interest in taking part in the Selection Process using the Virtual Universe platform. This result is believable, maybe because VU platforms will allow respondents to engage in the selection process from the comfort of their homes, reducing stress, travel time, and cost –(Sharma et al., 2023; Widasiwi Setianingrum et al., 2023; 'Lim et al., 2024; "–Mehta, 2024). Also, most of the respondents belong to the age group between 21-30, who might be tech savvy and are comfortable with digital tools (Korn et al., 2024). VU platforms also enable respondents to apply for positions that might be geographically distant. This is also applicable for organisations, as they can tap the talent from any part of the world.

A very small portion of respondents (29 %) are concerned about the effectiveness of the technology for assessing a candidate's personality, knowledge, and abilities. Also, some respondents are not sure if virtual assessments can match the effectiveness of face-to-face interviews and might not be able to capture skills. Technical issues such as unstable internet connections or glitches in the software can disrupt the selection process (Rzeszewski et al., 2024).

4.5 Metaverse for Team Building Activities

It is worth mentioning that the majority of the respondents showed their interest in taking part in team-building activities using the VU/Metaverse platform. This result is plausible, maybe because Metaverse technology can provide a unique and innovative team-building experience by using engaging interactive interfaces such as simulations and games. Moreover, VU applications might help to enhance team dynamics, boost morale, and build friendships, which leads to better employee engagement(Staggers, 2008). However, 26 % respondents would have preferred in-person activities, as virtual work can lead to fatigue or burnout from excessive screen time. Further, there is some scepticism about the usefulness of virtual team-building activities in nurturing real team cohesion and association "–(Mehta, 2024).

4.6 Metaverse for training sessions

The majority of the respondents showed their interest in taking part in a training session using the VU/ Metaverse platform. This result is likely because of the features such as accessibility from anywhere, customization, scalability, interactive learning environment, etc., offered by Metaverse (Šímová et al., 2024). However, 25 % respondents prefer attending the session face-to-face because of networking opportunities, relevance, and hands-on experience '(Lim et al., 2024)

4.7 Metaverse for Wellbeing and Stress Management activities

We notice that a slight majority of the respondents (68%) would like to take part in wellbeing and stress management activities such as virtual yoga sessions, mindfulness exercises, or wellness challenges arranged on the Virtual Universe

platform using the VU/ Metaverse platform. This result may be valid because of increased awareness of stress management and mental health in the workplace (Bedarkar & Pandita, 2014). Also, respondents work in an IT organisation which is known for its high-pressure nature (Naqshbandi et al., 2024). They may also be feeling that these virtual activities might align well with the different preferences and needs of individuals.

A small group of respondents (32%) is sceptical about it because of a lack of relevance or personalisation. There might be perceived stigma with some respondents feeling conscious about openly engaging in these kinds of activities '(Lim et al., 2024).

4.8 Use of innovative tools for enhancing communication

The majority of the respondents (82.5%) prefer to use innovative tools backed by the Metaverse for enhancing communication. The respondents might have felt the need to enhance interactions, real-time collaboration, and seamless integration as the work mode is shifted to hybrid mode. Metaverse has the potential to offer the same with the help of Features like virtual reality and augmented reality (Aydın & Karaarslan, 2023). It is worth noting that 18 % respondents do not want to use innovative tools backed by Metaverse because of multiple options available in the market. Use of different tools across the departments may lead to fragmented communication, which may lead to chaos (Lee et al., 2021).

4.9 Metaverse for Performance Review Process

We discover that the majority of the respondents would like to take part in the performance review process using Metaverse platforms. This result is plausible, maybe because of two reasons. First, Metaverse offers various features such as flexibility, data-driven evaluation, visual analytics, robust security features to protect sensitive performance data, and real-time feedback. Second, there may be less bias during the performance appraisal process because of the Metaverse –(Sharma et al., 2023). It is also important to note that, as it is a comparatively new technology, 28% respondents prefer face-to-face meetings to those through the virtual universe platform because of privacy concerns. They may have doubts regarding the ability of the Metaverse to capture nuances and provide precise assessments (Peukert et al., 2024).

4.10 Metaverse for Employee Engagement Activities

It is crucial to highlight that the majority of the respondents showed their interest in employee engagement activities such as town hall, social events, etc, using the Metaverse platform may be because some of the Metaverse features, such as convenience in terms of location, time, and cost, inclusivity, and innovative experience (Aydın & Karaarslan, 2023). At the same time, 25% do not want the Metaverse, maybe because of technical barriers, lack of in-person connections, and screen fatigue (Lee et al., 2021).

4.11 Work Satisfaction using the Metaverse platform

A large group of respondents prefer one-to-one discussions to share work satisfaction using the Metaverse platform. This result is plausible, maybe because Metaverse has the potential to offer an effective and practical way to enable meaningful conversations, enhance feedback collection, and address employee concerns in a flexible and accessible manner. Further, a few respondents deny using Metaverse for sharing work satisfaction, possibly because of privacy concerns, connectivity issues, or lack of anonymity. They also might be feeling a lack of nuance and emotional connection required to get true feedback (Chen et al., 2022).

4.12 Chi-Square Analysis of Gender and Metaverse Adoption

Since the demographic information of the samples was expected to be mostly homogenous with respect to age, education, and work experience, we were interested in understanding whether female and male employees' perceptions differ across various Metaverse applications. The results of the Chi-Square analysis demonstrate that gender has no statistically significant relationship with most Metaverse applications, such as the recruitment process, training, team collaboration, performance review, and employee engagement. However, it should be emphasised that females show comparatively higher interest in using the Metaverse for well-being and stress management and team-building activities. This result is plausible, maybe because these activities are frequently seen as socially supportive domains, where females place significantly greater interest in collective engagement and psychological well-being.

[4] Please refer to https://www2.deloitte.com/in/en/pages/technology-media-and-telecommunications/articles/the-metaverse-in-asia.html

V. Conclusion

We investigate the possibility of introducing the Metaverse in the Indian IT sector for work-related aspects. We find that the majority of the respondents would like to use Metaverse platforms at the workplace for various activities. Our research contributes to the existing literature in multiple ways. First, this is the first attempt to investigate the possibility of the Metaverse's introduction in the Indian IT sector. Second, our result will be helpful to the policy makers of Indian IT firms to make informed decisions about introducing various Metaverse applications for work-related activities. This study has certain limitations, such as the data from a single firm and a skewed sample toward younger employees. However, the future study can be extended to cross-industry comparisons, longitudinal studies to follow changes over time, and qualitative validation to capture nuanced employees' experiences.

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PHYSICAL AND MENTAL WELLBEING OF POLICE FORCE PERSONNEL: A BIBLIOMETRIC ANALYSIS AND FUTURE DIRECTIONS

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Dr. Parul Jhajharia**
Subodh Saluja***

Purpose: *The physical and mental wellbeing of police force personnel is a significant area of research as they face numerous physical and mental health challenges due to the dynamic nature of security related duties. This study aims to analyse the trends, key contributors, and research gaps and to suggest future directions in this domain through a review of the literature and bibliometric analysis of Scopus-indexed literature from 2015 to 2025.*

Design/Methodology/Approach: *The bibliometric analysis was used in our research. This study evaluates research metrics such as publication trends, author contributions, and country-wise research output. It identifies high-impact publications, major thematic areas, and key gaps in current research. Using the relevant keywords in the Scopus database, we performed a bibliometric analysis on 950 articles. The bibliometric tool through "R" open-source software for thematic mapping and performance analysis, and VOSviewer was used for network analysis and co-occurrence keyword analysis.*

Findings: *The analysis reveals a growing interest in topics like physical wellness, mental wellness, stress management, resilience training and wellness interventions for police force personnel, with significant contributions from interdisciplinary research. Emerging themes include holistic wellness approaches and workplace wellness strategies.*

Practical Implications: *The findings provide insights for policymakers and law enforcement agencies to develop evidence-based wellness programs, highlighting the need for integrated wellness model and strategies to enhance physical and mental wellbeing of police force personnel.*

Novelty: *This bibliometric study offers a comprehensive and systematic perspective on research trends, gaps and future directions for wellbeing of police force personnel.*

Keywords : *Physical Wellness, Mental Wellness, Stress Management, Police Force Personnel, Wellbeing, Physical Exercise, Bibliometric Analysis*
JEL Code: *I10*

I. Introduction

The stress experienced in police organizations ranks among the highest of any profession, mainly due to the nature of their responsibilities, which require them to intervene in adverse situations and continually tackle crime and disorder. High levels of stress affect the overall health (physical and mental), as studies have shown that prolonged exposure to stressors leads to conditions such as cardiovascular disease, depression and anxiety in police officers (Gershon et al., 2009; Hartley et al., 2014). Poor physic also leads to poor mental health, negative quality of life, and a dip in professional efficiency, with research linking occupational stress to reduced performance and increased burnout (Purba & Demou, 2019; Shane, 2010).

The sources of stress typically experienced are complex, including inadequate staffing that leads to excessively long work hours and uncertainties in the job, which are well-recognized organizational stressors in police departments (Violanti et al., 2016; Shane, 2010). Unreasonable demands from advocacy groups, unfulfilled family obligations, marital conflicts, and issues related to children's education contribute to personal stress, with studies identifying work-family conflict as a major stressor (Griffin & Sun, 2018;

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Queirós et al., 2020). Financial pressures, frequent transfers, and uncertainties in election and internal security (IS) duties are additional systemic stressors identified in various studies (Kar & Kumar, 2015; Violanti et al., 2016). Weather calamities and natural disasters also contribute to the burden, as police are often first responders in such crises, increasing their exposure to traumatic events (Chopko et al., 2018; Queirós et al., 2020). The full spectrum of stressors is all a part of the deal, and all in a day's work, reflecting the cumulative impact of operational and organizational demands that research consistently associates with policing (Shane, 2010; Violanti et al., 2017).

II. Literature Review

Chhabra (2009) investigated the interplay between emotional intelligence and work-related stress among Border Security Force members. The findings indicated that BSF personnel experience high levels of occupational stress across all ranks, with the jawans reporting the highest levels of stress. Tripathy (2021) examined the stress factors affecting 150 CRPF personnel in Odisha, identifying stressors that are individual, organizational, and environmental in nature. It advises the use of guidance, open dialogue, counselling, and stress management training to improve both well-being and performance. Balakrishnamurthy (2009) examined 163 non-gazette officers in the CRPF, finding that age and experience significantly impact stress levels, indicating the need for customized welfare and stress relief strategies. Audichya (2018) investigated adverse factors like difficult working conditions and family separation affecting CAPF personnel, stressing the importance of enhanced work environments and support for livelihoods. Schilz and Sammito (2023) analyzed the physical activity levels of armed forces personnel, averaging 11,540 steps per day, suggesting the development of customized fitness options for roles with lower activity.

Pandaya (2019) suggested that implementing positive policing could enhance the well-being of police officers and foster better public relations by creating a positive workplace environment. In 2019, BPR&D partnered with IIPHG to publish 20 chapters in the Indian Police Journal addressing stress and mental health concerns among uniformed staff, providing strategies for mitigation. BPR&D, in collaboration with IIPA in 2022, examined attrition and suicide rates in CAPF, identifying sources of stress and proposing management solutions. Sharma (2007) shared results from a study conducted by the Defence Institute of Psychological Research, which revealed that factors related to occupation, such as extended job tenure and higher ranks, led to increased stress levels among officers, junior commissioned officers, and jawans. Given the limited reviews on the physical and mental health of the police forces in India, this study aims to fill this void by conducting a review to identify the most commonly researched topics in this area. The primary research question focuses on the significance of physical and mental health in police work. The findings include the total number of publications, publications attributed to individual authors, and the average annual publication rate.

These indicators shed light on the extent of research conducted on wellness (both physical and mental) and the degree of academic interest in the topic. Consequently, our first research question is:

RQ1. *Based on the published research, what is the relevance of physical and mental wellness in police force?*

In addition, by employing a descriptive research approach, it's essential to identify critical research metrics in this area to create a solid basis for further investigation. The data utilized to address this question includes leading authors, publications by single authors, publications categorized by country, and a three-field plot. The three-field plot illustrates the connections among various authors and their contributions to this field. Hence, we present a second question.

RQ2. *What are the fundamental research metrics in this field, considering the descriptive research method?*

The third research question seeks to pinpoint high-quality publications within the realm of police work. The analysis utilized to address this question comprises articles characterized by average citations per year and the caliber of journals according to the ABDC ranking. These measures shed light on the research impact in this area.

RQ3. *Which publications can be deemed as high-quality in this field?*

The fourth research question investigates the relationships among police forces in various countries and identifies the leading nations contributing to this field. The analysis used to answer this question includes average citations per year, categorized by country, and bibliometric coupling.

RQ4. *How are the dynamics between police force of different ccountries and top countries publishing in this area.*

The fifth research question focuses on identifying future research themes in this field. The analysis employed to answer this query includes citation analysis and thematic assessment. Citation analysis delivers insights into the influence of research on the physical and mental health of police personnel. Thematic assessment provides clarity on the emerging topics within this area.

RQ5. *What topics can researchers explore in the future in this field?*

First and foremost, understanding current trends, the authors who contribute the most, the countries with the highest contributions, the most cited papers, and the journals that publish the highest volume of articles in this area is essential. Secondly, there is a notable absence of reviews focusing on the physical and mental well-being of the police force.

Research Questions	Performance analysis tools Used
• Based on the published research, what is the relevance of physical and mental wellness in police force? • What are the fundamental research metrics in this field, considering the descriptive research method? • Which publications can be deemed as high-quality in this field? • How are the dynamics between police force of different countries and top countries publishing in this area. • What topics can researchers explore in the future in this field?	• Total no. of publications (Figure 1) • Publications by author (Figure 2) • Average publication per year (Figure 1) • Top authors (Figure 2) • Country-wise publications (Table 3) • Country-wise average citation per year (Table 3) • Journal-wise citation analysis (Figure 3) • Top cited articles (Table 4) • Three field plot (Figure 4) • Co-occurrence of author keywords (Figure 5) • Thematic evaluation (Figure 6,7 & 8)

Table 1: Research questions and Performance analysis tools used to answer these Questions

As a result, relevant literature was reviewed to pinpoint topics related to this research area. Understanding what scholars have previously researched is crucial for recognizing existing gaps. The main objective of this paper is to review recent research in this field and to explore possible future research avenues.

Methodology

Our research employed the bibliometric method to analyze and investigate the current literature. This method is recognized for its quantitative data analysis capabilities (Chaman Sab et al., 2020; Donthu et al., 2021a; Dinh et al., 2023; Ludhani et al., 2023; Ubgade & Joshi, 2022). Bibliometric tools assist in the exploration, organization, and analysis of large volumes of data (Chaman Sab et al., 2020; Daim et al., 2006).

We employed author keyword co-occurrence as outlined by Donthu et al. (2021a) and bibliographic coupling as described by Donthu et al. (2021b) to pinpoint research objectives. Numerous contemporary studies have recognized this method as an effective strategy for performing clustering analyses, enabling the examination of trends and visual categorization of literature data (Pollack & Adler, 2015). Given the expansive nature of the review, the dataset was excessively large for a manual assessment. Therefore, the bibliometrics approach was utilized to analyze and interpret the data.

After conducting a brief literature review with the keywords "Physical," "mental," "wellness," "stress," and "police" in Scopus, we aimed to identify research gaps. In contrast to other bibliometric studies, we adopted a global perspective to understand the research dynamics within the police force. The data for this study was obtained from Scopus. The search keyword included "physical and mental wellness in police force" and "stress." Since our research was related to wellness of police force, we restricted search criteria to social science journals. We considered the period of publications between the year 2015 – February 2025. Initially, we received 2,718 documents from Scopus. Later, it was reduced to 950 articles using inclusion and exclusion criteria. Our selection was limited to scholarly articles published in English language journals to achieve this objective. We used the bibliometric

tool through "R" open-source software for performance analysis, thematic mapping analysis, and Vos-viewer for co-occurrence keyword analysis and network analysis.

III. Empirical Analysis and Results

The three fundamental categories of bibliographic analysis are performance analysis, scientific mapping, and network analysis (Cobo et al., 2011), which can be seen in Table 2. We performed a performance analysis to pinpoint the authors with the highest output, the leading countries in research contribution, the publications that have received the most citations, and the journals that have published the greatest number of articles in this domain (Noyons et al., 1999).

Bibliometrics Analysis		
Analysis of Performance		Science Mapping
Metrics Related to Publications	Metrics Related to Citations	
Total number of publication (Figure 1)	Total Citations (Table 3)	Bibliographic coupling
Publications by an author (Figure 2)	Average Citations (Table 3)	Three fold plot (Figure 4)
Number of publications per year (Figure 1)	Country-wise citation (Table 3)	Co-word analysis (Figure 5)
Average number of publications (Figure 1)	Journal-wise citation (Figure 3)	Thematic evaluation (Figure 6-8)
Country-wise publications (Table 3)	Most cited articles (Table 4)	

Table 2 : Bibliometric analysis tools

By examining the co-occurrence of author keywords present in multiple documents, we can uncover the relational dynamics between the research efforts of two scholars. Each researcher selects specific keywords to highlight what they deem crucial in their work, thereby reflecting the core themes of their investigations. In our research, we are working with a substantial dataset; hence, we have chosen keyword co-occurrence analysis to map the intellectual landscape pertaining to studies on physical and mental wellness (Donthu et al., 2021b). A variety of methods, such as co-citation and co-word analysis (Callon et al., 1983), have been employed to construct science maps.

The co-citation technique, initially developed by Henry Small in the 1970s, has undergone significant evolution (Small, 1973). Co-citation analysis allows for the recognition of two papers which are cited together based on bibliographic data. The strength of the co-citation network is reliant on how often cited articles appear across two different formats. Within this network, the most frequently cited papers underscore the key experiments, methodologies, and processes utilized in the research field (Small, 1973).

Performance Evaluation

Performance evaluation uncovers the publication and citation-related metrics within the research domain (Cobo et al., 2011). Scholars frequently utilize performance evaluation to assess the achievements of authors, countries, institutions, and journals.

Publication Overview (Annual Publications)

Figure 1 illustrates the yearly publication trends related to physical and mental wellness. The annual publication numbers have slowly increased, reflecting the growing interest among authors in physical and mental wellness.

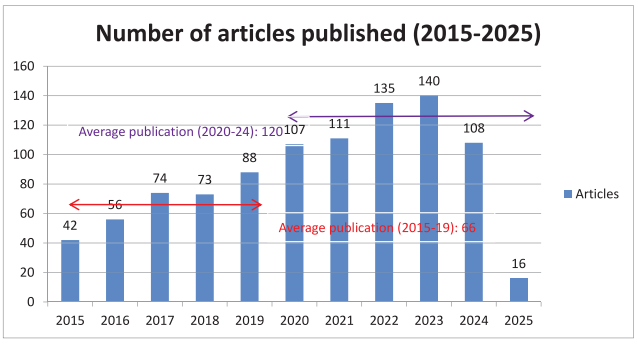

Figure 1 : Year-wise publication trend on the topic of Mental Health

The average publication count during 2015 and 2019 was 66 per year. The effect of physical and mental wellness in police force can be seen from the average number of articles published during 2020–2024, which is 120 publications per year.

Publications by Authors

Figure 2 illustrates the most prominent authors in the field of physical and mental wellness. Andwe ME and Violanti JM stand out as the most active contributors, with 16 articles published and 520 citations each. They are succeeded by Fekedulgn D, Gu JK, and Hartley TA, who have published 13, 11, and 9 articles, respectively, and garnered 483, 324, and 393 citations.

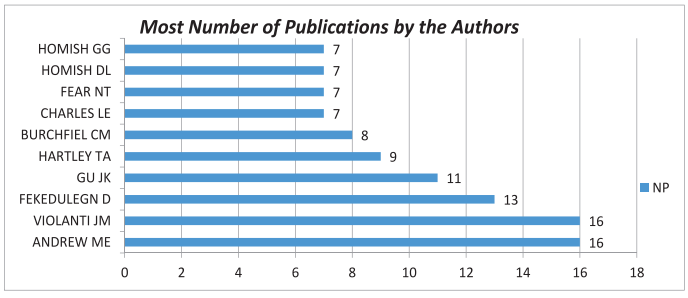

Figure 2: The Most Influential Authors on the Subject of physical and mental wellness

Citation and Publication-Related Analysis (Country-Wise Citation Analysis)

Table 3 shows the most productive countries that contributed to this topic. Authors from the United States significantly contributed to 424 articles, which were cited 6582 times.

Country	Number of publications	Total No Of Citations	Mean Article Citations
USA	424	6582	15.5
UNITED KINGDOM	260	3420	13.2
AUSTRALIA	78	709	9.1
CANADA	56	554	9.9
NETHERLANDS	8	151	18.9
INDIA	7	24	3.4
GERMANY	4	18	4.5
LEBANON	4	34	8.5
BRAZIL	3	20	6.7
FINLAND	3	19	6.3
NEW ZEALAND	3	106	35.3
FRANCE	2	30	15
GEORGIA	2	22	11
HONG KONG	2	72	36

Table 3 : Country-Wise Publications in the Field of physical and mental wellness

Authors from UK (United Kingdom) and Australia contributed 260 and 78 articles respectively. Our study reveals that most of the contributing countries to physical and mental wellness have primarily originated from the USA and UK.

Journal-Wise Citation Analysis

The journals publishing more number of articles in the field of mental health are shown in Figure 3. The Journal of Military Psychology and Police Journal, which contributed 62 and 35 papers on the topic, are the highest-publishing journals in the field. The articles published in these journals have received 365 and 313 citations, respectively. These journals are ranked in the Scopus database and have received high cite scores.

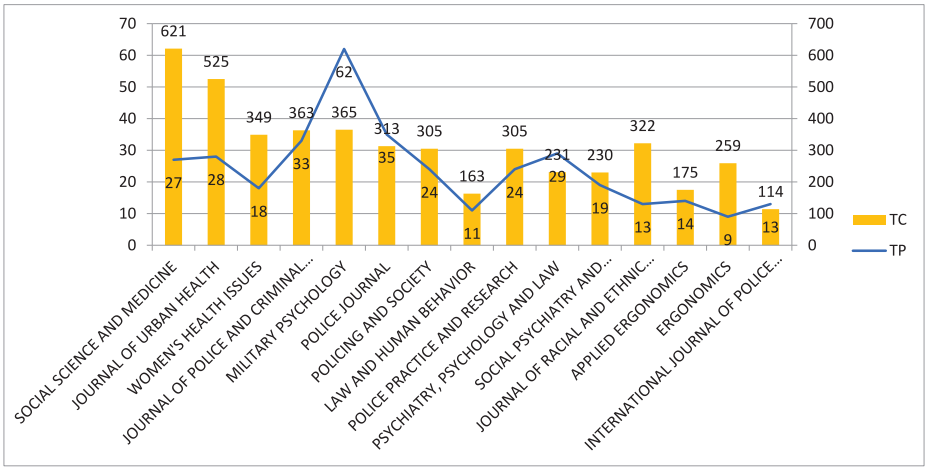

Figure 3 : Journals publishing the maximum number of papers

Top Cited Articles: Table 4 presents the journal articles that have received the highest number of citations regarding this subject. With a total of 300 citations and an average of 37.50 citations annually since its release, Rolison JJ (2018) stands out as the most referenced work in the field.

Paper description	Total Citations	TC per Year
ROLISON JJ, 2018, ACCID ANAL PREV	300	37.5
STARK E, 2019, VIOLENCE AGAINST WOMEN	271	38.7
PAIN R, 2015, POLIT GEOGR	214	19.4
STOGNER J, 2020, AM J CRIM JUSTICE	209	34.8
WILSON JP, 2017, J PERS SOC PSYCHOL	192	21.3
THOMEER MB, 2023, J RACIAL ETHN HEALTH DISPARITIES	181	60.3
LAUFS J, 2020, INT J DISASTER RISK REDUCT	149	24.8
SMITH LEE JR, 2019, J BLACK PSYCHOL	143	20.4
JENNINGS WG, 2020, AM J CRIM JUSTICE	129	21.5
JACOBS LA, 2021, J PROG HUM SERV	124	24.8
KARAFFA KM, 2016, CRIM JUSTICE BEHAV	110	11
GUILARAN J, 2018, INT J DISASTER RISK SCI	102	12.75

Table 4 : ***Most Cited Publications***

Three-Field Plot Analysis

The three-field relationship graphic illustrates the connection between authors, keywords, and sources (Figure 4). The size of the middle boxes indicates the frequency with which the terms appeared. Our analysis reveals that the top four keywords are Police, Mental Health, Police Officers and Stress are the leading academic journals on research.

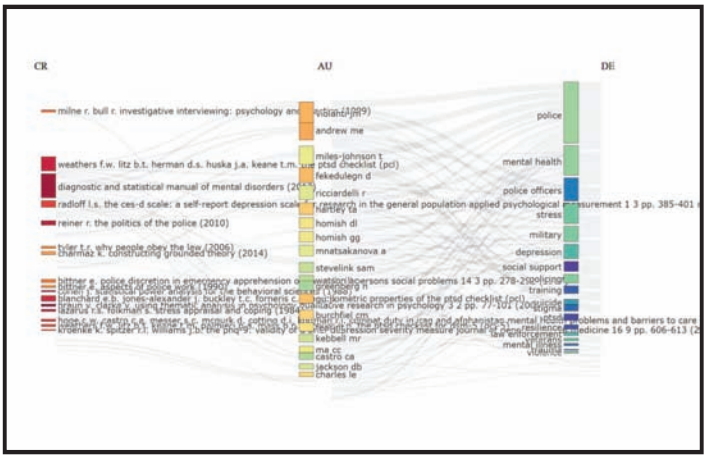

Figure 4 : Three Field Plot Diagrams Using Authors (AU), Author Keywords (DE), and Sources (CR)

Co-occurrence of Keywords

In a co word analysis, the vocabulary is often sourced from "author keywords." However, when author keywords are absent, important terms for co word analysis can be selected from "article titles," "abstracts," and "full texts" (Baker et al., 2020; Donthu et al., 2021). Similar to co-citation analysis, co-word analysis indicates that words that frequently co-occur possess a thematic connection. In our research, we utilized author keywords to develop a co-occurrence network. A co-occurrence network formed from author keywords is created to explore the topics related to "wellness" in research. An examination of author keywords using VOSviewer shows notable clusters during the specified period for this bibliometric analysis. Figure-5 demonstrates that "police," "mental health," "military," "policing," "depression," and "trauma" are the most commonly co-occurring keywords.

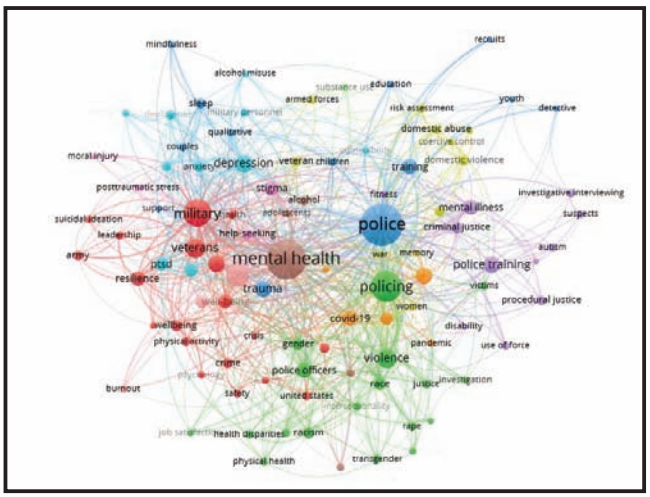

Figure 5 : Co-occurrence of keyword

Thematic Evaluation

The evaluation of the themes is analyzed using R-Bibliometric software. The results are illustrated in Figures 6 to 8. The thematic map displays each of the four quadrants. A range of research topics is organized in a two-dimensional space into four distinct categories. The principles found in the right quadrant (upper) are intricate and fundamental to framework of mental health research (Aria & Cuccurullo, 2017). The topics located in the upper left quadrant of the mental health area are more complex and less pertinent. The subjects noted in the lower left quadrant are underdeveloped and minimally significant. These are concepts that are either fading away or reemerging, while the ideas recorded by the right quadrant (lower) are significant to the investigation. These themes are currently in the process of development.

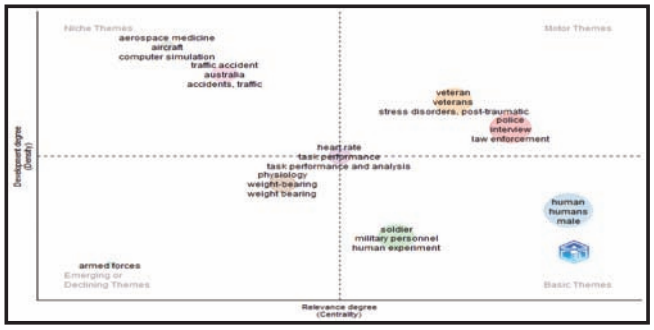

Figure 6: Thematic Evaluation during the period of 2015–2018

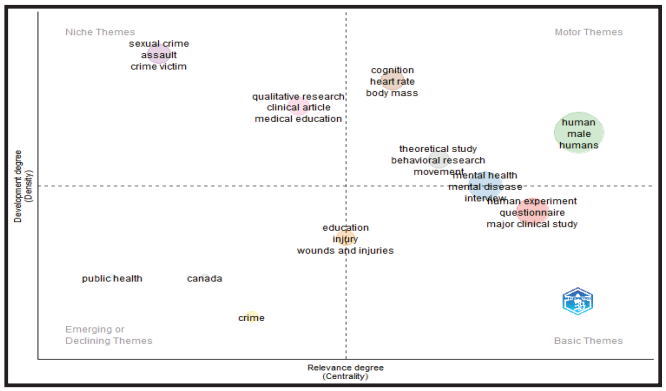

Figure 7: Thematic Evaluation during the period of 2023-2025

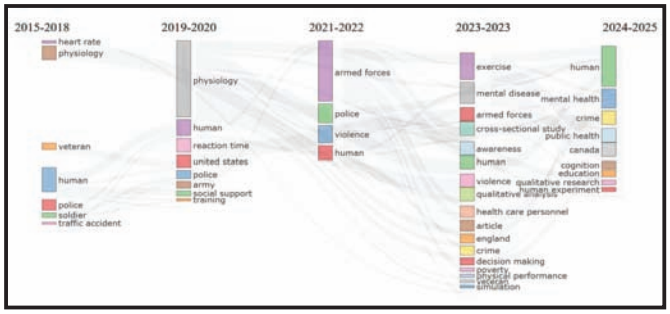

Figure 8: Thematic evaluation during the period of 2015-2025

Figures 6 and 7 illustrate the fundamental and emerging themes identified in this bibliometric analysis. The themes recognized from research articles published between 2015 and 2018 focus on military personnel and soldiers, while articles from 2023 to 2025 have shifted the primary theme to "mental health".

Figure 8 highlights the evolution of themes throughout the entire duration of this study, spanning from 2015 to 2025. It reveals that themes such as heart rate and police physiology were of interest during the years of 2015-18. In the period of 2021-22, "armed forces" emerged as the central theme.

IV. Discussion

The information presented in the performance analysis (Figures 1, 2, and Table 3) demonstrates significant research into the physical and mental health of police personnel. The citation analysis in Table 3 reveals that most of the contribution countries in research in this field primarily have been done by USA and UK. In addition, it is noted that emerging countries like India have just begun research in this field and thus has a wide scope for exploring various dimensions in this field. Figure 3 shows the no of highly cited journals in the domain of physical and mental wellness and this notion is further corroborated by the three-field plot shown in Figure 4, which illustrates how mental and physical wellness is again viewed by multi dimensions and encompasses numerous factors of wellness disciplines. Figures 6 & 7 show the most significant themes during different time periods where the lower right themes are the niche themes and researchers need to explore all these themes.Finding new areas of investigation or highlighting significant trends in this field may be made easier with citation analysis and theme evaluation (Figure 8). The information could also be used to investigate how mental and physical health affects many facets of Central armed police forces like CRPF in India. Overall, the information emphasizes how crucial wellness is to police force personnel. This research can direct future research and provide information for policy decisions relating to wellbeing of police force personnel.

Theoretical Implications

- The bibliometric analysis of police force personnel physical and mental wellness has various theoretical implications. First, the study emphasizes the importance of physical and psychological wellness in policing. This area is relevant to law enforcement research because to its high amount of publications.
- The research highlights the significance of bibliometric analysis in recognizing the most impactful research metrics, such as leading authors, publications by individual authors, and contributions by country.
- It advances theoretical understanding of occupational stress and physical health in law enforcement, particularly in high-risk environments like the CRPF and other police forces.

- The study combines bibliometric methodologies (e.g., co-citation, co-word, and scientific mapping) to address an underexplored research subject, offering a systematic approach for future researchers.

- The shift from stress-related research to holistic wellness frameworks shows that mental and physical health is essential to law enforcement.

- The comparative analysis of country-wise research contributions suggests disparities in scholarly attention to police wellness, particularly between developed and emerging nations.

Practical Implications

- The research offers data-driven findings that can assist policymakers in developing organized wellness initiatives specifically suited for the requirements of police force members. Findings emphasize the need for proactive interventions, such as mental health counselling, resilience training, and stress-reduction initiatives within police organizations.

- Regular mental health assessments and workplace wellness programs should be institutionalized to mitigate occupational hazards and improve overall officer well-being.

- The study highlights the research disparity between developed and developing nations, emphasizing the need for more studies on police wellness in countries like India.

- Government agencies and research institutions should work together to establish long-term studies evaluating the effectiveness of wellness programs.

V. Conclusion, Limitations and Future Directions of the study

This study highlights the increasing focus on police force personnel's physical and mental wellbeing in academic research. The findings indicate a shift from stress management to more holistic wellness strategies, interventions supported by interdisciplinary collaborations. By identifying key authors, influential studies, and research gaps, this study provides valuable insights for scholars and policymakers. Future research should emphasize emerging technologies, longitudinal wellness assessments, and cross-cultural comparisons to develop comprehensive wellness frameworks for police force personnel in India and globally also

The study is limited to Scopus-indexed publications/selected literature and does not consider other databases. The analysis primarily focuses on bibliometric data and does not incorporate qualitative assessments of wellness interventions.

Future directions

- Future research should integrate systematic reviews and meta-analysis to complement bibliometric insights.

- Further research should empirically examine police force personnel well-being in developing nations like India to explore contextual factors such as stresses, coping methods, and institutional support.

- Future studies should explore factors affecting the physical and mental well-being of police personnel, especially those in high-risk environments, to develop targeted stress-mitigation strategies.

- Future research should use longitudinal methodologies to study the long-term impacts of occupational stress, mental health therapies, and policy initiatives, as most current research uses cross-sectional data.

- Future studies should focus on translating research findings into actionable policy recommendations for law enforcement agencies.

- Evaluating the effectiveness of implemented wellness policies and interventions can provide feedback for refining institutional approaches to police mental health.

- Future studies should investigate how leadership styles, workplace culture, and internal policies influence police personnel's psychological resilience and job satisfaction.

Authors' contribution

The manuscript is a collaborative effort of Bhagat Singh, Dr.Parul Jhajharia, and Subodh Saluja. All three authors contributed to the manuscript by discussing and developing the manuscript. Therefore, the three authors have made significant contribution to the study

Declaration on competing interest

The authors declare that they have no known competing financial or non-financial interest or personal relationships that could have appeared to influence the work reported in this study.

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ADVANCING FINANCIAL INCLUSION THROUGH AI: SCIENCE MAPPING AND FUTURE RESEARCH PROSPECTIVE THROUGH BIBLIOMETRIC ANALYSIS

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Dr. Garima Srivastava**
Dr. Nivi Srivastava***

Introduction: *Artificial intelligence (AI) is transforming financial inclusion by improving accessibility, efficiency, and cost of financial services, especially for marginalised communities. This paper does a bibliometric analysis to evaluate research trends, principal authors, and theme advancements in AI-driven financial inclusion.*

Design/Methodology/Approach: *This study employs bibliometric analysis of research publications obtained from the Dimensions database. Critical metrics like citation frequency, author influence, institutional contributions, and research output by country are analysed. Co-authorship networks and journal impact are examined to discern prevailing research clusters and developing trends within the discipline.*

Findings: *The data indicates a substantial increase in research on AI-driven financial inclusion, with China, India, and the United States in the forefront of publication output. Prominent publications like Environmental Science and Pollution Research and Sustainability are essential for the dissemination of knowledge. Prominent authors such as Satish Kumar and Emmanuel Mogaji have made significant contributions to AI applications in fintech, mobile banking, and financial literacy. The research clusters emphasise multidisciplinary interactions across finance, technology, and policy-making.*

Practical Implications: *This report offers insights for researchers, policymakers, and financial institutions by pinpointing significant advancements in AI-facilitated financial inclusion. The results underscore the necessity for regulatory frameworks, ethical AI practices, and technology-based financial literacy initiatives to guarantee fair financial access.*

Originality/Value: *The Bibliometric framework is one first steps to define artificial intelligence in financial inclusion. It provides important new perspectives on research trends, important players, and future prospects, therefore laying a foundation for further research and policy projects in this emerging sector.*

Keywords : *Artificial Intelligence, Financial Inclusion, Bibliometric Analysis, Financial Literacy*
JEL Code: *G21, O33, C88*

I. Introduction

Financial inclusion has been identified as a vital global driver behind social equality, poverty reduction, and economic growth. With an especially focus on those in underprivileged or marginalised groups, Demirgüç-Kunt et al. (2018) allude to the availability and affordability of financial services for people and businesses. Though great progress has been made, the Findex Database of the World Bank indicates that a sizable fraction of the world's population is still left excluded from official financial services, therefore hindering their capacity to save, invest, and engage in economic activity. The rise of artificial intelligence (AI) and related digital technologies has the potential to close this gap by improving financial accessibility, lowering expenses, and increasing service efficiency (Arner et al., 2020). AI-driven solutions—including machine learning (ML), natural language processing (NLP), and blockchain-based financial applications—have transformed banking, microfinance, and digital payment systems, so improving the efficacy and inclusivity of financial services (Gabor & Brooks, 2017).

AI-driven financial inclusion is transforming the banking sector by means of alternative credit scoring methods, fraud

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detection, automated financial advice services, and customised financial offers,. While artificial intelligence-driven algorithms use alternative data sources—such as mobile transactions, social media activity, and utility payments—conventional credit rating procedures sometimes exclude those without official financial records (Berg et al., 2020). Particularly in developing countries with limited conventional banking infrastructure, these developments have made micro-lending and small business funding possible (Ozili, 2022). By means of chatbots, speech recognition, and automated financial planning tools, artificial intelligence increases financial literacy and accessibility, therefore enabling those with limited banking knowledge (Mhlanga, 2020). Notwithstanding these advances, implementing artificial intelligence into financial inclusion policies presents challenges like algorithmic biases, data privacy concerns, and legal uncertainty (Philippon, 2019).

While several studies have looked at artificial intelligence applications in financial services, thorough mapping of academic contributions in this field is lacking. Evaluating the intellectual framework, thematic patterns, and developing research paths inside a topic requires bibliometric analysis as a useful tool (Donthu et al., 2021). Co-citation analysis, keyword co-occurrence analysis, and bibliographic coupling are among the science mapping techniques that let researchers identify important academic works, cooperative networks, and regions of knowledge gaps (Aria & Cuccurullo, 2017.). This paper investigates the literature on artificial intelligence-driven financial inclusion using bibliometric approaches, therefore offering insights on main research topics, authorship patterns, and future prospects.

This work systematically arranges and evaluates current knowledge on artificial intelligence in financial inclusion, therefore improving scholarly debate. For legislators, financial institutions, and academics hoping to use artificial intelligence's promise in creating inclusive financial ecosystems, it offers vital data. This work uses bibliometric analysis to provide a data-driven foundation for strategic policy decisions and next research projects. Furthermore underlined is the need of responsible artificial intelligence development in order to guarantee financial services' equity, openness, and accessibility.

Research Questions

The following are the prominent research questions that require further analysis to observe information in this domain

• What are the current trends in research in the area of role of AI in Financial Inclusion?

• Which are the leading, influential, and impactful sources and contributors to the literature?

• What are the most influential co-authorship and co-words, and most cited articles in the research area ?

• How have different bibliographic clusters evolved in the field, and what interdisciplinary collaborations have emerged?

II. Research Methodology

This study intends to examine the advancements in research about financial inclusion, specifically in relation to Technology and Artificial Intelligence. To achieve this objective, bibliometric analysis was conducted on the biographical data of papers published in this domain and indexed in the Dimension database. This study utilises citation, co-citation, and co-authorship analysis. The search terms, extraction methodology, and criteria for inclusion and exclusion are detailed below. Table 1 outlines the approach for article extraction, yielding a total of 1047 research publications following the application of multiple filters.

Inclusion Criteria	Total no. of accepted papers
Search engine: Dimensions	
Search Date: February 2025	
Search Items: AI, or "Artificial Intelligence" and "Financial Inclusion" or "Financial Services"	
Year: 2016–2025	2502
Subject Areas: Banking Finance and Investment , Commerce, Management	1505
Document Type: Research papers/Articles	1105
Sources Type; UGC Care group II	1047

Table 1: Search Criteria to extract research papers in Financial Inclusion and AI

III. Result Analysis and Discussion

1.Publication activity of AI and Financial Inclusion research in finance

Figure 1 illustrates the publication trend of research concerning the application of AI for financial inclusion and services for underserved populations, displaying the total number of papers in relation to their respective years of publication. Figure 1 demonstrates that this field of study is

not novel; it has been established for a decade. Nevertheless, research in finance within these domains has surged only in recent years, attributed to the extensive use of digitisation following Covid. The most prolific years are 2024 (413 articles), 2023 (155 articles), and 2022 (110 items). The publishing trend demonstrates a notable increase, reflecting heightened academic and business interest in the topic. Beginning with merely 6 articles in 2016, the figures have consistently escalated, culminating in 75 in 2021 and 413 in 2024, illustrating significant growth. The increase in publications indicates an intensified global emphasis on AI-driven financial services, digital transformation, and inclusive economic policies.

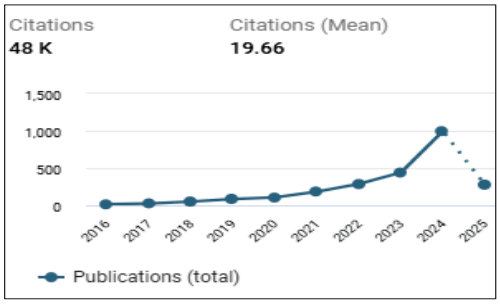

Figure 1: Publication trend of research

2. Top authors, institutions, and countries of AI and financial inclusion research

TC	AUTHOR	TP	TC	ORGANISATION	TP	TC	COUNTRY	TP
1187	Kumar, Satish	5	1752	Southwestern university of finance and economics	16	14379	China	547
1157	Kauffman, Robert j.	2	1213	Malviya national institute of technology jaipur	5	5444	United Kingdom	138
1131	Gomber, peter	1	1009	University of Johannesburg	16	5386	India	172
1131	parker, Chris	1	947	University of Economics Ho chi mint city	13	4611	United States	120
1131	weber, Bruce w.	1	913	Nankai university	8	3007	Pakistan	86
909	Mhlanga, David	8	838	University of electronic science and technology of china	10	2676	Malaysia	74
898	Mogami, Emmanuel	9	836	Xinjiang university	10	2394	France	41
689	Nguyen, Nguyen phong	7	808	University of Greenwich	7	1951	Saudi Arabia	74
683	Goyal, Kirti	1	783	Unsw Sydney	11	1835	Australia	50
673	Kou, gang	5	723	xi'an Jiaotong university	14	1742	turkey	37
668	Al-okaily, Manaf	15	701	Zayed university	5	1717	United Arab Emirates	36
632	Adebayo, Tokiwa Sunday	6	676	Jiangsu university	22	1694	South Africa	46
627	Wamba, Samuel fosso	4	668	Jadara university	15	1675	Bangladesh	41
551	Queiroz, Maciel m.	3	632	king Abdulaziz university	15	1596	Spain	30
510	lee, chi-Chuan	2	602	Beijing institute of technology	11	1340	Japan	18
510	Yu, chin-Hsien	2	602	Toulouse business school	3	1331	Vietnam	29
510	Zhao, Jimsong	2	589	Zhejiang university	9	1296	Cyprus	18
509	Bani-Hani, Anoud	1	585	Sichuan university	11	1265	Jordan	36
509	Benkhelifa, elhadj	1	580	Swinburne university of technology Sarawak campus	5	1147	Ghana	31
509	Ghedira-Guegan, chrine	1	570	Ilma university	13	1086	Italy	34

Note(s): TC = total citations. TP = total publications. The research constituent (i.e., author, institution, country) appear according to total citations in this table.

Table 2: Top authors, institutions, and countries of AI and financial inclusion researches

The bibliometric examination of artificial intelligence in financial inclusion identifies notable trends in authorship, institutional contributions, and country-specific impact. Kumar, Satish is the leading author with 1,752 citations from 5 articles, demonstrating significant influence in the subject. Kauffman, Robert J. has garnered 1,213 citations from only 2 works, indicating a substantial citation-per-publication ratio. Other highly cited authors, such Gomber, Peter, Parker, Chris, and Weber, Bruce W., have almost 900–1,000 citations from one single publication, therefore demonstrating the great impact of their own work. Mhlanga, David (8 publications) and Mogaji, Emmanuel (9 publications) have the highest publication totals simultaneously, therefore underlining their continuous contributions to the field.

Leading the field with 14,379 citations from 16 papers, Southwestern University of Finance and Economics (China) is clearly the most powerful university. With 5,444 citations from 5 works, Malaviya National Institute of Technology Jaipur (India) has clearly shown great scientific influence. With 5,386 and 4,611 citations respectively, the University of Johannesburg (South Africa) and the University of Economics Ho Chi Minh City (Vietnam) quite help. With 22 publications and 1,694 citations, Jiangsu University (China) boasts the highest publishing count, therefore demonstrating a consistent commitment to the discipline.

With 14,379 citations and 547 publications, China ranks globally at the national level and clearly leads in research on AI-driven financial inclusion. The United Kingdom (5,444 citations, 138 articles) and India (5,386 citations, 172 publications) are significant contributors, underscoring their vibrant research communities. The United States (4,611 citations, 120 articles) continues to be a prominent contributor, albeit with a little reduced publishing output. Furthermore, Pakistan (3,007 citations, 86 articles) and Malaysia (2,676 citations, 74 publications) signify burgeoning research centres, presumably attributable to the growing significance of financial inclusion in developing economies.

This analysis highlights China's pre-eminence in AI and financial inclusion research, succeeded by India, the United Kingdom, and the United States. Institutions such as Southwestern University of Finance and Economics and the University of Johannesburg are making significant contributions. The involvement of developing nations like Pakistan, Malaysia, and Bangladesh in the research domain indicates an increasing focus on financial inclusion strategies

for marginalised communities. Future study may investigate collaborative networks and citation trends to obtain a more profound understanding of how AI is influencing global financial accessibility.

3. Top journals in the research area of AI in financial inclusion.

TC	JOURNALS	TP
4310	environmental science and pollution research	122
1771	sustainability	47
1131	journal of management information systems	1
1036	journal of environmental management	33
951	international review of financial analysis	16
939	technological forecasting and social change	25
896	world development	6
761	financial innovation	16
757	international journal of information management	6
751	international journal of bank marketing	12
749	heliyon	31
747	resources policy	37
691	international journal of consumer studies	2
674	international journal of financial studies	9
673	information technology for development	16
608	electronic commerce research and applications	3
576	journal of behavioral and experimental finance	3
520	research in international business and finance	21
509	peer-to-peer networking and applications	1
506	finance research letters	47

Table 3: Top journals in the research area

The table 3 displays the leading journals that publish AI research in financial inclusion. Environmental Science and Pollution Research and Sustainability are the two most prominent journals in terms of citations, with 4,310 and 1,771 citations, respectively. In terms of publications, Environmental Science and Pollution Research (122 publications) and Finance Research Letters (47 publications) are the two most prolific journals. Additional significant journals comprise Technological Forecasting and Social Change (25 publications, 939 citations) and Research in International Business and Finance (21 publications, 520 citations), reflecting the increasing influence of AI on financial markets and economic forecasting.AI-driven financial inclusion study encompasses finance, sustainability, and technology, highlighting its extensive socio-economic implications.

4. Top Articles for AI research in financial inclusion.

TC	AUTHORS	ARTICLES
1131	gomber (2018)	On the Fintech Revolution: Interpreting the Forces of Innovation, Disruption, and Transformation in Financial Services
683	goyal (2020)	Financial literacy: A systematic review and bibliometric analysis
509	mhlanga (2020)	Industry 4.0 in Finance: The Impact of Artificial Intelligence (AI) on Digital Financial Inclusion
472	Farah (2018)	Mobile-banking adoption: empirical evidence from the banking sector in Pakistan
430	goodell (2021)	Artificial intelligence and machine learning in finance: Identifying foundations, themes, and research clusters from bibliometric analysis
423	hao (2022)	The role of digitalization on green economic growth: Does industrial structure optimization and green innovation matter?
394	omar (2020)	Does financial inclusion reduce poverty and income inequality in developing countries? A panel data analysis
394	arner (2020)	Sustainability, FinTech and Financial Inclusion
346	wamba (2020)	Impact of Green financing, FinTech, and financial inclusion on energy efficiency
335	Astha(2021)	Artificial intelligence and fintech: An overview of opportunities and risks for banking, investments, and microfinance
329	murinde (2022)	The impact of the FinTech revolution on the future of banking: Opportunities and risks
322	stoumpos (2023)	Digital Transformation in Healthcare: Technology Acceptance and Its Applications
322	liu (2021)	Can digital financial inclusion promote China's economic growth?
320	milian (2019)	Fintechs: A literature review and research agenda
307	munyegera (2016)	Mobile Money, Remittances, and Household Welfare: Panel Evidence from Rural Uganda
306	kou (2021)	Fintech investments in European banks: a hybrid IT2 fuzzy multidimensional decision-making approach
285	lee (2021)	Does fintech innovation improve bank efficiency? Evidence from Chinaâ€™s banking industry
262	li (2020)	How should we understand the digital economy in Asia? Critical assessment and research agenda
260	meske (2020)	Explainable Artificial Intelligence: Objectives, Stakeholders, and Future Research Opportunities
258	Park (2029)	FINANCIAL INCLUSION, POVERTY, AND INCOME INEQUALITY

Table 4:Top Articles for AI research in financial inclusion.

Table 4 ranks the most important papers on artificial intelligence in financial inclusion. With his study on the disruptive effect of fintech on financial services, Gomber (2018) has attracted 1,131 citations. Emphasising its importance in financial inclusion, Goyal (2020) (683 citations) does a bibliometric study of financial literacy. Particularly in underdeveloped countries, research by Mhlanga (2020) (509 citations) and Farah (2018) (472 citations) looks at how artificial intelligence affects digital finance and the acceptance of mobile banking.

Other important books include Omar (2020) (394 citations), which looks at how financial inclusion might help to reduce poverty, and Goodell (2021) (430 citations), which defines AI and machine learning problems in finance. Research on fintech's impact on green finance show the intersection of artificial intelligence, financial inclusion, and sustainability; examples include Wamba (2020) with346 references and Hao (2022) with 423 references.

Moreover, Murinde (2022) (329 citations) and Milian (2019) (320 citations) evaluate the influence of fintech on banking, whilst Lee (2021) (285 citations) investigates fintech innovation and banking efficiency. Subjects like digital economic expansion (Liu, 2021, 322 citations) and explainable artificial intelligence (Meske, 2020, 260 citations)

underscore the increasing significance of AI in financial systems. The many studies highlight AI's substantial and progressive role in financial inclusion, fintech, and economic development.

5. Most Prolific Authors in the Research Area

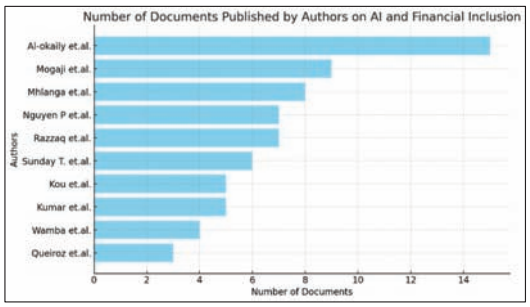

Figure 2: Top 10 leading authors' studies on

Figure-2 depicts the quantity of research articles concerning AI and financial inclusion produced by different scholars. Only authors with a minimum of three research articles on the chosen topic were considered. The table enumerates the preeminent scholars in this domain, accompanied by the quantity of articles they have authored. Al-Okaily et al. is the most productive author, having published 15 works, followed by Mogaji et al. with nine research papers. Mhlanga et al. are ranked third, with eight publications to their credit. Nguyen P et al. and Razzaq et al. have both authored seven publications each. The remaining authors, including Sunday T. et al., Kou et al., Kumar et al., Wamba et al., and Queiroz et al., have each contributed between three and six papers, underscoring their substantial impact on research in this domain.

6. Co-authorship of top Ten authors in the research on AI research in financial Inclusion

S NO.	AUTHOR	TP	TC
1	Mogaji, Emmanuel	9	898
2	Mhlanga, David	8	909
3	Nguyen, Nguyen Phong	7	689
4	Kou, Gang	5	673
5	Kumar, Satish	5	1187
6	Kauffman, Robert j.	2	1157
7	Gomber, Peter	1	1131
8	Goyal, Kirti	1	683
9	Parker, Chris	1	1131
10	Weber, Bruce W.	1	1131

Table 5 : Co-authorship of top Ten authors

The analysis of co-authorship examines scholarly collaboration on a particular subject, as detailed in Table 5. Co-authorship serves as a formal mechanism for researchers to collaborate intellectually.

Table 5 shows the co-authorship of ten of the top authors helping to research artificial intelligence in financial inclusion. From five publications (TP), Satish Kumar has the highest total citations (TC), at 1,187; Robert J. Kauffman follows with 1,157 from just two articles. Although each Gomber, Parker, and Weber have one publication, their combined influence with 1,131 citations is really significant. Having produced nine and eight books respectively with citations surpassing 900, Emmanuel Mogaji and David Mhlanga are among the most prolific writers. Additionally presenting important findings with varying citation impact are Nguyen Phong, Kou Gang, and Kirti Goyal. This paper emphasises the productivity and influence of eminent AI and financial inclusion studies experts.

7. Bibliographic Coupling of Countries:

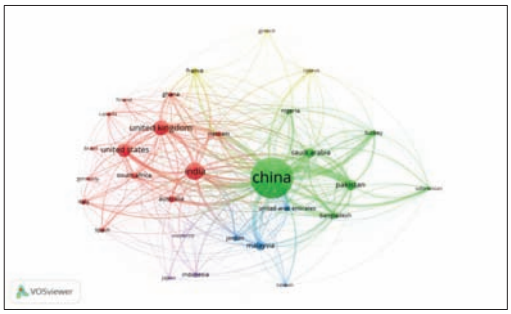

Figure 3: Network of bibliographic coupling of countries

COUNTRY	TP	CLUSTER	TC	COUNTRY	TP	CLUSTER	TC
China	547	1	14379	Italy	34	2	1086
India	172	2	5386	Ghana	31	2	1147
United Kingdom	138	2	5444	Spain	30	2	1596
United States	120	2	4611	Vietnam	29	2	1331
Pakistan	86	1	3007	Nigeria	28	1	1008
Malaysia	74	4	2676	Canada	22	2	722
Saudi Arabia	74	1	1951	Germany	20	2	1075
Australia	50	2	1835	Cyprus	18	5	1296
South Africa	46	2	1694	Japan	18	2	1340
Bangladesh	41	1	1675	Taiwan	18	4	674
France	41	5	2394	Uzbekistan	17	1	793
Turkey	37	1	1742	Morocco	13	3	739
Jordan	36	4	1265	Brazil	10	2	1000
United Arab Emirates	36	4	1717	Greece	10	5	634
Indonesia	34	3	1058	Finland	9	2	744

Table 6: table lists the top 30 countries of the five bibliographic clusters

China produces the highest volume of documents, succeeded by India. With 14,399 and 5,444 citations respectively, China and the United Kingdom have the most important impact among papers; India follows with 5,386 citations. Both under Cluster 2, the United Kingdom and the United States are major providers with 138 and 120 articles respectively. In Clusters 1 and 4 Pakistan (86 publications) and Malaysia (74 publications) show notable research activity. Additionally making significant contributions are Saudi Arabia, Australia,

and South Africa. Cluster 2 has the highest average influence per publication; nations including the UK, US, and France show high citation counts. With significant contributions from both developed and emerging economies, the dataset shows the different geographical dispersion of research on artificial intelligence in financial inclusion.

IV. Findings of the Study

The bibliometric analysis shows that research on artificial intelligence in financial inclusion is rather increasing, as seen by a notable rise in publications in recent years. Among the leading publications in this area are Financial Innovation, Sustainability, and Environmental Science and Pollution Research. Prominent writers include Mhlanga, Mogaji, and Kumar have made significant contributions shown by high citation counts. Reflecting great global involvement in this sector, China leads research output followed by India, the United Kingdom, and the United States. Co-authorship studies show that, including multidisciplinary contributions from finance, technology, and sustainability points of view, cooperative research is becoming ever more important. Emphasising AI's help to improve financial accessibility, efficiency, and global inclusion, the most often cited papers focus on fintech innovation, mobile banking, and AI-enhanced financial services.

V. Conclusion

This bibliometric study emphasises, based on a growing volume of publications, highly referred journals, and eminent personalities helping the field, the increasing relevance of artificial intelligence in financial inclusion. Innovations in fintech, mobile banking, and AI-enhanced financial services, which have greatly improved global financial access drive the research. Among the main contributors are China, India, and the United States, therefore underscoring the worldwide interest in using artificial intelligence for financial inclusion. Even with great progress in the field, continuous research on ethical issues, legal systems, and how artificial intelligence affects underprivileged populations is absolutely vital. Future studies should focus on the integration of artificial intelligence with new technologies, so fostering multidisciplinary cooperation, and ensuring financial inclusion by means of fresh AI-driven solutions. The results of this study provide researchers, legislators, and financial organisations trying to increase financial accessibility and inclusion using artificial intelligence with important new perspectives.

Future Research Directions

Transparency and equity should be given top priority as future studies on AI-driven financial inclusion probe the ethical and legal issues related to AI applications in finance. Examining how artificial intelligence affects underprivileged people—especially in developing countries—is crucial if we are to solve income inequalities. Combining artificial intelligence with innovative technologies including blockchain, machine learning, and quantum computing will help to enhance financial services.

Furthermore, multidisciplinary studies combining artificial intelligence with policy-making, cybersecurity, and behavioural finance will provide a whole picture of how AI affects financial inclusion. Making AI-driven financial literacy tools to improve people's financial decision-making capacity should be the main focus of researchers.

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SUBSERVED BY CHATGPT: EXPLORING THE ADOPTION OF AI TOOL FOR ACADEMIC TASKS AMONG COLLEGE AND UNIVERSITY STUDENTS

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Artificial Intelligence based chatbots, such as ChatGPT, have significantly influenced students' attitudes toward academic tasks, including projects, assignments, and presentations. This study examines the factors affecting students' adoption of ChatGPT using the UTAUT model, incorporating additional constructs such as Habit, Privacy, and Trust. Responses were collected from 469 undergraduate and post-graduate students across various universities in India. Structural Equation Modelling (SEM) using Partial Least Squares (PLS) was employed for data analysis. The findings reveal that Performance Expectancy, Social Influence, Trust, and Privacy negatively impact students' willingness to use ChatGPT, whereas Effort Expectancy and Habit significantly encourage its adoption. These insights will aid developers in refining ChatGPT's interface to enhance user experience and mitigate its limitations.

Keywords : *Student Adoption, UTAUT Model, Performance Expectancy, Effort Expectancy, Behavioural Intention.*
JEL Code: *I21, O33, C90*

I. Introduction

One of the functions of technology in education is to assist students in obtaining knowledge for any field, whether they are seeking inspiration or thinking of something novel (Laya,2023). Students have benefited from technology and innovation in many areas of their academic careers, notably when finishing project and assignment-related duties. According to a study by Dolean & Lervag (2022), the quantity of homework/assignments profoundly impacts writing quantity. Technology, ranging from personal computers to artificial intelligence, has aided students in developing more effective and efficient abilities that support their overall growth. The study by Laya (2023) reveals that integrating technology in completing assignments can help them complete work more quickly, reduce errors made during the process, and boost their confidence while sharing their thoughts. Using Android applications as a tool for completing science tasks was considered adequate. Students get more excited about completing homework and using technology for constructive purposes to access the internet (Safitri, 2019). A study that examined how GeoGebra was used to improve students' learning, performance, and motivation to learn mathematics discovered that integrating the tool improved students' understanding of the topic (Nzaramyimana et al., 2021). While the benefits of integrating technology into academics are still being debated, several studies have also pointed out potential drawbacks. Bhat (2023) evaluated the body of research on the subject and discovered that issues with the digital divide, possible distractions, data privacy concerns, and the requirement for proper teacher preparation existed when integrating technology into classrooms. Integrating technology in education helps students become comfortable academically but may raise some management concerns (Carstens et al.,2021). Technology has revolutionised over time and assists students in completing their academic tasks in diverse ways. One such technology that is becoming famous among students is ChatGPT. An open AI tool based on artificial

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intelligence, Chat-Generative Pretrained Transformer, is well-known among professionals, students, businesses, and researchers in a variety of fields (Martin et al., 2024). It has become increasingly popular among higher education pupils because it enables students to maximise the time needed for academic work. The findings of an investigation by medical students showed that while 66% of participants were familiar with ChatGPT, other AI technologies were far less well-known (Maab et al.,2025). ChatGPT has three significant roles in student learning: encouraging student involvement through content creation and cooperation, programming and technical support, and individualised tutoring (Heung & Chiu,2025). Students using ChatGPT are more confident in finishing tasks, preparing for tests, and spending less time searching for information (Ibnu et al.,2025). At the University of Nigeria, pressure, fear of failure, and the desire for high grades were the factors in adopting tools for academic writing (Adam, 2025). The studies conclude that the tool can change students' approach to thinking and performing their academic work, such as projects and assignments. Thus, studies focusing on the adoption of tool by university students will assist the stakeholders in defining the technology according to the requirements and overcoming the constraints, such as ethical and pragmatic considerations (Al-Hattami, 2025). However, limited attention has been paid to this research area, and there is a requirement for empirical studies examining university students' perceptions of utilizing ChatGPT for various academic purposes (Artur, 2023). Therefore, the current study attempts to close this gap by evaluating the factors affecting the adoption of ChatGPT for the completion of assignments and projects among students of various colleges and universities across India using the extended UTAUT framework.

II. Literature Review

Current scenario about ChatGPT in higher education

ChatGPT has attracted many customers since its inception in November 2022. Reports state that ChatGPT has 300 million active users and is quite well-known among college students. Over half of students in the United States utilise the tool for general and writing purposes monthly (Baek et al., 2024). According to academic needs, ChatGPT is anticipated to be an alternative solution to support the successful and efficient student learning process (Popy & Diny, 2024). It can assist with an extensive array of tasks within the realm of education, such as information retrieval, text translation, adaptive learning, data analysis, support research, automated grading, text writing, instructional support, and alternative questions to help students grasp the content more thoroughly ("Dempere et al., 2023"; "Aithal & Aithal, 2023"; "Firaina & Sulisworo, 2023"; "Sok & Heng, 2024"). Studies have also shown that, in addition to its benefits, ChatGPT has several drawbacks that academicians should be aware of before utilising it to instruct students. The risks of plagiarism and cheating, students' excessive reliance, unethical tool use, and possible biases are among the issues raised (Tareq et al., 2023). Students are becoming heavily dependent on ChatGPT due to using the tool as an assistant, which makes them accustomed to using technology to complete homework and projects for school credit. Artur (2023) discovered that the intention to use ChatGPT in postsecondary education is most significantly impacted by habit. The use of tools in high-level studies has been the subject of investigation.

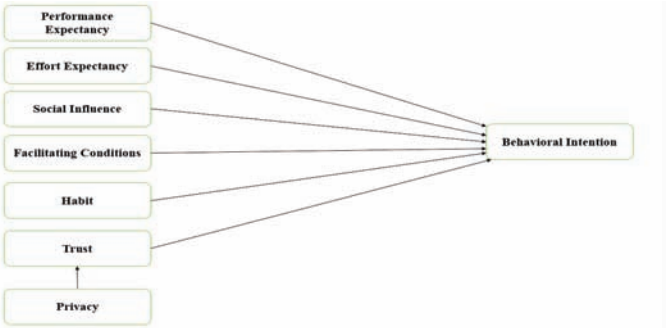
Theoretical Framework

Numerous competing models with various acceptance criteria have been produced by embracing technology research (Venkatesh et al., 2003). Each model has its own set of limitations; to overcome these, a superior framework was introduced. In line with this, Venkatesh empirically compared and analysed the prominent models to introduce a novel structure called the 'Unified Theory of Acceptance and Use of Technology (UTAUT)' in 2003. It incorporates four variables: Performance Expectancy (PE), Effort Expectancy (EE), Facilitating Conditions (FC), Social Influence (SI), and Behavioural Intention (BI); scholars can discover potential adoption barriers and learn more about what drives early adopters to embrace new technology by comprehending these variables (Venkatesh, 2022). UTAUT is one of the many models with variables that include distinct constructs from other technology adoption models. As a result, it is widely regarded as a leading, reliable, and contemporary framework for assessing tech acceptance (Shiferaw & Mehari, 2019). Since its introduction, the framework has been utilised in various research studies to understand the uptake of various tech innovations among users, including ChatGPT. Many scholars have incorporated various constructs in the UTAUT model to make the framework more robust and to understand other factors. However, in 2012, an advanced version of UTAUT was introduced with the name of UTUAT 2, which retained the variables of the earlier version along with new constructs like Habit, Price Value, and hedonic Motivation.

Nevertheless, several researchers have adopted the UTAUT model and expanded the framework with additional components based on the goals and specifications of the investigation. For example, Sarkar et al. (2025) added grievance redressal, social support, and anxiety to comprehend the use of social commerce. This study incorporates Habit, Privacy, and trust in the initial UTAUT model to investigate the adoption of ChatGPT among the students for assistance in projects and assignments. Habit is the original construct of the UTAUT 2 model and has been incorporated in many studies to investigate the use behaviour for ChatGPT. Privacy is considered an important factor in shaping BI. AI adoption in academics, mobile health services, and mobile payment solutions has recognized the function of privacy in the acceptance of the tech ('Liu et al., 2022'; 'Lee et al., 2019'; 'Rana et al., 2024'). Trust is another important construct in understanding technology adoption, like Cashless Payment Systems, Internet Banking, E-Government & Cloud Computing ('Namahoot et al., 2023'; 'Cheng et al., 2008'; 'Taiwo et al., 2012'; 'Alharbi et al., 2014'). The study is conducted in higher education settings, with the study object being BI to use ChatGPT, and the survey object is the students of colleges and universities who use the tool to complete assignments and projects. Therefore, the 'UTAUT' model is proposed as the theoretical framework.

Fig. 1

Conceptual Framework



Hypothesis Development

Performance Expectancy

The degree to which a person thinks that utilising the system will enable him or her to improve job performance is known as performance expectancy, as described by ("Venkatesh et al., 2003"). The construct has been instrumental in shaping the behavioural intention of users to adopt technology, especially AI-based ones. Many innovations like IoT (Xu & Suzuki, 2025), Social Commerce (Sarker et al.,2025), AI-powered EFL pedagogy (Zaim et al.,2024), M-Payment (Chand & Kumar, 2024) have been constructed as a significant factor in framing the intention for adoption. However, Namahoot & Jantasri (2022) found that construction negatively influenced Thailand's Cashless Payment System. In the ChatGPT scenario, studies have indicated that PE will positively affect the intention, as pupils at universities and colleges will believe that adopting the tool will help them complete their projects and assignments.

H1: 'Performance Expectancy' has a significant influence on 'Behavioural Intention'.

Effort Expectancy

According to Venkatesh et al. (2003), effort expectancy refers to the degree of ease with which the system can be used. The ease of using technology plays an important role in forming the user's intention. EE has contributed significantly to the acceptance of ChatGPT, as indicated in the study (Tribikam et al.,2024). Many innovations found the construct as a significant factor in framing the intention for the usage, which includes Social Commerce ("Sarker et al.,2025"), AI-Based Medical Devices ("Young Joo Kim et al., 2024"), Flipped Classroom Teaching (Yufan & Wang, 2023), and Fintech Adoption ("Florentina et al.,2023"). However, Zaim et al. (2024) found EE has no notable impact on BI for adopting AI-powered EFL pedagogy. Students might adopt ChatGPT if they find it easy to use when completing project tasks and assignments. Based on the aforementioned studies, the following hypotheses are formed.

H2: 'Effort Expectancy' has a significant influence on 'Behavioural Intention'.

Social Influence

Social influence is the degree to which an individual perceives that people who are important to them believe that he or she should use the new system (Venaktesh et al., 2003). Many researchers have found that peer impact has a significant role in the formation of BI, as shown in M-Health (Aljohani, 2025), Blockchain Technology (Shazad & Zhang,2024), Mobile-Based Clinical Guidelines (Demsash et al.,2024) & M-Payment (Chand & Kumar, 2024). In contrast, Fashoto et al. (2024), within their research, revealed that the variable had no significant influence on the acceptance of Online Learning Systems such as Moodle. The global acceptance and rapid increase in ChatGPT usage following its official launch

suggest that social influence positively impacts its adoption (N Saini,2023). Thus, the following hypotheses are formulated.

H3: 'Social Influence' has a significant influence on 'Behavioural Intention'.

Facilitating Conditions

It refers to the degree to which an individual believes that an organisational and technical infrastructure exists to support the use of the system (Venkatesh et al.,2003). Studies on various technologies discovered constructs have a significant role in the adoption of technology, which includes the IoT (Shibly et al.,2025), Online Agriculture Education (Ghouse et al.,2024), AI-generated Content (Weiyi li,2024) & Digital Health Technologies (Chen et al.,2024). Contrary to the studies, the construct found no significant influence on adopting AI-powered EFL pedagogy (Zaim et al.,2024). The availability of smartphones and the internet may help students feel more confident that ChatGPT will support them in finishing their projects and assignments. Taking into account the studies, the following hypotheses are formulated.

H4: 'Facilitating Conditions' have a significant influence on 'Behavioural Intention'.

Habit

Studies show that the factors affecting the adoption of ChatGPT are highly influenced by habitat, as shown in (Artur et al.,2023; Gulati et al.,2024). (Venkatesh et al., 2003) defines habit as the extent to which an individual tends to perform behaviours automatically because of prior learning and experiences with the technology. Many studies found that the construct positively influences behavioural intention, which includes AIKU (Sembiring et al.,2024), Air Quality Monitoring Solutions (Qurotul et al.,2024), Mobile Assisted Language Learning (Li Pan et al.,2024) & Communicational AI ("Cortez et al.,2024"). The following hypothesis is put forth in light of this literature.

H5: 'Habit' has a significant influence on 'Behavioural Intention'.

Trust

Since Trust gives users optimism that technology will help them achieve their goals, it is a significant component that influences behavioural intention. According to McAllister (1995), Trust is a positive expectation in which someone has faith and confidence in the words, actions, and decisions of others. The construct has been incorporated into the UTAUT model many times and has positively influenced behavioural intention. Studies of Social Media Platform for government services ('Almansoori et al., 2024'), AI adoption in Academia ('Rana et al., 2024'), Smart Tourism (Lee,2024), Thailand's Cashless Payment System (Namahoot,2022) found that Trust plays a key role in the adoption of a technology. Considering these findings, the following hypotheses are put forth.

H6: 'Trust' has a significant influence on 'Behavioural Intention'.

Privacy

After Trust, privacy is crucial in technology adoption since it assures users that technology will be secure and not damage their personal property. Trust is also impacted by privacy since a feeling of security encourages the uptake of an information system. The variable has been widely embraced in studying technology adoption in the UTAUT framework, and it has been discovered that privacy has a constructive impact on trust and behavioural intention. On the contrary, adopting AI for Academia found privacy negatively affecting behavioural intention (Rana et al.,2024). In the scenario of ChatGPT, factors like privacy help form behavioural intention as they will ensure that students' data is protected when they use the tool to complete projects or assignments in universities/colleges.

H7: 'Privacy' has a significant influence on 'Trust'.

H8: 'Privacy' has a significant influence on 'Behavioural Intention'.

III. Method Research

3.1 Data collection

The study aims to explore students' intentions to use ChatGPT for their project/assignment work. This innovative research addresses academic needs and uniquely examines student usage of ChatGPT. To fulfil the research objective, we incorporated a question to identify whether respondents have prior experience with ChatGPT. As Scholars can demonstrate a keen understanding of ChatGPT's significant impacts, it helps provide students with content for project/assignment work. So, our data was collected from undergraduate and post-graduate students from different Universities in India. Previous studies have collected data from Marketing Students (Gulati et al., 2024), Researchers

(Abdelhafiz et al., 2024), UAE instructors (Talal AlAraj, 2024), Students in Vietnam (Popy & Diny,2024)

Participants completed an online questionnaire to evaluate their experiences with ChatGPT. Four hundred sixty-nine individuals' responses were collected; their profiles are detailed in Table 1. Measurements that have been verified for every construct were sourced from established research. A 5-point Likert scale was used for assessment, with 1 signifying significant disagreement and 5 indicating strong agreement.

Table 1

Individuals' Profile

Demographic	Frequency	Percentage
Gender		
Male	238	50.7%
Female	231	49.2%
Educational Qualification		
Undergraduate	308	66%
Postgraduate	161	34%
University		
Sharda University	39	8.3%
IGNOU	57	12.1%
GGSIPU	105	22.5%
Chaudhary Charan Singh University	34	7.24%
Delhi University	61	13%
Christ University	46	9.8%
Lal Bahadur Singh PG College	37	7.88%
Sharda University	95	20%

To examine students' intention towards adopting ChatGPT, we used the Extended UTAUT framework in this Paper. The constructs examined include 'Performance Expectancy', 'Effort Expectancy', 'Social Influence', 'Facilitating Condition', 'Habit', 'Privacy', 'Trust', and 'Behavioural Intention'. PE for four items, EE for four items, and three items using behavioural intention were taken from Venkatesh et al. (2003). Three items measuring SI and three items for FC were taken from Venkatesh et al. (2003) & and Rana et al. (2024). The habit was evaluated using four items from (Venkatesh et al., 2012). Trust used three items, and privacy was measured with two items adapted from (Lim et al., 2006). In this study, we gathered a convenience sample of 469 respondents using Google Forms to collect data in June-September 2024.

3.2 Measurement model

All constructs were assessed using 'Cronbach's alpha' and 'Composite Reliability' (CR) during reliability testing. Convergent validity was assessed with the help of 'Average Variance Extracted' (AVE), with all reflective item loadings surpassing the 0.7 threshold. The construct was treated as high-order, with loadings for Social Influence (0.97), Facilitating Condition (0.96), and Performance Expectancy (0.90). Composite reliability values and Cronbach's alpha confirmed reliability, although one item from habit (H3) was removed, as they found less than 0.70. AVE ranged from 0.78 to 0.97, and CR ranged from 0.78 to 0.99.

Additionally, values of AVE for every construct were more than 0.5. supporting convergent validity. By ensuring that the AVE's square root was more significant than the component correlations, discriminant validity was proven (Tables 2–3).

Variable/Constructs	Items	Standardised factor loading	Cronbach Alpha	Composite Reliability	Average Variance Extracted
Performance Expectancy	PE1	.98	0.96	0.97	0.90
	PE2	.98			
	PE3	.90			
	PE4	.94			
Effort Expectancy	EE1	.87	0.92	0.94	0.81
	EE2	.94			
	EE3	.91			
	EE4	.87			
Social Influence	SI1	.98	0.98	0.99	0.97
	SI2	.99			
	SI3	.98			
Facilitating Condition	FC1	.98	0.98	0.98	0.96
	FC2	.97			
	FC3	.98			
Habit	HT1	.74	0.85	0.91	0.78
	HT2	.94			
	HT3	.13			
	HT4	.94			
Privacy	P1	.90	0.90	0.93	0.83
	P2	.91			
	P3	.93			

Trust	TR1	.95	0.95	0.97	0.91
	TR2	.95			
	TR3	.96			
Behavioural Intention	BI1	.95	0.94	0.96	0.89
	BI2	.95			
	BI3	.93			

Note. α: Cronbach's alpha, CR: Composite reliability, AVE: Average variance extracted

Table 3

Discriminant Validity

	BI	EE	FC	HT	PE	P	SI	TR
BI	**0.943**							
EE	0.831	**0.90**						
FC	0.816	0.738	**0.97**					
HT	0.775	0.514	0.596	**0.883**				
PE	0.141	0.082	0.051	0.224	**0.948**			
P	0.486	0.321	0.342	0.614	0.16	**0.911**		
SI	0.48	0.492	0.435	0.417	0.189	0.279	**0.98**	
TR	0.471	0.339	0.376	0.563	0.105	0.387	0.339	**0.95**

3.3 Data Analysis

Data analysis was done with the support of Smart PLS (v.4.1.0.2), a widely recognised software package that applies the structural equation modelling method known as partial least squares (PLS-SEM). Moreover, two well-known techniques for SEM are usually used: 'partial least squares SEM (PLS-SEM)' and 'covariance-based SEM (CB-SEM)'. This research opted for the PLS-SEM technique because of its capacity to explore intricate relationships among constructs, validate theoretical levels, and estimate path coefficients (Hair et al., 2011). PLS-SEM ensures robust theory validation and accurate reporting, making it a dominant approach for predicting direct or mediating relationships among components (Sarstedt et al., 2011; Henseler et al., 2009).

IV. Result

4.1 Structural model

The R-square in Table 4 determines the extent to which the independent variable can explain the change in the dependent variable (Hair et al., 2019). In this study, BI and Trust have R2 values of 71% and 81.2% respectively.

Table 4

R-Square

	R-square	R-square adjusted
Behavioral Intention	0.712	0.710
Trust	0815	0.812

4.2 Hypothesis testing

The Smart-PLS analysis yielded information on the relationships, model fit, and statistical significance levels. A bootstrapping analysis with 5,000 subsamples was undertaken to understand connections within constructs in the UTAUT, and three other constructs are utilised in this investigation, including Habit, Trust, and Privacy towards the Behavioural intention of using Chat GPT for project/assignment work. The findings, both in Figure 2 and Table 5, present the significant and non-significant results. The analysis revealed that the direct relationships hypothesised in H2, H3, H5, and H8 are significant, while the hypotheses for H1, H4, H6, and H7 were not supported.

Fig 2

Model

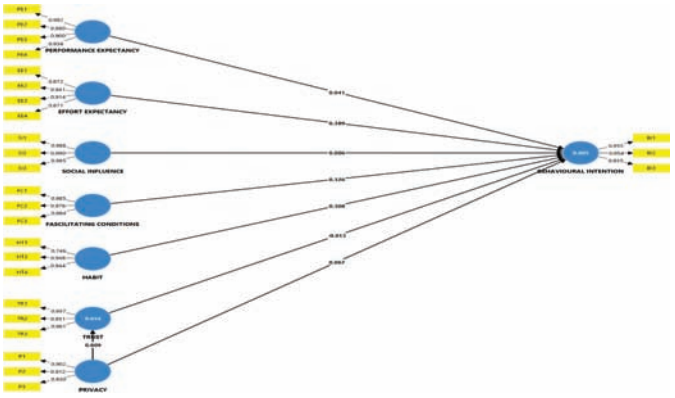


Table 5

Path Coefficient and Results

Hypothesis	Relationship	β value	T statistics	Hypothesis
H1	PE —> BI	0.041	1.232	Not Supported
H2	EE -> BI	0.389	7.007	Supported

H3	SI -> BI	0.006	5.859	Supported
H4	FC -> BI	0.326	0.168	Not Supported
H5	HT -> BI	0.308	6.818	Supported
H6	TR -> BI	-0.013	0.243	Not Supported
H7	P -> BI	0.067	1.261	Not Supported
H8	P -> TR	0.809	23.563	Supported

Discussion

Using students as a survey object, the study incorporated the UTAUT model along with three extra variables, which are Habit, Privacy, and Trust, to determine elements driving adoption of ChatGPT regarding the completion of projects/assignments in colleges and universities.

PE had reported a negative impact on BI (beta= 0.043, T-value= 1.232). This finding aligns with the research of Namahoot (2022), but it contradicts the results of the established findings of (Sarker et al., 2025; Xu & Suzuki, 2024; Zaim et al., 2024), which found that construct positively impacts intention. The results demonstrate that the adoption of the tool is not useful for them due to not giving effective results of their query, and getting bored with the same repeated results.

EE positively impacted BI (beta= 0.386, T-Value= 7.007), which indicates that using the tools is very easy for the students for projects/assignments. Our study complies with the results of (Sarker et al., 2025; Kim et al., 2024; Kurniasari et al., 2023), whereas it contradicts the findings of Zaim et al. (2024), where construct negatively impacted the adoption of Pedagogy.

In the case of the SI results indicate that it has negatively influenced the BI (beta= 0.006, T-Value= 0.168), supported by findings of Stephen et al. (2024) in the case of the adoption of online learning. However, the study of (Nasser Aljohani, 2025; Khuram et al., 2024; Demsash et al., 2024) contradicts the findings by showing that the construct positively affects the BI. This study indicates that peer influence does not appreciably shape the intention of students to use tools.

Another construct, FC, positively influences BI (beta = 0.325, T-Value = 5.859), which corresponds to the results of (Motteh S et al., 2025; L. Mohd. et al., 2024; Weiyi Li, 2024). The result shows that the availability of smartphones and the internet gives students confidence in using ChatGPT for academic work. However, our findings contradict the study of Zaim et al. (2024), which found that the construct negatively impacted BI.

HT is another significant construct that helps shape students' behaviour when adopting ChatGPT (beta= 0.312, T-Value = 6.818). Our findings suggest that using ChatGPT has become a habit for the pupils as it helps them to retrieve or complete their projects with less effort. This is in line with (Qurotul et al., 2024; Patrick et al., 2024; Artur et al., 2023; Sembiring et al., 2024).

TR had reported negatively in the analysis (beta=-0.016, T-Value= 0.243); our study aligns with the (Rana et al., 2024; Taiwo et al., 2012) but contradicts the outcomes of (Namahoot, 2022). It suggests that students have low faith in the tool, as the ChatGPT output is unreliable and can help students complete their tasks on time and with less effort, but cannot add value to their knowledge.

In the study, privacy had a negative influence on the BI (beta= 0.071, T-Value= 1.261), which is supported by the results of Rana et al. (2024), contradicts the findings of Almansoori et al. (2024), and hints that the factor of privacy does not contribute in shaping BI of students for the adoption of tool in colleges & universities. At last, privacy had the highest influence on TR (beta= 0.807, T-Value=23.563), which is in line with (Almansoori et al., 2024) and implies that privacy helps users of tech to keep faith in the tech.

V. Conclusion

Artificial Intelligence has impacted the education sector in a way that no technology has in the past. Various AI-based chatbots and tools have been created in recent years that are helping students, teachers, and all the stakeholders related to this sector in diverse ways. From planning the classes and the courses for the teachers to helping complete assignments and projects, ChatGPT and AI-based tools provide solutions with less effort. Like any other technology, ChatGPT and other AI-based tools are not entirely perfect, as many concerns are raised by the researchers for the assimilation of the tools in education by highlighting their ethical issues, the impact of these tools on the creativity of the students, incapability of the technology in giving knowledge to the students, and many more. The present study attempts to validate constructs shaping the purpose of the pupils for using ChatGPT in

Academic tasks using the extended UTAUT approach. The results reveal that EE had the highest impact on the BI following Habit, which suggests that the students' minimal effort, which leads to completing their assignments, is forming a habit of utilising the tool without thinking or any development goals. The research results will assist the tool developers in evaluating adoption factors and making significant changes in the interface of the ChatGPT to overcome the tool's limitations and help the students overcome their reliance on such technology. However, this study has certain limitations: First, the research survey object includes students of colleges/universities and ignores other stakeholders. Secondly, it ignores the role of mediating variables like age, gender, and different courses the students pursue. Lastly, our data is collected specifically from the management field students, and we cannot get insights from other field students, which can give better results for future endeavours.

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CODES	ITEMS PERFORMANCE EXPECTANCY	REFRENCES
PE1	I find the Chat-GPT useful in my project work/assignments.	
PE2	Using the Chat-GPT enables me to accomplish my project work/assignments more quickly.	
PE3	Using the Chat-GPT increases my productivity while completing my project work/ assignments.	**(Vishwanath Venkatesh et al., 2003)**
PE4	If I use Chat-GPT, I believe it will increase my academic performance.	
	EFFORT EXPECTANCY	
EE1	My interaction with Chat-GPT for project work/assignment is clear & understandable.	
EE2	It would be easy for me to become skilful at using Chat-GPT for project work/assignment.	**(Vishwanath Venkatesh et al., 2003)**
EE3	I find Chat-GPT easy to use for my project work/assignment.	
EE4	Learning to operate Chat-GPT for project work/assignment is easy for me.	
	SOCIAL INFLUENCE	
SI1	People who influence my behaviour think that I should use Chat-GPT for my project work/assignments.	
SI2	People who are vital to me suggest that I should use Chat-GPT for some crucial project tasks/assignments.	**(Vishwanath Venkatesh et al., 2003; Rana et al.,2024)**
SI3	My classmates and co-workers have helped encourage me to use Chat-GPT for project work/assignments.	

	FASCILITATING CONDITIONS	
FC1	I have the resources (e.g., phone or computer) to use Chat-GPT for my project tasks/assignments.	
FC2	I have the necessary knowledge to use Chat-GPT for my project work/assignments.	**(Vishwanath Venkatesh et al., 2003; Rana et al.,2024)**
FC3	The Chat-GPT is compatible with other systems I use for projects/assignments.	
	HABIT	
HT1	The use of Chat-GPT for completing my projects/assignments has become a habit for me.	
HT2	I am addicted to using Chat-GPT for my projects/ assignments.	**(Vishwanath Venkatesh et al., 2012; Strzelecki et al.,2023)**
HT3	I must use Chat-GPT for my Project work/assignments.	
HT4	Using Chat-GPT for my project work/assignments has become natural for me.	
	TRUST	
TR1	I trust that the Chat-GPT will function as needed for my project work/assignments.	
TR2	Chat-GPT appear trustworthy when used for project tasks/assignments.	**(K.H. Lim et al.,2006)**
TR3	I trust that Chat-GPT keeps best interest of their customers in mind.	
	PRIVACY	
P1	I feel Chat-GPT will respect my privacy while using it for project work/assignments.	
P2	I believe that Chat-GPT do not asks for the information which is not required.	**(K.H Lim et al.,2006)**
P3	Chat-GPT protects and do not disclose my information to other parties.	
	BEHAVIOURAL INTENTIONS	
BI1	I intend to continue using Chat-GPT for my project work/assignments.	
BI2	I will always try to use Chat-GPT in my all projects/ assignments	**(Vishwanath Venkatesh et al., 2003)**
BI3	I plan to continue using Chat-GPT frequently for my projects/assignments.	

MILLENNIAL EMPLOYEES' JOB SATISFACTION WITH WORK-LIFE BALANCE USING STRUCTURAL EQUATION MODELLING

Dr. Prabakaran Vijayan*
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Purpose: *The study aims to evaluate the factors that impact job satisfaction among millennial employees regarding work-life balance.*

Design/Methodology/Approach: *The study employs quantitative research methods and utilises Structural Equation Modelling (SEM) to analyse data acquired from a convenience sample of 240 millennial employees. The proposed model includes latent variables representing work-life balance and job satisfaction, along with corresponding indicators.*

Findings: *The study suggests a considerable positive relationship between work-life balance factors such as managing leisure time, personal well-being, quality of work life, self-care management, stress management, and time management and job satisfaction among millennial employees.*

Conclusion: *The study concludes that a robust analysis of the relationships between the variables offers guidance for organisations seeking to improve employee job satisfaction and well-being in the context of work-life balance.*

Originality/Value: *The study provides valuable insights for organisations looking to create supportive and fulfilling work environments for millennial employees, addressing the unique factors that contribute to their job satisfaction and work-life balance.*

Keywords : *Millennial employees, Job satisfaction, Work-life balance, Managing leisure time, Personal well-being, Quality of work life.*
JEL Code: *J20, J28, C29*

I. Introduction

The ability to effectively manage and balance the demands of work and personal life allows individuals to maintain a healthy balance of professional and personal responsibilities. This necessitate effective management of time, energy, and attention to satisfy both work and personal duties such as family, relationships, hobbies, and self-care (Catherine Tan Yee Wen, 2018). Achieving a desirable work-life balance has been linked to increased job satisfaction, improved physical and mental well-being, enhanced job performance, and reduced turnover intentions. Employee motivation affects their attitudes, which in turn affects an organisation's competitive advantage (Aryee et al., 2013). Those who face job insecurity may develop negative attitudes towards their situation, negatively influencing their work-life balance. Consequently, there is a higher emphasis on human resource practises addressing job insecurity and employee personal outcomes (Hung-Yu-Tsai and Meng-Hsiu Lee 2022). Family happiness and achievement can lead to professional fulfilment and pleasure (Victoria et al., 2019).

Organisations are concerned with employee job engagement because of its enormous potential for creating organisational prosperity. Simultaneously, they are increasingly attempting to create conditions that allow employees to achieve work-life balance (Jacob Wood, 2020). The presence of a good work-life function with minimal role conflict (Jayeeta Majumder et al., 2019) has been found to improve worker productivity and well-being (Dousin et al., 2019). Exultant employees are more productive and focused, and more institutions rely on them to maintain a balanced lifestyle. In today's rapidly changing

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work environment, organisations face numerous challenges in attracting and retaining talented employees, particularly millennials. As a generation known for its unique characteristics and preferences, millennials place a significant emphasis on achieving a satisfactory work-life balance. Their expectations and values differ from those of previous generations, and understanding their needs is crucial for organisations seeking to optimise employee satisfaction and productivity. Furthermore, in today's fast-paced climate, human resource managers are seeking for methods to enhance their companies' bottom lines, increase employee satisfaction, retain employees with critical business skills, and stay updated on workplace trends.

II. Review of Literature

Several studies have been indirectly helpful to this research, as follows:

Thomas Kalliath and Paula Brough (2008) describe six literature-based conceptualisations of work-life balance (WLB): multiple roles, equity across multiple roles, satisfaction between multiple roles, fulfillment of role salience between multiple roles, a conflict-facilitation relationship, and perceived control between multiple roles. Jacob Wood et al. (2020) investigate the relationship between work-life balance and job engagement, providing background information that demonstrates the links between job engagement and work-life balance.

Pai S. et al. (2021) examine the significant impact of the COVID-19 pandemic lockdown on professionals' ability to balance work and life due to sudden and unexpected changes. Jayeeta Majumder et al. (2019) focus on essential elements influencing work-life balance and job happiness, such as organisational facility, familial positive interference, and employee mental strength. They utilised SPSS and AMOS Software for Exploratory Factor Analysis (EFA) and Structural Equation Modeling (SEM), also addressing work-life balance concerns in industrial firms. Amadeja Lamovsek et al. (2022) discuss the significance of enhanced work design for employee work-life balance. They investigate whether organisationally enforced formalisation and workers' individual adaptive personality qualities (proactive personality and resilience) act as boundary conditions that enhance this positive association. Agha K. et al. (2017) found that work and personal life interference are adversely linked with job satisfaction, while work and personal life improvement are favorably connected with job satisfaction. Dipanwita Chakrabarty et al. (2020) discovered that various factors, such as organisational culture, extracurricular activities, family-related factors, personality characteristics, and motivation, impact individuals' work-life balance. A balanced work and personal life may result in enhanced employee productivity, positively influencing individual progress.

Sakthivel Rania and Kamalanabhan (2011) examine the link between employee happiness and work-life balance, considering components such as career opportunity, recognition, job duties, payments, benefits, superior-subordinate relationships, employee happiness, and work-life balance. Perengki Susanto et al. (2022) found that numerous components improve work satisfaction and performance, with job happiness, work-life balance, and job performance being moderated in some way. Family-supportive supervisor behavior interacts with work-life balance and job satisfaction, altering the connection between work-life balance and job performance and the relationship between job satisfaction and job performance.

Meng-Hsiu Lee and Hung-Yu Tsai (2022) discovered that perceived control and work-life balance programs positively affect the relationship between job insecurity and life satisfaction. Sofia Bano and Abuzar Wajidi (2021) found that employees who understand the relevance of work-life balance can manage their jobs and relationships better. Hamid Abdullah et al. (2022) found a positive association between various components of job liking and work-life balance. Afia Nyarko Boakye et al. (2023) identified work-life balance as a measure of job satisfaction in higher education, noting that workplace assistance can mitigate personal life interference with work and vice versa. Both work-life and personal-life conflict had a negative impact on job satisfaction.

Chandan A. Chavadi et al. (2021) found that mismatched employment is positively related to turnover intention, while job satisfaction is negatively related to turnover intention. Work mismatch and work happiness have a negative relationship. Their findings revealed that work satisfaction moderated the associations between job mismatch and the desire to leave.

Several studies addressed job satisfaction across all employees, but the notion of work-life balance was specifically addressed for millennial employees. Variables such as the quality of work life, personal well-being, managing leisure time, time management, and stress

management are associated with personal well-being and job satisfaction among millennial employees. This study contributes to a more comprehensive understanding of the complex dynamics between work-life balance and job satisfaction, allowing organisations to develop targeted interventions and practices to improve employee well-being and satisfaction across various contexts and generations.

Research Questions

1. What are the factors influencing job satisfaction among millennial employees?

2. Is there a relationship between work-life balance and job satisfaction among millennial employees?

Objectives of the Study

1. To identify the key factors that influence job satisfaction among millennial employees.

2. To analyse the relationship between work-life balance and job satisfaction among millennial employees, thereby providing valuable insights into the specific impact of work-life balance on job satisfaction.

III. Research Methodology

The study employs a quantitative research design to gather data and analyse the relationship between job satisfaction and work-life balance among millennial employees. The respondents (born between the early 1980s and the mid-1990s), were selected from various companies and enterprises in the Chennai district. The sample size of 240 provided adequate data for valid analysis. A convenient sampling method was used to ensure the target population's representativeness, and the chosen sample contributed valuable insights to the understanding of job satisfaction and work-life balance.

Identify the key factors influencing job satisfaction a comprehensive literature review was conducted based on the journals published between 2010 and 2023 were reviewed, and factors were selected based on their recurrence and empirical support in prior studies (Judge et al., 2001; Haar et al., 2014). The most relevant factors identified include Time Management, Leisure Time Management, Stress Handling, Self-Care, Quality of Work Life, and Personal Well-being. These variables were frequently reported to have a significant influence on millennials' job attitudes (Kossek et al., 2011; Twenge & Campbell, 2012).

Data was analyzed using Structural Equation Modeling (SEM) to assess the relationship between work-life balance and job satisfaction. Additionally, regression analysis was applied to test the hypotheses. The reliability of the constructs was tested using Cronbach's Alpha, and the validity was assessed through Composite Reliability and Average Variance Extracted (AVE) (Hair et al., 2010).

Hypothesis

The following null hypotheses were developed based on the objectives of the study on millennial employees' job satisfaction regarding work-life balance:

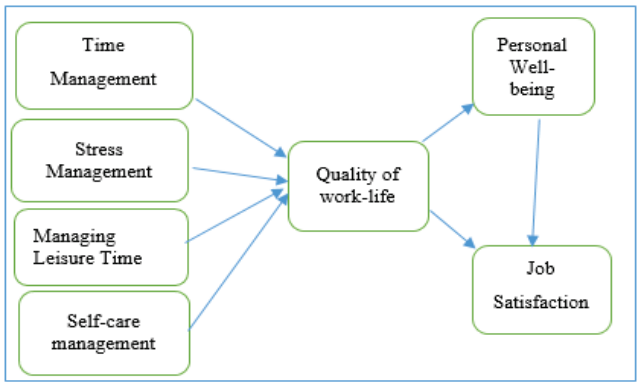
(H0) There is no positive relationship between managing leisure, personal well-being, quality of work-life, self-care management and time management with job satisfaction among millennial employees.

The study aims to test and validate these hypotheses through the application of SEM and regression analysis of the relationships among the constructs.

Model Specification – Job Satisfaction

Job satisfaction model to assess the influence of work-life balance factors on job satisfaction among millennial employees and provide insights into the specific areas where interventions can be made to enhance job satisfaction in the context of work-life balance. Here's an outline of the proposed model:

Figure 1
Model of Job Satisfaction with Work-life balance



The model can be analysed using SEM to estimate the parameters and test the relationships between the constructs. This model helps us understand the factors influencing job satisfaction among millennial employees and how work-life balance impacts their overall job satisfaction.

Latent Variables

This latent variable represents the overall work-life balance experienced by millennial employees. It includes indicators related to managing leisure time, personal well-being, quality of work life, self-care management, stress management, and time management.

Indicators

The concept of Work-Life Balance (WLB) in this study is examined through seven key latent variables, each operationalized with specific indicators. These include Time Management (TM), Managing Leisure Time (MLT), Stress Management (SM), Self-Care Management (SCM), Quality of Work Life (QWL), Personal Well-Being (PWB), and Job Satisfaction (JS). Time Management focuses on how individuals prioritize tasks and balance professional and personal commitments (Greenhaus & Allen, 2011). Indicators include handling high-priority items and minimizing time wastage. Managing Leisure Time reflects engagement in non-work activities such as hobbies and social gatherings (Kalliath & Brough, 2008), with indicators like using vacation days and participating in physical activities. Stress Management involves identifying personal coping mechanisms, indicated by sleep quality and emotional control (Crawford et al., 2010). Self-Care Management assesses routines like wellness maintenance and setting personal boundaries. Quality of Work Life explores job satisfaction, autonomy, and growth opportunities (Sirgy et al., 2001). Personal Well-Being covers physical and emotional health and life satisfaction, using indicators such as a sense of purpose and mental comfort at home. Finally, Job Satisfaction includes flexibility, innovation, and interpersonal relations at work (Judge et al., 2001). These indicators collectively provide a multidimensional framework to understand how individuals perceive and manage their work and personal life demands.

Work-Life Balance Indicators:

Indicator 1: Time Management (Task prioritization, work-life balance practices)

Indicator 2: Managing Leisure Time (Engaging in hobbies, personal interests)

Indicator 3: Stress Management (Coping strategies, stress reduction techniques)

Indicator 4: Self-Care Management (Setting boundaries, self-care activities)

Indicator 5: Quality of Work Life (Supportive work environment, work-life balance policies, growth opportunities)

Indicator 6: Personal Well-Being (Physical health, mental well-being, life satisfaction)

Indicator 7: Job Satisfaction (General satisfaction with the job)

IV. Results and Discussion

Model Prediction

Model prediction in the context of SEM uses the estimated relationships and parameters of the model to make predictions about the relationships between variables or the values of certain variables of interest. By inputting values for the exogenous variables (independent variables) into the model, predictions can be generated for the endogenous variables (dependent variables) based on the estimated coefficients and structural relationships.

Reliability and Validity

Reliability and validity are two key concepts in research that examine measurement quality and dependability, essential for accurate and meaningful results. Appropriate statistical analysis was used to examine and report on the precision and accuracy of the measurements.

Table 1
Construct Reliability and Validity

Variables	Cronbach's Alpha	Composite Reliability	R Square	AVE
Job Satisfaction	0.853	0.857	0.280	0.774
Managing Leisure Time	0.811	0.813	----	0.725
Person Well Being	0.874	0.880	0.575	0.888
Quality of Work Life	0.897	0.904	0.507	0.829
Self-Care Management	0.823	0.857	----	0.735
Stress Management	0.778	0.784	----	0.693
Time Management	0.748	0.770	----	0.661

Source: Computed from primary data

The Job Satisfaction variable demonstrates good internal consistency, with a cronbach's alpha of 0.853, indicating that the items used to measure job satisfaction are reliable. The composite reliability of 0.857 further confirms the reliability of the scale. The R square value of 0.280 suggests that 28 per cent of the variance in job satisfaction can be explained by the

other variables included in the model. The AVE value of 0.774 indicates that 77.4 per cent of the variance in job satisfaction is captured by the items.

The Personal well-being variable exhibits excellent internal consistency, with a cronbach's alpha of 0.874, indicating high reliability. The composite reliability value of 0.880 further supports the reliability of the scale. The R square value of 0.575 suggests that 57.5 per cent of the variance in personal well-being can be explained by the other variables included in the model. The AVE value of 0.888 indicates that 88.8 per cent of the variance in personal well-being is captured by the items. The Quality of work life variable has a cronbach's alpha of 0.897, indicating high reliability. The composite reliability value of 0.904 further supports the scale's reliability. The R square value of 0.507 suggests that 50.7 per cent of the variance in quality of work life can be explained by the other variables included in the model. The AVE value of 0.829 indicates that 82.9 per cent of the variance in quality of work life is accounted for by the items.

The variables demonstrate good internal consistency with acceptable cronbach's alpha values (Managing Leisure Time: 0.811; Self-Care Management: 0.823; Stress Management: 0.778; Time Management: 0.748), indicating good reliability. The composite reliability values also support the scale reliability (Managing Leisure Time: 0.813; Self-Care Management: 0.857, Stress Management: 0.784, and Time Management: 0.770). The AVE values suggest that a substantial proportion of the variance is accounted for by the items used to measure these variables (Managing Leisure Time: 72.5 per cent; Self-Care Management: 73.5 per cent, Stress Management: 69.3 per cent, and Time Management: 66.1 per cent).

Table 2
Outer Loading

Variables and Indicators	Outer loadings	Interpretation
JS3 <- JS	0.882	Indicating a strong positive relationship between the latent variable and Job Satisfaction (JS).
JS4 <- JS	0.918	
JS5 <- JS	0.837	
MLT4 <- MLT	0.840	Indicating a strong positive relationship between the latent variable and Managing Leisure Time (MLT).
MLT6 <- MLT	0.826	
MLT7 <- MLT	0.888	
PWB4 <- PWB	0.948	Indicating a very strong positive relationship between the latent variable and Personal Well-Being (PWB).
PWB5 <- PWB	0.936	
QWL4 <- QWL	0.919	Indicating a very strong positive relationship between the latent variable and Quality of Work Life (QWL).
QWL6 <- QWL	0.880	
QWL7 <- QWL	0.932	
SCM2 <- SCM	0.900	indicating a strong positive relationship between the latent variable and Self-Care Management (SCM).
SCM4 <- SCM	0.849	
SCM5 <- SCM	0.821	
SM3 <- SM	0.861	Indicating a strong positive relationship between the latent variable and Stress Management (SM).
SM4 <- SM	0.788	
SM5 <- SM	0.846	
TM2 <- TM	0.830	Indicating a strong positive relationship between the latent variable and Time Management (TM).
TM5 <- TM	0.773	
TM6 <- TM	0.835	

Source: Computed from primary data

Overall, the high outer loadings suggest that the indicators used to measure each latent variable have a strong and positive relationship with their respective constructs. These findings provide support for the validity of the measurement model and indicate that the selected indicators effectively represent the underlying latent variables.

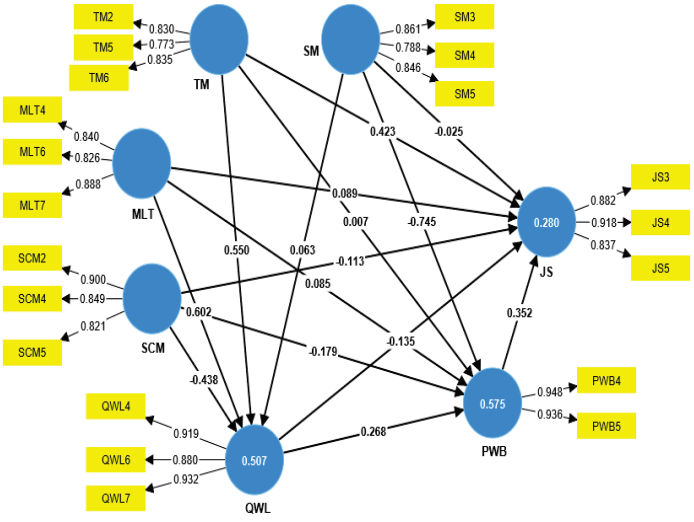
Table 3
Discriminant Validity (Inter Correlation)

Path	JS	MLT	PWB	QWL	SCM	SM
MLT	0.137					
PWB	0.467	0.079				
QWL	0.196	0.618	0.199			
SCM	0.154	0.762	0.082	0.269		
SM	0.369	0.284	0.838	0.265	0.168	
TM	0.456	0.449	0.157	0.609	0.726	0.192

Source: Computed from primary data

The inter-correlations between the latent variables show that most of the correlations are below 0.7, indicating acceptable discriminant validity. This suggests that the constructs in the study are distinct and not highly correlated, supporting the discriminant validity of the measurement model. However, it is important to note that the correlation between PWB and SM is relatively high (0.838). Further examination of the conceptual relationship between these constructs and potential overlaps in measurement should be considered to ensure discriminant validity. Overall, the inter-correlation matrix provides insights into the relationships between the latent variables and indicates that the constructs are reasonably distinct from each other, supporting their discriminant validity.

Figure 2
Structural Equation Model



Source: Primary data

Chi-square: The chi-square value of 4.453 is below the recommended threshold value of 5 and even closer to the more stringent threshold of 3, indicating a good fit.

SRMR (Standardised Root Mean Square Residual): The SRMR value of 0.076 is below the recommended threshold of 0.08, suggesting a good fit. The SRMR measures the average discrepancy between the observed covariance matrix and the model-implied covariance matrix, with lower values indicating a better fit.

Composite Fit: The composite fit index value of 0.97 is above the recommended threshold of 0.90, indicating a good fit. The composite fit index assesses the relative fit of the proposed model compared to a null model, with higher values indicating a better fit.

The Root Mean Square Residual: The value of 0.086 is slightly higher than the recommended threshold of 0.05, but it is still low, indicating a good fit. It measures the discrepancy between the observed and predicted covariance matrices, with lower values suggesting a better fit.

PNFI (Parsimonious Normed Fit Index): The PNFI value of 0.622 is above the recommended threshold of 0.60, indicating a good fit. The PNFI is a relative fit index that compares the proposed model to a baseline model with no relationships between variables, with higher values suggesting a better fit. Overall, based on the fit indices provided and their recommended values, it appears that the model demonstrates a good fit for the data.

Hypothesis Test Results

Table 4
Fit Indices

Fit Indices	Recommended Values	Value	Results
Chi-square	< 5 preferably < 3	4.453	Good fit
SRMR (Standardized Root Mean Square Residual)	<0.08	0.076	Good fit
Composite fit	>0.90	0.97	Good fit
Root mean square residual	<0.05	0.086	Good fit
PNFI	>0.60	0.622	Good fit

Source: Computed from primary data

a. Dependent variable: Job Satisfaction

b. Predictors: (Constant), PWB, MLT, TM, SCM, SM, QWL

b) Regression Coefficent

Model	Unstandardized Coefficients	Standardized Coefficients	Beta	T - Value	P value
	B	Std. Error			
(Constant)	7.591	2.085		3.641	0.000
SM	0.212	0.068	0.223	3.109	0.002
QWL	0.019	0.071	0.021	0.274	0.784
SCM	0.239	0.062	0.262	3.855	0.000
TM	0.393	0.076	0.364	5.166	0.000
MLT	-0.122	0.072	-0.130	-1.693	0.092
PWB	0.237	0.078	0.219	3.021	0.003

Source: Computed form primary data
Dependent variable: Job satisfaction

The results of the regression model's ability to estimate the variations of the variable in dependence, including the predictors under consideration, and the relevance of this model are highlighted by the unusually low p-value, which indicates the impossibility of discovering such a robust F-statistic by chance. Nonetheless, a more extensive evaluation of the coefficients and accompanying p-values of individual predictors is required to gain a more nuanced understanding of their distinct roles and contributions.

The coefficients in the model show how each predictor affects the dependent variable. A positive baseline impact with a constant term of 7.591. Significantly positive predictors include Stress Management (0.223, p value 0.002), self-care management (0.262, p value 0.001), Time Management (0.364, p value 0.001), and personal well-being (0.219, p value 0.003). The quality of Work-life balance and Managing leisure Time have much lesser impacts. The standardised coefficients support these findings. The influence of Leisure Management is notable. With a variance of 0.130 and a p value of 0.092, time is marginally significant. The t-values highlight the significance of each predictor's influence. Overall, the model is useful, with individual predictors having a considerable impact on the result.

Stress management, self-care management, time management, and person well-being were found to have statistically significant effects on the dependent variable. Quality of life at work has no substantial influence, while managing leisure time has a marginal effect. These findings shed light on the links between these predictors and the dependent variable, assisting in the comprehension of the variables impacting the outcome under investigation. All null hypotheses were rejected, with the exception of managing leisure time and the quality of work-life balance. As a consequence, the study gained valuable insights into the complicated relationships between these predictors and the dependent variable, providing for a deeper understanding of the variables that impact the observed outcome.

Findings of the study

The SEM used to examine millennial employees' job satisfaction with work-life balance demonstrates a good fit for the data. The study discovered a link between job satisfaction and work-life balance among millennial workers. Job satisfaction is influenced by managing leisure time, personal well-being, quality of work life, self-care management, stress management, and time management. The model achieved a good fit based on the various fit indices assessed. The chi-square value was within an acceptable range, the SRMR and root mean square residual values indicated a good fit, and the composite fit and PNFI values indicated a relatively high level of fit. The indicators related to managing leisure time showed a strong positive relationship with job satisfaction. This suggests that effective management of leisure time, such as engaging in hobbies, pursuing personal interests, or maintaining a work-life balance, can significantly contribute to higher job satisfaction among millennial employees. Personal well-being was found to have a significant impact on job satisfaction. Factors related to personal well-being, such as physical health, mental well-being, and overall life satisfaction, were positively associated with job satisfaction. This highlights the importance of promoting employees' well-being to enhance their job satisfaction levels. There is a positive relationship between work life quality and job satisfaction. A supportive work environment, work-life balance policies, opportunities for growth and development, and job security were identified as influential factors that can improve millennial employee job satisfaction. The indicators related to self-care management and stress management showed a positive relationship with job satisfaction. This suggests that effective self-care practices and stress management strategies, such as maintaining a healthy work-life balance, practising mindfulness, and setting boundaries, can contribute to higher job satisfaction levels. Time management was found to have a positive influence on job satisfaction. Effective time management skills, such as setting priorities, planning and organising tasks, and maintaining a healthy work-life balance, were associated with higher job satisfaction among millennial employees. According to the study, organisations should prioritise these factors in order to foster a supportive work environment that promotes job satisfaction and overall well-being among millennial employees.

V. Conclusion

The study provides useful insights into the elements influencing job happiness among millennial employees in the context of work-life balance and emphasises the necessity of time management for job satisfaction. The study discovered a positive direct relationship between work-life balance and job satisfaction among millennial employees. This suggests that a balanced work-life situation is associated with higher levels of job satisfaction for this demographic. The positive influence of work flexibility on work-life balance further emphasises the importance of providing flexible work arrangements to enhance employee satisfaction. The millennial workforce, which practises excellent self-care and uses stress management measures, reports higher levels of job satisfaction. Maintaining a good work environment would include stressing the importance of managing leisure time, personal well-being, and work-life balance policies to encourage better levels of job satisfaction in the organisation. As a consequence, employers should develop supportive work environments that promote work-life balance and employee well-being to increase millennial employees' job satisfaction. Moreover, the study highlighted the significant impact of organisational support on job satisfaction among millennial employees.

Implications of the Study

The study highlights the necessity for organizations to adopt a more holistic and employee-centered approach to workplace culture. Specifically, for millennial employees, fostering a supportive environment that values personal fulfillment alongside professional achievements is essential. Companies should implement flexible work policies, encourage open communication, and offer wellness initiatives that align with individual aspirations. Such practices not only enhance engagement and morale but also reduce turnover and build a resilient, high-performing workforce.

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ANNEXURE

Indicators	Attributes
TM1	Wasting time by failing to complete some tasks
TM2	Bring office work to home
TM3	Respond to texts when in public.
TM4	Skip important family gatherings
TM5	Feel don’t have time for family and friends
TM6	Paying special attention to the highest priority items
TM7	Spend too much time doing things don’t want to do.
MLT1	Use all vacation days and personal days each year.
MLT2	On vacation, housework takes up more than an hour every day.
MLT3	On vacation, it might be nice to do something.
MLT4	Take time away from work to engage in enjoyable hobbies.
MLT5	Every six months, read and complete at least one book
MLT6	Playing games and competing in physical activities.
MLT7	Going out for social gatherings and spending time at parties and events
SCM1	Every day, set aside time for lunch
SCM2	Schedule at least 30 minutes of "me time" every day.
SCM3	Feel that personal needs are secondary
SCM4	Make time for healthy eating, and wellness maintenance.
SCM5	Get adequate sleep for the day.
SCM6	Get everything sorted for the next day the night before.
SCM7	Turning up to work on time with a good attitude.
QWL1	Not often delegate tasks to others
QWL2	Gratifying and pleasant employment
QWL3	Possess a sense of power over the workplace.
QWL4	Satisfied with where the business life path is at this point.
QWL5	Have a hard time saying “no” to requests at work.
QWL6	Utilise each day as productively as possible.
QWL7	Makes sense to work harder than to think.
SM1	Feel pressured to behave in a specific way because others rely on you.
SM2	Feeling drained and unable to commit to any aspect of life.
SM3	Impatient and curt with family and coworkers.
SM4	A restful night's sleep is disrupted by thoughts of work.
SM5	Spend more time reacting than thinking.
SM6	Finding time for activities outside of work.
SM7	Upset due to workplace events.
PWB1	Look forward to starting the day.
PWB2	Day off with some pursuits

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PWB3	Not participating in the most important activities.
PWB4	Not satisfied with my current position in personal growth.
PWB5	lose sight of identity and activities.
PWB6	Feel unrelaxed and not comfortable at home.
PWB7	A job with a social prestige
JS1	Interpersonal relationship with the colleague
JS2	Maintain a proper work schedule
JS3	More innovative thinking
JS4	Enhance work efficiency
JS5	Flexibility in the workplace
JS6	Able to complete tough tasks
JS7	Increases individual familiarity

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GO GREEN: JOURNEY OF YATRI

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The case, *Go Green: Journey of Yatri* the entrepreneurial journey of two childhood friends Manish Kumar and Arun Jain who started an e-rickshaw business in Central India realizing their dream of sustainable mobility. Starting as Yatri e-rickshaw distributors in 2017, they had drivers who were skeptical about the product, challenges to find financing options for it, and servicing and maintenance that had no infrastructure available. By introducing practices including lease-cum-purchase schemes, accepting government subsidies, and implementing new technologies such as lithium batteries and FINTECH applications, the two were able to successfully expand throughout the state of Madhya Pradesh and further. It was an effort at generating sustainable livelihoods for women that also contributed to a number of sustainable development goals (sdgs) including those around clean forms of transportation, and economic inclusion. While they did undergo tremendous growth, including branching out into e-scooters and rentals, the case exposes some serious issues around team building, dependency on subsidies, as well as questions around the scalability of their business model in an ecosystem for electric vehicles that is changing quickly. The case affords opportunity for discussion of aspects of entrepreneurial vision, innovation in raising capital and financing, the use of technology, and sustainable business in the developing world.

Keywords : *E-rickshaw, Entrepreneurship, Sustainable mobility, Electric vehicles (EVs), Business model innovation, Financial inclusion, Lease-cum-purchase model, FINTECH integration*
JEL Code: *L26, M13*

Initiation

Mr. Manish Kumar and Mr. Arun Jain were sitting in their office at Indore, MP and discussing about how to take their ambitious venture forward. Both were childhood friends and dreamt together about starting business and also wanted to serve the society. Manish was selected for police Inspector few years ago and Arun was gold medalist from NIT and a UPSC aspirant. When Arun was preparing for UPSC examination in Delhi he saw e-rickshaws' massive use there which clicked his mind to get into this business in future and later, he shared this idea with Manish. For initial study, they both visited around top 50 e-rickshaw companies in Delhi to understand the future of e-rickshaw. They did extensive survey with rickshaw drivers on various parameters such as driving experience, fuel efficiency, and other economic aspects.

In 2017, they took distributorship of e-rickshaw of Yatri Company based in New Delhi.

E-rickshaw market in India

E-rickshaws are battery operated three-wheelers which are economical. It is lower operational and maintenance cost. These e-rickshaws were not only ecofriendly, but also economic for passengers as compared to high-priced auto rickshaws and cabs. The augmented usage of e-rickshaws on the roads do not only lower down air pollution but also provide livelihood to the needy people as the purchasing

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price of these e-rickshaws was much lesser than petrol/diesel/gasoline operated rickshaws. The Indian e-rickshaw market size was USD .1.2 billion in the year 2022 and was projected to grow at a CAGR of 10.7 percent in next five years (Source: https://www.imarcgroup.com/india-electric-rickshaw-market).

Now-adays , E-Rickshaws have become one of the most chosen means of transportation in most of the suburban and urban cities of India. In October 2015, SmartE was launched which had served above 6 million 'zero-pollution' rides. By December 2017, SmartE aimed to serve more than 3 million commuters per month, through its 1,000 E-Rickshaw fleet. SmartE also aims to roll-out 10,000 vehicles by end of 2018 and crossed the 100,000 vehicle mark by 2020. At 100,000 vehicles, SmartE helped reduce close to a million tonnes carbon emissions, an equivalent of planting 17 million trees per year.

All over the nation, electric rickshaw has become an integral part of the transport system and is estimated to witness a noteworthy growth over the forecast period on account of government plans such as the National Electric Mobility Plan (NEMP). The government aimed to encourage the use of electric vehicles in India along with the commitment to build an efficient electric vehicle network including suitable charging points and incentives on buying an electric vehicle. As per the Society of Manufacturers of Electric Vehicles (SMEV), electric vehicles' sale got doubled in context of volume in the FY 2017-18 compared to the previous year, majorly through unregulated E-Rickshaw market, with 850,000 E-Rickshaw were sold in the indicated period. The drivers of the manually-pulled rickshaws have found E-Rickshaws quicker, easier and quieter to keep running as they need less effort, compared to the pedal-cycle rickshaws. It results in more rides and lesser effort for the driver, making E-Rickshaws a wise investment for them.

The growth potential of e-rickshaws and their eco-friendliness attracted the attention of Arun and Manish and they soon thought of harnessing the growth potential of e-rickshaws with their new venture.

You've written a very good evaluative point. Here's a polished version that balances critique and constructive suggestion (suitable for teaching notes, reviewer comments, or case analysis):

Strength of Entrepreneurial Narrative

The case study vividly captures the entrepreneurial journey of Manish and Arun, emphasizing their vision, resilience, and adaptive strategies in navigating a nascent market. Their progression from distributors to market leaders demonstrates strong entrepreneurial orientation and innovative problem-solving. However, the narrative could be enriched by examining how cultural attitudes, regional socio-economic conditions, and behavioral norms shaped customer perceptions and adoption of e-rickshaws. Such an exploration would provide a more nuanced understanding of market acceptance, particularly the contrasts between urban and semi-urban contexts, and would strengthen the pedagogical value of the case.

Linkage to Sustainability and SDGs

The case commendably situates the venture within the framework of sustainable development, particularly emphasizing contributions to climate action (SDG 13) and decent work and economic growth (SDG 8). This provides readers with a clear view of how entrepreneurial activity can align with global sustainability priorities. However, the discussion would be strengthened by including measurable environmental impacts—such as estimates of emissions reduction, energy savings, or lifecycle benefits—which would provide quantitative validation of the venture's contribution to the SDGs and enhance its academic rigor.

E Rickshaw in Indore (MP)

Yatri E Rickshaw Pricing in Indore

In Indore, the price ranges varies significantly for Yatri E Rickshaws. For example, the YC Electric Yatri E Rickshaw is priced between Rs. 1.26 lakh and Rs. 1.30 lakh whereas, another offer lists the Yatri E Rickshaw at Rs. 1.85 lakh. The Black Yatri E Rickshaw, starts from Rs. 1.35 lakh.

Purchasing Options and Dealers

For Yatri battery-operated auto rickshaws, potential buyers can explore several dealerships in Indore. Prominent dealers include Gayatri E Motors, King's Automobile and Ekta Motors etc. This helps potential customers with wide choices to find the model that fulfil their needs.

Financial Solutions

Those who are looking for financing options, it is important to check various platforms that give instalment details and loan simulations for various Yatri models, including the standard and super variants. It can make the purchase more tailor-made and manageable to individual financial needs.

Challenges Ahead:

The biggest challenge before them was to promote and sell theses e-rickshaws in the market as auto drivers were still skeptical about its benefits and performance. They appointed dealers in Madhya Pradesh, Chhattisgarh, and Rajasthan. The major target was not the auto drivers, but the poor people in the need for livelihood. These were the people who did not have even the half of the money to purchase e-rickshaws. The average price of these e-rickshaws was 1.69 lakhs. Even the banks refused to pass loan to purchase these e-rickshaw as it had a warranty of six months only and these poor people had nothing to mortgage to avail loan facility. Prospective customers were not having even sixty thousand rupees to add it in the sum if they get loan from a bank. Many prospective clients understood that CNG vehicle was a better option in terms of speed and cost of vehicle. Mechanics were available for CNG vehicles whereas no mechanic was available for e-rickshaw. Battery life of e-rickshaw was 14-15 months costing Rs. 7000 that time. Only two mechanics were available in Indore to meet the requirements of customers. When Manish and Arun launched e-rickshaw in Indore the competitors were "Jangid" and "Bagghi". Later on they started its manufacturing also. They had a tough time in the beginning as no vehicle was sold by them. **Canopy's** were put up at many places to attract customers.

One year warranty was introduced from 2018 which was a great relief to the purchasers of e-rickshaw and sellers. After a launch of "Mukhyamantri Swarozgar Yojana" (**Chief Minister Self Employment Scheme),** thirty percent subsidy was given to purchasers of e-rickshaw which helped them to sell around seventeen vehicles in a month. Just after this, bank also started sanctioning loan easily. The moment bank started giving loans on this, on an average seventy e-rickshaws were sold by Manish and Arun in a month. They could see 100 percent growth every year. Bankers used to accept customers depending on rickshaw pullers' residential address. If address was not of Indore, loan was not sanctioned. Dealership was given for Gwalior, Bhopal and West Maharashtra region. They decided to have one dealer in every district. They were the second highest sellers in the country. They had total twenty nine dealers in Madhya Pradesh and one in West Maharashtra. Distributors' margin was 1-3% and Dealer margin was 15-20%. There were three service outlets and one sales outlet. Foreign tours were offered to Dealers and Distributors on the basis of their performance. In a month 40 ACs and mobile phones were gifted to Distributors and Dealers for their hard work. Business was flourishing in Bhopal because it had many examination centers for the candidates and cost of petrol & diesel is little high as compared to other cities of Madhya Pradesh making e-rickshaw a boon for the sellers.

In the year 2019 lithium battery was introduced which had warranty of three years. After charging this battery, it could run e-rickshaw for nine hours and earlier it used to run for five hours only. Post COVID 19, forty thousand rupees subsidy was also provided by Central Government under Faster Adoption of Manufacturing of electric vehicles scheme. Manish and Arun established a start-up named as E-Sawari Rental Pvt. Ltd in 2020 as many prospective buyers could not purchase it because of unavailability of fund. By 2017-2018 many e-rickshaws were sold so this rental concept emerged for secondary income also. There were around twenty percent customers who purchased e-rickshaws on cash. Rescaling market was poor. Later on Manish and Arun started another venture on Lease cum Purchase Model where a customer had to deposit thirty thousand rupees and two hundred fifty rupees were to be deposited per day for thirty six months. For initial two months, e-rickshaw buyers were exempted to pay any rent. Ownership was transferred only in that condition if all installments were deposited by customers. In this model, three years free service was offered to the customers.

If e-rickshaw's parts are to be replace worth rupees eighteen thousand, that would be done by them. During pandemic they did CSR and gave e-rickshaws to Municipal Corporation for distribution of vegetables. Manish and Arun helped lady drivers to get their driving license and sold thirty e-rickshaws to them. Post pandemic, private sector banks also started to provide loan to e-rickshaw customers. Later on Manish and Arun decided to start an App- FINTECH which enabled to identify customers' loan requirements and if loan is not applicable then offer was of leasing. Toll free number was also there to help the customers by solving their queries. For customers who were taking e-rickshaw on lease had to keep at-least one thousand rupees in Wallet and two hundred fifty was deducted as a rent on daily basis. This App helped both partners to use technology fully. Being a computer engineer (Nano Technology) Arun had variety of ideas which he implemented gradually. They started manufacturing e-scooters (Orbit) in Manglia (village) near Indore MP in 2022. The cost was seventy eight thousand rupees.

Table Sales of Yatri (FY 2017-2024)

Though the venture was doing well **(see Table 1)** gradually and they put all efforts to make it a success but the major challenge was that, Manish and Arun did not have strong team to help them properly to cater the needs of customers. People were reluctant to join them as they had a fear that whether this sector will be growing or not?

Clarity in Recommendations

FY	Sales (Amt. in Crore)	Sales (Qty)
2017 - 18	1.14	112
2018 - 19	2.56	241
2019 - 20	4.67	397
2020 - 21	7.89	531
2021 - 22	22.28	1432
2022 - 23	37.21	2390
2023 - 24	48.13	3515

The case effectively identifies major challenges such as financing barriers for low-income customers, inadequate service and charging infrastructure, and the difficulty of building a skilled and motivated workforce. These challenges are central to understanding the venture's growth trajectory. However, the recommendations provided remain somewhat general. To strengthen their applicability, the case could integrate **specific, actionable frameworks**:

- **Workforce Training and Development:** Adopting structured models such as *skill ecosystem frameworks* or *public–private training partnerships* could address the shortage of skilled mechanics and sales staff, while also aligning with government skill development initiatives.
- **Partnerships and Ecosystem Building:** Drawing on concepts like *shared value creation* or *stakeholder mapping* could provide a roadmap for collaborations with banks, NGOs, local governments, and technology providers to ease financing and infrastructure challenges.
- **Customer Engagement and Adoption:** Using models like *Rogers' Diffusion of Innovation* or *community-based social marketing* could help explain and operationalize strategies to overcome skepticism, build trust, and encourage adoption in both urban and semi-urban markets.
- **Scalability and Sustainability:** Incorporating frameworks such as the *Business Model Canvas* or *Triple Bottom Line* would allow the recommendations to connect financial growth with long-term environmental and social impact.

By grounding recommendations in these frameworks, the case could move beyond descriptive insights to prescriptive strategies, enhancing its practical value for entrepreneurs, managers, and policymakers navigating similar emerging market contexts.

Academic and Pedagogical Usefulness

The case provides strong teaching potential by offering discussion questions and teaching notes that stimulate critical thinking around entrepreneurship, sustainability, and innovation. Its multi-dimensional narrative allows instructors to approach the case from strategy, finance, or policy perspectives. However, its pedagogical impact could be enhanced by articulating **clearer and more structured learning objectives**. For instance, aligning each major section with targeted outcomes—such as *understanding entrepreneurial risk and resilience*, *evaluating financial innovation in resource-constrained contexts*, or *assessing stakeholder management in emerging industries*—would guide instructors in lesson planning and help students anchor their analysis. Explicit linkage to theoretical frameworks (e.g., Diffusion of Innovation, Resource-Based View, or Business Model Innovation) would further enrich its academic rigor and support cross-disciplinary teaching.

References:

1. Electric Rickshaw Market in India - Share & Size
2. indore e rickshaw
3. THE 17 GOALS | Sustainable Development
4. MERAYUVA | Mukhya mantri Swarojgar Yojana

Questions:

1. How did Manish and Arun align their business model with the socio-economic challenges of their target market? What were the limitations of their approach?
2. Evaluate the impact of technological advancements like lithium batteries and FINTECH integration on their competitive positioning.

3. Analyze the scalability of their business model in a rapidly evolving electric vehicle (EV) market. What risks could threaten their growth trajectory?
4. How does their venture contribute to sustainable development goals (SDGs), and what are the critical challenges in amplifying this impact?
5. What leadership qualities and strategies enabled Manish and Arun to transition from distributors to market leaders? How could these be applied to other industries?
6. Given their success with government schemes and subsidies, how can they reduce dependency on external support for long-term sustainability?
7. How could workforce and skill development address their team-building challenges and further support the growth of their business?
8. What challenges do you see for Manish and Arun in the future?

Teaching Notes

Critical Analysis of the Case Study

1. **Entrepreneurial Vision and Adaptability**: Manish and Arun demonstrated a clear entrepreneurial vision by identifying the potential of the e-rickshaw market, especially in eco-conscious urban areas. Their adaptability is evident in their decision to evolve from distribution to manufacturing, and later to leasing and rentals.
2. **Market Research and Feasibility**: Their thorough market research in Delhi and initial distributorship helped them understand the intricacies of the e-rickshaw business. However, they underestimated challenges such as financial barriers for customers, skepticism from traditional auto drivers, and lack of skilled mechanics.
3. **Government Support and Policy Utilization**: The duo effectively leveraged government schemes like the *Mukhyamantri Swarozgar Yojana* and subsidies under the *FAME* initiative. These programs helped them overcome initial hurdles and expand their market.
4. **Financial Innovation**: Recognizing the financial constraints of their target audience, they introduced innovative financial models like the lease-cum-purchase model. This approach significantly boosted sales and made e-rickshaws accessible to low-income groups.
5. **Technological Integration**: Their use of technology, such as the FINTECH app for loan facilitation and wallet integration, showed forward-thinking and addressed customer pain points. This also helped streamline operations and improve customer service.
6. **Challenges and Gaps**:
    - **Skepticism Among Stakeholders**: Convincing both drivers and mechanics to adopt e-rickshaws was a significant challenge due to perceptions about durability, maintenance, and reliability.
    - **Lack of Skilled Team**: Despite their efforts, the absence of a strong support team limited their ability to scale effectively.
    - **Market Saturation Risk**: Over-reliance on subsidies and government support could become a vulnerability if these incentives reduce or vanish.
7. **Social Impact**: The venture positively impacted livelihoods, especially for women and economically disadvantaged groups. Initiatives like facilitating licenses for female drivers highlight their social responsibility.
8. **Prospects**: While the business is scaling well, further diversification into e-scooters and leveraging post-COVID government incentives indicate growth potential. However, sustainability and workforce challenges must be addressed.

Questions & Answers

1. How did Manish and Arun align their business model with the socio-economic challenges of their target market? What were the limitations of their approach?

Answer:

Manish and Arun recognized that their primary customer base consisted of individuals from economically disadvantaged backgrounds. They introduced financial innovations such as the *lease-cum-purchase model*, rentals, and tie-ins with government subsidies to address affordability barriers. These models aligned with the socio-economic realities of their audience, enabling rickshaw

pullers and unemployed individuals to transition into sustainable livelihoods.

However, the limitations of their approach included:

- **Dependency on External Support:** The reliance on government subsidies and bank loans made their business vulnerable to policy changes or economic downturns.
- **Limited Scalability for Low-Income Groups:** While lease models lowered the entry barrier, they required long-term financial discipline from buyers, which could be challenging for individuals with irregular income streams.
- **Operational Complexity:** Managing leasing and rentals added logistical and financial risks to the business.

2. Evaluate the impact of technological advancements like lithium batteries and FINTECH integration on their competitive positioning.

Answer:

The introduction of **lithium batteries** revolutionized the usability of e-rickshaws by extending operational time from 5 to 9 hours, significantly reducing downtime and increasing driver earnings. This technical enhancement also lowered long-term maintenance costs, improving the product's appeal and competitive edge.

The **FINTECH app** facilitated better customer service by:

- Streamlining loan application and leasing processes.
- Introducing transparency in daily rent deductions via digital wallets.
- Enabling data-driven decisions to identify customer needs and minimize financial risks.

These advancements bolstered their competitive positioning by improving both customer experience and operational efficiency. However, their dependency on technological infrastructure introduced risks related to customer adaptability and potential technical glitches in rural areas.

3. Analyze the scalability of their business model in a rapidly evolving electric vehicle (EV) market. What risks could threaten their growth trajectory?

Answer:

The scalability of their model was driven by a combination of:

- **Market Expansion:** By diversifying into manufacturing and expanding dealerships across regions, they ensured access to untapped markets.
- **Innovative Financing:** Lease and rental models allowed them to penetrate low-income segments.
- **Product Development:** Adding e-scooters to their portfolio showcased their adaptability to evolving customer preferences.

Risks to scalability include:

- **Intense Competition:** Established players and new entrants with superior technology or pricing models could erode their market share.
- **Infrastructure Dependency:** A lack of charging stations and repair facilities in semi-urban and rural areas could limit adoption.
- **Regulatory Uncertainty:** Shifts in government policies, especially subsidies, could impact affordability for their core customer base.
- **Financial Strain:** High operational costs tied to leasing, warranties, and incentives for dealers/distributors could challenge profitability.

4. How does their venture contribute to sustainable development goals (SDGs), and what are the critical challenges in amplifying this impact?

Answer:

The venture contributes to multiple SDGs:

- **Goal 8 (Decent Work and Economic Growth):** By creating affordable employment opportunities for marginalized communities, particularly women.
- **Goal 9 (Industry, Innovation, and Infrastructure):** Through technological advancements like lithium batteries and the FINTECH app, they foster innovation.
- **Goal 13 (Climate Action):** Their e-rickshaws reduce carbon emissions and promote clean transportation, directly addressing environmental concerns.

Challenges in amplifying this impact include:

- **Resource Constraints:** Expanding service networks and charging infrastructure requires significant capital investment.
- **Inclusive Growth:** Ensuring equitable access to their products across geographic and socio-economic divides remains a challenge.
- **Education and Awareness:** Many potential users lack awareness about the benefits of e-rickshaws, requiring substantial outreach efforts.

5. What leadership qualities and strategies enabled Manish and Arun to transition from distributors to market leaders? How could these be applied to other industries?

Answer:

Their leadership qualities included:

- **Visionary Thinking:** Recognizing the potential of the e-rickshaw market ahead of its widespread adoption.
- **Resilience:** Overcoming financial, logistical, and market challenges in the initial phases.
- **Customer-Centric Innovation:** Tailoring financial models and product features to meet customer needs.
- **Strategic Alliances:** Leveraging government schemes and bank partnerships to build trust and scale operations.

Strategies applicable to other industries:

- **Early Adoption of Technology:** Staying ahead of competitors by introducing innovative products like lithium batteries and apps.
- **Financial Inclusion Models:** Developing payment plans and incentives for underserved markets.
- **Local Partnerships:** Collaborating with regional dealers and service providers to create a robust supply chain.

6. Given their success with government schemes and subsidies, how can they reduce dependency on external support for long-term sustainability?

Answer:

To reduce dependency, they could:

- **Diversify Revenue Streams:** Expand product lines (e.g., e-scooters, cargo e-rickshaws) to attract a broader customer base and reduce reliance on subsidy-driven sales.
- **Enhance Cost Efficiency:** Invest in R&D to lower production costs and reduce the need for external financial incentives.
- **Focus on Branding and Value Proposition:** Build a strong brand identity that highlights quality and durability, enabling them to compete on value rather than price alone.
- **Develop Private Financing Solutions:** Partner with NBFCs or microfinance institutions to provide alternative funding options independent of government schemes.

7. How could workforce and skill development address their team-building challenges and further support the growth of their business?

Answer:

The lack of a skilled and motivated team has been a bottleneck in their growth. To address this:

- **Skill Development Programs:** Establish training centers for mechanics and drivers to ensure a steady supply of skilled labor.
- **Incentivizing Talent:** Offer competitive wages, growth opportunities, and performance-based rewards to attract skilled employees.
- **Partnerships with Educational Institutions:** Collaborate with technical institutes to create courses on EV technology and maintenance.
- **Building a Leadership Pipeline:** Groom existing employees for leadership roles to ensure continuity and a strong organizational culture.

8. What challenges do you see for Manish and Arun in the future?

Answer:

Specific challenges from the case study include:

1. **Market Trust and Perception**:
    - Customers initially preferred CNG vehicles due to their speed and existing infrastructure, reflecting ongoing skepticism about e-rickshaw reliability.
2. **Service Infrastructure**:
    - The lack of trained mechanics and service centers was a major pain point initially and remains a challenge as they scale.
3. **Financial Barriers for Customers**:
    - Many potential buyers couldn't afford even the subsidized cost or initial deposit, which limits the market size.
4. **Scalability of Operations**:
    - As they expand, managing dealerships, ensuring uniform service quality, and providing adequate customer support could strain resources.
5. **Dependence on Government Policies**:
    - Growth has been significantly tied to subsidies and incentives. Changes in government policies could impact their business model.
6. **Team Building**:
    - They struggled to hire a strong team due to perceptions of the industry's volatility.

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