Editorial

It is with great pleasure that we present the December 2025 issue of the *International Journal of Research in Business Studies (IJRBS)*. In the era of technological advancements and evolving market structures, research is no longer confined to the traditional boundaries. Instead, it is interdisciplinary, and impact-driven. This issue is also an effort to bring forth the very spirit of IJRBS with the support of our authors, editorial board, reviewers and assistance team.

We appreciate the commitment of editorial team and reviewers in maintaining the standards of scholarly writings through an aggressive and robust double-blind peer-review process. We also extend our appreciation to the authors for contributing to the current issue of IJRBS as a medium to share their research work.

As we sail towards today's fast paced business environment, we remain steadfast in our determination to foster and bring impactful research in the domain of academia.

With regards,

Arun Kumar

Editor-in-Chief

IJRBS

Contents

AI Ethics in Consumer Decision-making Trends in E-commerce: A Bibliometric Analysis

Daniel Okunbor
Professor
Fayetteville State University
Fayetteville, North Carolina
United States.

Kritin Piplani
Research Scholar
United World College
of South Asia (UWCSEA)
Singapore, Asia.

Abstract

The research paper aims to examine the ethical implications of Artificial Intelligence on the consumer decision-making process in E-commerce since 2020. The study maps research trends, highlights excellence through citation analysis, and the most prolific authors, countries, and institutions in the field by analysing 123 Scopus-indexed publications using bibliometric analysis. Findings indicate an exponential rise in relevant literature, with India leading global contributions. The most cited works emphasise transparency, privacy, fair pricing, and trust as the core challenges in managing the ethics in AI. The papers have also highlighted concerns such as accountability, data manipulation, and price discrimination in AI-driven E-commerce systems. The analysis provides actionable insights for industry policymakers, recommending mechanisms to ensure consumer privacy protection, transparency, and the responsible implementation of AI.

Keywords

AI ethics, E-commerce, Consumer Decision-making, Bibliometric analysis, Transparency, Privacy, Price discrimination, India, and Scopus.

1. Introduction and Review of the Literature

The pace of technological innovation has been unprecedented over the last few years. The myriad of changes witnessed include the social media explosion, which has defined how people live their lives; the rise of artificial intelligence as both an enabler and a disabler; the quick commerce revolution in developing countries like India, revolutionizing e-commerce (an interesting takeaway for developed countries); and many more. The growth of e-commerce worldwide has been exponential. E-commerce was enabled by the ease of use of the World Wide Web, and the exchange of communication and the hyperlinks enabled the start of E-commerce, which has rapidly evolved since its inception in the late

20th century, accelerating in the late 1990s, marked by the launch of eBay (1995) and Amazon (1995). E-commerce growth was further propelled by the accessibility of websites and Apps (Applications) on mobile phones. The questions have transitioned from "Whether anyone has ever shopped online?" to "Is there anyone who has never shopped online?".

Covid-19 was a game-changer for many industries, challenging for some (such as physical stores and the travel industry) and a blessing for e-commerce, where global e-commerce transactions jumped to around $5 trillion in 2021. It was attributed to lockdowns and restrictions on physical interactions; however, the share of e-commerce transactions continued to rise even after the pandemic, reaching approximately 24.5 percent of all, retail sales by 2025 (Salesforce, 2025). The growth is propelled by customers and businesses' acceptance and adoption of online business, digital payments, and mobile as a medium of e-commerce. Today, the global e-commerce market is expected to surpass $8 trillion by 2027, cementing its place as a core driver of modern commerce.

Generative Artificial Intelligence (Gen AI) represents a new dimension that is expected to accelerate the growth of e-commerce further. As it holds true for all new technology modifiers, the impact and its ethical implications need to be monitored, researched, and discussed. Gen AI is helping consumers make quicker decisions, offering instant comparative choices and personalized search, which helps maximize return on time investment (ROTI) for consumers. Various research papers and reports have supported the fact that the use of AI in consumer decision-making is increasing rapidly, with consumers relying on AI to evaluate products and make final decisions (Naemi, 2025; Khandelwal, 2025). Industry reports by Salesforce and Capgemini indicate that using GenAI to search for products is becoming the norm rather than the exception, potentially replacing search engines. Salesforce 2025 reports point to the fact that more than 50 percent of Gen-Z users are already using AI to discover products, and 39 percent of all customers. Capgemini's report shows that nearly 60 percent of shoppers are interacting with Gen AI, such as ChatGPT, to find recommended products. (Salesforce Team, 2025).

The reliance on Gen AI to make buying decisions comes with a plethora of ethical concerns that have been discussed in the literature, and the purview of this paper is to analyze the literature in the field discussing the ethical challenges emerging from AI usage in e-commerce.

2. Objectives of the study

To explore the fascinating and evolving world of AI ethics, a journey from data to consumer decisions in e-commerce, the following Research Objectives (ROs) are being studied.

2.1. Mapping the theme, bibliometric profile by extracting the trends in publications and the most cited papers.
2.2. Excellence Analysis (analysis of the most cited papers).
2.3. Identifying the most prolific authors, along with the top contributing countries and organizations.

3. Research Methodology

The paper employs bibliometric analysis to explore the study of ethical issues in AI-driven consumer decision-making, with a particular focus on e-commerce transactions.

Bibliometric analysis is an interesting and simple technique that helps in studying an identified area of academic research by quantifying (numbers and statistics) the scholarly research in terms of the number of published papers, country-wise contribution, number of collaborations, etc. The analysis of this data helps determine which topics (within a topic) are studied or which researchers have had the most significant impact, using citation analysis. This technique helps identify highly explored areas and research gaps. Bibliometric analysis is applied to specific databases, such as Scopus, Web of Science, and PubMed, and presents the data clearly and beneficially. This technique is highly preferred when aiming to provide a clear map of scientific progress in any field to researchers, policymakers, and organisations. Based on the patterns that emerge from the papers, the research aims to study the concerns that have been mentioned, as well as those that have been overcome.

The present study focuses on the Bibliometric analysis of the Scopus database, as it is one of the largest databases with wide coverage of disciplines, high-impact journals, and global publications (Hashem, 2023; Baas, 2020). A Scopus publication is highly sought after and recognized for its rigorous standards and strict quality control.

Within the Bibliometric analysis, excellence analysis plays a vital role in summarizing the research findings of the most cited papers, providing directions for further research, and also avoiding the duplication of research in this particular field of research. The field is evolving so rapidly that the cues for future research are very important.

Table 1:- Inclusion and Exclusion Criteria for Retrieving the Dataset

Criteria Type	Inclusion Criteria	Number of Papers
Keywords	"AI" OR "Gen AI" AND "E-commerce" AND "Ethics" OR "ethical"	174
Publication Years	2020 to 2025 (PUBYEAR > 2019 AND PUBYEAR < 2026)	174
Subject Areas	All except Medicine, Energy, Agriculture, Biochemistry, and Mathematics	129
Publication Stage	Final (LIMIT-TO (PUBSTAGE, "final"))	123
Language	English	123
Date of Extraction: October 28, 2025		

Source:- Prepared by Authors with Data from Scopus Biblioshiny

4. Data Analysis

Table 1 explains that the researchers extracted the data analyzed in this paper from the Scopus database on October 28, 2025, using the keywords "AI" OR "Gen AI" AND "E-Commerce" AND ("Ethics" OR "ethical") from 2020 onwards. The first iteration yielded 174 papers. After excluding certain areas of research, 129 papers remained, which were reduced to 123 relevant papers based on their final stage of publication and publication in the English Language.

4.1. Research Objective (RO) 1: Mapping the theme bibliometric profile by extracting the trends in publications, and enlisting the most cited papers.

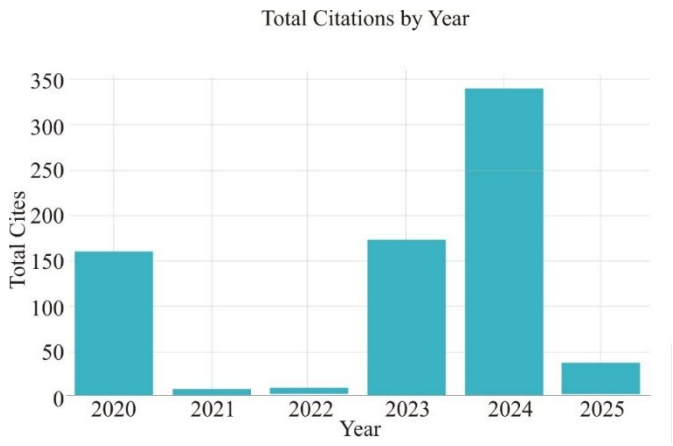
Table 2:- Annual Scientific Production

Year ↓	Documents ↑
2025	46
2024	63
2023	6
2022	4
2021	3

Source:- Prepared by Authors with Data from Scopus

The research sought to study the area of Artificial Intelligence ethics in E-Commerce Consumer decision making since 2010 but the extraction of the data from Scopus database reveals that the first relevant publication was in the year 2020. The growth of AI has been rapid, and so has the trend of research publications. With a humble 1,3, 4, and 6 from 2020 to 2023, the publications grew to 63 in 2024 and 46 in 2025 (till October 28, 2025). The increase in the number of publications within a year is an indication of growing interest, a widening knowledge-base, and active exploration of the research area.

The spurt of growth can be taken as an indicator of the need to conduct a bibliometric analysis based on the number of publications, rather than waiting for a few more years to conduct the research. The analysis of the data would help researchers and businesses identify and implement the findings of the studies.



Source:- Prepared by Authors with Data from Scopus

Figure 1:- Total Citations by Year

Table 3:- Year-wise Citations of the Papers

Year	Total Citations	Average Citations	Number of Papers
2020	160	160.00	1
2021	8	2.67	3
2022	9	2.25	4
2023	172	28.67	6

Year	Total Citations	Average Citations	Number of Papers
2024	340	5.40	63
2025	36	0.78	46

Source:- Prepared by Authors with Data from Biblioshiny

The bibliometric analysis yields interesting results in the citations study, making it highly skewed with 123 publications and 725 total citations, and a median citation count of 0, although the average citation is 5.89 per paper.

The year 2024 had the highest number of publications (63) with the highest total citations (340), but only an average of 5.40 citations per publication. In contrast, in 2023, the average citations were very high (28.67), with only six publications. This implies two things: the quality of the publications in 2023, and also that the 2024 publications are too recent and will take time to build citations. In 2020, one paper had the highest number of citations, 160. This skewness is likely due to this being a relatively recent area of research, and citations take time to accumulate.

4.2 Research Objective (RO) 2 - Excellence Analysis (Analysis of the most Cited Papers)

In bibliometric analysis, Excellence analysis is a blend of quantitative and qualitative methods, which identifies the most cited papers and then analyzes them. The analysis of these "excellent"/"most cited papers" helps to identify the key findings, methodologies that have worked, and research gaps, serving as benchmarks for future research in any field.

Table 4:- Excellence Analysis of Publications

S. No.	Authors	Title	Year	Source title	Cited by
1.	Khrais, L.T.	Role of artificial intelligence in shaping consumer demand in e-commerce	2020	Future Internet	160
2.	Li, K.; Lau, B.P.L.; Yuan, X.; Ni, W.; Guizani, M.; Yuen, C.	Toward Ubiquitous Semantic Metaverse: Challenges, Approaches, and Opportunities	2023	IEEE Internet of Things Journal	64

S. No.	Authors	Title	Year	Source title	Cited by
3.	Bani Ahmad, A.Y.A.B.; Naidu, T.N.; Shrivastava, G.; Gabbi, R.S.; Islam, S.; Nagaraju, K.	E-commerce Trend Analysis and Management for Industry 5.0 using User Data Analysis	2023	International Journal of Intelligent Systems and Applications in Engineering	46
4.	Singh, B.; Jain, V.; Kaunert, C.; Dutta, P.K.; Singh, G.	Privacy matters: Espousing blockchain and artificial intelligence (AI) for consumer data protection on e-commer-ce platforms in ethical marketing	2024		43
5.	Khennouche, F.; Elmir, Y.; Himeur, Y.; Djebari, N.; Amira, A.	Revolutionizing generative pre-traineds: Insights and challenges in deploying ChatGPT and generative chatbots for FAQs	2024	Expert Systems with Applications	43
6.	Kopalle, P.K.; Pauwels, K.; Akella, L.Y.; Gangwar, M.	Dynamic pricing: Definition, implications for managers, and future research directions	2023	Journal of Retailing	39
7.	Izadi, S.; Forouzanfar, M.	Error Correction and Adaptation in Conversational AI: A Review of Techniques and Applications in Chatbots	2024	AI (Switzerland)	33
8.	Vashishth, T.K.; Sharma, V.; Sharma, K.K.; Kumar, B.; Chaudhary, S.; Panwar, R.	Enhancing Customer Experience through AI-Enabled Content Personalization in E-commerce Marketing	2024		29

S. No.	Authors	Title	Year	Source title	Cited by
9.	Pathirannehelage, S.; Shrestha, Y.R.; Von Krogh, G.	Design principles for artificial intelligence-augmented decision making: An action design research study	2025	European Journal of Information Systems	20
10.	Ros√°rio, A.T.	Generative AI and generative pre-trained transformer applications: Challenges and opportunities	2024		17
11.	Tran, M.T.	Unlocking the AI-powered customer experience: Personalized service, enhanced engagement, and data-driven strategies for E-commerce applications	2024		16
12.	Chaudhary, M.; Gaur, L.; Singh, G.; Afaq, A.	Introduction to Explainable AI (XAI) in E-Commerce	2024	Studies in Computational Intelligence	14
13.	Fabbri, M.	Social influence for societal interest: a pro-ethical framework for improving human decision making through multi-stakeholder recommender systems	2023	Studies in Computational Intelligence	14

Source:- Prepared by Authors with Data from Scopus

In this section, the study highlights the Excellence analysis by selecting the top 10 percent most cited papers from a set of 123 papers. The threshold for excellence was set at approximately 14 citations (the 90^{th} percentile). A total of 13 excellent papers have been cited, with the citation range of 14 to 160, and the average citation amongst these papers is 41.38.

The top 5 have been considered since the citations are not very high due to the recent publications in the area of exploration.

All these papers are discussed in detail.

The paper "Role of artificial intelligence in shaping consumer demand in e-commerce" by Khurais (2020) is by far the most cited paper with 160 citations. It is a novel and a pioneering attempt at recognising the potential of AI in influencing consumer preferences and stresses the need for managing the challenges in the ethical implementation of AI and its governance. The study utilizes Amazon's transaction data from 2018 to 2022 on an exemplary e-commerce platform to reveal how consumer behavior can be impacted by the use of AI in e-commerce and the need for transparency in AI systems.

The second most cited paper (Li, K et al., 2023) delves into all aspects of the topic being studied, specifically the role of AI ethics in e-commerce consumer decision-making. The paper examines the future of e-commerce in the context of continually advancing AI technologies, including semantic communication, intelligent surfaces, and edge intelligence. The paper emphasizes the importance of ensuring fairness, transparency, and privacy when integrating generative AI into e-commerce systems to influence customer decision-making processes. These ethical aspects are challenging to meet, as the authors also discuss the importance of respecting customer privacy and maintaining their trust. Ethical issues should not be an afterthought; they should be given due importance when designing next-generation e-commerce platforms with the help of AI.

The following most cited paper on E-commerce and Industry 5.0 (Bani, 2023) discusses in detail the enhanced role that Generative AI is expected to play in consumer decision-making in E-commerce within the next-gen Industry. Gen AI thrives on insights from the data and works around it, highlighting the ethical considerations that come with handling data while maintaining privacy and transparency. Leveraging AI to influence and help consumers make decisions is highly lucrative, but ethical considerations include maintaining that personalized recommendations do not compromise consumer trust. The paper empowers the research by focusing on making AI an enabler that helps customers make informed and fair decisions in e-commerce.

The paper, "Privacy matters: Espousing blockchain and artificial intelligence (AI) for consumer data protection on e-commerce platforms in ethical marketing" recognizes the need to protect the manipulation of e-

commerce consumers' decision-making in light of AI usage and the importance of ethical considerations. The paper proposes that blockchain and AI could be used as protective measures to manage unethical data practices. Blockchain is to be utilized to ensure tamper-proof data storage and transparency, while AI is to be employed to protect the privacy of the data through real-time monitoring. This could help in ensuring autonomy in consumer buying decisions and maintain their trust. The paper categorically discusses that AI-driven aid, in terms of recommendations and personalized content, should be used without the risk of data manipulation and privacy violation. The paper advocates that the aim of e-commerce businesses is to create a trustworthy environment where consumers are enabled, rather than coerced, to make decisions by the ethical use of data for AI.

Another highly cited paper, "Revolutionising generative pre-training: Insights and challenges in deploying ChatGPT and generative chatbots," focuses on the concern surrounding biases in AI training and advancement, which can lead to biased and inappropriate responses that affect consumer decision-making by manipulating them. This paper also discusses the importance of transparency and privacy protection, but additionally, it raises the question of accountability for AI chatbots in assisting customers with FAQs and purchasing decisions. The uniqueness of the paper lies in its emphasis on mandating the use of unbiased AI, which provides accurate information to support customers rather than manipulating them into purchasing through altered responses.

By analysing how AI-powered dynamic pricing algorithms can raise moral questions about fairness, transparency, and consumer manipulation, Kopalle's (2023) paper directly addresses e-commerce and AI ethics in consumer decision-making. The study raises concerns about how AI systems may use personal information (such as location, income, and browsing habits) to charge different customers different prices for the same goods, potentially taking advantage of weaker consumers with few options. When AI algorithms target price-sensitive consumers or manipulate pricing in critical situations, the paper emphasizes the need for ethical guidelines to prevent discriminatory pricing practices that could erode consumer trust and autonomy in decision-making. To ensure that AI-driven pricing strategies strike a balance between revenue optimisation and consumer welfare, it requires precise pricing mechanisms and robust regulatory frameworks.

4.3 Research Objective (RO) 3: Identifying the most Prolific Authors, along with the Top Contributing Countries and Organisations.

4.3.1. Contribution by Country

Based on the country affiliation shared by the authors, India has the most publications, with a significant lead of over 102 papers, followed by the United States of America (20) and China (12).

Table 5:- Contribution to Research by Country

S. No.	Country	Number of Papers
1.	India	102
2.	United States	20
3.	China	12
4.	Malaysia	8
5.	Portugal	8
6.	United Kingdom	8

Source:- Prepared by Authors with Data from Biblioshiny

Table 6:- Institutions Contributing to Research

Institution	Country	Region	Focus Area
Bennett University	India	Asia-Pacific	E-commerce AI & Metaverse
S.A. Engineering College	India	Asia-Pacific	Text-to-Image Generation
Vel Tech Rangarajan Dr. Sagunthala R&D Institute	India	Asia-Pacific	Text-to-Image Generation
Christ University	India	Asia-Pacific	Business Model Innovation
Marwadi University	India	Asia-Pacific	Big Data Analytics

Source:- Prepared by Authors with Data from Biblioshiny

Table 5 shows that India, with 102 publications leads the nations in the research publications in the field, followed by United States of America with 20 publications and China, with 12 publications.

Table 6 displays the list of institutions contributing to research in the field of focus of the paper, and all the top 5 institutes are located in India, viz., Bennet, S.A. Engineering College, Vel Tech Rangarajan, Christ, and Marvadi University.

4.3.2. Most Prolific Authors in the Field

The number of papers published by the authors in the field is relatively small, and the pace is increasing as the field of research is comparatively new. Singh, Fabbri, Gaur, and Siva have each published three works within the 2024-2025 time frame.

Table 7:- Most Prolific Authors in the AI Ethics in influencing consumers in E-commerce

Rank	Author	Public-ations	Total Citations	Average Citations	Year Range
1.	Singh, G.	3	57	19.00	2024-2025
2.	Jain, V.	2	43	21.50	2024-2024
3.	Fabbri, M.	3	23	7.67	2023-2024
4.	Tran, M.T.	2	17	8.50	2024-2024
5.	Gaur, L.	3	17	5.67	2024-2024
6.	Siva Subramanian, R.	3	15	5.00	2024-2024
7.	Chaudhary, M.	2	15	7.50	2024-2024
8.	Afaq, A.	2	15	7.50	2024-2024
9.	Sudha, L.	2	4	2.00	2024-2025
10.	Sathya, V.	2	2	1.00	2024-2024

Source:- Prepared by Authors with Data from Biblioshiny

Most of the prolific authors published in 2024. Singh, G., leads with 3 publications (57 citations), achieving the highest impact among the most prolific authors. The focus of the cited papers is AI in e-commerce and blockchain. Fabbri, M. has published threethree papers between 2023 and 2024, with an emphasis on ethics in AI recommender systems. Citations gathered by these three papers are 23.

Jain, V., with two publications in the area of blockchain and privacy in e-commerce, stands out with the highest average citations of 21.50 per paper.

2024 has been the most active year of research in the field, indicating a recent and growing interest in the field.

4.3.3. Most Prominent Journals

Table 8:- Journals with the Publishers

Rank	Journal Name	Publisher	ISSN
1.	Journal of Theoretical and Applied Electronic Commerce Search	MDPI	0718-1876
2.	Technology in Society	Elsevier	0160-791X
3.	Journal of Circuits, Systems and Computers	World Scientific	0218-1266
4.	EAI Endorsed Transactions on Internet of Things	European Alliance for Innovation	2414-1399
5.	International Journal of Interactive Mobile Technologies	IFEES	1865-7923

Source:- Prepared by Authors with Data from Biblioshiny

Table 8 presents the five journals that collectively represent the leading publications in AI ethics and consumer decision-making in e-commerce. The publications focus on research into the impact of AI on e-commerce, artificial intelligence, and emerging technologies, as well as their societal implications. The dominance of open-access publishers (MDPI and EAI) indicates a commitment to research accessibility and the wide dissemination of findings.

The researchers can focus on The Journal of Theoretical and Applied Electronic Commerce Research, Technology and Society, Journal of Circuits, Systems and Computers, EAI Endorsed Transactions on Internet of Things (European Alliance for Innovation), and the International Journal of Interactive Mobile Technologies as outlets for their research in this domain. Though the

number of publications has been one or two, they are the pioneers in the field.

5. Conclusion

The paper encapsulates the research undertaken in this relatively new yet pertinent area of research, namely AI Ethics in e-commerce consumer decision-making. The first relevant publication was in 2020; the number of publications saw a steep rise in 2024 (63) from only six publications in 2023. 2025 is also thriving, with 46 publications as of October 28, 2025. The trend is steeply upward, indicating an annual growth rate of 115 percent. The average number of citations per document is 5.894.

Research in India is leading far ahead of other nations, viz., the US, China and Malaysia. The top three institutes leading the study are also from India, namely Christ, Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology, Amity University, and SRM Institute of Science and Technology.

Book chapters (44) are the most popular way of publishing in the field, followed by articles in journals (33) and conference papers (31). The journals, The Journal of Theoretical and Applied Electronic Commerce Research, Technology and Society, Journal of Circuits, Systems and Computers, EAI Endorsed Transactions on Internet of Things (European Alliance for Innovation) and International Journal of Interactive Mobile Technologies can be referred to first for the research in this area, since they have been the first ones to recognize the research interest in the area of ethics of AI in e-commerce customer preferences.

The most cited papers suggest that there is a straight forward need to integrate AI into the decision-making process of e-commerce customers. The papers address various aspects to consider when using AI to influence customers' choices in e-commerce. Including transparency, protecting privacy, ensuring fairness, maintaining customer trust, implementing checks to block data manipulation, assigning responsibility for the use/misuse of AI to manipulate customer choices, and avoiding discriminatory pricing.

6. Limitations and Future Research

The limitations of the study are acknowledged in this section, enabling researchers in the field to understand the way forward in this rapidly evolving field clearly.

6.1. The novelty of the topic was a limitation in terms of the first relevant paper being authored in 2020. Although we searched for results from 2010 to 2025, the analysis yielded results from 2020 to 2025, and only 123 relevant papers were found. The upward trend in publications in the area of AI ethics in e-commerce consumer decision-making is a promising sign that researchers in the future will not face any dearth in the number of papers.

6.2. Another worth noting limiting factor has been the temporary nature of the most cited papers. The temporary nature is because the latest research papers, especially those from 2025, may take some time to build citations, even though they might be excellent papers. However, even with a lesser number of citations, the most cited papers share similar concerns related to AI-driven e-commerce consumer decision-making, specifically transparency and privacy.

Researchers in the future are encouraged to monitor the number of papers being published in the field, which may increase exponentially due to the revolutionary and rapidly changing AI scenario, and perform the necessary analysis. There has been a 10-fold increase in publications from 2023 to 2024.

6.3 Scopus is the database that has been used for this paper. Although widely used and an established database, some research work may be exclusively available in Web of Science, IEEE, PubMed, or other sources. A single-database approach may have resulted in an incomplete representation of the study's topic.

For researchers who wish to conduct more extensive research in the area, it is suggested to include a multi-database approach, utilizing databases such as Scopus, Web of Science, PubMed, or any other relevant sources.

6.4 For the exclusion criteria of this paper, the authors have not included papers from Medicine, Agriculture, Energy, Biochemistry, and Mathematics; this might have removed some interdisciplinary relevant research. An all-inclusive topic research may help remove this limitation.

7. Practical Contribution to Industry and Policy Makers

Artificial Intelligence (AI) is a relatively new tool, serving as a dynamic facilitator in influencing customer choices in e-commerce. The paper points to the directions that the industry can look into:

7.1. Privacy Protection: Incorporation of AI in e-commerce has exciting outcomes, but there is a need to incorporate a mechanism of privacy protection for the customers.

7.2. Transparency: Gen AI utilizes constant training and customization, so how the customer data is being used needs to be transparent.

7.3. Avoid Data Manipulation and Price Discrimination: Data is the king and is very enticing to use it to manipulate the customers into doing what is profitable for the e-commerce company in terms of sales. Price discrimination is one such tactic being used by companies and should be discouraged.

7.4. Fixing Responsibility: The sporadic and dynamic growth of AI mandates that responsibility of any fallout or problems that may arise be fixed proactively. This would enable the responsibilities to be upstepped in AI, when any negative outcome can be traced back to the implementor.

8. References

1. Ahmad, A. Y. A. B., Gongada, T. N., Shrivastava, G., Gabbi, R. S., Islam, S., & author, +1. (2023). E-commerce Trend Analysis and Management for Industry 5.0 using User Data Analysis. *International Journal of Intelligent Systems and Applications in Engineering*. https://www. scopus.com/pages/publications/85171371628? origin= citation- overview
2. Baas, J., Schotten, M., Plume, A., Côté, G., & Karimi, R. (2020). Scopus as a Curated, High-quality Bibliometric Data Source for Academic Research in Quantitative Science Studies. *The MIT Press Journals*, *1*(1), 377–386. https://doi.org/10.1162/QSS_A_00019
3. Hashem E, A. R., Md Salleh, N. Z., Abdullah, M., Ali, A., Faisal, F., & Nor, R. M. (2023). Research Trends, Developments, and Future Perspectives in Brand Attitude: A Bibliometric Analysis Utilizing the Scopus Database (1944–2021). *Heliyon*, *9*(1), e12765. https://doi.org/ 10.1016/J.HELIYON. 2022.E12765
4. Khandelwal, S. (2025). Artificial Intelligence and Consumer Behaviour: A Data-Driven Approach to Understanding Buying Patterns. *Int. J. Adv. Res*, *13*(07), 99–105. https://doi.org/10.21474/IJAR01/21314
5. Khennouche, F., Elmir, Y., Himeur, Y., Djebari, N., & Amira, A. (2024). Revolutionizing Generative Pre-traineds: Insights and Challenges in Deploying ChatGPT and Generative Chatbots for FAQs. *Expert Systems with Applications*, *246*. https://doi.org/10.1016/j.eswa.2024.123224

6. Kopalle, P. K., Pauwels, K., Akella, L. Y., & Gangwar, M. (2023). Dynamic Pricing: Definition, Implications for Managers, and Future Research Directions. *Journal of Retailing*, *99*(4), 580–593. https://doi.org/10.1016/j.jretai.2023.11.003
7. Li, K., Lau, B. P. L., Yuan, X., Ni, W., Guizani, M., & Yuen, C. (2023). Toward Ubiquitous Semantic Metaverse: Challenges, Approaches, and Opportunities. *IEEE Internet of Things Journal*, *10*(24), 21855–21872. https://doi.org/10.1109/JIOT.2023.3302159
8. Lopez-Lopez, D., & Iniesta, M. B. (2025). The Impact of Conversational AI on Consumer Decision-making: A Systematic Review and Cluster Analysis. In *International Journal of Engineering Business Management* (Vol. 17). SAGE Publications Inc. https://doi.org/10.1177/18479790251351889
9. Manser Payne, E. H., Peltier, J., & Barger, V. A. (2021). Enhancing the Value Co-creation Process: Artificial Intelligence and Mobile Banking Service Platforms. *Journal of Research in Interactive Marketing*, *15*(1), 68–85. https://doi.org/10.1108/JRIM-10-2020-0214
10. Naeimi, M., & Family, Q. (2025). AI and Post-purchase Behavior: Personalization, Behavioral Insights, and Ethical Challenges. *SSRN Electronic Journal*. https://doi.org/10.2139/SSRN.5460815
11. Salesforce Team. (2025). *Salesforce Connected Shopper Report 2025 - Salesforce*. https://www.salesforce.com/news/stories/consumer-shopping-ai-trends-2025/
12. Singh, B., Jain, V., Kaunert, C., Dutta, P. K., & Singh, G. (2024). Privacy matters: Espousing Blockchain and Artificial Intelligence (AI) for Consumer Data Protection on E-commerce Platforms in Ethical Marketing. In *Ethical Marketing Through Data Governance Standards and Effective Technology* (pp. 167–184). IGI Global. https://doi.org/10.4018/979-8-3693-2215-4.ch015
13. Vashishth, T. K., Vikas, Sharma, K. K., Kumar, B., Chaudhary, S., & Panwar, R. (2024). Enhancing Customer Experience through AI-enabled Content Personalization in E-commerce Marketing. In *Advances in Digital Marketing in the Era of Artificial Intelligence: Case Studies and Data Analysis for Business Problem Solving* (pp. 7–32). CRC Press. https://doi.org/10.1201/9781003450443-2

14. Xu, Y., Shieh, C. H., van Esch, P., & Ling, I. L. (2020). AI Customer Service: Task Complexity, Problem-solving Ability, and Usage Intention. *Australasian Marketing Journal*, *28*(4), 189–199. https://doi.org/10.1016/j.ausmj.2020.03.005

Effect of Flexible Work Arrangements on Work-life Balance among Mineworkers in Ghana

David Boohene
Senior Lecturer
University of Energy and Natural Resources
Ghana, West Africa.

Amita Maxwell
Associate Professor
Sam Higginbottom University of Agriculture Technology and Sciences
Uttar Pradesh, India.

David Oyekunle
Research Scholar
University of Salford
United Kingdom, Europe.

Abstract

Recently, there has been a significant shift in the way that work is organized, and this situation appears to be the same in Ghanaian workplaces, as mobile communication devices and flexible work arrangements like working from home are becoming more popular, particularly among mineworkers. This study developed and evaluated a regression model while also determining the interactions and processes by which flexible work arrangements (FWAs) impact work-life balance (WLB) in the mining industry. The survey's findings showed that FWAs and WLB were positively and significantly correlated, and that mine workers believed to a large extent that various FWAs advanced WLB, although there appeared to be a low-level incorporation of FWAs into their work schedule. The study therefore recommends that mining firms take a serious interest in providing FWAs for employees while ensuring that they are well-managed.

Keywords

Flexible work arrangements, Work-life balance, Flextime, Satisfaction, and Mining.

1. Introduction

Mining is a cornerstone of Ghana’s economy, contributing significantly to GDP and employment (Aryee, 2020). However, the mining sector is also known for its physically demanding and hazardous working conditions, often involving long hours and shift work. Thus, for mineworkers, achieving work-life balance

(WLB) can be particularly challenging, inevitably calling for flexible working arrangements. Flexible work arrangements (FWAs) have been proposed as a strategy to enhance WLB (Ibeh et al., 2023), yet their implementation in sectors like mining appears limited. FWAs encompass various practices that allow employees greater control over when, where, and how they work (Ibeh et al., 2024; Ramachandran et al., 2012). These include flexible scheduling, compressed workweeks, telecommuting, and part-time options (Henderson, 2019). In industries such as mining, implementing FWAs is often complicated by the need for physical presence at mining sites and the rigid nature of operational schedules. Broadly, between individuals and the organizations, FWAs are largely provided and allowed by organizations (Pretorius, 2020). Also, there is equally the increasing desire of workers to be able to balance their work and personal lives. That is, as much as workers wish to advance in their careers, the current and emerging Ghanaian workforce equally seeks to enjoy their personal lives and invest time to raise and manage a family (Asiedu-Appiah, 2015). The essence of this is confirmed by a good number of studies that have established that WLB policies come with considerable positive outcomes to beneficiaries (Pretorius 2020; Lau et al., 2018). However, on the contrary, in other studies the concept of WLB has also been found not to yield considerable benefits to organizations and individuals (Fang et al., 2019), predominantly as a result of the interacting or mediating variables (Aryee et al., 2013). This study therefore delves into the matter to see if the situation is the same or differs in the mining sector in Ghana.

The mining sector in Ghana often demands extended hours, night shifts, and rotational schedules, which can disrupt family life and personal well-being (Mensah et al., 2021). Prolonged separation from families, coupled with the physically demanding nature of mining, increases stress and burnout among workers. Thus, achieving WLB is not merely a personal aspiration but a necessity for maintaining productivity, mental health, and job satisfaction (Baffoe & Antwi, 2022). In line with this, prior studies have found FWAs to help employees stay in employment for a long time and contribute to higher levels of work-life balance satisfaction, especially among highly skilled employees (Chung and van der Horst, 2018). Consequently, some attention has been given to some intervening mechanisms (Asiedu-Appiah and Zoogah, 2019). Regardless of these intervening mechanisms, notably FWAs, there is still a need to conduct more studies to resolve some pertinent quandaries associated with WLB (Falola et al., 2018). In practice, FWAs are primarily intended to yield family-friendly opportunities for employees to be able to engage in

family-life roles (Sirgy and Lee, 2018; OECD, 2016). Contrastingly, conflict has been associated with these FWAs, especially in studies carried out outside Ghana (Kim et al., 2019; Beutell et al., 2018). and hence making the paucity of studies in the Ghanaian context a lacuna for this study to be conducted. Therefore, the drive of this study is to investigate the effect of FWAs on the WLB of employees in Ghana's mining sector.

2. Review of the Literature

Flexible work arrangements (FWAs) refer to policies and practices that allow employees greater control over their work schedules, locations, or hours (Henderson, 2019; Bharathi et al., 2018). These include options such as compressed workweeks, flexible schedules, job sharing, and remote working. Globally, FWAs have been associated with improved job satisfaction, productivity, and reduced stress (Aryee, 2020). However, industries requiring physical labor, such as mining, face unique barriers to implementing FWAs effectively (Osei, 2020). Work-life balance is defined as the ability of individuals to manage work and personal responsibilities effectively without undue strain on either (Mensah et al., 2021). In the mining sector, it is particularly difficult to achieve due to extended shifts, rotational schedules, and the physically demanding nature of the work. Research by Baffoe and Antwi (2022) shows that prolonged absences from families increase stress and strain relationships, impacting workers' mental health and job performance. In Ghana, where mining is a key economic activity, addressing these challenges is essential for sustaining the workforce. Also, despite limited implementation, FWAs hold promise for Ghana's mining industry. Studies emphasize the need for tailored solutions, such as compressed workweeks and rotational flexibility, to address operational challenges while supporting WLB (Osei, 2020). Additionally, on-site wellness programs and supportive policies, such as paid leave for family events, are highlighted as practical interventions (Mensah et al., 2021). Although FWAs have been widely studied in various sectors, research on their applicability in labor-intensive industries like mining remains limited, particularly in the Ghanaian context.

3. Research Methodology

The study adapts a quantitative research approach which involved some numerical estimation and inference. By using a convenient sampling technique, data was collected from 150 mine workers across Ghana for the study. According to Cochran (1977), when the population size is unknown,

determining the sample size typically involves using a formula based on desired confidence levels and margin of error. Cochran (1977) developed a formula to calculate a representative sample for proportions as:

$$N_0 \frac{z^2 pq}{e2}$$

n = The Sample Size
Z = the number of Standard Deviation from the mean corresponding to the desired confidence level. That is, for 95 percent confidence level, Z= 1.21
P = is the estimated proportion of an attribute that is present in the population,
q = *1-p* (Using 0.5 for maximum variability).
E = the margin of error, which is 0.05.
For a confidence level of 95 percent and a margin of error of 5 percent, assuming p = 0.5: n = 146. 41. Therefore, the sample size of the study is approximately 150.

Table 1:- Demographic Background

Variables	Attributes	Frequency	Percentage
Gender	Male	86	57.3
	Female	64	42.7
Age	Below 25yrs	43	28.7
	25-35yrs	100	66.7
	36-45yrs	7	4.7
Work Duration	less than 2 years	102	68.0
	2-5 years	38	25.3
	Above 5 years	10	6.7
Educational Level	Post graduate	18	12.0
	Bachelor's Degree	99	66.0
	HND	13	8.7
	SHS	15	10.0
	Others	5	3.3
Marital Status	Married	20	13.3
	Single	126	84.0
	Others	4	2.7
Dependents	Yes	79	52.7
	No	71	47.3

Variables	Attributes	Frequency	Percentage
Number of Dependents	1-3	78	52.0
	4-6	17	11.3
	7-9	2	1.3
	Others	53	35.3
Total		**150**	**100**

Source:- Field Data, 2025

The demographic statistics discusses the background information of individuals involved in this study, which comprises their gender, age, educational level, work experience, marital status and dependents.

Table 2:- Normality Test

Descriptive Statistics	FWA	WLB	SFWA
Mean	2.98	3.22	3.78
Std. Deviation	0.53	0.58	0.52
Skewness	-0.282	-0.146	0.767
Std. Error of Skewness	0.198	0.198	0.198
Kurtosis	0.296	-0.651	0.786
Std. Error of Kurtosis	0.394	0.394	0.394

Source:- Processed Data 2025

The researchers adopted kurtosis and skewness as tools in measuring normalcy of the data collected. This is because, as Fidell and Tabachnick (2007) point out, a key criterion for the application of statistical test like regression analysis is that the variables involved have a normal distribution. The skewness and kurtosis of all the main variables were within $\{-2 \leq x \geq 2\}$ which means that the variables were regularly distributed and fit for further analysis.

Table 3:- Reliability

Variable	No. of Item	Cronbach Alpha
Flexible Work Arrangement	10	0.766
Work Life Balance	15	0.847
Satisfaction with Flexible Work Arrangement	6	0.735

Source:- Processed Data 2025

It can be observed from the results of the reliability test that high reliability coefficients were recorded for each construct employed in the study. For instance, the construct of FWAs was measured with 10 items and these items were reliable at 76.6 percent (i.e. .766). The highest reliability coefficient (.847, that is 84.7 percent) was recorded for the work life balance scale, also measured with 15 items. With the other scales recording values above .735 it can be advanced that the items used in this study are highly reliable (Downing, 2004).

Table 4:- Descriptive Statistics on Flexible Work Arrangement

Statements	Min	Max	Mean	Std. dev
I have the freedom to change the times that I begin and end each workday due to my personal preferences/needs	1	5	2.52	1.21
I have the freedom to change the department where I conduct my work each day	1	5	2.30	1.07
I have the freedom to choose the location where I complete my work	1	5	2.49	1.13
I have the freedom to choose my work schedule	1	5	2.50	1.15
I am satisfied with my current work arrangements	1	5	3.49	0.92
I would prefer to be involved in structuring my working times in the company	1	5	3.49	0.89
I find it difficult to balance my work life commitments	1	5	2.77	0.98
Flexible work arrangement will help me balance my work life	1	5	3.81	0.89
I often need time off during a working day to take care of personal commitments	1	5	3.51	1.08
My work hours do not allow me to spend time with my family	1	5	3.01	1.11

Source:- Processed Data 2025

The main independent variable in this survey was FWAs and it was measured using 10 indicators. The composite variable for this construct suggests an absence or limited use of FWAs in the work domain of participants. The

predominant disagreement of participants (shown M= 2.99 and SD = 1.04) can be interpreted as most of them were not exposed to flexible work arrangements such as flexible time schedule (flextime), flexible location schedules (flexplace) and flexible work schedules. With inference from these statistical findings, it can be advanced that there is a low level of FWAs among mineworkers.

Table 5:- Descriptive Statistics on Work Life Balance

Statements	Min	Max	Mean	Std. dev
I struggle with trying to juggle both my work and non-work responsibilities	1	5	2.93	1.04
I feel overwhelmed when I try to balance my work and personal life	1	5	3.27	0.92
I have difficulty scheduling vacation time because of my workload	1	5	3.33	1.05
I am unable to relax at home because I am preoccupied with work	1	5	2.99	1.06
I am happy with the amount of time I spend doing activities not related to work	1	5	3.35	1.02
I often have to make difficult choices between my work and my personal life	1	5	3.15	0.99
I have to put aspects of my personal life “on hold” because of my work	1	5	3.19	1.14
I am able to accomplish what I would like in both my personal and work lives	1	5	3.39	0.93
I often neglect my personal life needs because of the demands of my work	1	5	3.08	1.00
My personal life suffers because of my work	1	5	2.97	1.03
I have to miss out on important personal activities due to the amount of time I spend doing work	1	5	3.14	1.09
I feel that I allocate appropriate amounts of time to both work and non-work activities	1	5	3.45	0.98
I make personal sacrifices to get work done	1	5	3.65	0.91

Statements	Min	Max	Mean	Std. dev
I come home from work too tired to do things I would like to do	1	5	3.31	1.06
My job makes it difficult to maintain the kinds of personal life I would like	1	5	3.11	1.04

Source:- Processed Data 2025

Unlike most of the other constructs where there was generally some level of agreement with the indicators provided, the results of the descriptive test of work life balance were contrary. Given M= 3.22 and SD = 0.95. the greater proportion of participants in this research indicated that they are unable to achieve balance in the roles they play in their work and personal lives. To a larger extent, they reported that they are unable to simultaneously handle both work and non-work demands, make trade-offs in both spheres, neglect "personal life" for career, suffer stress in personal life and are unable to achieve a desired personal life. Based on these findings, it can be argued that this study identified a low level of work life balance among participants in the study area.

4. Results

In a bid to further understand the relationships between the variables considered in the study, a correlational analysis was conducted. The results of this test show some noteworthy associations among control variables (gender, age, educational level and marital status) and the other constructs comprising work life balance, occupational role reward value, occupational role commitment, homecare role reward value and flexible work arrangements.

Table 6:- Correlation Analysis

Particulars	Gender	Age	Work	Education	FWA	WLB	SFWA
Gender	1						
Age	-.248**	1					
Work	-.147	.353**	1				
Education	.105	-.002	-.111	1			
FWA	.001	-.014	.063	.048	1		
WLB	-.007	-.033	.177*	-.058	.472**	1	
SFWA	.126	-.016	-.029	-.071	.181*	.024*	1

Source:- Processed Data 2025

For instance, flexible work arrangement has a positive and substantial association with WLB, given B= .472 and p< .01. This can be interpreted as, an increase in the flexibility of one's work arrangement to increase their ability to balance work and domestic demands. Also, age was found to have a significant but inversely proportional relationship with FWA given B= -.014 and p<.05. This result further suggests that as most employees advance in age, they have less expectation of having flexible work arrangement. Since FWA was also found to relate significantly with WLB, this finding offers an interesting area for further enquiries. Furthermore, the educational level of respondents had a positive and substantial association with FWA (B= 0.048, p<.05).

The Effect of Flexible Work Arrangement on Work Life Balance

The correlational analysis carried out in the preceding section (see section 4.8) indicates that there is a positive and significant association between FWAs and WLB given *r* = .472. This coefficient suggests as FWAs are utilized increasingly there is the likelihood that WLB will increase. By considering the results of the regression analysis carried out on the two constructs in the table below, a clearer insight into this relationship is established.

Table 7:- Regression Analysis

Direct Effect	**Beta**	**S. E**	**T**	**P-value**
FWA→ WLB	0.472	0.079	6.520	0.00
R	*R-Square*	*F-Statistics*	*P-Value*	
0.472	0.223	42.509	0.00	

Source:- Processed Data 2025

Given the regression values (B= .472; t-value= -6.520; p-value =.00), it can be explained that the shared variance between FWAs and WLB is 22.3 percent (percentage of .223 r-square value) and that FWAs explains 22.3 percent variance in WLB. Additionally, this change is significant, considering the f-statistic of 42,509 and its associated p-value of .000 (which is lesser than the threshold of p<.05). Furthermore, the beta-value of .472 suggests that a unit change in FWAs is likely to result in a 47.2 percent increase WLB, although this change is also statistically significant, given the p-value (.000) and t-statistic (6.520).

5. Discussion

Principally, this study was aimed at ascertaining the association between flexible work arrangements and work-life balance among mine workers in

Ghana. The findings from this study provide some pertinent academic, theoretical, and practical (managerial) insights. For instance, the relationship between FWAs and WLB has been largely studied by scholars; however, the results have generally been somewhat contradictory. It does appear that researchers have usually found positive relationships between FWAs and WLB (Gudep, 2019; Rawashdeh et al., 2016; Aziz-Ur-Rehman and Siddiqui, 2019; Brosch and Binnewies, 2018). Nevertheless, contrary to the findings made in this study, some scholars have also established negative relationships between the two constructs (Dizaho, Salleh, and Abdullah, 2017; Wilson, 2009). The results of this current study affirm the earlier researchers' findings that a positive relationship exists between FWAs and WLB. The primary argument given for the negative relationship is that FWAs have the tendency to create work and family conflicts (Young and Schieman, 2018; Kim et al., 2019), and therefore they do not entirely benefit the employee positively. It is also advanced by Bjarntoft et al. (2020) that WLB can be adversely affected in the face of FWAs due to other attendant factors that are largely work-related. It is asserted that inflexible work arrangements have the likelihood to cause work-family conflicts among individuals, as it makes it challenging to be concurrently engaged in one's job and also meet family demands (Gamor, Amissah, and Boakye, 2014). Further, while an employee would prefer to work from home, probably due to family demands, there is likely to be no change or maybe even an increase in family-work imbalances or conflicts (Chung and Van der Lippe, 2018). This is confirmed by a study by Quansah et al. (2020), which shows that in Ghana's mining industry, family-work conflict already significantly contributes to job stress. Additionally, by working from home (telecommuting), it is possible for attention to be shared and most likely biased towards occupational duties (Bjarntoft et al., 2020; Galea, Houkes, and De Rijk, 2014). This is also likely to cause "absentmindedness" at home (Hollanda, 2020), resulting in domestic conflicts. With these contrasting views from previous studies, the current study goes on to, however, affirm that implementing FWAs in the mining sector offers several benefits that contribute to improved WLB among mineworkers in Ghana and that it can be inferred that FWAs, such as flexible scheduling and compressed workweeks, allow mineworkers to plan their work around personal and family obligations. Henderson (2019) argues that employees who have control over their schedules experience reduced stress and greater satisfaction in managing work and life commitments. For instance, compressed workweeks enable mineworkers to work longer shifts over fewer days, providing extended periods for rest and family time. Also, studies show that FWAs significantly reduce stress levels by giving workers the opportunity

to allocate time for personal well-being and relaxation. According to Baffoe et al., (2022), mineworkers who are offered flexible scheduling report improved mental health and reduced burnout, and by balancing work demands with personal priorities, employees can maintain a healthier lifestyle, resulting in greater productivity at work. Further, FWAs create opportunities for mineworkers to spend more time with their families, fostering stronger relationships. In Ghana, where family is central to social life, FWAs enable workers to attend important family events and fulfill caregiving responsibilities (Osei, 2020). This strengthens family bonds and reduces guilt associated with prolonged absences due to work. Yet again, workers who achieve a healthy WLB through FWAs are generally more satisfied with their jobs and less likely to leave their organizations. In the mining sector, where turnover rates can be high (Boohene et al., 2024), FWAs help retain skilled workers by improving their quality of life. Mensah et al. (2021) note that employers offering FWAs benefit from increased employee loyalty and motivation. Regarding the inverse relationship between age and FWAs in the mining sector, it could stem from generational differences in work preferences, technology adoption, and the sector's operational demands. For instance, according to Salminen et al. (2016) and Chimamise et al. (2013), emerging mining companies require young personnel, such as operators or laborers, who have less experience and expertise to work for shorter hours but usually older miners, who are more susceptible to distractions, to work for longer hours (Stemn, 2016). Thus, it can be inferred that while younger workers embrace flexibility as a key component of job satisfaction, older employees often prioritize routine and stability.

6. Conclusion

The findings suggested that FWAs had a positive and significant association with WLB. Therefore, as more FWAs are provided by mining firms and used by individuals, WLB is likely to increase. The study also revealed that, to some extent, mine workers feel comfortable with flexible work arrangements; however, older mine workers are less comfortable with flexible work arrangements compared to younger ones. The study recommends that FWAs should be properly managed so that they do not contribute to work-life conflict. Also, mining companies should seek to balance the dynamics associated with the inverse relationship between older mine workers and FWAs, which is in contrast to younger mine workers and FWAs, by leveraging technology and creative policies to implement FWAs that benefit a diverse workforce while maintaining operational efficiency.

7. References

1. Aryee, S., Chu, C.W., Kim, T.Y. and Ryu, S., 2013. Family-supportive Work Environment and Employee Work Behaviors: An Investigation of Mediating Mechanisms. *Journal of Management, 39(3), pp.792-813.*
2. Asiedu-Appiah, F. and Zoogah, D.B. (2019). Awareness and Usage of Work-life Balance Policies, Cognitive Engagement and Perceived Organizational Support: A Multi-level Analysis. *Africa Journal of Management, 5(2), pp.115-137.*
3. Asiedu-Appiah, F. (2015). The Effects of Organizational Work-life Balance Policies on Employee Engagement (Doctoral dissertation).
4. Aziz-Ur-Rehman, M. and Siddiqui, D.A., (2019). *Relationship Between Flexible Working Arrangements and Job Satisfaction Mediated by Work-Life Balance: Evidence from Public Sector Universities Employees of Pakistan.* Available at SSRN 3510918.
5. Baffoe, E., & Antwi, S. (2022). Work-life Balance in Resource-intensive Industries: The Case of Ghanaian Mineworkers. *African Journal of Social Research, 18(2), 123-140.*
6. Beutell, N. and O'Hare, M., 2018. Work Schedule and Work Schedule Control Fit: Work-family Conflict, Work-family Synergy, Gender, and Satisfaction. *Work-family Synergy, Gender, and Satisfaction (January 19, 2018).*
7. Bharathi, P. S., Jasim, K. M., Santhanalakshmi, K., & Boohene, D. (2018). WLB Model and Performance Measurement: Evidence with Private Hospital Women Nurses in Ghana Milieu. *International Journal of Business Innovation and Research, 16(4), 424-452. https://doi.org/10.1504/IJBIR.2018.093520*
8. Boohene, D., Awalime, B., Oyekunle, D., Odame, C., Anderson, F. (2024). The Role of Trade Union Activities in Fostering Job Satisfaction in Ghana's Mining Industry. *International Journal of Research in Business Studies. 9 (2),135-148.*
9. Bjarntoft, S., Hallman, D.M., Mathiassen, S.E., Larsson, J. and Jahncke, H., (2020). Occupational and Individual Determinants of Work-life Balance among Office Workers with Flexible Work Arrangements. *International Journal of Environmental Research and Public Health, 17(4), p.1418.*
10. Brosch, E. and Binnewies, C., (2018). A Diary Study on Predictors of the Work-life Interface: The Role of Time Pressure, Psychological Climate and Positive Affective States. *Management Revue, 29(1), 55-78.*

11. Chung, H. and Van der Horst, M., (2018). Women's Employment Patterns After Childbirth and the Perceived Access to and use of Flexitime and Teleworking. *Human Relations, 71(1), pp.47-72.*
12. Chung, H. and Van der Lippe, T., (2018). Flexible Working, Work–life Balance, and Gender Equality: Introduction. Social Indicators Research, pp.1-17.
13. Chimamise, C., Gombe, N.T., Tshimanga, M, et al. (2013). *Factors Associated with Severe Occupational Injuries at Mining Company in Zimbabwe, 2010: a Cross-sectional Study.* Pan Afr Med J. 14:5.
14. Cochran, W.G. (1977*). Sampling Techniques.* 3rd Edition, John Wiley & Sons, New York.
15. Dizaho, E.K., Salleh, R. and Abdullah, A., (2017). Achieving Work Life Balance through Flexible Work Schedules and Arrangements. *Global Business & Management Research, 9.*
16. Fang, T., Lee, B., Timming, A. and Fan, D., (2019). The Effects of Work-life Benefits on Employment. *SSRN Electronic Journal.*
17. Ibeh, F & Boohene, D. (2023). Work-Life-Balance Initiatives among Healthcare Practitioners. *International Journal of Research in Business Studies: 8(2), 5-16*
18. Ibeh, F., Oyekunle, D., & Boohene, D. (2024). Exploring Effective Methods to Boost Virtual Workers' Morale for Improved Project Performance. *International Journal of Professional Business Review, 9(3), e04335.* https://doi.org/10.26668/businessreview/2024.v9i3.4335
19. Gamor, E., Amissah, E.F. and Boakye, K.A.A., (2014). Work–family Conflict among Hotel Employees in Sekondi-Takoradi Metropolis, Ghana. *Tourism Management Perspectives, 12, pp.1-8.*
20. Gudep, V.K., (2019). An Empirical Study of The Relationships between The Flexible Work Systems (FWS), Organizational Commitment (OC), Work Life-Balance (WLB) and Job Satisfaction (JS) for the Teaching Staff in The United Arab Emirates (UAE). *International Journal of Management, 10(5).*
21. Henderson, P. (2019). Flexible Work Arrangements: A Global Overview. International Labour Organization.
22. Hollanda, P., (2020). Antecedents and Outcomes of Work-family Conflict and Work-family Enrichment: A Longitudinal, Multilevel, and Multimethod Study. *In the New Ideal Worker (pp. 223-249)*. Springer, Cham.
23. Kim, H., Kim, Y. and Kim, D.L. (2019). Negative Work–family/family–Work Spillover and Demand for Flexible Work Arrangements: the

Moderating Roles of Parenthood and Gender. *The International Journal of Human Resource Management*, 30(3), pp.361-384.

24. Mensah, D., Obeng, A., & Addo, R. (2021). Workplace Stress and Productivity in Ghana's Mining Sector. *Ghanaian Journal of Industrial Relations, 9(1), 78-96.*
25. OECD., (2016). Be Flexible! Background Brief on How Workplace Flexibility Can Help European Employees to Balance Work and Family; Organisation for Economic Co-operation and Development: Paris, France. Available online: *https://www.oecd.org/els/family/Be-Flexible-Backgro-under-Workplace-Flexibility.pdf*
26. Osei, Y. (2020). *Challenges and Innovations in Ghana's Mining Workforce Management.* Accra: Mineral Resources Institute.
27. Pretorius, L., (2020). Investigating Family-friendly Work Arrangements in the South African Financial Services Industry: Effects of Work-to-family Enrichment and Gender (Doctoral dissertation, North-West University (South Africa).
28. Quansah, P. E., Eggley, V. E., & Fanyinkah, K. D. (2020). Family-work Conflict and Safety Performance: An Un-examined Relationship in the Ghanaian Mining Industry. *International Journal of Scientific and Research Publications, 10(11), 411–420*
29. Ramachandran, T., K. Santhana, L., & Boohene, D. (2012). "Analysis of Work-life Balance of Female Nurses in Hospitals" A Comparative Study between Government and Private Hospital in Chennai district, T, N, India. *International Journal of Trade, Economics and Finance, Hong Kong* (IJTEF, ISSN: 2010023X)
30. Rawashdeh, A.M., Almasarweh, M.S. and Jaber, J., (2016). Do Flexible Work Arrangements Affect Job Satisfaction and Work-life Balance in Jordanian Private Airlines? *International Journal of Information, Business and Management, 8(3), p.172.*
31. Stemn, E. (2019). *Analysis of Injuries in the Ghanaian Mining Industry and Priority Areas for Research.* Saf Health Work.10:151–65.
32. Salminen, S. (2016). Long Working Hours and Shift Work as Risk Factors for Occupational Injury. *Open Ergonomics J. 9:15–26*
33. Sirgy, M.J. and Lee, D.J., (2018). Work-life Balance: An Integrative Review. *Applied Research in Quality of Life, 13(1), pp.229-254.*
34. Wilson, D.A., (2009). Flexible Work Arrangements and Work-Life Balance. *Journal of the University College of the Cayman Islands, 3.*

Reciprocal Reinforcement: Social Media Engagement and FoMO

Meera Mehta
Professor
Shaheed Bhagat Singh College
Delhi University
Delhi, India.

Shivani Arora
Professor
Shaheed Bhagat Singh College
Delhi University
Delhi, India.

Abstract

Social media originated in 2004 and has been exponentially researched by academicians and practitioners. From being an obscure concept to being an integral part of people's everyday lives, social media is a phenomenon that has various contributors and consequences. Fear of Missing out (FoMO) is one such crucial contributor as well as a result that needs analysis. The tool of bibliometric analysis has been applied to social media usage and fear of missing out. The area of research has yielded 458 papers since 2013 (when the first and the most cited paper was authored). The importance of FoMO in social media usage has been recognized and elaborated by the fact that a 10-item FoMO scale has been used to measure and report it, sometimes as a cause of social media usage, a result of social media usage, or a mediator of social media usage. Publication analysis clubbed with co-occurrence and author network analysis has yielded some interesting results discussed in the paper. This paper has made an effort to point out the future research venues in the field of social media usage and FoMO.

Keywords

Fear of Missing out (FoMO), Social media, Social media usage, Social Media Addiction (SMA), Instagram, Facebook, and Whatsapp.

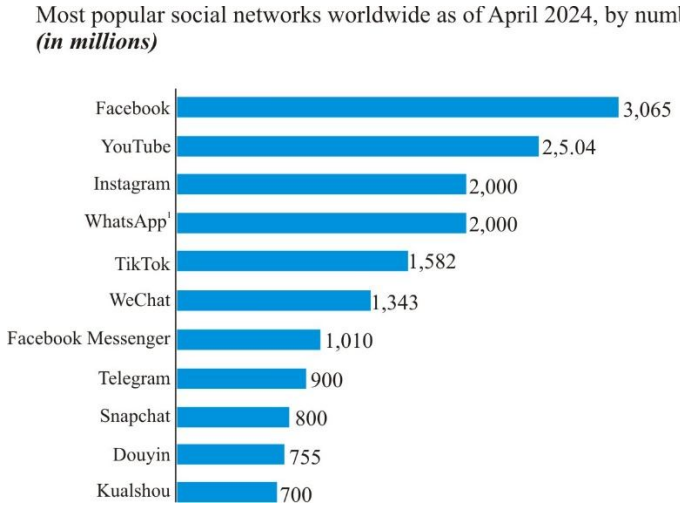
1. Introduction

Experiencing life through the lens of smartphones is the new way of life. The tourists, the audience of the live shows, and parents at the annual functions of their kids all bear testimony to it. People spend thousands on buying tickets to watch their favourite artist perform, but one look at the audience and the urge to record “it all” is more than evident. Everyone, on the surface, believes that they are watching through the camera lens because pictures and videos preserve memories. But the question arises, are the real memories being created through the lens? Are the memories being created for ourselves, or are they for the

followers/friends on social media? Maybe the answer is that it is for both, but it is not that simple, is it? Those on the show are recording it, and those who cannot attend feel left out by the posts on social media glorifying the event. People spend money and make sure that the world of their social media friends (which of course includes their real-life friends, family, and acquaintances/ followers/subscribers) knows that they had a great time.

Now, imagine a scenario where none of the audience were allowed to take their gadgets to record the videos! It would make the audience just focus on the event, their favourite celebrity, but how will they share? This sharing is responsible for the fear of missing out being heavily talked about on social media. Sharing leads to FoMO for those who could not attend, and "not sharing" leads to FoMO for those who attended but did not post. FoMO on the appreciation and views they might have had if they had shared their pictures/ videos. FoMO is the outcome either way.

Social media owes its origin to Orkut and Facebook, which started in 2004. The acquisitions, collaborations, and innovations in the field of social media have led to a humongous increase in the number of users accessing it and making it an integral part of their lives. Figure 1, from Statistica, encapsulates the usage of various social media platforms in April 2024. Facebook (3,065 monthly users) leads the roost, followed by YouTube (2,504), Instagram (2,000), WhatsApp (2,000) and the rest. These high numbers are an indication of the wide use of social media all across the globe.



Source:- https://www.statista.com/statistics/272014/global-social-networks-ranked-by-number-of-users/

Figure 1:- Most Popular Social Media Networks, 2024

The term FoMO, the fear of missing out, was added to the Oxford dictionary in 2013, but the term was used for the first time by Dr. Dan Herman in 1996 in an academic paper authored by him. Formally, the term was popularised by Patrick McGinnis, a Harvard MBA student, while writing for Harbus, a non-profit self-funded news organization of the Harvard Business School. FoMO is a paradox to the idea of "enjoying the present." It is humanly not possible to be present everywhere, but the technology lets you view what is happening everywhere, leading to the uncomfortable feeling called the Fear of Missing Out (FoMO).

Przybylski (2013) discusses FoMO in comprehensive detail elaborating on the practical impossibility of ever being a part of every event and resulting in FoMO, which is "a pervasive apprehension that the others might be having a rewarding experience from which one is absent." FoMO is in no way a new construct of human nature, but its magnitude has increased manifold since social media enables us to be made aware of, and in minute detail about, what is happening in the lives of people in every nook and corner of the world, and we can share the same with them. A very interesting intersectional study on FoMO, social media intensity, and social connections (Robert, 2019), which emphasizes that FoMO increases the social media intensity, but it may also have a positive impact on the social connections through the use of social media.

2. Objectives of the Study

The present study aims to decipher the laid-down research objectives in detail. Through the following objectives, the paper focuses on finding interesting and widely used relationships between social media and FoMO.

2.1. Research Objective 1 (RO1): To extract the most productive journals and other publishing trends to map the bibliometric profile.

2.2. Research Objective 2 (RO2): To determine which authors are the most prolific and also which nations and organizations contribute the most.

2.3. Research Objective 3 (RO3): To identify the themes that have emerged in the study of social media and the Fear of Missing Out.

2.4. Research Objective 4 (RO4): To summarize the methodology and findings of the most cited papers in the field of FoMO and social media.

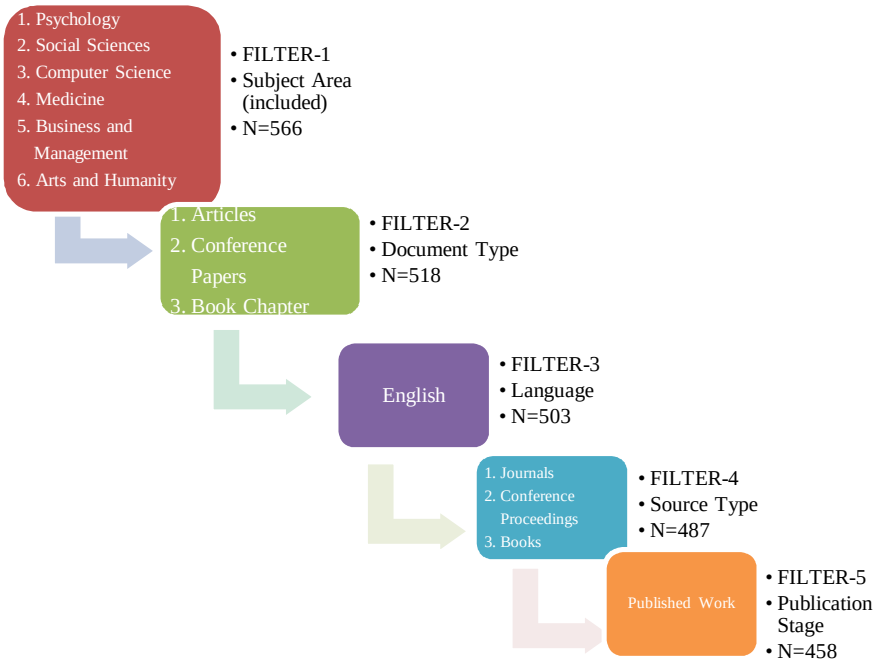
3. Research Methods

The study performs a bibliometric analysis to understand the research trends in FOMO and social media, as this will help in identifying the critical topics within the academic literature. For bibliometric analysis the study undertakes publication analysis, author network analysis and network of words co-

occurrence analysis. Bibliographic analysis facilitates researchers to comprehending the impact and quantifying the influence of individuals, publications, or journals on the growth of the research topics. Bibliometrics is a quantitative and literature-based analysis that uses statistical methods to analyze the interrelationship of publications and articles (Fahreza & Harjanah, 2024). The bibliometric analysis method is also very good at handling a lot of publication to develop research subjects, find areas of interest, and explain internal relations and researcher contact. (Van Eck and Waltman 2010). Bibliometric analysis also considerably lessens the researcher's bias, time, and effort as compared to a systematic literature review. (Radhakrishnan et al., 2017)

3.1 Data Search Strategy

A total of 589 documents were successfully retrieved from the Scopus Database using the search string “Social Media” AND “FoMO” OR “Fear of missing out” on December 17, 2024. The publication time frame was set until 2024. The process of data retrieval was undertaken by applying the following inclusion criteria. Figure 2 shows the flowchart for data retrieval.



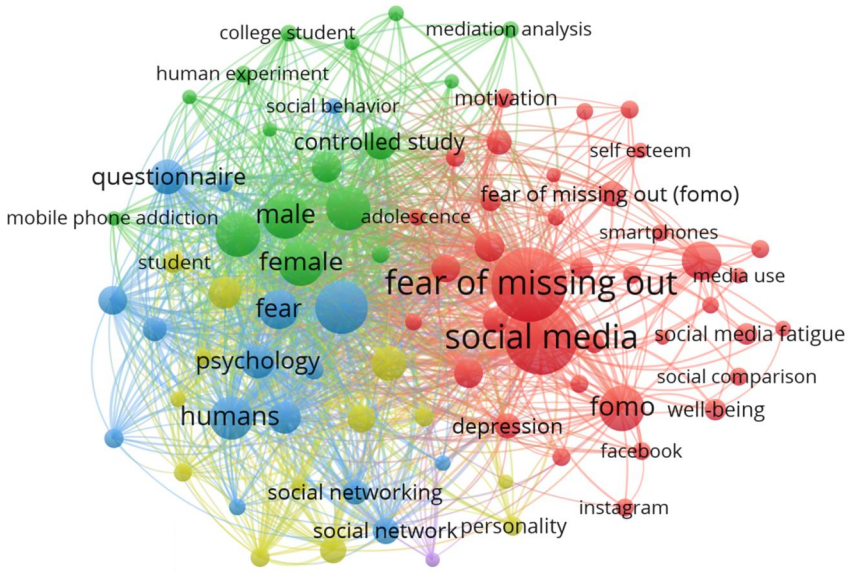
Source:- Created by Authors thorough Biblioshiny

Figure 2:- Search Strategy

4. Analysis and Tools

This study undertakes a network of word co-occurrence analysis, author network analysis and publication analysis to track research in this field.

Words co-occurrence analysis: Word co-occurrence analysis in bibliometric studies look at the relationships and frequency of words or concepts that appear together in the same document. Using word co-occurrence analysis, researchers can find theme patterns, research trends, and links across topics. This analysis offers insights into social media and the fear of missing out (FoMO) topics (Figure 3) that have gained attention from scholars.



Source:- Created by Authors thorough Biblioshiny

Figure 3:- Word Co-occurrence Analysis

The author's co-occurrence (co-authorship analysis) gives an overview of research collaborations and the social structure of research work in social media and FoMO. Co-authorship analysis facilitates the identification of collaboration networks, discovering influential authors or groups within a research domain, analysing interdisciplinary collaboration patterns, and detecting clusters of researchers working on similar topics. Co-authorship analysis can also examine the issues of collaboration on the level of institutions and countries (Župič & Cater, 2015).

Publication analysis presents the analysis of the literature in the area of FoMO and social media. It includes publication frequency by year (information on research trends in the field of research), year-by-year overview of scientific research in FoMO and social media, and the citation analysis of the research published.

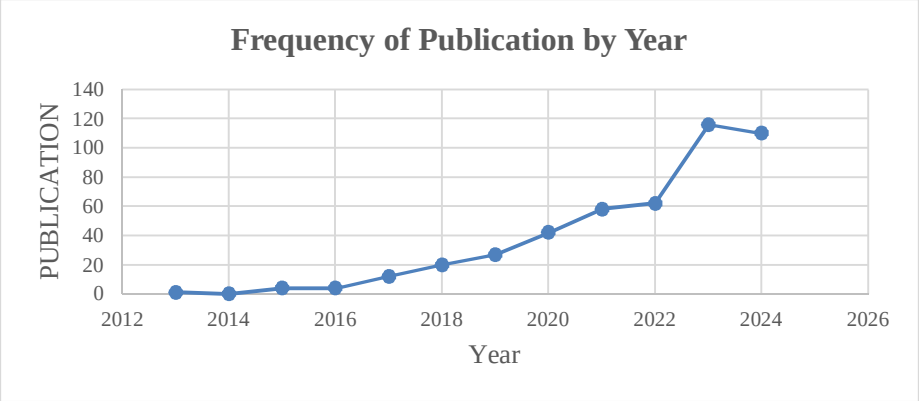
VOSviewer version 1.16.19 (Centre for Science and Technology Study, Leiden University) has been used to study word co-occurrence and author co-occurrence. For word co-occurrence, all keywords (data) are extracted by the software, and based on the data, clusters are created for further analysis. Co-author analysis of scientific publications is presumed to be a measure of collaboration (Župič & Cater, 2015).

4.1 Publication Analysis

RO1: To extract the most productive journals and other publishing trends in order to map the bibliometric profile.

2013, saw the first research paper on social media and FoMO (SM & FoMO) was published with zero research in this area in 2014; however, in the subsequent year, (post-2016) research in FoMO and social media gained interest, and 2023 witnessed 116 research articles. In total, 458 publications were identified which included research articles (413 documents), book chapters (17 documents), and conference papers (28 documents). The growth is exponential in the years 2020 and 2021 (due to increase in social media usage and the fear of missing out in life during the pandemic), and also in 2022-2023 as FoMO changed form, people were more interested in not missing out on anything and posting about it.

The average number of citations per article is 32.1.



Source:- Created by Authors thorough Biblioshiny

Figure 4:- Publication Analysis

These articles appeared in 241 journals, of which 23 (maximum) articles relating to FoMO and social media were published in Computers in Human Behavior followed by 21 publications in Current Psychology, and 12 each in Cyberpsychology, Behavior, and Social Networking and Inter-national Journal of Environmental Research and Public Health (Table-1).

Table 1:- Top 10 Academic Journals with the Most Publications (Biblioshiny)

S. No.	Publication Name	Number of Articles
1.	Computers in Human Behavior	23
2.	Current Psychology	21
3.	Cyberpsychology, Behavior, and Social Networking	12
4.	International Journal of Environmental Research and Public Health	12
5.	Addictive Behaviors	11
6.	Frontiers in Psychiatry	10
7.	BMC Psychology	8
8.	Psychology Research and Behavior Management	8
9.	Journal of Technology in Behavioral Science	7
10.	International Journal of Human-computer Interaction	6

Source:- Created by Authors through Biblioshiny

Table 2 presents the top 10 most cited journals with maximum citations and a minimum of three documents. Computers in Human Behavior has 3543 citations to its credit with the highest number (23 articles) of publications in this area of research. Journal of Adolescence has only three documents published in this field, but the citations of these documents are 911, Addictive Behavior with 811 citations (11 articles published), Personality and Individual Differences has published 3 documents, and the citations of these papers are 529, International Journal of Environmental Research and Public Health has 504 (12 research articles published), and New Media and Society has 453 citations (3 publications), followed by the Journal of Retailing and Consumer Services with 437 citations (3 documents). These figures point to the outstanding performance of Computers in Human Behavior, Journal of Adolescence, Addictive Behaviors, Personality and Individual differences in terms of citation v/s publications. Also, new researchers should target these journals for a higher readership of their work.

Table 2:- Top 10 Highly Cited Publications. (Vosviewer.CSV file)

S. No.	Publication Name	Documents	Number of Citations
1.	Computers in Human Behavior	23	3543
2.	Journal of Adolescence	3	916
3.	Addictive Behaviors	11	811
4.	Personality and Individual differences	3	529
5.	International Journal of Environmental Research and Public Health	12	504
6.	New Media and Society	3	453
7.	Journal of Retailing and Consumer Services	3	437
8.	Technological Forecasting and Social Change	5	435
9.	Current Psychology	21	276
10.	Internet Research	3	276

Source:- Created by Authors through Biblioshiny

4.2 Author Network Analysis

RO2: To determine which authors are the most prolific as well as which nations and organizations contribute the most.

The paper uses VOS viewer software for author network analysis. VOS viewer is a tool for constructing and visualizing bibliometric networks.

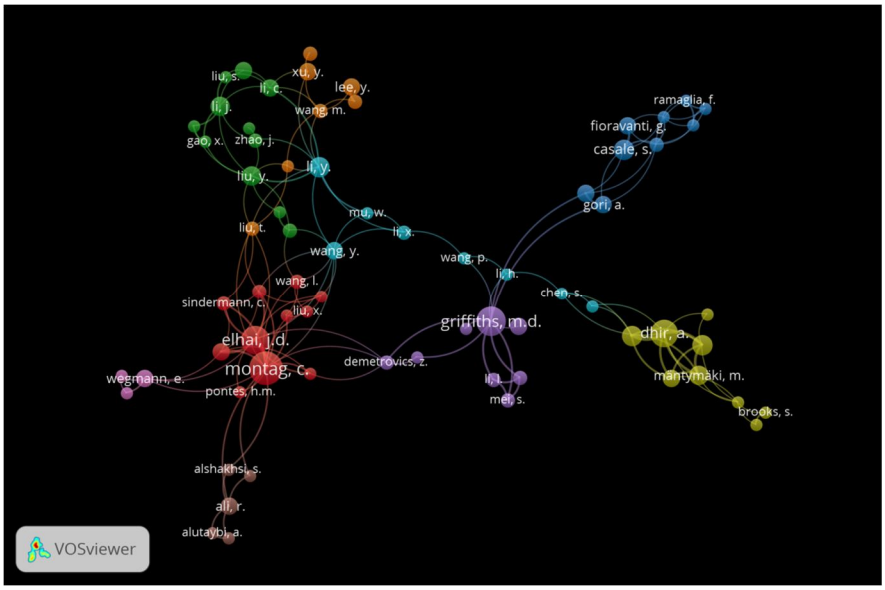
Table 3:- Top 10 Author's Publication Analysis (VOSviewer-.RIS file)

S. No.	Author	Documents	Total Link Strength
1.	C. Montag	15	34
2.	M.D. Griffiths	12	22
3.	J.D. Elhai	11	26
4.	A. Dhir	10	25
5.	A. Tandon	6	19
6.	P. Kaur	6	17
7.	Y. Li	6	13
8.	S. Casale	6	9
9.	C.T. Barry	6	4
10.	M. Mantymaki	5	17

Source:- Created by Authors through Biblioshiny

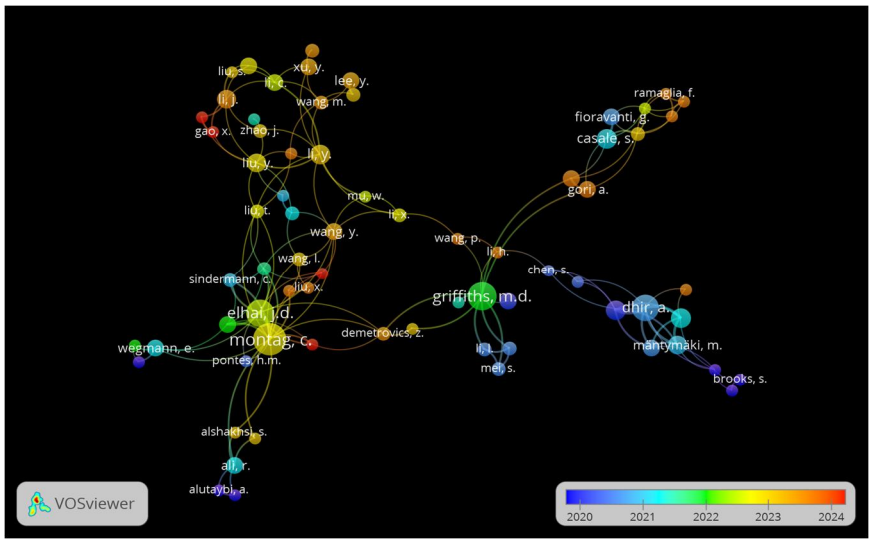
Between 2013-2024, 1279 authors contributed towards 458 SM & FoMO publications. The top 5 authors with 5 or more publications were Montag (15) - ULM University, Germany, Griffiths (12) - Nottingham Trent University, UK, Elhai (11), University of Toledo, USA, Dhir (10), University of Agder, Norway, Tandon (6) University of Turku, Finland, and Kaur (6), NorthWestern University, SA/University of Bergen, Norway. Table 3 presents the top 10 authors with 5 or more publications. The work of these authors in SM & FoMO can be investigated for further research in this area. Of the 458 publications with 1271 contributing authors, only 36 were single-authored, and 1235 were multi-authored. The Total link strength (TLS) indicates the total strength of an author's collaboration with others. A high TLS (e.g. A. Dhir, A. Tandon) suggests that the author is highly connected and has strong collaborative ties, indicating centrality in research collaborations. Items with higher TLS are often central to the network and can represent influential authors with groundbreaking papers. By interpreting TLS, researchers can have a better understanding of collaboration patterns, influential topics, or authors.

To study the composition of co-authors' relationships among contributing authors, this paper examines the 1271 authors by analysing their co-occurrence and connection.



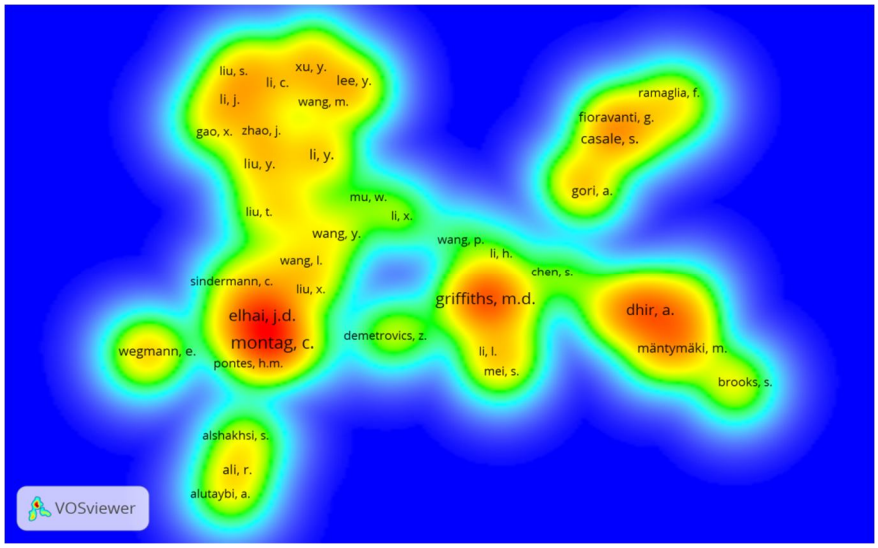
Source:- Created by Authors through Biblioshiny

Figure 5:- Network Visualization of Co-authorship Analysis



Source:- Created by Authors through Biblioshiny

Figure 6:- Overlay Visualisation of Co-authorship analysis



Source:- Created by Authors through Biblioshiny

Figure 7:- Density Visualisation of Co-authorship analysis

Co-authorship analysis was conducted using VOSviewer software. Figure-5 shows that there were 11 clusters with 4 significant clusters (with a minimum of 9 authors in each cluster), and the remaining 7 clusters have

authors ranging from three to eight in number. The authors who represented the 4 significant clusters: Montag (red cluster), Griffiths (purple cluster), Dhir (yellow cluster), and Li J (ocean blue cluster).

The overlay visualization map records the period of article publication by prominent authors (Figure-6). The clusters in blue colour indicate the authors who contributed before 2019. (Przybylski et. al., 2013), initiated research in this field. The clusters in yellow and orange refer to the authors with recent work in SM and FoMO. Montag and Griffiths, with their recent work in 2024 belong to this group however, these authors have been contributing to research in this area since 2019.

Figure-7 presents a density visualization of the co-authorship network. It allows us to visualize the profiles of the authors. Color gradients are used to represent density. Warm colours (e.g., red, orange, and yellow) indicate higher density (more influence). Cool colours (e.g., green and blue) represent lower density. Red zones highlight dominant authors; hence, Montag, Dhir, and Griffiths dominate the research in the field of SM and FOMO. New researchers can connect with these authors to explore more in this research area.

Table 4:- Top 10 Authors with Highest Citations (VOSviewer using .CSV file)

S. No.	Authors	Documents	Citations
1.	D. Alt	3	454
2.	A.Tandon, A. Dhir, S. Talwar, P. Kaur	2	162
3.	T.C.T. Dinh, Y. Lee	2	94
4.	A. Gori, E. Topino, M.D. Griffiths	2	40
5.	F. Westin, S. Chiasson	2	34
6.	A. Koessmeier, O.B. Buttner	2	31
7.	A. J. Sultan	2	22
8.	T. Eitan, T. Gazit	2	20
9.	I. Alvi, N. Saraswat	2	8
10.	L. Zhao	2	6

Source:- Created by Authors through Biblioshiny

Network analysis shows 10 significant authors in terms of citations. Dorit Alt, with 3 publications, has the highest number of citations (454) followed by Tandon, Dhir, Talwar, Kaur, Dinh and Lee (Table 4). Alt has published 3 research papers each in 2015, 2017, and 2018. His work focuses on the usage of social media on the mental health of university students. Anushree Tandon, Puneet Kaur and Amandeep Dhir have 2 publications and 162 citations. Their work (from 2020 to 2022) investigates the dark side the problematic use of social media. Their most recent work in 2022 highlights social media-induced FoMO.

4.3. Word Co-occurrence Analysis

RO3: To identify the themes that have emerged in the study of social media and Fear of Missing out.

This section of the paper studies the most frequent words or terms (keywords) in academic journals. For this study, five minimum co-occurrences of a keyword have been considered in VOSviewer and selected 162 words that met the threshold. Thus, only 162 out of 2142 words were retained for word co-occurrence analysis.

Out of the 162 keywords retained, Table 5 displays 14 keywords that occurred 50 or more times. 2 keywords (Fear of Missing Out & Social Media) appeared more than 200 times, followed by human (128 times), 3 keywords occurred more than 90 times, 5 words appeared more than 70 times. Table-6 presents a keyword co-occurrence analysis. Fear of missing out has the highest occurrence (252), closely followed by social media (241) for SM and FOMO topics in the academic journals. However, in terms of total link strength (TLS), social media is the most vital link keyword (2279 TLS), followed by fear of missing out (2241 TLS).

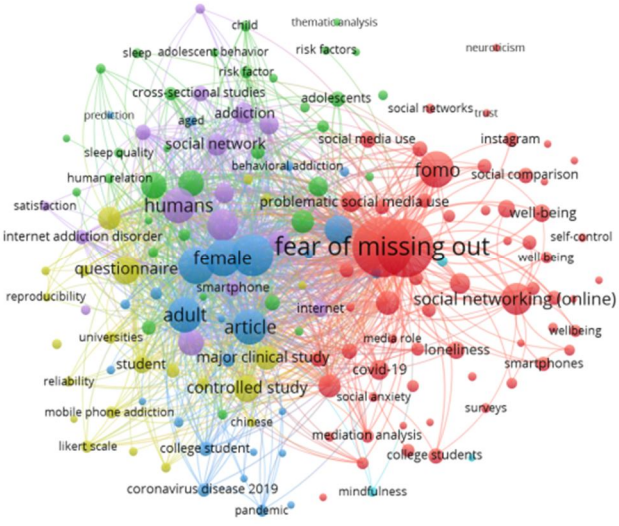
Table 5:- Most Influential Publications of Co-word Analysis

S. No.	Keywords	Cluster	Occurrence	Total Link Strength
1.	Fear of Missing Out	1	252	2227
2.	Social Media	1	241	2279
3.	Human	3	128	2103
4.	Male	3	93	1705
5.	Female	3	93	1701
6.	FoMO	1	92	602
7.	Adult	3	87	1610

S. No.	Keywords	Cluster	Occurrence	Total Link Strength
8.	Article	3	87	1569
9.	Humans	5	86	1500
10.	Fear	5	72	1179
11.	Social Networking (Online)	1	70	464
12.	Social Media Addiction	3	57	761
13.	Questionnaire	4	55	972
14.	Psychology	2	50	942

Source:- Created by Authors through Biblioshiny

Figure 8 illustrates a network map of all keyword co-occurrence and interactions in academic journals. The distance between nodes represents the strength of the relationship between the terms or keywords they represent. Closer nodes indicate terms that co-occur frequently in the dataset. Farther nodes suggest weaker relationships, meaning the terms are less likely to appear together. The distance between the nodes indicates the measure of conceptual similarity or thematic closeness. Nodes within the same cluster (same colour) are typically closer together because they represent terms that co-occur more frequently with each other than with terms in other clusters. (Van Eck & Waltman, 2010)



Source:- Created by Authors through Biblioshiny

Figure 8:- Co-occurrence Analysis

Four significant clusters emerge from the keyword co-occurrence analysis. The red cluster with the highest number of nodes (61 items) mentions problematic social media, phubbing, well-being, social networking (online), (FoMO), fear of missing out, and social media prominently. These items may be used to develop foundational knowledge and theoretical understanding of this research area. The green cluster with 33 items points at adolescents, anxiety, and psychology, although these items are as prominently used however, these are underdeveloped items that can be used for research growth in the subject area of social media and FoMO as these are more specialized and relevant for emergent studies. The blue cluster has 27 items. These items majorly point to the influence of gender on social media and FoMO. The items that prominently emerge from this cluster are male, female, and social media addiction. The yellow cluster (22 items) majorly focuses on controlled study, major clinical study, and questionnaire suggesting the various research tools used to study this subject, other items gaining attention in this cluster are the Likert scale, survey and questionnaire suggesting that these tools can also be applied by researchers for a better research output.

4.4. Research Findings for FoMO and Social Media

RO4: To summarise the findings and gaps of the most cited papers in the field of FoMO and Social Media.

Table 6:- Most Cited Papers

Paper	DOI	Total Citations	TC per Year	Normalized TC
PRZYBYLSKI AK, 2013, COMPUT HUM BEHAV	10.1016/j.chb.2013.02.014	1697	141.42	1.00
DHIR A, 2018, INT J INF MANAGE	10.1016/j.ijinfomgt.2018.01.012	593	84.71	4.52
FOX J, 2015, COMPUT HUM BEHAV	10.1016/j.chb.2014.11.083	529	52.90	2.30
BLACKWELL D, 2017, PERS INDIVID DIFFER	10.1016/j.paid.2017.04.039	513	64.13	3.40

Paper	DOI	Total Citations	TC per Year	Normalized TC
HUNT MG, 2018, J SOC CLIN PSYCHOL	10.1521/jscp.2018.37.10.751	507	72.43	3.87
OBERST U, 2017, J ADOLESC	10.1016/j.adolescence.2016.12.008	497	62.13	3.30
TALWAR S, 2019, J RETAIL CONSUM SERV	10.1016/j.jretconser.2019.05.026	351	58.50	5.90
ALT D, 2015, COMPUT HUM BEHAV	10.1016/j.chb.2015.02.057	310	31.00	1.35
KLEIS NIELSEN R, 2018, NEW MEDIA AND SOCIETY	10.1177/1461444817701318	272	38.86	2.07
BARRY CT, 2017, J ADOLESC	10.1016/j.adolescence.2017.08.005	266	33.25	1.76

Source:- Created by Authors through Biblioshiny

Table 7:- Details of the Most Cited papers

S. No.	Title of the Paper and Year	Authors
1.	Motivational, emotional, and behavioral correlates of fear of missing out, 2013	Andrew K. Przybylski, Kou Murayama, Cody R. DeHaan, Valerie Gladwell
2.	Online social media fatigue and psychological well being—A study of compulsive use, fear of missing out, fatigue, anxiety, and depression, 2018	Amandeep Dhir,Yossiri Yossatorn Puneet Kaur, Sufen Chen
3.	The dark side of social networking sites: An exploration of the relational and psychological stressors associated with Facebook use and affordances, 2015	Jesse Fox, Jennifer J. Moreland

S. No.	Title of the Paper and Year	Authors
4.	Extraversion, neuroticism, attachment style and fear of missing out as predictors of social media use and addiction, 2017	David Blackwell, Carrie Leaman, Rose Tramposch, Ciera Osborne, Miriam Liss
5.	No More FoMO: Limiting Social Media Decreases Loneliness and Depression., 2018	Melissa G. Hunt, Rachel Marx, Courtney Lipson, and Jordyn Young
6.	Negative consequences from heavy social networking in adolescents: The mediating role of fear of missing out, 2017	Ursula Oberst, Elisa Wegmann, Benjamin Stodt, Matthias Brand, Andrés Chamarro
7.	Why do people share fake news? Associations between the dark side of social media use and fake news sharing behavior, 2019	Shalini Talwar, Amandeep Dhir, Puneet Kaur, Nida Zafar, Melfi Alrasheedy
8.	College students' academic motivation, media engagement, and fear of missing out, 2015	Dorit Alt
9.	Dealing with digital intermediaries: A case study of the relations between publishers and platforms, 2018	Rasmus Kleis Nielsen and Sarah Anne Ganter
10.	Adolescent social media use and mental health from adolescent and parent perspectives, 2017	Christopher T. Barry, Chloe L. Sidoti, Shanelle M. Briggs, Shari R. Reiter, Rebecca A. Lindsey

Source:- Created by Authors through Biblioshiny

The paper "Motivational, emotional, and behavioural correlates of fear of missing out" has been cited 1697 times. It is rich in content and a fascinating read. It handles a complex topic with simplicity. The objective of the paper is to make a measure of FoMO for the individuals, followed by another sample to study the demographic, individual differences, and social engagement levels of the users related to the fear of missing out, and the third one was to measure the impact of FoMO on emotional well-being of the users and the real-life experiences (Przybylski et al., 2013).

The study included participation by 1013 (672 men, 341 women), within the age group of 18 to 62 years (M = 28.5, SD = 8.55). The participants were English-speaking; from different parts of the world, including the United States, India, Australia, Canada, The United Kingdom, and some other nations.

The study employed a Likert scale to develop the instrument, which focused on accurately identifying tapped-in between-persons variability in FoMO. The second part of the study used the 10-item scale for FoMO developed in the study, social media engagement was studied by asking the respondents about the daily use of social media through an 8-point Likert scale. The Need Satisfaction Scale (9-item scale) was employed to study psychological need satisfaction. A 5-point Likert scale was used to study overall life satisfaction and was measured with an assessment that tapped into life satisfaction. The Emmons Mood Indicator (modified 9-item scale) was used to measure the general mood of the participants.

The results indicated that there was an association between FoMO and lower need, life and mood satisfaction; it led to higher social media engagement and a link between FoMO and distracted driving as well as attention deficiency during the lectures was established. FoMO also mediated links between social media engagement and individual differences. The study also established a self-report measure of FoMO. With such rich outcomes, it is no wonder the study is the most cited study.

The paper “Online social media fatigue and psychological well-being—A study of compulsive use, fear of missing out, fatigue, anxiety, and depression” has been cited 593 times. It studies various psychosocial well-being factors related to social media fatigue. The paper discusses the concept of social media fatigue amongst the reasons why social media users take a break. (A. Dhir, 2018)

Various antecedents and precedents of social media fatigue have been studied, with this particular study bridging the gap. The stressor-strain-outcome framework (SSO) is used to examine if the precedents are the psychosocial well-being measures, including compulsive media use and fear of missing out. The study also studies if anxiety and depression are the antecedents of social media fatigue.

The study's sample is from adolescent social media users in India. A repeated cross-sectional methodology with two waves of data (N = 1554, 1144) separated by 5 months was used to study them.

Confirmatory Factor Analysis (CFA) using the measurement model has been used to evaluate the model fit. The study concludes that obsessive media use considerably increased social media fatigue, which in turn led to higher levels of anxiety and depression. Through the mediation of obsessive social media use, social media fatigue was indirectly predicted by FoMO.

"The Dark Side of Social Networking Sites: An Exploration of the relational and psychological stressors associated with Facebook use and affordances" by Jesse Fox and Jennifer J. Moreland has been cited 529 times. The paper is very rich in research and explores multiple aspects, though for this paper the study of FoMO has been identified as a small part of the research. (Fox & Moreland, 2015)

The sample was a focus group of 44 participants (17 men and 27 women) from the Midwestern university, aged within the age group of 19 to 52. Focus groups were employed to decipher the themes around the emotional responses and stressors of Facebook usage. It is an interesting takeaway from the study, where focus groups instead of surveys and questionnaires have been preferred. In this particular study of social media, where the basic fibre is social interactions, and hence focus groups would be a more emphatic study.

Twelve focus groups (same-sex) were analyzed, and an open coding process was applied to the script. Vivo coding has been employed to identify the key terms the focus group participants have used to describe the experiences (e.g., friend sluts, FoMO, TMI, creeping, friend sluts). A constant-comparative method, where the iterations of the data have been layered to identify, explain, and clarify categories, determining their salience and recurrence within and amongst the groups. Common themes were identified through individual coding by the experts.

Facebook users frequently feel depressed and under pressure to use the site regularly, mainly due to FoMO (the fear of missing out) and to meet relationship maintenance requirements. Some participants had privacy concerns and felt that Facebook's prominence, connectivity, and persistence. These characteristics also made it possible to constantly compare oneself to other people in the network, which led to feelings of worry, jealousy, and many other undesirable emotions.

"Extraversion, neuroticism, attachment style, and fear of missing out as predictors of social media use and addiction" (Blackwell et al., 2017), has been cited 513 times. The paper is focused on determining whether Fear of

missing out (FoMO), extraversion, neuroticism, and attachment style were predictors of overuse of social media (simple use and addiction).

The sample to study the precedents of social media usage and addiction was from the Southeastern U.S., with around 80 percent still enrolled in college. 207 survey participants, including 155 women, 50 men, and the two who identified as "other." The range in age is from 17 to 49 years (M = 22.15, SD = 7.38).

Various instruments were used to analyse the precedents, including the FoMO 10-point scale (Cronbach's alpha=0.91).; the experience in close relationships scale to study the attachment anxiety and avoidance (Cronbach's alphas = 0.81 for anxiety; 0.79 for avoidance); 8-point Big five inventory to measure extraversion and neuroticism (Cronbach's alpha=0.84); 6-item, Bergen social media addiction scale (Cronbach's alpha =0.88) and 5-item Social Media Engagement scale (Cronbach's alpha=0.85). To analyze the scales bivariate correlation (between all variables). MANOVA was applied with recruitment style (general psychology or online) was considered as an independent variable and all the other variables were treated as dependent variables.

The study is of immense importance for the researchers focusing on FoMO as the two predictors of the use of social media have been identified as FoMO and neuroticism. For social media addiction, only FoMO predicted it.

"No More FoMO: Limiting Social Media Decreases Loneliness And Depression" By Melissa G. Hunt, Rachel Marx, Courtney Lipson, And Jordyn Young has been cited 507 times. The study's focus is crisp with an experimental approach to establishing that social media usage is linked to worse well-being and how limiting it could have a positive impact. (Hunt et al., 2018)

143 undergraduates at the University of Pennsylvania were recruited to either use social media as they usually do for three weeks or limit their usage of social media (FB, Instagram, and Snapchat) to 10 minutes per platform, per day.

The study analyses the subjects on 7 scales since social media usage has not been extensively studied. 10-point FoMO scale (Cronbach's alpha =0.87); 20-point The Interpersonal Support and Evaluation List scale to measure social support (Cronbach's alpha=0.77); the UCLA Loneliness Scale measuring perceived isolation (20 points) (Cronbach's alpha=0.94); 20-point, The Spielberger State-trait Anxiety Inventory to measure anxiety;

21 items on the Beck Depression Inventory to measure depressive symptoms; 10-item The Rosenberg Self-esteem Scale to analyze how one feels about himself; 42-item The Ryff Psychological Well-being Scale to analyze psychological well-being in six directions.

Increased self-monitoring decreases fear of missing out, anxiety, loneliness, and depression. The study advocates that social media use be restricted to 30 minutes a day would greatly impact overall well-being.

The paper, "Negative consequences from heavy social networking in adolescents: The mediating role of fear of missing out" by Ursula Oberst, Elisa Wegmann, Benjamin Stodt, Matthias Brand, and Andrés Chamarro has been cited 497 times. The paper is framed with an understanding that adolescents find social networking sites attractive and use them excessively. And this excessive usage leads to negative psychological consequences (Oberst et al., 2017).

1468 Spanish-speaking Latin American social media users, through mobile phones. The age group targeted was 16-18 years old.

Four scales were used to measure various dimensions. HADS (Hospital Anxiety and Depression Scale), SNI (the Social Networking Intensity Scale), the FoMO scale (Fear of Missing Out), and a questionnaire on the negative impact of using SNS via mobile devices (CERM). The results were analyzed using structural equation modelling.

FoMO and social networking intensity is the mediator between psychopathology and the questionnaire on the negative impact of using SNS. For females, being depressed is the trigger of social media involvement and for males, anxiety is the trigger.

"Why do people share fake news? Associations between the dark side of social media use and fake news sharing behaviour" by Shalini Talwar, Amandeep Dhir, Puneet Kaur, Nida Zafar, and MelfiAlrasheedy have been cited 351 times. The paper delves into a very crucial aspect of excessive social media usage i.e. propagating fake news. The paper focuses on establishing an association between the negative side of soil media usage and fake news-sharing behaviour (Talwar et al., 2019).

1022 WhatsApp users from India were used for this research using surveys (open-ended and closed-ended). The study participants were aged between 18 and 30 years The study was advertised in three different public and private universities in Lahore, Pakistan.

Theme analysis was done on the responses using NVivo on a set of open-ended surveys, and the collected data were analysed using SPSS 23 (IBM

Corp. 2017) and AMOS 23. Next, a two-step process has been applied to test the research model. Confirmatory factor analysis (CFA) was done to examine the model fit indices and different forms of validity and reliability. Later, the structural path and different hypotheses were assessed using structural equation modelling (SEM).

FoMO (along with online trust, self-disclosure and fatigue) has a positive association with propagating fake news. More the online social comparison lessening the sharing of fake news. The users authenticated news before sharing if they suffered from social media fatigue. Also, online trust was negatively associated with authenticating news before sharing.

"College students' academic motivation, media engagement, and fear of missing out" by Dorit Alt was cited 310 times. It touches on the FoMO's mediation effect on academic motivation and social media engagement (Alt, 2015).

296 undergraduate students from a major college in Northern Galilee. The authors developed a Social Media Engagement (SME) scale was designed to measure the extent of social media usage in the classroom. The FoMO scale and the Academic Motivation scale were also used, and Path analysis was performed.

The positive link between SME (social media engagement) and extrinsic motivation for learning is likely to be mediated by the fear of missing out (FoMO).

"Dealing with digital intermediaries: A case study of the relations between publishers and platforms" by Rasmus Kleis Nielsen and Sarah Anne Ganter is very different from the other research papers highlighted by the extraction of most cited papers in the field of Social Media and FoMO, but it touches upon a news media affected by FoMO. The paper was cited 272 times is a case study highlighting the collaboration between social media and search engines with the news media (Kleis Nielsen & Ganter, 2018).

Large news media houses and established digital intermediaries have been roped in for this case study. Semi-structured interviews with major players in the news media (editorial staff, product development managers, and strategic managers); off-the-record conversations and secondary sources have been interpreted to discuss the impact of search engines, social media, and news media. 13 such interviews held in 2016 were a part of the case study.

In 2016, collaborations started between news media and digital intermediaries, including search engines and social networking sites, as a

"let us try and see" approach. The major driver of the collaboration is FoMO.

"Adolescent social media use and mental health from adolescent and parent perspectives" authored by Christopher T. Barry, Chloe L. Sidoti, Shanelle M. Briggs, Shari R. Reiter, and Rebecca A. Lindsey have been cited 266 times. The paper studies the relationship between the social media usage of adolescents and its impact on their mental health and psychosocial functioning (Barry et al., 2017).

The study had 226 participants, 113 parents from all across the United States of America, and 113 students (51 females, 55 males, and 7 unreported) in the age group of 14-17 years.

A social media survey developed by the authors has been administered to both the parent participants and the students. Parents also completed an 82-item checklist of symptoms in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5). A 10-item FoMO scale and a 20-item UCLA loneliness scale was filled out by the students.

Regression and correlation through SPSS Version 24 have been applied to the various hypotheses developed to understand the impact of social media usage on the mental health of adolescents.

Parent-reported DSM-5 symptoms of inattention, hyperactivity/impulsivity, ODD, anxiety, and depressive symptoms, as well as adolescent-reported loneliness and fear of missing out (FoMO) were modestly connected with the number of social media accounts reported by adolescents and their parents. Finally, teenagers with relatively high FoMO and a high number of parent-reported social media accounts had the greatest levels of anxiety and depression symptoms.

5. Discussion

The research paper analyzes the scientific work done in the field of social media and the fear of missing out (FoMO) over the last decade. (Since the work in the field has been identified to have started in 2013). The data has been retrieved from the Scopus database.

The main objective of the paper is to decipher the graph of research being done in the field of social media usage and fear of missing out (FoMO) (the keywords were restricted to these two areas only). Social media started in 2004 with the advent of Facebook and Orkut and the research concerning the impact or relationship between FoMO and social media began in 2013, with the upward

trend starting in 2016 and reaching its peak in 2023 and 2024, where more than 100 Scopus-indexed papers have been published in the field.

The paper by Przybylski (2013) is the most cited (1697) and finds a mention in most of the papers intending to study FoMO and social media usage since a 10-item FoMO scale has been developed by the authors. The scale represents people's fears, anxieties, and concerns about being in or out of touch with the events, conversations, and experiences occurring in their wide online social media networks.

Computers in Human Behavior (23) and Current Psychology (21) are the two journals that have shown the inclination to publish work in the field of social media usage and fear of missing out (FoMO).

Four hotspots for collaboration are visualized by the co-author heatmaps, with Montag's cluster stood out as the largest and most active. In addition to receiving the most citations, this cluster highlights increased production and a deep interest in the topic. A higher number of citations indicates productivity and significant interest in the topic.

This study identifies four clusters emerging from the co-occurrence network analysis, representing distinct research streams in social media and FOMO. Problematic social media, phubbing, well-being, and social networking (online), are the themes that summarise work in this area.

The major contribution of the paper is the deep dive into the most cited papers in the field of social media usage and fear of missing out (FoMO). Some very interesting takeaways are

- Przybylski, (2013) developed the 10-item scale for Fear of Missing Out, which has been used by most of the studies factoring in FoMO as a precedent, antecedent, or mediator in analysing Social media usage (Przybylski et al., 2013).
- Foxsuggests that focus groups instead of surveys and questionnaires should be preferred to study social media interactions and their impact (Fox & Moreland, 2015).
- Social media fatigue and social media addiction are predicted by FoMO (A Dhir, 2018; Blackwell et al., 2017; Fox & Moreland, 2015).
- Increased monitoring of Social media usage can decrease FoMO (as well as anxiety, depression, and loneliness) (Hunt et al., 2018).
- The more the FoMO, the more the number of social media accounts held by adolescents (Barry et al., 2017).

- Fake news is also a result of FoMO (Talwar, 2017). Collaborations between reputed media houses and Social media websites are driven by FoMO (Neilsen Report 2018, 2018).

The present study reveals that FoMO is considered an important contributor to social media usage and has been studied as a precedent, antecedent or mediator of social media usage. The exploration of research in the field through this paper leads to a comprehensive understanding of the concept of FoMO and social media usage.

6. Conclusion

The field of FoMO and social media usage research has seen an upward trend in publications. Though the publications started in 2013, the acceleration started in 2016 and reached the 100+ mark in 2023 and 2024. This implies that the field is being thickly pursued by the researchers.

Countries like the United Kingdom, France, and China have come up the guidelines restricting the use of social media by children since the harmful effects of social media usage have been identified and acknowledged. The interest in the field of social media usage and the contributors of or consequences of it (FoMO, along with a host of others) do not show any signs of fading away.

More than 1200 authors have contributed to the field with 458 publications since 2013. Most of the publications were co-authored (only 30+ publications are attributed to single authors). The heat map of the co-authorship clusters has been highlighted with significant clusters by Montag (red); Griffiths (purple); Dhir (yellow); and Li. Y (ocean blue).

We identified the 4 themes, namely, problematic social media, phubbing, well-being, and social networking (online). In literature, these themes are sometimes referred to as research fronts. Since the themes also highlight the gaps in this field of study, identifying them will assist new researchers in guiding their work.

These themes are also known as research fronts in literature. Recognizing the themes will help new researchers in giving direction to their research as these themes also point to the gaps that exist in this research field.

The investigation of research into social media and FoMO is expected to encourage researchers to pursue this important area. In addition, the analysis of the existing review of literature can help interested researchers identify possible research avenues, possible collaborations, and viable publication options and also define the parameters of their studies.

7. Limitations

Though the paper intends to make a significant contribution to the field of Social media usage and fear of missing out by accumulating and analysing the huge data in the field through bibliometric techniques; it is necessary to acknowledge the limitations to pave the way for the future researchers to investigate the field.

The study has extracted data only from the Scopus database, which, though quite rich additional or a combined study of other databases like Web of Science, Google Scholar etc., can add significantly to the knowledge in the area of research. It may yield some unique results by exploring the research published in non-academic media. The expansion of the database would widen the perspective and may provide a different insight into the field.

The results of the bibliometric analysis are heavily dependent on the keywords and the strings used to extract the data. It may sometimes unintentionally omit some significant work done by the authors/researchers in the field of the study. A thorough analysis of various combinations of keywords, including the synonyms and related terms would help to make the study comprehensive, multi-dimensional and complete.

7. References

1. A Dhir, Y. Y. P. K. (2018). Online Social Media Fatigue and Psychological Well-being—A Study of Compulsive Use, Fear of Missing Out, Fatigue, Anxiety, and Depression. *Int J Information Manag*, *40*, 141–152. https://doi.org/ 10.1016/j.ijinfomgt.2018.01.012
2. Barry, C. T., Sidoti, C. L., Briggs, S. M., Reiter, S. R., & Lindsey, R. A. (2017). Adolescent Social Media Use and Mental Health from Adolescent and Parent Perspectives. *Journal of Adolescence*, *61*, 1–11. https://doi.org/ 10.1016/J.ADOLESCENCE.2017.08.005
3. Blackwell, D., Leaman, C., Tramposch, R., Osborne, C., & Liss, M. (2017). Extraversion, Neuroticism, Attachment Style and Fear of Missing Out as Predictors of Social Media Use and Addiction. *Personality and Individual Differences*, *116*, 69–72. https://doi.org/10.1016/j.paid.2017.04.039
4. Fahreza, M. Y., &Harjanah, T. W. (2024). Work is Fun, Isn't it? Bibliometrics of Fun Work. *Gadjah Mada International Journal of Business*, *26*(3), 369–399. https://doi.org/10.22146/gamaijb.76200
5. Fox, J., & Moreland, J. J. (2015). The Dark Side of Social Networking Sites: An Exploration of the Relational and Psychological Stressors

Associated with Facebook use and Affordances. *Computers in Human Behavior*, *45*, 168–176. https://doi.org/10.1016/J.CHB.2014.11.083

6. Hunt, M. G., Marx, R., Lipson, C., & Young, J. (2018). No More FoMO: Limiting Social Media Decreases Loneliness and Depression. *https://Doi. Org/10.1521/Jscp.2018.37.10.751*. https://doi.org/10.1521/JSCP.2018.37.10.751
7. Neilsen Report 2018. (2018). *Time Flies: U.S. Adults Now Spend Nearly Half a Day Interacting with Media – Nielsen*. Q1 2018 Nielsen Total Audience Report. https://www.nielsen.com/us/en/insights/article/2018/ time-flies-us-adults-now-spend-nearly-half-a-day-interacting-with-media/
8. Przybylski, A. K., Murayama, K., Dehaan, C. R., & Gladwell, V. (2013). Motivational, Emotional, and Behavioral Correlates of Fear of Missing Out. *Computers in Human Behavior*, *29*(4), 1841–1848. https://doi.org/ 10.1016/ j.chb.2013.02.014
9. Radhakrishnan, S., Erbis, S., Isaacs, J. A., & Kamarthi, S. (2017). Correction: Novel Keyword Co-occurrence Network-based Methods to Foster Systematic Reviews of Scientific Literature (PLoS ONE (2017) 12:3 (e0172778) DOI: 10.1371/journal.pone.0172778). *PLoS ONE*, *12*(9), 1–16. https://doi.org/10.1371/journal.pone.0185771
10. Van Eck, N. J., & Waltman, L. (2010). Software Survey: VOSviewer, A Computer Program for Bibliometric Mapping. *Scientometrics*, *84*(2), 523–538. https://doi.org/10.1007/s11192-009-0146-3

AI-enabled Interventions for Improving Healthcare and Psychological Well-being of the Rapidly Ageing Silent Generation

Mohammad Iqbal Zaffar Ansari
Associate Member
Vocational Education Foundation (VEF)
Greater Noida, Uttar Pradesh, India.

Bushra Iqbal
Student
RDMC King George Medical University
Lucknow, Uttar Pradesh, India.

Abstract

Rate of abuse and family-neglect cases of the rapidly ageing elderly population have increased, resulting in long-term psychological consequences on their wellbeing. The silent generation population of age group 80-97 years or living eighty plus is expected to triple and is likely to cross 426 million by 2050. It needs to be eased with AI-enabled social interventions, supported with age-inclusive public policies, and provided with resilient healthcare infrastructure for their happy ageing. Predominant mental health conditions of the elderly are anxiety, depression, and schizophrenia. Dementia is the most common neurological implication caused by biological ageing of nerve cells, which damages brain cognitive functions. Other general geriatric health problems include hearing loss, cataract, fracture, due to falls, chronic back-neck pain, pulmonary disease, urinary incontinence, and pressure ulcers due to frailty, diabetes, and strokes, which require proper medical attention and family care.

A synopsis of existing policies and practiced interventions is detailed through this qualitative research to ameliorate existing public policies for implementing AI-enabled interventions for healthcare and psychological well-being and improving the overall quality of life of the elderly population. It can be further humanized by permitting ethical use of AI-enabled social robots in the ALF and LTC for their abuse-free living with dignity. In post-Covid-19 world its services are being utilized globally; however, its acceptability in the regional context will depend heavily upon the cost of infrastructure, operational skill training its healthcare professionals, and digital literacy of the ageing users, apart from their religious belief, ethical concern, family financial capabilities, and cultural fit into the society.

Keywords

Artificial Intelligence (AI), Assisted Living Facility (ALF), Long Term Care (LTC), Resilient healthcare infrastructure, and Silent generation.

1. Introduction

The United Nation General Assembly on 14 Dec 1990, has manifested October 1, as the International Day of Older Persons and accepted the Principles of Older Person in 1991, based on the proceedings of the first Vienna Assembly in 1982, and later in the year 2002, the second Madrid International Plan of Action on Aging was shapeds and in November 1989, UN Decade of Healthy Aging (2020-2030) was declared to align with the last 10 years of the Sustainable Development Goals (SDGs). The initial initiative to improve the healthcare of the elderly people was taken by the Geriatric-Long Term Care Review Committee of the office of the Chief Coroner of Ontario, with the mission to decrease their medical abuse. The motto of the Chief Coroner's office articulates that, 'we speak for the dead to protect the living.' The LTC committee was established to provide basic healthcare education to healthcare professionals for improving the overall healthcare and psychological well-being of the elderly people of Canada (Clark & Goldish, 2008). Since the global population is ageing very fast and has already crossed the eight billion mark in 2022 (UNFPA, 2025). The number of persons aged eighty and above is expected to cross 426 million by 2050 (WHO, 2025). The Indian elderly population aged sixty and above is also rapidly aging and has reached 149 million, which is most likely to equal 20 percent of the total Indian population of an astonishing 347 million people by the end of the year 2050 (India Ageing Report, 2023).

2. Objective of the Study

The prime objective of this qualitative research design is to raise awareness for attracting carefulness for the elderly people (aged 80 and above), who are living silently now and being subjected to social isolation and community abuse due to their age-related dependencies. This paper highlights their mental health, neurological conditions, and other psychosocial disabilities, which are causing impairment in their daily activity of living and posing a high risk of self-harm. It also recommends various age-inclusive public policy interventions for improving their healthcare and psychological well-being in the present societal environments.

3. Research Methodologies

A simple methodological approach focusing on secondary data was embraced for attracting care for the elderly people aged 80 and above. As they were mostly found deprived of their basic health care needs and lived through various abusive challenges from their children despite having devoted their lives to growing and nurturing them when they were infants and unable to perform any task without their elderly care and full-time parental support. Thus, tolerating any form of abuse against them, like verbal, physical, financial, and sexual violence against women in the present environment, due to their becoming elderly, is not desirable at all. An ancient blank verse in this regard is still spot-on and can even be tested without any letdown. It articulates that "Any person, who regularly takes care of older adults and respects their parents each day, his age, education, fame, and strength increase by fourfolds" (Sanskritwisdom.com, accessed on July 19, 2025).

On the basis of the above prevalent theme, a qualitative and exploratory research design was finally selected, and by adopting the rigorous search methodologies using Medical Subject Headings (MSH) from the recently cited publications of the following medical publication journals of repute like BJPhsych, BMC, CP-CUP, Cureus, Elsevier, Emerald, Frontiers, GGM, GScholar, IJG, IJERPH, IJMHS, IJP, IJRBS, JAGS, JMIR, Lancet, Lancet Neurology, MDPI, Nature, OUP, RGate, Sage, Springer, Sustainability, World Psychiatry, and Wiley Online Publications, they were made online.

In order to find out the relation between mental healthcare and psychological well-being of the elderly population (aged 80 and above) availing caregivers services both in the home atmosphere and societal framework utilizing a developed knowledge synthesis tool (ScienceDirect.com, accessed on July 19, 2025), available online, to draw a rapid thematic review of the accessed literature and to bridge the gap and present the findings thereof to achieve the aforesaid objective of this exploratory research undertaken for academic purpose only (Among K, 2022).

In order to strengthen the existing healthcare response systems for the overall well-being of the elderly population, who presently suffer from the dismay of ruinous abuse owing to their getting older, it was considered necessary to evaluate the available healthcare infrastructure facilities meant for caring for the elderly population (aged 80 and above). The UNFPA India Ageing Report-2023 reflects some valuable secondary data highlighting the current Indian elderly population (aged 60 and above), which is found to be 10 percent of the total population, which is projected to double to 20 percent by the end of the year

2050, and about to reach 34.70 Cr, with hardly 240 Nos. of trained geriatricians presently available to cater to 14Cr older adults, most of them are illiterates with very limited access to basic digital information. Out of which, there are 29 percent living pensioners and only 25 percent are getting insurance benefits, whereas 71 percent women were facing compounded vulnerabilities and abuse in their present environment (Sources: India Ageing Report-2023, accessed on July 19, 2025). The UN Global Burden of Disease (GBD) results for the year 2024 were also quite thought-provoking, as it has also projected the total number of people aged 60 years or more by 2050, to reach 2.1B and the number of people aged 80 more by 2050, to reach 426M. 14 percent people aged 60 and above were found living with a mental health condition and percentage of the people aged 60 and above who died from the reported suicide in 2019, which is 27.2 percent, is from the Global Health Estimates (GHE). While Alzheimer's, is the most common form of Dementia and alone accounts for nearly 60-70 percent cases, 57M people had Dementia in the year 2021, and 10M new dementia cases are being reported every year from the 60 percent population emerging mostly from the poorer countries. In the year 2019, reported number of people living with Mental Disorder was 970M, Anxiety Disorder was 301M, Depressive Disorder was 280M, Bipolar, and Dissocial Disorder was 40M, Schizophrenia was 24M, and Eating Disorder was 14M, with 5.7 percent older people aged 60 and above were found to having depressive disorder or depression and reported with a total abuse percentage up to the tune of 15.7 percent (at least 1 in 6 numbers of elderly adult aged 60 and above) (sources: World Population Prospect-2022, IHM&E, GBD, Results (GHDx), accessed on July 19, 2025). The Landscape Today report of India's Ageing Society has also tabulated the percentage of population of the elderly adults (aged 60 and above) living in different Indian states which is found to be 11 percent and above, with Kerala having the highest at 22.8 percent, followed by TN at 20.8 percent and HP-19.6 percent, (sources: India's Ageing Society-The Landscape Today-2025, accessed on July 19, 2025).

4. Review of the Literature

In order to draw a thematic review of the available online stuff of the published literatures and to suggest a number of suitable interventions for addressing the present gap in the healthcare infrastructure system meant for promoting the psychological well-being of the elderly adults (aged 80 and above) and to promote their mental healthcare and overall psychological well-being, a rapid survey of copiously available online literatures on the subject domain was made

and presented here in detail to validate the findings of the best global practices adopted in this regard, as very limited research has been conducted in India to promote the mental health and psychological well-being of the elderly.

Thus, the mostly recently concluded overseas studies were taken into account for presenting the literature review in detail. A current-year study on achieving the SDGs targets of resilient healthcare systems, focusing on public health challenges and medicine in the zone of conflict, was recently concluded (Ugwu et al., 2025). The recently released Lancet Countdown report pointed out many health threats and called for decisive health-focused actions to reduce the deaths due to GBD and to deliver a healthy future for all (Marina Romanello et al., 2024), as most of the burden proportion was found emerging from the disorders in people ages 60 and above (Martin Prince et al., 2015). Fatima, Gizal, et al., have currently examined the factors affecting mental health and studied interventions to reduce the stigma and improve mindfulness using a strong social support system (Fatima et al., 2025). To reduce the stigma of mental health, use of music therapy was also professed (Tuastad Lars, et al., 2023), as present mental health stigma may lead to self-harm, recalling the famous lyrics patented by the Creeping Death Music Company of Ulrich, Lars, and James Hetfield (1991), as “life is ours and nothing else matters.”

Arecent Nature’s scientific report reveals that health literacy reduces the psychological and social distress and dysfunctions and improves the ability to make healthier choices (Aliasghar et al., 2024). In a recently concluded Chinese community-based cross-sectional study, it was found that older adults had a higher risk of intrinsic capacity decline due to not regularly exercising, resulting in a decrease in their handgrip strength and an increase in the comorbidity index (Jiang et al., 2023). In a currently concluded Saudi study, it was also noticed that accidents due to falls, injuries, and deaths can be addressed using the STEADI tool developed for the prevention of falls for the safety of patient and to reduce their hospitalization (Aljarbou et al., 2025). Dementia caregiver experiences were found to be studied in home-based care in rural parts of India, and challenges faced by the family caregiver having dual reality were examined to reduce their burden, stress, and poor health conditions due to lack of knowledge and support (Lillekroken et al., 2024). The Brazilian yoga-based interventions were found to improve the quality of life of dementia caregivers (Pinto et al., 2024). Similarly, mindfulness, and self-regulation interventions were found to improve the self-neglect behavior in older diabetic adults in Iran (Jahromi et al., 2024). A cross-sectional path analysis of the Iranian adult population with mental health disorders to elucidate the mediating role of

quality of life through social support and good governance interventions was also found carried out for reducing discrimination for promotion of their mental health and well-being (Kakemam et al., 2024). A scoping review on the healthcare and social care of the elderly living in Asia was also published in the Sustainability Journal for their social development (Alavi et al., 2022).

CUP has recently published a systematic review of reviews to examine the interventions targeting social determinants of mental disorders to map the UN SDGs (Oswald et al., 2024). An extensive review of the healthy ageing trajectories of the elderly was conducted to develop an analytical framework to inform transformative changes across community and healthcare domains as advocated by the WHO Decade of Healthy Ageing for promotion and prevention of mental health of the elderly (Horgan et al., 2024). Quality rights initiatives under the United Nations Convention on Rights of Persons with Disabilities (CRPD) were significantly found to impact the quality of mental health services in the Indian state of Gujarat (Pathare et al., 2021). Evidence-based interventions to address the loneliness issues of the elderly and group-based treatment and training to use the internet for connecting socially and better community living were studied in the USA (Shekelle et al., 2023).

A rapidly ageing population requires implementation of collaborative, socially engaging policies to cater to the needs of the elderly people for reducing their disability and dependencies arising due to ageing (Hafiz et al., 2024). In the era of global warming, the need for formulating action plans for the country's mental health policy legislation to promote awareness and to protect and prevent the mental health problems of society was emphasized (Ansari M I Z., 2023). Policy support in terms of access to education for older women and better healthcare support was found to reduce the depressive symptoms and cognitive impairment amongst the elderly residents of rural areas (Muhammad T., 2023). The role of family was found to be important in nurturing mental health influences, emotional well-being, and creating a supportive home environment for psychological long-term care of the elderly. (Rasool A., 2022). Social isolations, mental health conditions, and psychosocial dimensions of ageing was found to promote suicide in the geriatric population aged 65 and above (Ahmed & Patil., 2024), and a stressful working environment, a high degree of burnout and a lack of mindfulness activity were found to be accountable for causing the mental disorders among Indians (Ansari M I Z., 2025). Social isolation and loneliness of the elderly were found to adversely affect the mental health and well-being of the elderly (Sivakumar et al., 2024). The mediating role of gender, marital status, and education level of elderly living in old age homes was also found to impact their psychological well-being

(Mishra et al., 2023). A recent MVR study on healthy ageing reveals education, gender equality, safety, and healthcare access as pivotal factors for the overall well-being of the elderly (Dhillon & Das, 2024). The mental health challenges were more societal, and related issues were the outcomes of cultural norms and practices that affect the individual as well as their caregivers and, in particular, their relatives. Significant provisions were found to be made available under the Indian Mental Health Act, 2017 (Goswami & Handa, 2024).

OUP in association with The London School of Hygiene and Tropical Medicine, had also published a detailed report on primary mental healthcare of elderly in India, and emphasized that for its development age inclusive, unambiguous, integrated policy approaches are needed to address the complex mental healthcare needs of elderly in India (Hamel K et al., 2021), and for primary healthcare of older person's mental health, and to define the role of family members, community base caregivers and healthcare workers, integrating the alternative medicine services like Ayurveda, Yoga-naturopathy, Unani, Siddha-Sowa-Rigpa, and Homoeopathy (AYUSH), into the Primary Health Centers are needed (Hamel Kerstin et al., 2021), and to develop the robust network of mental health services at PHC level was found necessary for strengthening the primary mental healthcare of elderly in India (Hamel & Kafczyk, 2024). Recent ageing and social policies research highlighted the challenges faced by the elderly and advocated for their institutional care over familial support to avoid family abuse for their better healthcare and psychological well-being with government support (Annapuranam K, 2025). Health and social welfare policies governing mental health and ageing to strengthen Indian policy responses to ageing and to uphold the rights of the elderly to live with dignity and free from abuse were found to be reviewed in detail (Mohan. A et al., 2024). The Kerala elderly ageing in place study recommends a healthy living strategy utilizing digital health interventions for better geriatric care as a sustainable solution (Thampi & Mathew, 2024).

Use of AI-enabled social robots to resolve healthcare challenges requires orientation training and raises ethical concerns, but it was found to lift the interest of healthcare providers in improving the healthcare and psychological well-being of the elderly (Wong et al., 2024). For developing positive emotional impact and regulatory interventions for improving overall healthcare of patients and transforming mental health practices using machine learning, supervised machine learning, and unsupervised machine learning AI tools in the diagnosis and treatment of psychiatric mental health disorders, the awareness was found necessary (Thakkar et al., 2024). Digital technology integration for mental health promotion, treatment, and implementing real-time interventions using

tele-health, mobile apps, virtual reality, and machine learning models were found efficacious in addressing the mental health issues with privacy concerns in a detailed study conducted in the UAE (Al Daweik et al., 2024). Wiley Nursing Open recently published a study (Steinke et al., 2024) on the quality of life of the elderly who reside in Assisted Living Facilities (ALF), which clearly describes their adaptability of adjustment to the social environment, physical environment, and home care facility arrangements. The National Health Aging Trends Study conducted at Michigan recognized factors associated with the transfer of the elderly from ALF to nursing homes to promote physical functions, for ease of Activities of Daily Living (ADL) for economic benefits (Son JY et al., 2024). Social and companion robots such as LAVOT and PARO had provided effective Long Term Care (LTC) in diseases like dementia to increase longevity and ease of daily living activity and handled social isolation and loneliness issues amongst elderly suffering from chronic illness (Deusdad B, 2024), as AI enabled digital and mental health innovations can work for all people and can positively impact the LTC if augmented properly using Gen AI, LLM, VR, and Smart Phone Apps for digital navigation with human support (Torous et al., 2025), even though in the recent technological advance era of AI-enabled robotics, ethical use of social robots like PARO and LOVOT for long term care of elderly to support their mental health and psychological well-being may not be able to substitute the personalized human care required for happy ageing with dignity (Hung L, 2025), However the use of wearable Health Apps were found supporting the mental healthcare with better physical functions of ADL amongst the global users across US, China and Singapore (Edmund Lee, 2024). Though the upsurge in the abusive environment for the elderly in society was noticed owing to their ageing, loneliness, depression, heart diseases, diabetes, and chronic illness due to their present geriatrics, and mental health conditions, they are paying the price for getting old. While new factors such as the recent pandemic, global warming, and emerging technologies have brought new kinds of challenges into their present lives, it was considered necessary to better understand and add value to the mental health conditions of the elderly. One can refer to the most liked book by the practicing health care professionals, “Volunteering in Global Mental Health”: A Practical Guide for Clinicians by (Thomson Sophie et al., 2023), Out of Her Mind by (Linda Gask, 2024), The Toxic Stress by (Lawson R, and Wulsin 2024), and Adultish by (Charlotte Markey, 2024) and Climate Change and Youth Mental Health by (Elizabeth Haase, 2024) for elevating further knowledge on the subject domain, if required to help an elderly adult suffering from ageing.

5. Policy Implications

Though Indian Government was in action after finalization of the initial Madrid International Plan of Action on Aging-1989 by the UN, and tossed several welfare schemes for the welfare of elderly adults right from 1994-2018, and in the year 2019 amended the Maintenance and Welfare of Parents and Senior Citizens Act (M&WPSrCA-2007) later in 2021, it was decided to implement the next five year National Action Plan for Welfare of the Senior Citizens (NAPSrC 2021-2026).

However, all such schemes are running below expectations and are unable to achieve the target of facilitating happy ageing and improving the overall quality of life of the silent generation. The secondary data reveals that 71 percent elderly people do not receive any amount of pension. Just Rupees 200 to 500/- per month pension amount is paid to the elderly people belonging to the below poverty level category under IGNOAPS-2007, and only one-fourth of elderly people were getting benefits from the health insurance schemes. The same old welfare pension schemes and insurance policies were generally found being re-launched, just with a new name, by the incoming government in power every five years for their political gain, and attracting the digitally illiterate beneficiaries for their own electoral benefit.

A comprehensive year-wise list of some of the major welfare schemes launched for the welfare of the senior citizens by the Government of India, so far is provided here for making references. National Old Age Pension Scheme-1994, National Policy on Older Persons-1999, National Council for Older Person-1999, Pradhan Mantri Vya Vandana Yojna-2003, Indira Gandhi National Old Age Pension Scheme (IGNOAPS-2007), Maintenance and Welfare of Parents and Senior Citizens Act 2007, Indira Gandhi National Widow Pension Scheme-2009, Indira Gandhi National Disability Pension Scheme-2009, National Program for Healthcare of Elderly-2010, National Policy for Senior Citizens-2011, Varishtha Pension Bima Yojna-2014, Atal Pension Yojna-2015, Pardhan Mantra Suraksha Bima Yojna-2015, Senior Citizen's Welfare Fund-2016, National Mental Healthcare Act 2017, National Health Mission-National Health Program-2017, Rashtriya Vayoshri Yojna-2017, Pradhan Mantri Jan Aarogya Yojna (PMJAY), Aayushman Bharat National Health Protection Scheme (ABNHPS)-2018, Senior Citizen Saving Scheme-2019, Maintenance and Welfare of Parents and Senior Citizens Act (M&WPSrCA-2007's) Amendment Bill-2019), Atal VaYo Abhyuday Yojna-2021, National Social Assistance Program, Integrated Program for the Older Persons, Pradhan Mantri Jan Aushadhi Kendra (PMJAK), National Senior Citizen Saving Scheme, and

Sansad Adarsh Gram Yojna. Under the Integrated Program for Senior Citizens, it has recently been mandated to implement the next five-year national action plan for the welfare of the senior citizens, named NAPSrC 2021-2026.

On scrutinizing the above schemes meant for the welfare of the senior citizens, it was very significantly noticed that there was a lack of a proper monitoring mechanism, and moreover, the funds remain unutilized in the book of accounts and are not being actually used for the welfare of the senior citizens as envisaged. Though the legal recourse on financial abuse of elderly people is now covered under M&WPSrCA-2007's Amendment Bill-2019, and a few schemes like PMJAY and PMJAK are gaining some popularity, and PMJAY is offering some kind of support to the needy people, but with low visibility and beyond the reach of elderly people. Mass-scale misuse of the allocated funds under the schemes like ABNHPS-2018 was reported on the part of the private sector service providers in the name of healthcare and psychological well-being of elderly people. Thus, age-inclusive public policies are the need of the hour. Just increasing the bank interest rates to attract the substantial amount of deposits from the deprived senior citizens are not going to enhance their overall quality of life, but in turn it is benefitting the public sector banks itself, since in most of the cases the earned interest amount remains stuck in the bank for long-time and later it goes directly to the nominees after the death of the beneficiary. Thus, raising a higher rate of interest on deposits made by the senior citizens is of no use, as it does not serve the basic purpose at all.

However, it is worth mentioning that provisions for the day care support of the elderly have been made under IPSrC for their long-term care, and facilitating the old age homes and provision for their ease of mobility has also been made by reserving the lower seats under the senior citizen quota by the Indian Railways. Free onboarding and disembarking assistance has been fully assured by all the operating airlines for helping the elderly passengers, and a special tax rebate was also made for the senior citizens under the Income Tax Act, 1961. The elderly toll-free helpline number, 14567 was also started. National plans for senior citizens and state-level action plans for senior citizens have been made, and two National Centers on ageing have been started at New Delhi and Chennai, and one National Institute of Social Defense and several Regional Resource Training Centers were opened for spreading the specialized domain knowledge.

6. Social Interventions

For taking care of the elderly adults representing the silent generation some of the AI- enabled social interventions are required to be implemented without making any further delay, since in today's scientifically advanced society, it is worth mentioning that every small intervention is supported by the research findings, and there are copious studies conducted around the globe involving gap map analysis, systematic meta-analysis, and randomized controlled trials which support the outcome of the adopted interventions and public welfare policy responses on ageing, but still a lot more has to be done. There is an immediate need to ameliorate existing elderly welfare policies for implementing the age-inclusive public policy interventions which can directly help the older adults by providing complete healthcare benefits required for their well-being and boosting morale for their happy ageing by protecting their basic rights of abuse free living with dignity. As in the present scenario, most of the old-age pension schemes and policies are not at all effective in catering to the daily basic expenses of the elderly people since the disbursed amount is quite meager and generally remains unutilized in the bank accounts, and in most cases it goes to the legal heir or inheritor account after the death of the real beneficiary. Similarly, raising the higher rate of interest on deposits made by the senior citizens is of no use since it does not serve the basic purpose, as it was observed that there is a lack of a proper monitoring mechanism, and the funds remain unutilized in the book of accounts and are not actually used for the welfare of the senior citizens as envisaged. Building codes for skyscrapers and multistoried residential towers need to be amended to mandatorily provide a stretcher-length passenger lift for ferrying the elderly; provide ramps, walking handles, gripping support, and anti-fall measures at all vulnerable public places, pilgrimage center, prayer homes; and provide basement parking and elderly public convenience facilities made with anti-slip floorings and provided with 24x7 manned wheelchair assistance to avoid any physical harm due to falls and any untoward accident.

Apart from the personal in-practice health initiatives such as engaging in the mindfulness activity, meditation, yoga, exercise, music, sound sleep, nutritious diet, group activities, collective gatherings, and social functions, which were found to positively impact the quality of life and improve the overall psychological well-being of the elderly and in turn support their happy ageing. There are a few more proven interventions, which are to be taken care of under the new age inclusive public policies to be amended exclusively for the elderly population (aged 80 and above) to cover the free availability of wearable

assistive technology devices, full doorstep clinical diagnostic and medical healthcare services and permitting the ethical use of highly trending AI-enabled innovative robotics interventions in the ALF and LTC facilities for abuse free living with dignity and implementing the globally advocated Universal Health Coverage (UHC) interventions for their much better care.

7. AI-enabled Robotic Interventions

In the present era of Gen-AI, the use of AI-enabled robots is trending in Western countries, where the use of Japanese social robots MARIO and PARO for ALF setups and companion robot LAVOT for LTC is gaining momentum for taking care of elderly population; it is even being utilized in home care setups also. These social robots can be easily programmed according to the physical and personal needs of the elderly. Just think beyond the human capacity, as now Gen-AI can limitlessly perform every task beyond our imaginations. For instance, it can be used for sounding an alarm for taking meals-breakfast, milk, tea, soup, or juice- and medicines, as the case may be, on time, and it can also set a reminder for morning and evening walk time, taking a bath, and changing old clothes. The AI-enabled social robots and wearable social health apps can automatically take all the programmed clinical measurements in time and record the data and can transmit the present level of glucose, uric acid, and thyroid measure heartbeat rate; monitor blood pressure; take pulse; record body temperature, and oxygen level; measure body height and weight for assessing bone density; and record optical reading for vision corrections for improving the eyesights periodically. It can also measure the length of hair, beard, and nails for initiating their in-time cleaning, cutting, trimming, and taking the filing actions as per the personalized needs of the elderly adults using highly innovative and advanced AI-enabled robotic technologies, just to ease their life.

8. Age-inclusive Policy Interventions

Age inclusive public policies are now the need of the hour, as they can provide complete healthcare and improve the overall quality of life and psychological well-being of elderly adults, boost their morale for happily ageing, and even protect their basic right to abuse-free living with dignity with full governmental support. The concept of Universal Health Coverage (UHC) seems to be the only legitimate solution, being advocated by the global thought leaders under the custodianship of the United Nations, where everyone can get quality health without facing any hardship. Therefore, by immediately integrating adaptation

of globally accepted UHC interventions with the amended age-inclusive public policies, developing economies like India can also very well achieve the sustainability health targets, SDG 3.8.1 (The Service Coverage) and the SDG 3.8.2 (The Financial Protection) for the well-being of all its rapidly ageing population with the help of the World Health Organization, World Bank, and Asian Development Bank.

9. Inferences and Discussions

The thematic review of all the selected medical publications, which were cited in the aforesaid survey of literature, reveals that most of the older adults (aged 60 and above) were found good health as they regularly contribute to society as community members. However, the elderly adults (aged 80 and above), were found to have a higher risk of developing a mental health condition due to experiencing violence and social abuse (Mohan A, 2024) or owing to its stigma (Fatima, 2025), social isolation, feeling loneliness (Shekelle, 2023), inequality, and sometimes their physical disabilities. WHO, Director-General Tedros Adhanom Ghebreyesus has very recently been quoted as saying, "The world is accepting the concept of Universal Health Coverage (UHC). Mental health must be an integral part of UHC. Nobody should be denied access to mental health care because she or he is poor or lives in a remote place (WHO)." Mental health is a state of mental well-being that enables people to cope with the stresses of life, realize their abilities, learn well, work well, and contribute to their community, thus doing what matters in times of stress. Thus, in order to address the challenges faced by elderly people not only for living longer, but for surviving longer and ageing with dignity, it is high time to develop a cohesive response system by adopting research-based social interventions to change the existing public perceptions on ageing.

Thus, to ultimately improve the overall quality of life (Kakemam, 2024), and psychological well-being of the rapidly ageing elderly population, it is necessary to strengthen the resilient health care infrastructure by developing assisted living facilities and long term care facilities with full governmental support to build resilient healthcare infrastructure with proper monitoring mechanism and by making financial provisions for millions of elderly Indians population by thoroughly implementing age inclusive public policies (Hamel, 2021) and adopting AI-enabled technology interventions (Thampi, 2024) to reduce the global burden of disease, to increase the nation's economic output and to achieve the sustainability (Oswald, 22024) health targets (Horgan, 2024) where everyone can get the benefit of quality health.

10. Conclusion and Recommendations

The factors responsible for the present wretched conditions of the elderly people aged eighty and above in the present era of high-tech innovative medical diagnostics, robotic surgery, advanced clinical research, health insurance and financial security were notably found to be the stigma of abuse, exploitation, high degree of loneliness, digital illiteracy, social isolation, lack of emotional support, and high-priced palliative day care facilities getting out of reach due to financial dependencies on their family members and caregivers, though the AI-enabled assisted living facilities remain accessible for the long-term care of the elite class of people. Therefore it is high time to act now for improving the quality of life of elderly aged eighty and above by adopting the desired technological (Al Dweik, 2024), social (Mohan A, 2024) and policy (Muhammad T, 2023) interventions without making any further delay to achieve the sustainability (Oswald, 2024) health target SDG 3.8 (Good health and Global well-being) with two of its monitoring indicators, SDG 3.8.1 (The Service Coverage) and the SDG 3.8.2 (The Financial Protection), for everyone by the end of year 2030 as envisioned by the global thought leaders and universal health and well-being monitoring bodies like WHO, WB, IMF, UN, UNDESA, UNFPO, ADB and other governmental, nongovernmental and public sector, private sector, community based, non-profit, and voluntary organizations working for improving the quality of public life for every citizen and achieving the good health (Kakemam, 2024) and global well-being targets. Therefore, it is high time for a developing economy like, India with a huge number of its growing silent generation population, to immediately switch over from all its existing schemes to implement the globally agreed and commended schemes like Universal Health Coverage (UHC), where everyone can get the health insurance benefit without any differentiation of age, gender, financial status, cast, and creed (Horgan, 2024). Thus, it is highly recommended to allocate a generous amount of financial budget to cater to the basic needs of the elderly people from the government and non-governmental reserve funds meant for CSR activities for increasing the overall lifespan of elderly people and ultimately reducing the Global Burden of Disease to achieve sustainability in the health sector (Ugwu, 2025). For uplifting the basic rights (Pathare, 2021) of the silent generation and boosting their dignity, the latest research and R&D projects on ageing must be academically supported, and related governmental efforts must be firmly taken to develop the high-end resilient healthcare infrastructure for community care of elderly people (Deusdad, 2024); startups must be financially supported for providing the basic orientation training to use

AI-enabled robots and to lift the interest of healthcare professionals (Wong et al., 2024) and for producing safe assistive technology products (Edmund Lee et al., 2024) for better mobility, spreading digital literacy (Aliasghar, 2024), encouraging financial inclusion either through pool funding or philanthropic activity for their happy ageing and living with dignity (Hung L et al., 2025) in the last phase of their precious life without facing any abuse (Mohan A, 2024) as life is beautifully gifted by the almighty to everyone. So one must live and move off happily. As life is ours, we live it our way, every day for us, something new, an open mind for a different view, and nothing else matters and nothing else matters (Ulrich L, 1991).

11. Limitations of the Study

There were a few limitations of this research study; its initial scope was kept limited to represent the silent generation only, as they were found to be more indignant of their basic elderly rights and found facing lots of abuse. The study was conducted at the convenience of the authors by completely following the international protocols. It abided by the Helsinki declaration and was concluded without receiving any financial support from external sources.

12. Future Research Directions

In view of the rapidly growing Indian silent generation population, it is further advised to conduct in depth study on the problems faced by them in detail with future researches and funded research and development projects on ageing, highlighting the acceptability of social robots, cost of incurred AI-enabled infrastructures, its operational skill training to healthcare professionals, and digital literacy of the ageing users (aged 80 and above) for developing resilient healthcare infrastructure for silent generation population, considering their personal willingness for digital transformation to adopt the new age AI-enabled technologies, religious belief, ethical concerns, family financial capabilities and cultural fit into the current societal environments in the Indian context, keeping in mind the provisions of Helsinki Declarations.

13. Acknowledgements

The principal author wishes to dedicate this research to his consort, Nikhat Iqbal, who has extended her full-time homely support by offering a selfless caregiver service to his elderly mother, aged eighty-plus, which enabled him to understand the necessities of the silent generation in the present era of social isolation and abuse due to calamitous ageing.

14. References

1. Ahmed A, Patil PS. (2024), *"Navigating the Shadows: A Comprehensive Review of Suicide in the Geriatric Population"*, Cureus, 16(1): e53352, DOI 10.7759/cureus.53352 https://www.cureus.com/articles/221879-navigating-the-shadows-a-comprehensive-review-of-suicide-in-the-geriatric-population #!/
2. Alavi et al. (2022), "Connecting the Dots between Social Care and Health-Care for the Sustainability Development of Older Adult in Asia: A Scoping Review", *MDPI Journal Sustainability*, 14:2573, pp1-17 https://doi.org/10.3390/su14052573
3. Al Dweik et al. (2024), "Opportunities and Challenges in Leveraging Digital Technology for Mental Health System Strengthening: a Systematic Review to Inform Interventions in the United Arab Emirates", *BMC Public Health*, 24:2592, pp1-11 https://doi.org/10.1186/s12889-024-19980-y
4. Aliasghar Haeri-Mehrizi et al. (2024), "Health Literacy and Mental Health: A National Cross-sectional Inquiry", *Nature Scientific Reports*, 14:13639 https://doi.org/10.1038/s41598-024-64656-7
5. Aljarbou HM, Almoajel AM, Althomali MM, Almutairi, KM. (2025), "Risk and Preventive Measures Among Older Adults in Nursing Homes in Saudi Arabia: An exploratory study on falls". *Healthcare,*13:342, pp1-10 https://doi.org/10.3390/healthcare13030342
6. Among, Krystle et al. (2022), "The Web-based Right Review Tool asks Reviewers Simple Questions to Suggest Methods from 41 Knowledge Synthesis Methods", *Journal of Clinical Epidemiology*, 147, pp42-51 https://doi.org/10.1016/j.jclinepi.2022.03.004
7. Annapuranam, K. (2025), "Challenges of Older Adults in India: A Qualitative Study of Institutional Care, Preferences, and Government Initiatives", *Research on Ageing and Social Policy*, 13(1), pp1-22 http://dx.doi.org/10.17583/rasp.14536
8. Ansari, M I Z. (2023), "Promoting and Protecting the Mental Health of Working Professionals at Works in the Present Era of Global Warming", *International Journal of Research in Business Studies*, 08 (2), pp49-68 https://www.ijrbs.com/wp-content/uploads/2023/12/04%20Dr.%20MIZ%-20Ansari.pdf

9. Ansari, M I Z. (2025), "Promoting Employees Well-being by Reducing Working Stress to Achieve Sustainability", *International Journal of Research in Business Studies*, 10 (1), pp43-58 https://www.ijrbs.com/wp-content/uploads/2025/07/4.%20Mohammad%20Iqbal%20Zaffar%20Ansari.pdf
10. Charlotte, Markey. (2024), "Adultish: *The Body Image Book for Life*", Cambridge University Press, ISBN: 9781009228978, https://doi.org/10.1017/9781009228978
11. Clark P, Goldlist B. (2008), "Protecting Vulnerable Older Adults in the Healthcare System", *Indian Journal of Gerontology*, 22 (3&4), pp291-306 http://gerontologyindia.com/pdf/vol-22-3-4.pdf
12. Deusdad B. (2024), "Ethical Implications in using Robots among Older Adults Living with Dementia", *Frontiers Psychiatry*, 15:1436273 https://doi.org/10.3389/fpsyt.2024.1436273
13. Dhillon P, Das A. (2024), "Understanding Healthy ageing in India: Insights from Multivariate Regression Trees", *Aging Clinical and Experimental Research*, 36:158 https://doi.org/10.1007/s40520-024-02815-6
14. Edmund Lee et al. (2024), "Examining Health Apps and Wearable use in Improving Physical and Mental well-being across U.S., China, and Singapore", *Nature Portfolio*: Scientific Reports,14:10779 https://doi.org/10.1038/s41598-024-61268-z
15. Elizabeth Haase. et al. (2024), "Climate Change and Youth Mental Health", *Cambridge University Press*, ISBN: 9781009252904, https://doi.org/10.1017/9781009252904
16. Give Grants India. (2025), *"India's Ageing Society: The Landscape Today"*, March 2025 https://give.do/givegrants/indias-ageing-society-the-landscape-today/
17. Fatima Gizal et al. (2025), *"Mental Health and Well-being in the Modern Era: A Comprehensive Review of Challenges and Interventions"*, Cureus (Part of Springer Nature), 17(1): e77683, https://doi.org/10.7759/cureus.77683
18. Goswami S, Handa RK, (2024), "Issues and Challenges Concerning Mental Health in India: Time to Brood Over", *Journal of Victimology and Victim Justice*, 7(1), pp110-124 https://doi.org/10.1177/25166069241247890
19. Hafiz T. A. Khan, Addo KM, Findlay Helen. (2024), "Public Health Challenges and Responses to the Growing Ageing Populations", *Wiley Public Health Challenges*, 3:e213, pp1-9 https://doi.org/10.1002/puh2.213

20. Hamel K, Kafczyk T. (2021), "Primary Mental Healthcare for Older Persons in India: How Age-inclusive are Public Policies?", *Health Policy and Planning*, 36, pp1371–1383 https://doi.org/10.1093/heapol/czab067
21. Hamel Kerstin, Kafczyk Tom. (2021), "The Architecture of the Primary Mental Healthcare System for Older People in India: What Public Policies Tell us", *Int J Ment Health System*, 15:72 https://doi.org/10.1186/s13033-021-00494-8
22. Hamel, Kafczyk. (2024), "Challenges and Opportunities in Strengthening Primary Mental Healthcare for Older People in India: A Qualitative Stakeholder Analysis", *BMC Health Services Research*, 24:206 https://doi.org/10.1186/s12913-024-10622-y
23. Horgan et al. (2024), "Optimizing Older Adult Mental Health in Support of Healthy Ageing: A Pluralistic Framework to Inform Transformative Change Across Community and Healthcare Domains", *Int. J. Environ. Res. Public Health*, 21, 664 https://doi.org/10.3390/ijerph21060664
24. Hung L, Zhao Y, Alfares H, Shafiekhani P. (2025), "Ethical Considerations in the use of Social Robots for Supporting Mental Health and Well-being in older adults in long-term care", *Frontiers Robotics and AI*, 12:1560214 https://doi.org/10.3389/frobt.2025.1560214
25. India Ageing Report. (2023), IIPS Mumbai and United Nations Population Fund, New Delhi, India, Accessed 19 July 2025 https://india.unfpa.org /sites/default/files/pub-pdf/20230926_india_ageing_report_2023_web_ver-sion_.pdf
26. IHME. (2023), "Global Burden of Disease Results of Institute of Health Metrics and Evaluation" *Global Health Data Exchange (GHDx)*, Accessed 19 July 2025 https://vizhub.healthdata.org/gbd-results/
27. IIPS, UNFPA. (2023), "Caring for Our Elders: Institutional Responses", *India Ageing Report 2023*, United Nations Population Fund, New Delhi, Accessed 19 July 2025 https://india.unfpa.org/sites/default/files/pub-pdf/20230926_india_ageing_report_2023_web_version_.pdf
28. Jahromi MM, Kaveh MH, Vitale E. (2024), "Mindfulness and Self-regulation Intervention for Improved Self-neglect and Self-regulation in Diabetic Older Adults", *Nature: Scientific Reports*,14:13857, pp01-11 https://doi.org/10.1038/s41598-024-64314-y
29. Jiang et al. (2023), "Effects of Personal and Health Characteristics on the Intrinsic Capacity of Older Adults in the Community: A Cross-sectional

Study using the Healthy Aging Framework", *BMC Geriatrics,* 23:643 https:// doi.org/10.1186/s12877-023-04362-7

30. Kakemam et al. (2024), "The Relationship Between Good Governance, Social Support, and Perceived Discrimination with Mental Health through the Mediation Role of Quality of Life: A Cross-sectional Path Analysis in Iran", *BMC Public Health*, 24: 2306, pp01-11 https://doi.org/10.1186/ s12889-024-19806-x
31. Lawson R, Wulsin. (2024), "The Toxic Stress", *Cambridge University Press*, ISBN: 9781009306577, https://doi.org/10.1017/9781009306577
32. Lillekroken et al. (2024), "Caregivers' Experiences, Challenges, and Needs in Caring for People with Dementia in India: a Scoping Review", *BMC Health Services Research*, 24:1661 https://doi.org/10.1186/s12913-024-12146-x
33. Linda, Gask. (2024), *"Out of Her Mind: How we are Failing Women's Mental Health and What Must Change"*, Cambridge University Press, ISBN: 9781009382441, https://doi.org/10.1017/9781009382441
34. Marina Romanello et al. (2024), "The 2024 Report of the Lancet Countdown on Health and Climate Change: Facing Record-breaking Threats from Delayed Action", *Lancet*, 404, pp1847–96 https://doi.org/ 10.1016/ S0140-6736(24)01822-1
35. Martin J Prince et al. (2015), "The Burden of Disease in Older People and Implications for Health Policy and Practice", *Lancet*, 385, pp549–62 http://dx.doi.org/10.1016/S0140-6736(14)61347-7
36. Mishra et al. (2023), "Identifying the Impact of Social Isolation and Loneliness on Psychological Well-being among the Elderly in Old-age Homes of India: The Mediating Role of Gender, Marital Status, and Education", *BMC Geriatrics*, 23:684 https://doi.org/10.1186/s12877-023-04384-1
37. Mohan, A et al. (2024), "Growing Old in India: Mapping Health and Social Welfare Policy Responses on Aging", in: Rajan, SI., Eds. Handbook of Aging, Health and Public Policy, *Springer Nature,* Singapore Pte Ltd. Singapore, pp01-16 https://doi.org/10.1007/978-981-16-1914-4_252-1
38. Muhammad, T. (2023), "Life Course Rural/urban Place of Residence, Depressive Symptoms and Cognitive Impairment among Older Adults: Findings from the Longitudinal Aging Study in India", *BMC Psychiatry*, 23:391 https://doi.org/10.1186/s12888-023-04911-9

39. Oswald TK et al. (2024), "Interventions Targeting Social Determinants of Mental Disorders and the Sustainable Development Goals: A Systematic Review of Reviews", *Psychological Medicine*, 54, pp1475–1499 https://doi.org/10.1017/S0033291724000333
40. Pathare et al. (2021), "Systematic Evaluation of the Quality Rights Programme in Public Mental Health Facilities in Gujarat, India", *The British Journal of Psychiatry*, 218, pp196-203 https://doi.org/10.1192/bjp.2019.138
41. Pinto PP, et al. (2024), "Mental Health Outcomes in Dementia Caregivers: A Systematic Review of Yoga-based Interventions", *Dement Neuropsychol: Yoga and Informal Caregivers,*19: e20240151, pp01-10 https://doi.org/10.1590/1980-5764-DN-2024-0151
42. Rasool A. (2022), "The Role of Family in Fostering Mental Health: Nurturing Practices and their Long-term Effects", *Journal of Business, IT, and Social Science*, 01 (1), pp01-03 https://doi.org/10.51470/BITS.2022.01.01.01
43. Science Direct. (2022), "*Right Review Tool to Suggest Knowledge Synthesis Method"*, Accessed 19 July 2025 https://www.sciencedirect.com/science /article/abs/pii/S0895435622000658
44. Shekelle et al. (2023), "Interventions to Reduce Loneliness", *JGIM*, 39(6), pp1015-28 https://doi.org/10.1007/s11606-023-08517-5
45. Sivakumar et al. (2024), "Clinical Practice Guidelines for Promoting Mental Health and Well-being of Older Adults: A Special Focus on Strategies for Coping with Social Isolation and Loneliness", *Indian Journal of Psychiatry*, 66, S331-7 https://doi.org/10.4103/indianjpsychiatry. indian-jpsychiatry_757 _23
46. Son JY, Marriott DJ, Struble LM, Chen W, Larson JL. (2024), "Factors Associated with Transfer from Assisted Living Facilities to a Nursing Home: National Health Aging Trends Study 2011–2019", *Journal of the American Geriatrics Society*, 72(11), pp3374-3384 https://doi.org/10.1111/jgs.19147
47. Steinke Claudia, Alomari Elham. (2024), "Quality of Life in Assisted Living Facilities for Seniors: A Descriptive Exploratory Study", *Nursing Open*, 11:e2084 https://doi.org/10.1002/nop2.2084
48. Thakkar A, Gupta A, De Sousa A. (2024), "Artificial Intelligence in Positive Mental Health: A Narrative Review", *Frontier Digital Health*,

6:1280235 https://www.frontiersin.org/journals/digital-health/articles/10.3389/fdgth.2024.1280235/full

49. Thampi K, Mathew LM. (2024), "Aging in Place for Community-dwelling Older Adults in India: A Qualitative Exploration of Prospects and Challenges", *Gerontology & Geriatric Medicine*, 10, pp1-10 https://doi.org/10.1177/23337214231223636
50. Thomson Sophie., et al. (2023), "Volunteering in Global Mental Health: A Practical Guide for Clinicians", *Cambridge University Press*, ISBN: 9781108827003, Royal College of Psychiatrists (RCPSYCH), London, UK https://doi.org/10.1017/9781108920728
51. Torous et al. (2025), "The Evolving Field of Digital Mental Health: Current Evidence and Implementation Issues for Smartphone Apps, Generative Artificial Intelligence, and Virtual Reality", *World Psychiatry*, 24(2), pp156-174 https://doi.org/10.1002/wps.21299
52. Tuastad, Lars et al. (2023), "A Qualitative Study of Stigma in the Context of Music Therapy in Mental Health Aftercare", *Nordic Journal of Music Therapy*, 32:2, pp121-139, T&F, www.doi.org/10.1080/08098131.2022.2075437
53. Ugwu et al (2025), "Sustainable Development Goals (SDGs) and Resilient Gealthcare Systems: Addressing Medicine and Public Health Challenges in Conflict Zones", *Medicine*, 104:7, (e41535), http://dx.doi.org/10.1097/md.0000000000041535
54. Ulrich, Lars. James, Hetfield. (1991), "*Nothing Else Matters"*, *Creeping Death Music*, Lyrics Copyrights @ Global Music Rights, The Metallica Blacklist Album, May 30, 1991
55. UN. (2022), "*World Population Prospect 2022:* Release note about Major Differences in Total Population Estimates for mid-2021 between 2019 and 2022 revisions. 2022", Department of Economic and Social Affairs, Population Division. New York
56. UN. (2024), "*World Population Prospects 2024. Online Edition.* Data as on 01 July 2022", Department of Economic and Social Affairs Population Division, Accessed 19 July 2025 https://population.un.org/wpp/
57. UNFPA. (2025), "*India Insights: SOWP Report-2025"*, Accessed 19 July 2025 https://india.unfpa.org/en/publications/unfpa-india-insights-state-world-population-report-2025

58. UNFPA. (2025), "The Real Fertility Crisis: The Pursuit of Reproductive Agency in a Changing World", *State of World Population-2025*, Division for External Relation, New York, NY 10158, ISBN: 9789211542837; ISSN 1020-5195. https://www.unfpa.org/sites/default/files/pub-pdf/swp25-layout-en-v250609-web.pdf
59. Wong et al. (2024), "*Adoption of Artificial Intelligence*–Enabled Robots in Long-Term Care Homes by Healthcare Providers: Scoping Review", *JMIR-Aging*, 7:e55257 https://aging.jmir.org/2024/1/e55257/citations
60. WHO. (2025), "*Mental Health of Older Adults. Fact Sheet"*, Accessed 19 July 2025 https://www.who.int/news-room/fact-sheets/detail/mental-health-of-older-adults

Human Capital Development as a Driver of Employee Productivity in Microfinance Institutions: A Position Paper

David Boohene
Senior Lecturer
University of Energy and Natural Resources
Ghana, West Africa.

Amita Maxwell
Associate Professor
Sam Higginbottom University of Agriculture, Technology & Sciences
Prayagraj, Uttar Pradesh, India.

Abstract

This paper argues that strategically aligned human capital development (HCD) practices are a primary driver of employee productivity in Microfinance Institutions (MFIs) in Sunyani, Ghana. Drawing on human capital theory and empirical observations, the paper positions continuous training, leadership development, employee motivation and performance management as high-impact levers. When MFIs treat HCD as an investment rather than a cost; they enjoy a snowball effect of improved employee productivity emanating from indicators such as higher loan-processing speed, lower error rates, improved client retention, and stronger compliance outcomes, which is crucial for financial sustainability.

Keywords

Human Capital Development (HCD), Employee productivity, Microfinance Institution (MPIs), Training, Leadership, and Development.

1. Introduction

Microfinance institutions in Ghana serve vulnerable and underserved clients. Their effectiveness depends heavily on frontline staff (loan officers, customer-service agents, and field supervisors who manage client relationships, assess credit risk, and deliver financial literacy and other non-financial services). Yet many MFIs operate with limited resources and in a regulatory environment that has been evolving in recent years, requiring higher standards of governance and operational competence. Strengthened human capital therefore becomes a strategic necessity vital for sustainable growth. However, the sustainability and growth of these MFIs depends significantly on the productivity of their employees, which is influenced by various human capital development practices. Effective HCD practices, including leadership development

programs, continuous training, mentorship, and career advancement opportunities have been recognized as essential drivers of employee performance (Dennis, 2022; Otoo et al., 2019; Barnes et al., 2024). Human Capital Development (HCD) is increasingly recognized as a vital driver of organizational success and economic growth. Defined as the strategic process of enhancing employees' skills, knowledge, and abilities, HCD enables organizations to remain competitive, innovative, and productive in a rapidly changing global environment. The concept of human capital, introduced by Schultz in 1961 and further developed by Becker in 1964, emphasizes that investments in employees' skills, knowledge, and competencies enhance their productivity, which in turn benefits organizations and economies (Barnes, 2024; Winterton & Cafferkey, 2019). Effective human capital development practices, such as training, leadership development, and capacity building, enable employees to improve their performance, adapt to changes, and contribute meaningfully to institutional goals. In the financial services sector, particularly in microfinance institutions (MFIs), HCD is essential for achieving operational efficiency, ensuring financial inclusion, and maintaining institutional sustainability. MFIs, such as Sinapi Aba Savings and Loans, Opportunity International and Midland Savings and Loans in Ghana serve as lifelines for economically marginalized groups. MFIs also play an important role in economic development, particularly in emerging economies like Ghana, where they help bridge financial gaps for small businesses and individuals excluded from traditional banking systems. These institutions rely heavily on skilled and motivated employees to execute their operations effectively. According to Mbroh and Quartey (2015) state that MFIs' operational success depends significantly on the competency and efficiency of their workforce, given the labour-intensive nature of microfinance operations. Agyapong, Essuman, and Gyamfi (2018) found that consistent training programs in financial institutions in Ghana lead to significant improvements in task performance and customer satisfaction. Similarly, McKinsey and Company (2019) emphasize that organizations prioritizing workforce development are more likely to achieve higher retention rates, innovation, and operational efficiency. For MFIs, improved employee productivity translates to better loan recovery rates, enhanced customer satisfaction, and stronger financial stability. Despite the clear benefits of HCD, MFIs face several challenges in their implementation. Financial constraints, high employee turnover, and inadequate managerial support often hinder the consistent application of development programs

(Asiedu-Appiah, Adongo & Ameyaw, 2021). As noted by Asiedu-Appiah et al. (2021), many MFIs in Ghana struggles to balance operational costs with the need for employee training and development. Additionally, cultural resistance and lack of access to advanced training resources further exacerbate the problem, limiting the potential gains of HCD initiatives. Albeit regardless of these challenges, this paper argues that deliberate, well-resourced human capital development (HCD) practices, including training, leadership development, mentoring, and performance management, affect the workforce, and are essential for improving employee productivity in Ghana's microfinance institutions.

2. Theoretical Rationale

Human capital theory posits that investments in education, training, and health increase worker productivity by enhancing skills and capabilities (Becker, 1964). Contemporary HR perspectives add that alignment between HCD practices and organizational strategy and supportive performance systems converts training inputs into measurable outputs. In this study, two key theories are considered: Human Capital Theory and the Resource-based View (RBV) Theory. These theories provide insight into how MFIs can leverage human capital development to gain a competitive edge and ensure sustainable growth.

Human Capital (HC) Theory

Human Capital Theory (HCT) was initially developed by Schultz (1961) and further expanded by Becker (1993). The theory posits that investments in human capital such as education, training, and health, enhances individual productivity and contribute to overall economic growth. Human capital theory explains that expenditures on education and on-the-job training increase workers' productivity because they raise workers' skills, judgement, and problem-solving capacity (Becker, 1993). Under this framework, HCD is not a recurring "expense" but an asset that raises the marginal product of labour, producing measurable operational gains such as faster task completion, fewer mistakes, and better decision-making on client creditworthiness. In microfinance institutions, HCT underscores the importance of continuous employee development. MFIs rely heavily on skilled personnel to deliver financial services effectively, manage risk, and maintain client trust. Studies have shown that firms with higher investments in human capital development experience increased employee efficiency, lower turnover rates, and enhanced organizational performance (Bassi & McMurrer, 2007). Moreover, a lack of

structured training programs often result in knowledge gaps, inefficiencies, and reduced service quality (Noe et al., 2017).

Resource-based View (RBV) Theory

The Resource-Based View (RBV) Theory, introduced by Wernerfelt (1984), and later refined by Barney (1991), asserts that an organization's competitive advantage stems from its unique internal resources, including human capital. According to Barney (1991), resources must be valuable, rare, inimitable, and non-substitutable (VRIN) to provide sustained competitive advantage. Human capital, as an intangible asset, aligns with these criteria when effectively developed and utilized.

In the microfinance sector, skilled employees contribute significantly to customer satisfaction, loan repayment rates, and institutional sustainability. A study by McClean and Collins (2019) found that organizations with strategic human resource practices, such as continuous training and leadership development, outperform competitors in the long run. Furthermore, MFIs that prioritize employee development create an adaptive workforce capable of navigating regulatory changes, technological advancements, and market fluctuations (Hitt et al., 2001).

3. Empirical Review

Human Capital Development (HCD) refers to the systematic process of improving employees' knowledge, skills, and competencies to enhance organizational performance (Khayinga & Muathe, 2018; Boohene & Maxwell, 2017). It includes training, mentorship, career development, and continuous learning opportunities, among others.

Training and Development: Training and development are critical components of human capital development, aimed at enhancing employee competencies and organizational effectiveness. Training equips employees with job-specific skills, while development focuses on long-term career growth and leadership readiness (Boohene et al., 2023; Noe et al., 2017; Gidey, 2016). Microfinance institutions benefit significantly from continuous employee training, as it ensures staff can handle complex financial transactions, customer relations, and risk assessment effectively (Awak & Augustine, 2021). Furthermore, training fosters innovation and adaptability, enabling employees to respond to industry changes and regulatory requirements. Fostering a learning culture encourages employees to stay curious, experiment with new ideas, and embrace change, thereby promoting innovation and agility within the organization (Careerminds, 2023). Additionally, continuous training allows

employees to stay updated with the latest regulatory developments and acquire the necessary skills to adapt effectively (Merca Team, 2023).

Leadership Development: Leadership development is a crucial aspect of human capital development, as effective leadership directly impacts organizational growth and employee productivity. Strong leadership fosters a positive work culture, enhances decision-making, and improves team collaboration (Tuffour et al., 2019). In microfinance institutions, leadership development is particularly essential, as managers and supervisors play a critical role in guiding employees through complex financial processes, regulatory compliance, and customer relations (Goleman, 2000). Avolio & Bass (2004) indicated that organizations investing in leadership training experience higher employee engagement, reduced turnover, and improved financial performance. Furthermore, leadership development helps build a pipeline of future leaders, ensuring continuity and stability within the organization (Tuffour et al., 2015).

Employee Motivation and Engagement: Motivated employees are more productive and committed to their organizations. HCD practices, including incentives, career progression opportunities, and work-life balance programs, play a significant role in employee engagement and retention (Deci & Ryan, 2000). Studies indicate that organizations that prioritize employee well-being through continuous professional development experiences, improved job satisfaction and reduced absenteeism (Herzberg, 1968).

Performance Management: Performance management involves setting goals, providing feedback, and evaluating employee progress to ensure continuous improvement (Aguinis, 2013). A well-structured performance management system enhances accountability, aligns employee efforts with organizational objectives, and fosters professional growth. MFIs benefit from robust performance evaluation frameworks that identify strengths and areas for development, ultimately driving higher productivity and service quality (Agyapong et al., 2018).

4. Research Methodology

A convergent mixed-methods design was used in this study. Quantitative data measured respondents' perceptions of human capital development (HCD) practices and self-reported productivity indicators; qualitative data explored experiences and contextual factors. The mixed approach allows numeric description and small-sample testing while using interview data to explain mechanisms. Staff involved in credit delivery, operations, and branch management in four microfinance institutions (MFIs) operating in Sunyani,

Ghana formed the sampled unit. This accounted for seventeen respondents in total across the four MFIs. The distribution is provided below.

Table 1:- Respondents Information

MFI	Number of Respondents	Respondents profile		
		Branch Manager	Senior Loan Officer	Senior Operations Staff
MFA -A	5	1	2	2
MFA -B	4	1	2	1
MFA -C	4	1	2	1
MFA -D	4	1	1	2
Total	17	4	7	6

Source:- Field Data 2025

The study involved **(**17) participants drawn from four different microfinance institutions (MFIs) in Sunyani, Ghana, selected to ensure a diverse range of perspectives on human capital development and employee productivity. The sample included a mix of organizational roles that directly influence operational efficiency and staff performance. Specifically, the respondents comprised **(**4) branch managers**,** who provided strategic and administrative insights; (7) senior loan officers**,** whose frontline experience with clients and credit processes offered practical perspectives; and **(**6) senior operations staff, who contributed views on institutional training structures and performance systems. This distribution ensured representation across managerial, operational, and human resource functions, enabling a rich understanding of how human capital development initiatives shape productivity within the selected MFIs.

5. Discussion and Results

Table 1:- Human Capital Development

HCD Practices	Mean	Std. Deviation
Performance has improved due to training programs provided by the organisation.	4.41	0.51

HCD Practices	Mean	Std. Deviation
Leadership development programs have enhanced the ability to meet job targets.	4.41	0.51
As a result of new skills acquired, workers are better at solving work-related challenges now.	4.29	0.59
Training has positively impacted the ability to meet deadlines.	4.24	0.66
Ability to handle multiple tasks has improved through capacity-building programs.	4.18	0.73
Employees are more confident in using technology to perform duties.	4.24	0.75
Job efficiency has increased due to upskilling initiatives.	4.12	0.75
Productivity in departments has improved because of employee development programs such as sponsored short courses	4.35	0.61
Employee get emergency support funds at a reduced rate.	4.12	0.79
There is a structured framework that aligns staff performance with strategic goals.	4.29	0.59

Source:- Field Data, 2025

Table 2 provides a comprehensive assessment of how human capital development (HCD) influences employee productivity in microfinance institutions (MFIs) in Sunyani. The data reflects consistently high mean scores across various dimensions of productivity, suggesting a strong positive perception among employees regarding the effectiveness of HCD interventions in enhancing their job performance. For instance, the table shows a strong consensus from the respondents of selected MFIs in Sunyani on the prevalence of a well-established structure for training and leadership development in their respective MFIs. We find these two variables to be strong priorities in MFIs with mean scores of 4.41 and 4.41, respectively. This consistency suggests that respondents highly value these two variables, which are recognized in the literature as essential for enhancing individual performance (Yamoah et al., 2024; Noe et al., 2017; Armstrong, 2016). Tailored training programs and the

integration of digital tools into learning initiatives also received high ratings, with both items scoring 4.24. These results indicate that respondents are of the view that adopting modern and context-specific training methods meets current job demands at their respective MFIs. As Lazzara et al. (2021) argue, aligning training with specific roles and leveraging technology enhances employee engagement and learning retention. The inclusion of digital platforms also reflects the shift among MFIs toward technologically driven operations. Again, training programs emphasize the central role of training in boosting individual output. This aligns with Armstrong's (2016) assertion that structured training enhances both technical and behavioural competencies, thereby improving overall work efficiency (Boohene et al., 2024; Boohene et al., 2023). Furthermore, these responses reflect the broader impact of HCD in not only enhancing job-specific skills but also improving employee morale and technological adaptability. Such soft outcomes are vital to fostering a productive organizational culture (Garavan & Akdere, 2016). Notably, the ability to handle multiple tasks (mean = 4.18) and the perception that job efficiency has improved (mean = 4.12) also signal the success of capacity-building programs. Despite slightly lower scores compared to leadership and technical skill areas, these metrics still suggest a generally high level of perceived productivity among staff.

Further, the statement "productivity in departments has improved because of employee development programs such as sponsored short courses, and employees get emergency support funds at a reduced rate" also received mean scores of 4.36 and 4.12, respectively, validating that HCD interventions can lead to employee engagement and motivation (Jephet and Magali, 2021). That is, employer-sponsored short courses communicate that MFIs foresee a longer-term relationship with the employee; this reduces turnover intention and fosters employee commitment. Additionally, emergency support funds that offer staff access to low-interest loans address a different, but related, set of drivers: financial security and perceived organizational support, among others. Employees who can rely on an internal emergency fund to smooth shocks (medical bills, funeral costs, household crises, etc.) can experience lower financial stress, which reduces presenteeism and cognitive load and enables better workplace focus.

Lastly, we find (mean score=4.29) with a standard deviation of 0.59 for "structured framework aligning employee performance with strategic goals" being a core tool for performance management among employees in MFIs. This consistency suggests that respondents value performance management, which is also recognized in literature as essential for enhancing employee performance.

That is, structured frameworks enhance monitoring and accountability through performance metrics such as Portfolio at Risk (PAR), loan recovery efficiency, and client outreach indicators, among others, enabling managers to track staff performance consistently and objectively (Ledgerwood & White, 2006).

Counter arguments on results of the study

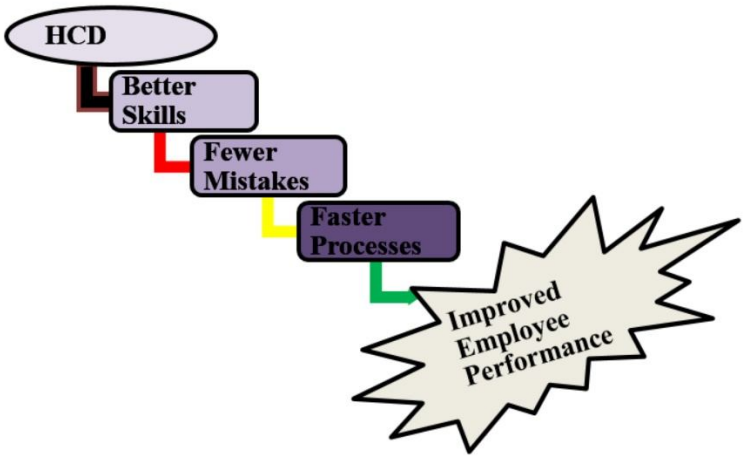
Critics argue that human capital development can consume scarce organizational resources, particularly in small or resource-constrained institutions (Becker, 1993; Storey, 2007). Thus, for undercapitalized MFIs, investing in human capital may reduce funds available for lending or other operational needs. However, on the contrary, other studies of Ghanaian banking institutions found that human capital development practices, including training & development, performance appraisal, communication, and motivation, together explain a substantial percentage of variance in employee performance. This suggests that even if human capital development consumes resources, their combined effect on employee performance can outweigh costs (Boohene & Maxwell, 2017; Agyare et al., 2016; Owusu-Antwi et al., 2016). This enhances the payoff of HCD investments by reducing employee turnover, thus preserving institutional knowledge and culture necessary for growth.

Another criticism is that HCD does not automatically lead to productivity gains in the short to medium term, as their impact depends on factors like leadership support, proper implementation, and alignment with organizational goals (Aguinis, 2013; Becker, 1993). For instance, some studies suggest that merely offering training does not guarantee that employees will perform better. Without follow-up, mentoring, or a supportive environment, gains from training may fade quickly. Also, staff might feel demotivated if training isn't tied to meaningful incentives or promotions. However, with all this limitation, it is empirically clear and thus obvious that HCD is not a guaranteed productivity booster in all circumstances. Its effectiveness depends on how it is designed and implemented. Key enablers of success when implemented under enabling conditions help HCD to significantly increase productivity and competence, reducing risks associated with cost, turnover, and poor implementation. Also, for microfinance institutions often constrained by resources and operating under external structural limitations, strategically targeted HCD practices offer a critical avenue not only for performance but also for sustainable development, compliance, and client service quality.

Position: HCD is vital to employee productivity.

When human capital development (HCD) practices are systematically paired with performance checks, compliance becomes an integral part of daily

operations rather than a reactive or peripheral task. For instance, employees who receive training in regulatory requirements, risk management, and client protection policies and are then evaluated regularly against these standards, internalize compliance as part of their workflow. This integration ensures that operational errors, breaches, or omissions are detected early, corrected promptly, and prevented from recurring. These mechanisms create a snowball effect as depicted in Figure 1. That is, enhanced skills through HCD reduce mistakes, which accelerates process efficiency and lowers operational costs. Faster, error-free processes improve client interactions, fostering trust, loyalty, and satisfaction. Satisfied clients are more likely to maintain long-term relationships and adopt additional financial products, which could eventually strengthen revenue streams for MFIs, all things being equal. Concurrently, robust compliance practices protect the institution from regulatory penalties and reputational damage, reinforcing both financial and public trust.



Source:- From Authors

Figure 1:- **Snowball Effect of HCD on Employee Productivity in Microfinance Institutions**

When HCD is combined with additional performance check mechanisms, as shown in Figure 1, its effects eventually have a greater impact on employees' productivity, creating a snowball effect: Implementing HCD principles improves skills, which reduces errors, speeds up procedures, and ultimately improves worker performance.

6. Conclusion

Human capital development is not optional for MFIs seeking sustainable productivity gains. When HCD is strategic, measured, and integrated with performance systems, technology, and delivered through pragmatic, low-cost methods, it improves employee productivity; that is, employees become more skilled and better equipped to reduce operational errors, making them more efficient. Ghanaian empirical studies, particularly in community banking and microfinance, support this position while also underscoring the importance of fair HR systems and contextual adaptation. Therefore, policymakers and sector partners can accelerate impact by subsidizing capacity building and facilitating knowledge sharing across MFIs in Sunyani, Ghana, and beyond.

7. References

1. Aguinis, H. (2013). *Performance Management* (3rd ed.). Pearson
2. Agyapong, A., Essuman, D., & Gyamfi, O. A. (2018). Impact of Training and Development on Employee Performance in Financial Institutions in Ghana. *International Journal of Business Management, 13*(5), 45-57.
3. Armstrong, M. (2016). *Armstrong's Handbook of Strategic Human Resource Management* (6th ed.). Kogan Page.
4. Asiedu-Appiah, F., Adongo, J., & Ameyaw, C. (2021). Challenges Facing Microfinance Institutions in Ghana: A Case Study of Employee Development Practices. *International Journal of Financial Studies, 9*(2), 12-24.
5. Awak, A. S., & Augustine, A. L. S. (2021). Training and Career Development on Employee Performance in Microfinance Institutions in Bambili, Cameroon. *International Journal of Empirical Research Development*, *103*.
6. Avolio, B. & Bass, B. M. (2004). *Multifactor Leadership Question: Manual and Sample set*. Redwood City: Mind Garden, Palo Alto, CA
7. Barney. J (1991) Firm Resources and Sustained Competitive Advantage. *Journal of Management*, 17 (1), 99-120
8. Bassi, L., & McMurrer, D. (2007). Maximizing your Return on People. Harvard Business Review, 85(3), 115–23, 144
9. Barnes, T., Abor, P.A., & Boohene, D. (2024). Capacity Building in Ghana's Decentralized Health System: A Qualitative Study. *Journal of Advocacy Research and Education. 11(2);* 258-268. DOI: 10.13187/jare.2024.2.258

10. Becker, G. S. (1993). *Human capital: A Theoretical and Empirical Analysis with Special Reference to Education* (3rd ed.). University of Chicago Press.
11. Boohene, D., & Maxwell, A. (2017). HCD Practices and Its Impact on Sustainable Growth: A Study on Selected Banks in Ghana. *Saudi Journal of Business and Management Studies. ISSN: 2415-66721; Vol2, Iss-7,* 711-715
12. Boohene, D., & Maxwell, A. (2017). Perception of Employee's on HCD Practices in the Indian Information Technology Industry. *International Journal of Development Research, 7, (07),* 13876-13878.
13. Boohene, D., & Maxwell, A. (2017). Technological Applications and its Functionality on HCD Practices. *International Research Journal of Human Resources and Social Sciences.* Vol 4, Issue 7
14. Boohene, D., Amma-Addae, N., Maxwell, A., Asante-Darkwah, J (2023). Adoption of Electronic Banking in Ghana: Does Convenience, Management Support, Security and Human Capital Matter? *Journal of Advocacy, Research and Education, 10(1),* 43-52. https://doi.org/ 10.13187/jare.2023.1.43
15. Boohene, D., Maxwell, A., Santhana, K.L., Sigh, P., & Aboagye, A.A. (2018). Funding Liquidity Risk in Ghanaian Microfinance Institutions (MFI's). *International Journal of Research in Business Studies ISSN: 2455-2992, Vol. 2 (1).* DOI: 10.6084/m9.figshare.22647832
16. Boohene, D., Maxwell, A., Asante Darkwah, J., & Addae-Nketiah (2023). Human Capital Development Practices in India's IT Industry. *Journal of Modern Management & Entrepreneurship. 13(2); 1-6*
17. Boohene, D., Thomas, F. K., Manideep, A. S., Guha, S. K., Ganguly, P., & Kumar, P. N. (2024). The Recent Advancements in Security, Privacy and Trust in Mobile and Wireless Communication in the Emerging Economies. In *Computer Science Engineering and Emerging Technologies* (pp. 289-295). CRC Press.
18. Careerminds. (2023). How to Foster a Learning Culture in your Organization. *https://careerminds.com*
19. Deci, E. L., & Ryan, R. M. (2000). The "What" and "Why" of Goal Pursuits: Human Needs and the Self-determination of Behavior. *Psychological Inquiry, 11(4),* 227–268.
20. Dennis, S. M. (2022). *Influence of Human Capital Development on Staff Performance of Commercial Banks in Kenya: A Survey of Commercial Banks in Ongata Rongai Town* (Doctoral Dissertation, Africa Nazarene University)

21. Garavan, T. N., & Akdere, M. (2016). Human Resource Development in CIVETS. In *Global Human Resource Development* (pp. 393-416). Routledge.
22. Gidey, A. (2016). The Effect of Training and Development on Employee's Performance: The Case of Commercial Bank of Ethiopia. *Unpublished MSc. thesis, School of Commerce, the Addis Ababa University, Ethiopia.*
23. Herzberg, F. (1968). One More Time: How do you Motivate Employees? *Harvard Business Review*, 46(1), 53–62.
24. Hitt, M. A., Ireland, R. D., & Hoskisson, R. E. (2001). *Strategic* M*anagement: Competitiveness and Globalization* (4th ed.). South-Western College Publishing
25. Japhet, G. J., & Magali, J. (2021). Monetary Staff Motivation, Agency Roles and The Performance of Arusha Road KKKT Savings and Credits Society. *Ruaha Journal of Business, Economics and Management Sciences, 4;* 4-18
26. Khayinga, C. M., & Muathe, S. (2018). Human Capital Development and Organizational Performance: Review & Critique of Literature and A Research Agenda. *International Journal for Innovation Education and Research*, *6*(2), 144-153.
27. Lazzara, E. H., Benishek, L. E., Hughes, A. M., Zajac, S., Spencer, J. M., Heyne, K. B., ... & Salas, E. (2021). Enhancing the Organization's Workforce: Guidance for Effective Training Sustainment. *Consulting Psychology Journal: Practice and Research*, *73*(1), 1.
28. Ledgerwood, J., & White, V. (2006). *Transforming Microfinance Institutions: Providing Full Financial Services to the Poor*. World Bank.
29. Mbroh, J. K., & Quartey, P. (2015). Financial Inclusion in Ghana: Analysis of the Impact of Microfinance on Rural Women. *African Journal of Economic Policy*, *22*(2), 56-78.
30. McKinsey & Company. (2019). The Future of Work: Driving Productivity through Workforce Upskilling. *Global Workforce Trends Report.*
31. Merca Team. (2023). Navigating Competency Management: Staying Adaptable in a Changing World. *https://merca.team*
32. Noe, R. A., Hollenbeck, J. R., Gerhart, B., & Wright, P. M. (2017). *Fundamentals of Human Resource Management* (6th ed.). McGraw-Hill Education
33. Otoo, F. N. K., Assiamah, Y., & Amegbe, H. (2019). Human Capital Development and Employee Performance: The Role of Training Effect-iveness. *Cogent Business & Management, 6*(1), 1–20.

34. Owusu Antwi et al., (2016). Assessing the Human Resource Management Practices of Public Banks from Employees' Perspective: Case Study of Selected Branches of Ghana Commercial Bank, Kumasi. *European-American Journals*
35. Ramous Agyare et al., (2016). The Impacts of Performance Appraisal on Employees' Job Satisfaction and Organizational Commitment: A Case of Microfinance Institutions in Ghana. *International Journal of Business and Management. 11(9); 281-297.*
36. Schultz, T. W. (1961). *Investment in Human Capital.* The American Economic Review, 51(1), 1-17.
37. Storey, J. (2007). *Human Resource Management: A Critical Text* (3rd ed.). Thomson Learning.
38. Tuffour, J. K., Gali, A. M., & Tuffour, M. K. (2019). Managerial Leadership Style and Employee Commitment: Evidence from the Financial Sector. *Global Business Review, 20(6),* 1-18.
39. Tuffour, J. K., Barnor, C., & Akuffo, E. (2015). Do Leadership Styles Matter in Microfinance Performance? Empirical Evidence from Ghana. *Journal of Business Research, 9(1),* 1-15.
40. Winterton, J., & Cafferkey, K. (2019). Revisiting Human Capital Theory: Progress and Prospects. *Elgar Introduction to Theories of Human Resources and Employment Relations*, 218-234.
41. Wernerfelt. B (1984) A Resource-based View of the Firm. *Strategic Management Journal, 5 (2),* 171-180

The Impact of Motivation and Empowerment on Employees' Commitment in the Indian Automotive Industry

Samar Raqshin
Assistant Professor
Gautam Buddha University
Greater Noida, Uttar Pradesh, India.

Monika Bhati
Assistant Professor
Gautam Buddha University
Greater Noida, Uttar Pradesh, India.

Abstract

This paper makes a strong case for the fact that the organizational factors of motivation and empowerment have a strong influence on employees' commitment. This argument is proved by using quantitative techniques of regression analysis, which shows a strong positive relationship between the parameters. This analysis has been conducted on the employee responses received within the Indian automobile sector in the Delhi NCR region of India. Although there is not much literature available on the correlation between the two factors and employees' commitment within the Indian automotive sector, but this paper makes a valuable contribution within the field of organizational behavior by analyzing employees' behavior in this sector and paves the way for further research on the subject in divergent sectors.

Keywords

Psychological empowerment, Intrinsic and Extrinsic motivation, Organisational commitment, Automotive sector, and Employees performance.

1. Introduction

From the various studies conducted in hope of improving employee's commitment across various sectors, it has been found that motivated & empowered employees were more committed to the organization. Kreitner (1995) has suggested that motivation is a psychological process that gives purpose and direction to an individual's behavior. Grant (2008) observed that certain employees often go above and beyond the call of duty and persist in performing their work effectively and productively even in the absence of any personal gain. A study conducted by Cooper and Robinson (2008) revealed that providing choice is positively related to intrinsic motivation, task performance and perceived competence. The study conducted by Yazani, Yaghoubi and Giri (2011) evaluated the role and relevance of job assignment, performance-based

rewards, participative management, self-determination, and participation in goal setting as the main ways of empowerment and found that empowered employees consider their job and work life more purposeful and meaningful.
According to the studies conducted by (Hamed, 2010; Naqvi et.al., 2011; Sahoo, 2010); Abu Rumman. A 2021, it was concluded that a positive relationship exists between psychological empowerment and organizational factors i.e., personal growth, organizational trust, reward, recognition, and leadership support that leads to reinforcing the organizational commitment (Naqvi et.al., 2011; Rawat, 2011).

2. Role of Empowerment and Motivation in Automobile Industry

In today's competitive environment, the automotive industry is more concerned about the survival, growth, and maximum uses of the potential of its workforce. To achieve such objectives, the majority of the labor force employed in automotive industry is on contract basis, but it is quite obvious that these employees, who besides not having any job security or opportunity for competency development, are also deprived of any type of operational autonomy or any role in the decision-making process, do not derive any pride in their work.
Enormous organizations are built on the inherent value of their employees, as motivated and committed employees almost always allow an organization to grow faster than similar competitive organizations (Shore & Martin, 1989; Meyer, Paunonen, Gellaty, Goffin, & Jackson, 1989; Rifai, & Sutiksan 2025).
Employees' organizational factors of motivation and empowerment are intimately associated with employees' identification, commitment, performance and productivity (Ashforth & Mael, 1989; Pratt, 1998; Manzoor, 2012, Liu *et. al.*,2019). Researchers have suggested that employee empowerment and motivation are positively associated with employees' participation, job satisfaction, organizational commitment and higher productivity (Mullins & Peacock, 1991; Kirkman & Rosen, 1999; Doughty, 2004; Kuo Ho Lin & Lai, 2009; Iqbal & Ahmad et al., 2013, (Denton, 1987).
Thus, the present study concentrates on examining the inter-linkages between various factors associated with managing the employees' commitment for ensuring sustained productivity in the Indian automotive industry.

3. Theoretical Development and Hypotheses Generation

Studies have been conducted to explore the relationship between empowerment and certain factors that are considered as antecedents of organizational

commitment, such as: personal growth, job satisfaction, and organizational trust (Hamed, 2010), reward and recognition (Bogler & Somech, 2004) and leadership support (Naqvi et al., 2011; Sahoo, 2010). These studies concluded that a positive relationship exists between psychological empowerment and these factors (Hamed, 2010) that lead to reinforcing the organizational commitment (Naqvi et al., 2011; Rawat, 2011). The linkage between psychological empowerment and factors of organizational commitment was also examined by Jha (2011) in context of IT industry. The study revealed that although no relationship exists between psychological empowerment and continuance commitment, there exists a positive relationship between employees' empowerment and the affective and normative commitments (Gabral et al., 2019 & Modise et al., 2023).

Numerous scholars have conducted research to identify the factors affecting empowerment. Jazime (2006) concluded that motivation, training, job satisfaction, and leadership style are the factors that have a significant relationship with the employees' empowerment. The study conducted by Yazdani, Yaghoubi & Giri (2011) evaluated the role and relevance of job assignment, performance-based rewards, participative management, self-determination and participation in goal setting as main ways of empowerment and found that empowered employees consider their job and work life more purposeful and meaningful.

Therefore, it may be comprehended that the firms need to focus on certain organization factors that determine the employees' empowerment and motivation and thereby increase their organizational commitment (Kyei-Frimpong, 2023).

3.1. Determinants of Organizational Factors of Motivation & Empowerment

Researchers have conducted numerous studies to understand nature and dimensions of motivation and empowerment. According to researchers' (Mottaz, 1985; Wong et al., 1999; Bakay and Huang, 2010; Edison et al., 2024), they observed there are two motivating factors of a job, separated as an intrinsic and extrinsic variable. Wong et al., (1999), say that the intrinsic variables contain feelings of involvement, interesting work, career development, and promotion. And the extrinsic variables, are job security, a respectable salary, thoughtful discipline, and good working conditions (Curtis et al., 2009 & William).

However, in the motivational approach, empowerment is considered as a psychological capability and intrinsic motivation of an individual

employee. Some researchers conceptualized psychological empowerment as a multidimensional motivational construct consisting of four cognitive dimensions, namely meaning or purpose, competence, self-determination, and impact which combined are indicative of the basic essence of employees' empowerment at the workplace (Spreitzer, 1995, 96; Thomas and Velthouse, 1990; Modise, 2023). According to structural approach the term empowerment is associated with granting a role to concerned employees participation in decision making process (Kanter, 1983; Thorlkson & Murray, 1996; Bogler and Somech, 2004; Ongoon & Sund, 2008; Judith, 2012).

Numerous scholars have conducted research to identify the factors affecting empowerment. Frankl (1984, 1992) analyzed the performance of the people at workplace. He found that having a purpose in life is the basic motivation that is related to an individual search for finding meaning in life. It may be appreciated that when employees find meaning in work, they display positive organizational behaviour leading to effective organizational relationship, commitment, and performance. A study conducted by Tempoe (1993) has identified three key motivators, viz., personal growth, operational autonomy and task achievement that create a feeling of personal and professional achievement thereby reinforcing the individuals' sense of being purposeful and significant.

The meaning of motivation & empowerment for employees is manifest. Jha (2011) explores the linkage between psychological empowerment and factors of organizational commitment in the context of IT industry. The study revealed that there exists a positive relationship between employees' empowerment and the affective and normative commitments. Hamed, (2010) examine the relationship between empowerment and certain factors that are considered as antecedents of organizational commitment, such as: personal growth, job satisfaction, and organizational trust reward and recognition (Bogler & Somech, 2004) and leadership support (Sahoo, 2010; Naqvi et al., 2011). These studies concluded that a positive relationship exists between psychological empowerment and these factors (Hamed, 2010) that leads to reinforcing the organizational commitment (Rawat, 2011, Naqvi et al., 2011, Oliveira 2023), if they are given freedom to participate in decision-making process and provided full autonomy to do their job and also providing a challenging job to the employees, they feel motivated and empowered to do work and thereby actively involve and attached with the work and the objective of the organization.

3.2. Organization Commitment

Commitment is an important instrument for enhancing the performance of the employees. Research conducted on commitment has shown that the employees committed to their organization indicate a positive attitude towards their organizational goals, which ultimately results in higher organizational performance and enhanced productivity (Jeffrey Arthur, 1994; Steers, 1977; Monje A., Xanthopoulou D., Calvo, Vazquez, 2021). Chen, Tsui, & Farh (2002) have found that organizational commitment may be positively related with various outcomes such as employee job satisfaction, motivation, and performance, and may be negatively correlated to absenteeism and turnover. Thomas (2002) found that commitment is motivated by purpose to work smart, take personal responsibility for making things happen, and apply intelligence to getting activities or tasks accomplished.

Mowday et al., (1979), & Andika et al., (2020) stated that employee's commitment is a psychological attachment of an employee with the organization that depends on the degree of employee's motivation, involvement, loyalty, and trust in the values and norms of the organization. According to Allen & Meyer (1991), organizational commitment classified into three main components that are affective commitment (AC), continous commitment (CC) and normative commitment (NC), which may be considered as a reference framework for organizational commitment. Thereby employees' commitment to the automotive industry was measured by using Meyer et al.'s (1993) 12-item measure of affective, continuance and normative commitment (four items in each scale).

The respondents were provided with 5 choices, viz., strongly agree (SA), agree (AG), neither agree nor disagree' (NA), disagree (DA) and strongly disagree (SD) with their relative weightages varying from 5 for strongly agree to 1 for strongly disagree, recorded and measured on a Likert scale. These sets of questions were distributed to around 400 employees working in four automotive companies. The number of fully filled-up 242 responses were selected for analysis. The total number of respondents indicating a specific choice against a statement was evaluated.

Thus, the following hypotheses are offered:

H_1 : The organizational factors of motivation and empowerment positively influence the employees' normative commitment.

H_2 : The organizational factors of motivation and empowerment positively influence the employees' continuance commitment.

H_3 : The organizational factors of motivation and empowerment positively influence the employees' affective commitment.

4. Data Analysis: Regression

The research was conducted to assess the influence of the organizational factors of motivation and empowerment, viz., job challenge, operational autonomy, open communication and organizational support on the dependent variable: organizational commitment. The organizational commitment was measured through three parameters: normative, continuous, and affective commitment.

The table-1 results show the details of the analysis indicating the impact of the motivational and empowering factors on employees' affective commitment. The analysis shows all the factors of the employees' motivation and empowerment *viz.,* job challenge (p=0.027), operational autonomy (p=0.000), open communication (p=0.000) and organizational support (p=0.000) are positive predictors of the affective commitment

Table 1:- Employees' Motivation& Empowerment on Affective Commitment

Model	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
(Constant)	**-.387**	**.188**		**.041**
Job Challenge	-.600	.270	-.399	0.027
Operational Autonomy	1.819	.126	-1.371	0.000
Open Communication	.883	.232	.597	0.000
Organizational Support	-1.043	.140	-.671	0.000

Source:- Created by Authors

It validates our Hypothesis -1 as:

H_1: "The organizational factors of motivation and empowerment viz., job challenge, operational autonomy, open communication and organizational support are positively associated with the employees' affective commitment".

It thus proves that all the factors of motivation and empowerment, (viz., job challenge, operational autonomy, open communication and organizational support) contribute to developing the synergy between an individual's own

values and organization values that ensures his total involvement and commitment for achieving organizational objectives.

Table 2:- Employees' Motivation & Empowerment on Continuance Commitment

Model	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
(Constant)	**-.277**	**.101**		**.007**
Job Challenge	-.222	.145	-.187	.127
Operational Autonomy	.749	.068	.716	.000
Open Communication	.337	.125	.289	.007
Organizational Support	.203	.075	.165	.007

Source:- Created by Authors

Table-2 provides the finding of data-analysis regarding the effect of the factors of motivation and empowerment on employees' continuance commitment. It is found that three factors, *viz.*, operational autonomy (p=0.000), open communication (p=0.007), and organizational support (p=0.007) have a strong impact on continuance commitment.

It partially validates Hypothesis-7(b) that may be stated as:

H_2: "The organizational factors of motivation and empowerment, viz., operational autonomy, open communication, and organizational support are positively associated with the employees' continuance commitment."

Thus, an individual's desire to stay in an organization is largely influenced by the operational autonomy that enhances an individual's self-efficacy, open communication that indicates the leadership's trust and organizational support for involvement in innovative ventures. The assignment of a challenging job per se is not an important factor in influencing one's decision to stay with the organization, as nobody expects that the other organization, he decides to join will not assign him a job according to the level of skills and abilities.

Table 3 details the impact of the employees' empowerment and motivation on normative commitment. It is found that three factors of the employees' motivation and empowerment: operational autonomy (p=0.000), open communication (p=0.014) and organizational support (p=0.000) have a strong impact on normative commitment also, but job challenge (p=0.207) does not turn out to be the predictor for normative commitment.

Table 3:- Employees' Motivation & Empowerment on Normative Commitment

Model	Unstandardized Coefficients		Standardized Coefficients	Sig.
	B	Std. Error	Beta	
(Constant)	**-.525**	**.191**		**.006**
Job Challenge	-.347	.274	-.229	.207
Operational Autonomy	1.776	.128	1.333	.000
Open Communication	.586	.236	.394	.014
Organizational Support	-.924	.142	-.592	.000

Source:- Created by Authors

Hence, the Hypothesis-7(c) is partially validated as follows:

H_3 "The organizational factors of motivation and empowerment viz., operational autonomy, open communication and organizational support are positively associated with the employees' normative commitment."

Thus, it is evident that the three organizational factors of motivation and empowerment, (viz., operational autonomy, open communication and organizational support) influence the employees' moral sense of responsibility towards the organizational objectives that also influence their preference to serve the organization, but the assignment of a 'challenging job' may not drive such a moral sense among the employees.

5. Conclusions and Further Scope

To sum up, it may be concluded that the predictors: operational autonomy, open communication and organizational support had a significant and direct relationship with the all the constituents of organizational-commitment, viz., affective, continuance and normative commitment. It is further revealed that although the job challenge is not a significant factor for affecting an employee's continuance and normative commitment, along with other three factors mentioned above, it is also a strong predictor of the employees' affective commitment.

According to the employee's perception, the organizational factors of motivation and empowerment viz., job challenge, operational autonomy, open communication, and organizational support are positively associated with affective commitment indicating the necessity of their inclusion in the HR policy framework of automotive industries.

There are few drawbacks of this study, first, there are no previous study exist about organizational factors of motivation & empowerment in Indian automotive industries in Delhi NCR.

Second, the duration of the study and data resources are very less; if we have proper resources and time, we can do our study much more deeply and can analyses each and every aspect that distressess the intrinsic motivation of employees toward better commitment of employees. Finally, this discovery is a beginning and as the analyzers go deeper; they may alter and become more aware. The study is still in progress, and the research will continue to review the findings. The researcher can also take other variables like leadership styles, job design, and managerial standards to improve the employee's performance.

6. References

1. Abu Rumman A. A., Al-Ahliyya, Lina Hamdan Mahmoud Al-Abbadi M. H. L., Abu-Rumman A., (2021), "Empowerment and its Impact on Organizational Commitment in an Academic Setting", *Journal of Legal, Ethical and Regulatory Issues* Vol-24, Special Issue 1.
2. Allen, N.J.,& Meyer, J.P. (1991). *A Three-conceptualization of Organisational Commitment.* Human Resource Management Review, vol.1, pp.61-89.
3. Alshemmari M. H. J. J., (2023), "An Empirical Study on Employee Empowerment Role in Increasing Efficiency of Employee Performance", *Journal of Logistics, Informatics and Service Science* Vol. 10 (2023) No.1, pp.52-71 DOI:10.33168/LISS., ISSN 2409-2665.
4. *Andika R., & Darmanto S., (2020),* "The Effect of Employee Empowerment & Intrinsic Motivation on Organizational Commitment and Employee Performance", *Journal of Applied Management (JAM)Volume 18 Number 2,June 2020 Indexed in Google Scholar.*
5. Arthur, J. B.(1994), Effects of Human Resource Systems on Manufacturing Performance and Turnover, *The Academy of Manufacturing Performance*, 37(3): 670-687.
6. Ashforth, Blake E., and Fred Mael. (1989). *"Social Identity Theory and the Organization."* Academy of Management Review 14 (1), 20-39.
7. Bakay A, Huang J (2010). *A Conceptual Model of Motivational Antecedents of Job Outcomes and How Organizational Culture Moderates.* 08.12.2010, http://ssrn.com/abstract=1722048.
8. Bogler, R. & Somech, A. (2004)," Influence of Teacher Empowerment on Teachers' Organizational Commitment, Professional Commitment and

Organizational Citizenship Behavior in School", *Teaching and Teacher Education*, Vol. 20, pp. 277-289.

9. Chen ZX, Tusi AS, Farh JL (2002). Loyalty to Supervisor vs. Organizational Commitment: Relationships to Employee Performance in China. *Journal of Occupational and Organizational Psychology*. 75(3): 339-356.
10. Curtis CR, U. R., Severt DE (2009). *"Employee Motivation and Organizational Commitment: a Comparison of Tipped and no Tipped Restaurant Employees.*" Int. J. Hosp. Tourism Adm.10: 253-269. Deci, E. L. (1975). Intrinsic motivation. New York: Plenum.
11. Denton, K. (1987). *Effective Appraisals: Key to Employee Motivation. Industrial Engineering, 19(12).* 24.
12. Doughty, H.A. (2004). "Employee Empowerment: Democracy or Delusion?". *The Innovation Journal: The Public Sector Innovation Journal.* 9(1), pp. 1-24.
13. Edison 1, Samdin 2, Saranani F., Sukotjo E., Asfahyaddin L. & Wahyuniati, (2024), "Police Personnel Performance: Intrinsic Motivation, Organizational Commitment and Psychological Empowerment in Indonasia, "*International Journal of Religion 2024 Volume: 5*| *Number 11*| pp. 2930–2939ISSN: 2633-352X (Print) | ISSN: 2633-3538.
14. Frankl, V. (1992), Man's search for meaning (4th ed.) Boston: Beacon Press.
15. Gabra1 F. S., Yousef H. R, Abood A. S., (2019), "Relationship between Empowerment and Motivation among Staff Nurses in Minia University Hospital", *IOSR Journal of Nursing and Health Science* (IOSR-JNHS) e-ISSN: 2320–1959.p- ISSN: 2320–1940 Volume 8, Issue 2, PP 57-64 www.iosrjournals.org.
16. Grant, A. M. (2008). "The Significance of Task Significance: Job Performance Effects, Relational Mechanisms, and Boundary Conditions. *Journal of Applied Psychology.* Vol.93, pp.108-124.
17. Grant, A.M. (2008). "Does Intrinsic Motivation Fuel the Prosocial Fire? Motivational Synergy in Predicting Persistence, Performance and Productive". *Journal of Applied Psychology.* vol. 93(1), pp. 48-58.
18. Hamed, S.S. (2010), "Antecedents and Consequences of Employees Empowerment. *Management Review: An International Journal*,. Vol. 5,(1), pp. 64-94.
19. Indridason, T. & Wang, C.L. (2008), Commitment or Contract: What Drives Performance in Public Private Partnerships?, *Business Strategy Serie*, Vol. 9(2), pp.78-89.

20. Iqbal N., Ahmad, N., Majid M., Naddeem M., Javed K., Zahra A., Ateeq M.(2013) ," Role of Employee Motivation on Employee's Commitment in the Context of Banking Sector of D.G.KHAN, Pakistan, *Journal of Human Resource Management*, 1(1): 1-8.
21. Jha,S., (2011). Influence of Psychological Empowerment on Affective, Normative and Continuance Commitment. A Study in the Indian IT Industry. *Journal of Indian Business Research*, 3(4), pp. 263-82.
22. Jomah B. N., (2017), "Psychological Empowerment on Organizational Commitment as Perceived by Saudi Academics", *World Journal of Education*, Department of Educational Administration, Education College at King Saud University, Vol. 7, No. 1.
23. Jones, G.R.(1986). Socialization Tactics, Self-efficacy and Newcomers' Adjustments to Organizations: *Academy of Management Journal*. Vol. 29, pp.262-279.
24. Judith, M. Z.,(2012)."Employee Empowerment and Organizational Commitment: A Study of the Food Manufacturing Sector in Zimbabwe". *African Journal of Business Management*. Vol. 6(38), pp.10332-10339.
25. Kreitner, R. (1995). *Management* (6th ed.). Boston: Houghton Mifflin Company.
26. Krikman, B.L. & Rosen, Benson (1999). "Beyond Self-management: Antecedents and Consequences of Team Empowerment". *Academy of Management Journal*. Vol. 42(1), pp. 58-74.
27. Kuo, Tsung-Hsien, Ho, L.A., Lin, C. & Lai, K.K. (2009). "Employee Empowerment in a Technology Advanced Environment". *Industrial Management and Data System*. Vol.110(1), pp. 24-42.
28. Kyei-Frimpong M, Amoako K. E. & and Bridget Akwetey-Siaw B., Boakye K. O., Adu N. I., Suleman A. R., & Bawa A. A., (2023), "Employee Empowerment and Organizational Commitment among Employees of Star-rated Hotels in Ghana: Does Perceived Supervisor Support Matter?", *Journal of Work-applied Management Emerald Publishing Limited* e-ISSN: 2205-149X p-ISSN: 2205-2062.
29. Liqin Chen, Liqin Chen & Xin Liao (2012) Factor Analysis-based Performance Evaluation of Listed Companes in Petroleum Industry of China, *International Journal of Business and Management*, 7(1),137-142.
30. Liu, Anita, W.M. Chiu, and Richard Fellows, (2019), *"Enhancing Commitment through Work Empowerment"*, School of the Built and Natural Environment, Glasgow Caledonian University, UK; and

Department of Real Estate and Construction, The University of Hong Kong.

31. Marta A.I., & Supartha G. W., (2018), "The Effect of Job Enrichment and Employee Empowerment to Organizational Commitment With Work Motivation As A Mediation", *International Journal of Economics, Commerce and Management*, United Kingdom Vol. VI, Issue 4, April 2018, ISSN 2348 0386.
32. Meyer, J.P, & Herscovitch, L. (2001). "Commitment in the Work Places toward a General Model", *Human Resource Management Review,* 11(3), pp.299-326.
33. Modise M. J., (2023), The Impacts of Employee Workplace Empowerment, Effective Commitment and Performance: An Organizational System Review, *International Journal of Innovative Science and Research Technology*, ISSN No: 2456-2165.
34. Monje Amor A., Xanthopoulou D., Calvo N., & Vazquez A. P.J., (2021), "Structural Empowerment, Psychological Empowerment, and Work Engagement: A Cross-country Study, *European Management Journal* , Volume 39, Issue 6, December 2021, Pages 779-789.
35. Mottaz, C. (1988a), "Determinants of Organizational Commitment", *Human Relations*, Vol. 41, No.1, pp. 57-74.
36. Mottaz, C.J. (1988), "Determinants of Organizational Commitment", *Human Relations*. Vol. 41, pp. 467-482.
37. Mowday, R.T., Porter, L.W. & Stress, R.M. (1979). The Measures of Organizational Commitment. *Journal of Vocational Behaviour*, 22 (8), pp. 90-96.
38. Mullins, L.J.& Peacock, A. (1991). "Managing through People: Regulating the Employment Relationship". *Administrator,* Dec. 45-55.
39. Naqvi, S.A.H., Hashmi, M.A., Zeeshan, A., & Shaikh, F.M. (2011). "Impact of Supportive Leadership and Organizational Learning Culture as a Moderator on the Relationship of Psychological Empowerment and Organizational Commitment". *Australian Journal of Business and Management Research.* Vol.1(8), pp. 65-71.
40. Ongori, H. & Shunda, W., (2008). Managing behind the Scenes: Employee Empowerment, *International Journal of Applied Economics and Finance,* 20, 1-11.
41. Paunonen S., Gellaty I.,R.,, Goffin R., D.,, & Jackson (1989), Organizational Commitment and Job Performance: It's the Nature of the Commitment that Counts. *Journal of Applied Psychology*, 74(1), 152-156.

42. Ping C., George T., (2008). *The Effect of Inter-functional Coordination on Organizational Commitment in the Hotel Industry*.
43. Pratt, M. G. (1998), *To be or not to be: Central Questions in Organizational Identification.* In D. A. Whetten & P. C. Godfrey (Eds.), Identity in organizations (pp. 171207). Thousand Oaks, CA: Sage.
44. Rawat, P. S. (2011)." Effect of Psychological Empowerment on Commitment of Employees: An Empirical Study. *2011 2nd International Conference on Humanities, Historical and Social Sciences, IPEDR.* Vol. 17, IACSIT Press, Singapore.
45. Sahoo, C.K., Behera, N., & Tripathy, S.K. (2010). Employee Empowerment and Individual Commitment: An Analysis from Integrative Review of Research. *Employment Relations Record.* 10 (1), pp.40-56.
46. Said Shaban Hamed (2010). "Antecedents and Consequences of Employees Empowerment. *Management Review: An International Journal.* Vol. 5, No. 1, pp. 64-94.
47. Shahnawaz MG and Jafri Hussan M (2009), "Psychological Captial and Predictors of Organisational Commitment and Organisational Citizenship Behavior, *Journal of Sudian Academy of Applied Psychology, Issue 35, pp 78-84.*
48. Shore, L. M. & Martin, H. J. (1989). Job Satisfaction and Organizational Commitment in Relation to Work Performance and Turnover Intentions. *Human Relations, 42(7),* 625- 638.
49. Sousa M., Santos E., Santos T., & Oliveira M., (2023), *"The Influence of Empowerment on the Motivation of Portuguese Employees—A Study Based on a Structural Equation Model"*.
50. Spreitzer G.M., (1995). Psychological Empowerment in the Workplace: Dimensions, Measurement and Validation. *Academy of Management Journal, vol. 38, no.5, pp.1442-1465.*
51. Spreitzer, G.M. & Quinn, R.E. (1996), "Empowering Middle Managers to be Transformational Leaders", *Journal of Applied Behavioral Review,* Vol. 32, pp.20-6.
52. Steers, R. (1977), "Antecedents and Outcomes of Organizational Effectiveness", *Administrative Science Quarterly*, Vol. 22, pp. 40-56.
53. Sutiksan S., & Rifai R. A., (2025), "The Influence of Motivation and Empowerment on Employee Performance with Organizational Commitment as a Mediator (Study on Employees of the Empowerment and Village Affairs Agency", Batang Regency), *Journal of History and Humanities* 8(3):4086-4099DOI:10.24815/jr.v8i3.48360.

54. Tampoe, M. (1993),' Motivating Knowledge Workers-The Challenge for the 1990's, *Long Range Planning, Vol.26, no.3, 49-55.*
55. Thomas, K.W., & Velthouse, B.A. (1990), Cognitive Elements of Empowerment, *Academy of Management Review, V*ol.15,pp. 666-681.
56. Tjosvold, D. & Sun, H., (2005). Effects of Power Concept and Employee Performance on Managers Empowering, *Journal of Leader and Organization Development*, 27,217-234.
57. Umana V. S., Akpan A. U. & Aniema C. U., (2025), "Influence of Employee Empowerment on Employee Commitment in Oil Producing Firms in Rivers State", *International Journal of Management Technology, Department of Business Management*, University of Uyo, Nigeria Vol.12, No 1, pp.77-86, ISSN: ISSN 2055-0847.
58. William C. Murray C. W., & Holmes R. M., (2021), "*Impacts of Employee Empowerment and Organizational Commitment on Workforce Sustainability*, Gordon S. Lang School of Business & Economics, University of Guelph, Guelph.
59. Yazani , B. O., Yaghoubi, N.M, & Giri, E.S.(2011)," Factors Affecting the Empowerment of Employees: An Empirical Study, *European Journal of Social Science,*Vol.20(2), pp.267-274.
60. Zaraket W., Garios R., & Malek A. L., (2018), "The Impact of Employee Empowerment on the Organizational Commitment", *International Journal of Human Resource Studies,* ISSN 2162-3058 2018, Vol. 8, No. 3.

Effects of Neuroleadership on Prefrontal Cortex Activity and Cognitive Resilience in Paramilitary Decision-making

Ekta Verma
Associate Professor
University of Allahabad
Prayagraj, Uttar Pradesh, India.

Abstract

This paper outlines neuroleadership as a developing framework for enhancing cognitive performance in high-pressure operational contexts, particularly among paramilitary operational cohorts. Drawing on neuroscience and behavioural psychology, it examines how neuroleadership principles strengthen situational awareness and enable split-second decision-making in volatile and uncertain environments. Given the extreme stress under which operational cohorts operate, the paper highlights the neurobiological bases of leadership behaviour and demonstrates how targeted cognitive training can improve emotional regulation, operational clarity, and tactical responsiveness. Methodologically, the study adopts a mixed-methods approach integrating psychometric profiling, structured interviews, and neurocognitive simulations that replicate realistic field conditions. It also draws on established situational awareness models and emerging developments in military artificial intelligence and neuro-symbolic systems to illuminate how brain-inspired architectures can enhance real-time threat detection and decision-making. By situating neuroleadership within the paramilitary domain, the paper offers a novel framework for embedding cognitive resilience into training, with significant implications for leadership development, crisis management, and operational readiness.

Keywords

Neuroleadership, Cognitive resilience, Prefrontal cortex, Split-second, Decision-making, and Operational cohorts.

1. Introduction

Paramilitary operational cohorts function in some of the most cognitively demanding environments, where rapid, high-stakes decisions must be made under intense pressure, uncertainty, and shifting threat landscapes. These volatile, uncertain, complex, and ambiguous (VUCA) conditions require

leadership models that extend beyond traditional behavioural frameworks and incorporate an advanced understanding of neural processes, emotional control, and adaptive cognition (Bennis & Nanus, 2007; Johansen, 2017). In this regard, neuroleadership—first articulated by Rock (2007, 2008) and further expanded by Ringleb and Rock (2008)—has emerged as an interdisciplinary paradigm integrating neuroscience, psychology, and organizational leadership to explain how leaders perceive, think, regulate emotion, and act under stress. Core neuroleadership domains such as decision-making, emotional regulation, cognitive flexibility, collaboration, and change facilitation (Rock & Ringleb, 2008; Goleman, Boyatzis & McKee, 2013) are directly aligned with the operational exigencies of paramilitary command, where attentional control, judgment, and team coordination occur in rapidly evolving tactical contexts (Kozlowski & Bell, 2013).

At the neurobiological level, situational awareness (Endsley, 1995)—a cornerstone of tactical preparedness—is deeply rooted in prefrontal cortex (PFC) functions governing working memory, executive decision-making, and inhibitory control (Miller & Cohen, 2001; Gazzaniga, Ivry & Mangun, 2018). Stress-induced impairments in these PFC pathways, as demonstrated by Arnsten (2009), McEwen and Gianaros (2011), and Sapolsky (2017), can lead to emotional hijacking, attentional lapses, and degraded operational judgment. Such disruptions also amplify cognitive biases identified in classic decision research, including anchoring, availability, optimism bias, and heuristic-driven errors (Tversky & Kahneman, 1974; Kahneman, 2011), all of which are frequently observed in paramilitary and military field settings. Research on emotional regulation and contemplative practices indicates that strategic training in mindfulness, cognitive reframing, and attentional strengthening can counteract stress responses, enhance neural efficiency, and restore PFC functioning (Tang, Hölzel & Posner, 2015; Siegel, 2007). These insights align with empirical evidence from military psychology showing that cognitive resilience and emotional hardiness significantly predict leader adaptability, mission success, and team cohesion (Bartone, 2006; Matthews et al., 2020).

Concurrently, advancements in neurotechnology and defense-oriented artificial intelligence have expanded our understanding of how cognitive processes can be supported or augmented during tactical operations. Neuro-symbolic AI systems capable of battlefield situation modelling (Zhou et al., 2022) and hypergraph-based multi-agent coordination algorithms (Wang et al., 2023) provide compelling evidence of how brain-inspired architectures can enhance decision accuracy and situational comprehension. These developments parallel

emerging work on command cognition, threat appraisal, and cue integration in complex environments (Lieberman, 2013; Friedman, 2021), reinforcing the relevance of neuroleadership as a scientific and operational framework. Recent scholarship in team science and organizational psychology further emphasizes that effective leadership under uncertainty requires high levels of shared mental models, communication clarity, emotional intelligence, and integrative problem-solving (Kozlowski & Bell, 2013; Goleman et al., 2013; Yukl, 2012).

Against this backdrop, the present study offers a multidimensional investigation into the application of neuroleadership principles among paramilitary operational cohorts in India. By synthesizing theoretical contributions from neuroscience, behavioral psychology, decision science, and defense studies, the research develops a neuro-adaptive leadership framework aimed at enhancing situational awareness, emotional regulation, cognitive flexibility, and split-second decision-making during field operations. In doing so, it contributes to the evolving discourse on operational neuroscience and leadership resilience (Waldman, Balthazard & Peterson, 2011; Lieberman, 2013), offering evidence-based insights into how cognitive mechanisms can be strengthened to improve mission effectiveness, team coordination, and operational safety in high-pressure deployments. This integrative approach responds to longstanding calls for leadership models that reflect the neurobiological realities of stress, cognition, and adaptive behavior in complex security environments (Goleman et al., 2013; Matthews et al., 2020), positioning neuroleadership as a transformative paradigm for contemporary paramilitary command systems.

2. Review of the Literature

The literature on neuroleadership, executive functioning, and high-pressure decision-making reflects a convergence of neuroscience, psychology, leadership studies, and defence research. Rock's pioneering work (2007, 2008) and the subsequent expansion of the neuroleadership paradigm by Ringleb and Rock (2008) established a conceptual basis for understanding leadership through brain-based mechanisms encompassing decision-making, emotional self-regulation, collaboration, and change facilitation. These ideas parallel the broader leadership scholarship on adaptive, resilient, and emotionally intelligent leadership (Goleman, Boyatzis & McKee, 2013; Bennis & Nanus, 2007; Yukl, 2012), which highlights the importance of cognitive and emotional competencies in uncertain environments. Within operational contexts, situational awareness—defined by Endsley (1995) as a three-tier perceptual–interpretive–projective process—remains a foundational construct for

understanding how personnel interpret dynamic field cues, further elaborated in military performance studies emphasizing vigilance, workload, and cognitive fatigue (Matthews, Warm & Smith, 2020).

Neuroscientific foundations of leadership and decision behaviour underscore the centrality of the prefrontal cortex (PFC) in executive functioning, working memory, attentional control, and inhibition (Miller & Cohen, 2001; Gazzaniga, Ivry & Mangun, 2018). Evidence from cognitive neuroscience supports the role of PFC networks in judgment, goal-directed behaviour, and adaptive thinking, forming the neural substrate of effective leadership (Friedman, 2021; Posner & Rothbart, 2018). Stress neurobiology literature consistently demonstrates how acute and chronic stress weaken PFC regulatory control while amplifying amygdala-driven emotional reactivity, thereby impairing higher-order cognition and flexibility (Arnsten, 2009; McEwen & Gianaros, 2011; Sapolsky, 2017). These findings align with cognitive psychology research on decision degradation and heuristic biases under uncertainty, as articulated in the seminal works of Tversky and Kahneman (1974) and later in Kahneman's (2011) dual-process theory.

Emotional regulation and resilience emerge as key moderators of decision performance under stress. Research on mindfulness, cognitive reappraisal, neuroplasticity, and executive strengthening—from Siegel's (2007) work on attunement to Tang, Hölzel and Posner's (2015) neurocognitive training models—demonstrates that targeted interventions can enhance PFC functioning and improve emotional stability. Studies on military resilience and psychological hardiness (Bartone, 2006; Jha et al., 2010; Resilience Gate review, 2023) reinforce these findings, indicating that structured cognitive training supports performance, endurance, and decision clarity. Emotional intelligence research further emphasizes interpersonal attunement and affective steadiness as predictors of leadership effectiveness in complex environments (Goleman et al., 2013; Lieberman, 2013).

Team-based and organizational decision-making research contributes additional insights. Kozlowski and Bell (2013) highlight the importance of team cognition, shared mental models, and coordinated problem-solving in high-risk operations, while organizational behaviour literature underscores the role of trust, communication, and adaptive leadership in enhancing collective decision outcomes (Johansen, 2017; Rock, 2007; Waldman, Balthazard & Peterson, 2011). These perspectives converge on the need for leadership frameworks that integrate neurobiological, cognitive, and behavioural dimensions.

Emerging technological approaches expand this field further. Neuro-symbolic artificial intelligence, deep learning, and hypergraph-based decision systems have demonstrated potential in enhancing real-time battlefield cognition and multi-agent coordination (Zhou et al., 2022; Wang et al., 2023). Similarly, research on neuro-tactical intelligence suggests that decision-making under threat involves coordinated activity across the PFC, amygdala, and basal ganglia (Rouhani, 2025; LeDoux, 2015). These developments echo earlier work in computational neuroscience and behavioural modelling, demonstrating how artificial and biological systems can inform one another. The integration of cognitive neuroscience into organizational training—supported by educational innovations such as Kozlowski & Bell (2013), Johansen (2017), and leadership literatures—highlights the growing relevance of brain-based models in preparing operational personnel for VUCA environments.

Collectively, these studies portray neuroleadership as a deeply interdisciplinary domain that bridges neural mechanisms, emotional regulation, cognitive resilience, and adaptive decision-making. The literature consistently affirms that optimal performance in high-pressure operational settings depends on the coordinated functioning of neural circuits governing executive control, emotional modulation, attention, and bias suppression. Against this backdrop, the current study's focus on neuroleadership, situational awareness, and split-second decision-making among paramilitary cohorts in India is situated within a robust and evolving body of scholarship that spans over five decades of theoretical and empirical development.

3. Research Gap

While neuroleadership has gained traction in corporate and educational settings, its application in high-stakes paramilitary environments remains underexplored. Existing literature primarily focuses on traditional leadership models or psychological resilience in military contexts (Bartone, 2006; Matthews et al., 2020), with limited integration of neuroscience-based strategies tailored to paramilitary command roles. There is a lack of empirical research examining how neuroleadership principles—such as cognitive regulation, emotional control, and situational awareness—can be systematically applied to enhance decision-making under pressure among paramilitary operational cohorts in India.

4. Problem Statement

Paramilitary operational cohorts frequently operate in volatile and high-pressure environments that demand rapid, precise, and emotionally regulated decision-making. However, traditional leadership training often overlooks the neurocognitive mechanisms that influence judgment, attention, and stress response. This gap in leadership development may compromise operational effectiveness, situational awareness, and team coordination during critical missions. Therefore, there is an urgent need to investigate how neuroleadership frameworks can be adapted to strengthen cognitive performance and decision-making capabilities among paramilitary leaders.

5. Research Questions

5.1. How do emotional regulation, cognitive flexibility, and decision-making speed influence situational awareness in paramilitary operations?
5.2. Which neurocognitive factors most significantly affect split-second decision-making under high stress?
5.3. To what extent can neuroleadership-based training enhance emotional regulation and cognitive resilience in command roles?
5.4. What challenges and unit-level variations affect the integration of neuroleadership in paramilitary leadership development?

6. Objectives of the Study

6.1. To examine the role of neuroleadership in enhancing situational awareness among paramilitary operational cohorts.
6.2. To identify the neurocognitive mechanisms that impact rapid decision-making in high-pressure operational contexts.
6.3. To assess the effectiveness of neuroleadership-based training interventions in improving emotional regulation and cognitive agility.
6.4. To explore the practical implications of implementing neuroleadership frameworks in paramilitary leadership development programs.

7. Research Designs and Methods

This study adopted a rigorous mixed-methods research design to investigate neuroleadership, situational awareness, and rapid decision-making among paramilitary operational personnel in Uttar Pradesh. The target population comprised 5,000 active-duty members of the Central Armed Police Forces

(CAPFs), including CRPF, BSF, ITBP, CISF, SSB, and RAF, officially deployed in the state for law-and-order support and Indo–Nepal border security, election duties, VIP protection, and counter-insurgency assistance. This figure is consistent with operational deployment data reported in the Ministry of Home Affairs (2023) and the Parliamentary Standing Committee on Home Affairs (2022), which document sustained CAPF presence across the state.

According to the MHA Annual Report (2022–2023), India's CAPFs—including CRPF, BSF, ITBP, SSB, CISF, and Assam Rifles—have a combined sanctioned strength exceeding one million personnel, with thousands deployed at any given time for state support operations. Uttar Pradesh is among the largest recipients of CAPF augmentation for elections, riot control, border coordination (Indo–Nepal), anti-terror duties, and strategic deployments (MHA, 2023; CAPF Deployment Gazette Notifications, 2019–2023).

- SSB units are permanently stationed along the UP–Nepal border, covering multiple districts such as Bahraich, Shrawasti, Maharajganj, Siddharthnagar, and Pilibhit.
- CRPF companies are routinely rotated into urban centres such as Lucknow, Varanasi, Noida, Kanpur, and Meerut for law-and-order and counter-insurgency support.
- BSF and ITBP battalions provide reinforcement for special security zones, election duties, and VIP protection across UP during scheduled and unscheduled deployments.

Across these forces, UP maintains between 4,000 and 7,000 deployed CAPF personnel at any point, depending on operational cycles, election periods, and security assessments (MHA Deployment Reports; Parliamentary Standing Committee on Home Affairs, 2022).

Thus, defining the eligible operational population as approximately 5,000 paramilitary decision-making personnel is both methodologically sound and administratively justified, representing the realistic strength of CAPF units actively engaged in high-stress operations suitable for this study's focus on split-second decision-making, situational awareness, and neuroleadership constructs.

This estimate also supports valid application of Cochran's sample size formula with Finite Population Correction (FPC) for large but finite and variable operational populations (Cochran, 1977; Israel, 1992).

The eligible study population ($N \approx 5{,}000$) reflects the approximate number of operational CAPF personnel deployed across Uttar Pradesh at any given time.

Government of India reports confirm substantial CAPF rotations in the state—including CRPF, BSF, ITBP, CISF, and SSB units—supporting law enforcement, border security, election duties, and counter-insurgency operations (Ministry of Home Affairs, 2023). Given these continuous deployments, an estimated population of 5,000 active paramilitary operatives represents a valid and authoritative sampling frame for examining neurocognitive and leadership factors in high-pressure operational environments.

Hence Sample size calculation and unit selection in Uttar Pradesh

- Confidence level: 95%
- Margin of error (precision): 4%
- Estimated proportion (p): 0.50 (maximizes required sample size when true proportion is unknown)
- Total eligible population (N): 5,000 operational cohorts across PMF deployments in Uttar Pradesh

7.1. Sample Size Formula

Sample size was determined using Cochran's (1977) formula for large populations, applying a 95 percent confidence level, 4 percent margin of error, and an estimated population proportion of 0.50. The initial estimate (n_0 = 600.25) was refined using the Finite Population Correction (Israel, 1992) for a population of N = 5,000, resulting in a required sample of 536 respondents.

Step 1: Initial (Cochran's) Sample Size for Large Populations:

$n_0 = (Z^2 \times p(1 - p)) / e^2$

Using Z = 1.96, p = 0.50, e = 0.04:

$n_0 = (1.96^2 \times 0.5 \times 0.5) / (0.04^2)$

$n_0 = (3.8416 \times 0.25) / 0.0016 \approx 0.9604 / 0.0016 \approx 600.25$

Step 2: Finite Population Correction (FPC):

$n = n_0 / (1 + (n_0 - 1) / N)$

Using N = 5000:

$n = 600.25 / (1 + 599.25 / 5000)$

$n \approx 600.25 / 1.11985 \approx 536.2$

To satisfy statistical requirements and account for non-response, 600 questionnaires were distributed via Google Forms. After data screening for completeness and consistency, 567 responses were valid and retained for analysis, while cases containing missing or incomplete data were excluded following established research guidelines (Denscombe, 2014).

7.2. Sampling Frame

The sampling frame comprised CAPF personnel with direct operational and supervisory responsibilities, including Assistant Commandants, Inspectors, Sub-Inspectors, Section Commanders, and Head Constables. These cadres were selected due to their active engagement in tactical decision-making, situational threat assessment, and command functions—domains central to neuroleadership and cognitive performance research (Bartone, 2006; Matthews et al., 2020).

Personnel serving exclusively in administrative posts or undergoing basic training were excluded, consistent with recommendations for sampling in operational psychology (Creswell & Creswell, 2018).

7.3. Sampling Strategy

A stratified cluster sampling strategy was implemented, consistent with methodological recommendations for large, geographically distributed paramilitary populations. Stratification was applied across:

(a) Unit Type
- Central Armed Police Forces (CAPFs)

(b) Operational Role
- Field-deployed cohorts
- Headquarters-based supervisory personnel

(c) Geographical Zones
- Western UP: Meerut, Ghaziabad, Gautam Budh Nagar
- Central UP: Lucknow, Kanpur Nagar, Prayagraj
- Eastern UP: Varanasi, Gorakhpur, Bahraich, Shrawasti
- Strategic Nodes: Agra, Bareilly

Clusters were defined at the battalion and company levels. Based on proportional allocation:
- Western UP: 30 percent (180 questionnaires)
- Central UP: 40 percent (240 questionnaires)
- Eastern UP: 25 percent (150 questionnaires)
- Strategic Nodes: 5 percent (30 questionnaires)

Following data cleaning, the 567 valid responses were distributed as:
- Western: 170
- Central: 227
- Eastern: 142
- Strategic Nodes: 28

Within each cluster, respondents were selected across rank strata (company cadres, platoon leaders, section in-charges, supervisory officers) and role strata (field vs. headquarters), ensuring balanced representation across hierarchical and functional responsibilities.

7.4. Data Collection Procedures

Data collection utilized validated psychometric instruments widely applied in neurocognitive and behavioural research:

- Cognitive Flexibility Scale (CFS)
- Emotional Regulation Questionnaire (ERQ) (Gross & John, 2003)
- Situational Awareness Rating Technique (SART) (Taylor, 1990)

To complement quantitative findings, semi-structured interviews were conducted with supervisory personnel to explore stress responses, cognitive habits, and neuroleadership behaviours in operational contexts.

8. Data Analysis

8.1. Quantitative analysis was performed using SPSS, employing descriptive statistics, Pearson's correlations, multiple regression, ANOVA, and reliability analysis (Cronbach's α). Reliability thresholds followed psychometric standards established by Nunnally & Bernstein (1994).

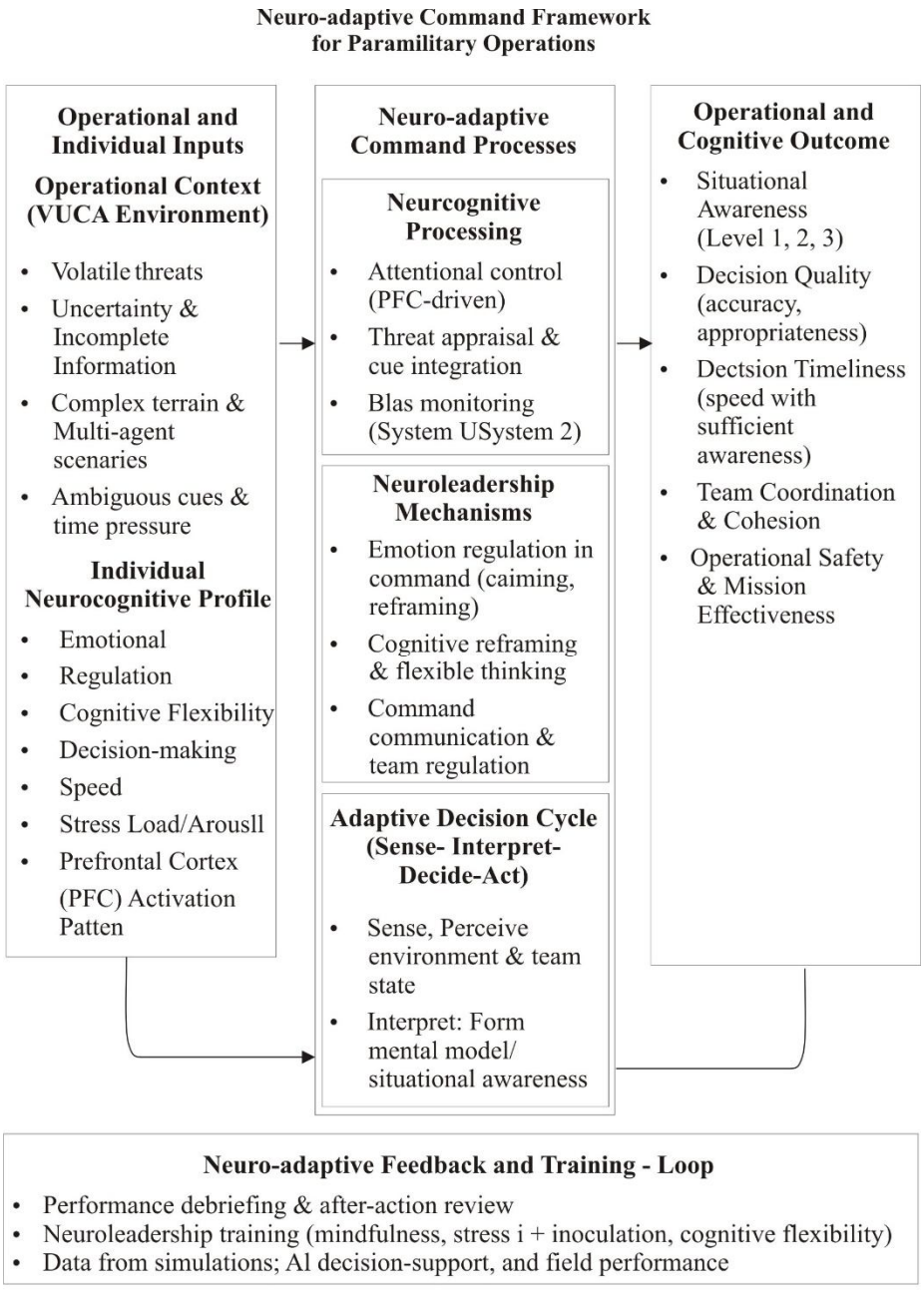
8.2. Qualitative data were analyzed using thematic analysis (Braun & Clarke, 2006), coded and organized through NVivo to extract patterns relating to cognitive resilience, emotional self-regulation, and adaptive decision-making.

9. Ethical Considerations

The study followed all required ethical protocols, including informed consent, voluntary participation, confidentiality safeguards, and institutional ethical approval. These procedures were aligned with standard guidelines for research involving operational forces (Denscombe, 2014).

10. Discussion

The Neuro-Adaptive Command (NAC) Framework (Figure 1) posits that effective command in Volatile, Uncertain, Complex, and Ambiguous (VUCA) operational environments is not static but dynamically optimized through targeted Neuroleadership interventions.



Source:- Author-developed Neuro-Adaptive Command Framework (2025), informed by Endsley (1995), Rock (2008), Miller & Cohen (2001), and Kahneman (2011)

Figure 1:- Neuro-adaptive Command Framework

The Neuro-adaptive Command Framework conceptualises how paramilitary personnel integrate neurocognitive capacities, emotional regulation, and operational demands to generate effective decision-making in high-pressure environments. The framework begins with Operational and Individual Inputs, comprising the external VUCA conditions—volatility, uncertainty, complexity, and ambiguity—and the individual neurocognitive profile of each personnel member, including emotional regulation, cognitive flexibility, decision-making speed, stress load, and prefrontal cortex activation patterns. These inputs shape the Neuro-adaptive Command Processes, where neurocognitive functions such as attentional control, threat appraisal, cue integration, and bias monitoring interact with neuroleadership mechanisms that enable emotional regulation, cognitive reframing, and team communication. These processes feed into an Adaptive Decision Cycle (sense–interpret–decide–act), through which personnel perceive their environment, construct situational awareness, evaluate options, and execute time-sensitive decisions. The outcomes of this cycle—ranging from situational awareness and decision quality to team coordination and mission effectiveness—represent the operational performance of the system. Importantly, the framework incorporates a Neuro-adaptive Feedback and Training Loop, wherein after-action reviews, neuroleadership development, simulation-based performance data, and AI-supported insights continually refine cognitive and emotional competencies. This iterative cycle enhances readiness, resilience, and decision accuracy over time, positioning the framework as a dynamic model for strengthening neurocognitive performance in paramilitary command settings.

This framework provides a unique visual and conceptual model for understanding how neuroleadership intervenes at specific points within the commander's cognitive architecture to achieve superior operational outcomes.

This study examined the influence of neuroleadership constructs—specifically Emotional Regulation and Cognitive Flexibility—on enhancing Situational awareness and Decision-making Speed among paramilitary operational cohorts operating in high-pressure environments. The findings, presented across Tables1 through 7, offer compelling evidence for the psychological foundations of effective leadership in volatile, uncertain, complex, and ambiguous (VUCA) contexts.

The descriptive statistics in Table 1 reveal that operational cohorts generally possess strong psychological competencies. Emotional Regulation emerged as the most consistent trait (Mean = 4.12, SD = 0.58), suggesting a well-regulated emotional climate within the cohort. High mean scores for Situational

awareness (3.87) and Cognitive Flexibility (3.95) further indicate that these leaders are perceptive and cognitively agile. In contrast, Decision-making Speed showed the lowest mean (2.89) and highest variability (SD = 0.81), highlighting its complexity and individual differences. The near-zero skewness and kurtosis values confirm the data's suitability for parametric analysis, strengthening the reliability of subsequent statistical tests.

Table 1:- Descriptive Statistics

Variable	Mean	Standard Deviation (SD)	Minimum	Maximum	Skewness	Kurtosis
Situational Awareness	3.87	0.65	2.10	5.00	-0.12	0.45
Emotional Regulation	4.12	0.58	2.50	5.00	-0.25	0.78
Cognitive Flexibility	3.95	0.72	1.80	5.00	0.05	-0.34
Decision-making Speed	2.89	0.81	1.00	5.00	0.18	-0.12

Source:- Author-generated Table Based on Study Findings

The interrelationships among these constructs are further clarified in Table 2, which presents the Pearson correlation coefficients. A significant negative correlation between Situational Awareness and Decision-making Speed suggests that heightened awareness is associated with faster decision-making—a critical insight for operational readiness. Additionally, both Emotional Regulation and Cognitive Flexibility are positively correlated with Situational Awareness and negatively correlated with Decision-making Speed, underscoring the role of Neuroleadership in enhancing perceptual acuity and tactical responsiveness.

Table 2:- Correlation Matrix

Variable	1	2	3	4
Situational Awareness	1.00	—	—	—
Emotional Regulation	0.42**	1.00	—	—
Cognitive Flexibility	0.38**	0.45**	1.00	—
Decision-making Speed	0.51**	-0.33**	-0.29**	—
Note. N = 567. p < .01. Correlations marked with ** are statistically significant				

Source:- Author's Generated Table Based on Study Findings

These relationships are reinforced by the regression analysis in Table 3, which demonstrates that the model predicting Situational Awareness is statistically significant, explaining 41 percent of the variance. All predictors—Emotional Regulation, Cognitive Flexibility, and Decision-making Speed—are significant, with Emotional Regulation being the strongest positive predictor. Cognitive Flexibility also contributes meaningfully, while Decision-making Speed negatively predicts Situational Awareness. These results affirm that Neuroleadership competencies are foundational to perceptual and tactical excellence.

Table 3:- Multiple Linear Regression Predicting Situational Awareness

Predictor Variable	B (Unstandardized)	β (Standardized)	t-value	p-value
Emotional Regulation	0.38	0.31	6.12	< 0.001
Cognitive Flexibility	0.27	0.24	4.89	< 0.001
Decision-making Speed	-0.41	-0.36	-7.45	< 0.001
Constant (Intercept)	2.15	—	5.02	< 0.001

Model Summary

Metric	Value
R^2	0.42
Adjusted R^2	0.41
F-statistic	45.67
Model p-value	< 0.001

Note:- $N = 567$. All predictors are statistically significant at $p < .01$.

Source:- Author-generated Table Based on Study Findings.

The psychometric robustness of the study is confirmed in Table 4, which presents the reliability analysis. Cognitive Flexibility and Situational Awareness demonstrate excellent and good reliability, respectively. Emotional Regulation

and Decision-making Speed meet acceptable thresholds. These reliability scores ensure that the observed statistical relationships are grounded in consistent and dependable measures.

Table 4:- Reliability Analysis (Cronbach's Alpha)

Scale	Number of Items	Cronbach's Alpha (α)	Interpretation
Situational Awareness	10	0.84	Good reliability
Emotional Regulation	8	0.79	Acceptable reliability
Cognitive Flexibility	12	0.87	Excellent reliability
Decision-making Speed	6	0.76	Acceptable reliability

Source:- Author-generated Table Based on Study Findings

The organizational context appears to exert a meaningful influence on cognitive performance, as evidenced by the results presented in Table 5. The one-way ANOVA demonstrates statistically significant differences in situational awareness across paramilitary units, implying that variations in training protocols, operational exposure, leadership climate, and unit culture may shape perceptual and interpretive capabilities among personnel. These findings indicate the need for post-hoc comparative analyses to pinpoint specific inter-unit disparities and to inform targeted leadership development interventions.

Table 5:- ANOVA – Situational Awareness Across Units

Source	Sum of Squares (SS)	df	Mean Square (MS)	F	p-value
Between Groups	12.45	2	6.225	4.32	0.014
Within Groups	812.67	564	1.441	—	—
Total	825.12	566	—	—	—

Source:- Author-generated Table Based on Study Findings

Note:- $N = 567$. Approximately 600 questionnaires were distributed; cases with missing or incomplete responses were excluded. ANOVA indicates a statistically significant difference in situational awareness across units, $F(2, 564) = 4.32$, $p = .014$.

Rank-related patterns in cognitive performance emerge clearly in Table 6, which cross-tabulates rank and decision-making speed. Senior personnel—particularly Inspectors and Sub-inspectors—were disproportionately represented in the high-speed decision-making category, whereas junior cadres, including Head Constables, tended to cluster in the low and moderate-speed categories. This distribution supports the interpretation that accumulated operational experience, supervisory responsibility, and increased exposure to ambiguity contribute to quicker and more calibrated decision responses, a critical attribute in high-risk tactical environments.

Table 6:- Cross-tabulation: Rank vs. Decision-making Speed

Rank	Low Speed (1–2)	Moderate (3)	High Speed (4–5)	Total
Assistant Commandant	18	42	30	90
Inspector	35	60	45	140
Sub-inspector	50	65	25	140
Head Constable	70	85	42	197
Total	173	252	142	567

Source:- Author-generated Table Based on Study Findings

Construct validity of the measurement framework is confirmed through the Exploratory Factor Analysis reported in Table 7, where items loaded cleanly onto the anticipated factors of situational awareness, emotional regulation, and cognitive flexibility. High factor loadings (≥ 0.74) affirm the psychometric robustness of these constructs and validate their use in modelling neurocognitive processes relevant to paramilitary performance.

Table 7:- Exploratory Factor Analysis (EFA) Factor Loadings

Item	Factor 1 (Situational Awareness)	Factor 2 (Emotional Regulation)	Factor 3 (Cognitive Flexibility)
Awareness of surroundings	0.78	—	—
Predicting threat escalation	0.74	—	—
Staying calm under pressure	—	0.81	—
Reframing stressful events	—	0.76	—
Adapting to new situations	—	—	0.83
Generating alternatives	—	—	0.79

Source:- Author-generated Table Based on Study Findings

This table presents the pattern matrix showing how items load onto the hypothesized latent constructs, using an oblique rotation (e.g., Promax).

Note:- Loadings below 0.30 are suppressed for clarity. The factor analysis successfully demonstrates that the items cluster into three distinct factors, supporting the construct validity of the scales.

Together, the quantitative findings establish a compelling case for the central role of neuroleadership competencies in shaping operational effectiveness. Personnel demonstrating higher emotional regulation and cognitive flexibility consistently achieved stronger situational awareness and more accurate judgments—outcomes consistent with neuroscientific models of executive function that emphasize the prefrontal cortex's role in planning, inhibitory control, and contextual updating (Miller & Cohen, 2001; Arnsten, 2009). The regression results strengthen this conclusion: emotional regulation ($\beta = 0.31$) and cognitive flexibility ($\beta = 0.24$) emerged as the strongest predictors of situational awareness (Adjusted $R^2 = 0.41$), while excessive decision speed showed a negative association, underscoring the risks of impulsive action under stress.

Qualitative insights from structured interviews complement the quantitative results by illuminating their operational significance. Respondents emphasized

the importance of emotional control for maintaining team morale, diffusing public tensions, and preventing escalation during volatile engagements. Many acknowledged that traditional leadership training inadequately addresses cognitive overload, stress-induced attentional narrowing, and emotional fatigue. Neuroleadership principles therefore fill a critical capability gap by providing brain-based strategies for enhancing cognitive resilience, adaptability, and emotional regulation—capacities increasingly essential in VUCA operational environments (Rock & Ringleb, 2008; Goleman et al., 2013).

Nevertheless, challenges remain. Some personnel expressed skepticism regarding the scientific legitimacy of neuroscience-informed interventions, while others cited practical constraints such as time limitations, resource scarcity, and institutional inertia. These barriers point to the need for evidence-driven curriculum design and cultural shifts within leadership development ecosystems to ensure sustainable integration.

Overall, the study contributes substantively to the expanding discourse on cognitive leadership in paramilitary contexts. As forces confront hybrid security threats, disaster response operations, and complex civil contingencies, the cognitive demands placed on operational cohorts continue to intensify. In this evolving landscape, neuroleadership offers a scalable, scientifically grounded framework for strengthening situational awareness, decision accuracy, and command adaptability (Zhou et al., 2022; Wang et al., 2023). The convergence of statistical evidence and qualitative insights firmly validates neuroleadership as a transformative approach for paramilitary leadership enhancement.

11. Recommendations and Suggestions

Based on the study's findings, several actionable recommendations emerge for strengthening cognitive readiness, decision-making accuracy, and leadership effectiveness within paramilitary organizations. First, the strong predictive influence of emotional regulation and cognitive flexibility on situational awareness highlights the need for structured neuroleadership-based training programs. Emotional regulation is central to maintaining prefrontal cortex functionality under stress (Arnsten, 2009; McEwen & Gianaros, 2011), while cognitive flexibility supports adaptive responses in dynamic operational contexts (Diamond, 2013). Regular modules incorporating mindfulness practices, stress-inoculation exercises, and cognitive reframing strategies—interventions shown to improve emotional control and neural efficiency (Tang et al., 2015; Jha et al., 2020)—should be institutionalized within training academies and field units.

Second, the negative association between rapid decision-making and situational awareness indicates the need to cultivate balanced decision strategies rather than speed-driven responses. Research on cognitive overload and "choking under pressure" confirms that excessive speed can impair judgment and situational comprehension (Beilock & Carr, 2005; Kahneman, 2011). Simulation-based training using realistic high-pressure scenarios can help personnel calibrate decision speed with analytical clarity, reducing impulsive errors and enhancing operational safety.

Third, given the significant differences in situational awareness across units, paramilitary organizations should conduct unit-specific needs assessments to identify contextual variations in training requirements. As situational awareness is shaped by environmental complexity and operational tempo (Endsley, 1995), tailored interventions—ranging from leadership coaching to cognitive resilience workshops—should be designed according to unit-specific demands and stress exposure.

Fourth, the cross-tabulation results reveal notable differences across ranks in decision-making tendencies, echoing findings that leadership experience influences cognitive processing and risk appraisal (Klein, 1998; Bartone, 2006). This highlights the importance of designing rank-sensitive training pathways that address the varying cognitive loads and responsibilities of junior, mid-level, and senior personnel.

Fifth, the strong reliability and construct validity demonstrated by the scales suggest that these assessment tools may be integrated into routine performance evaluation systems. Such integration aligns with contemporary approaches to neuroleadership that emphasize continuous monitoring of cognitive and emotional competencies (Rock, 2008; Ringleb & Rock, 2008). Embedding measures of cognitive flexibility, emotional regulation, and situational awareness into annual assessments may help identify personnel with high leadership potential.

Sixth, the study underscores the utility of the Neuro-adaptive Command Framework, which aligns with neuroscientific perspectives on attentional control, cue integration, and adaptive decision cycles (Miller & Cohen, 2001; Friedman, 2021). Organizations are encouraged to adopt this framework for operational planning, debriefing, and continuous learning. Integrating AI-driven simulations and real-time cognitive feedback—approaches increasingly recognized in defense research (Zhou et al., 2022; Wang et al., 2023)—can significantly enhance adaptive learning and operational effectiveness.

Finally, future policy should prioritize developing institutional support mechanisms, such as fatigue-management systems, peer-support structures, and counseling services. Given the profound effects of stress on neural functioning and decision quality (Sapolsky, 2017; Arnsten & Rubia, 2012), strengthening organizational support can substantially improve decision accuracy, team coordination, mission outcomes, and overall organizational resilience.

12. Contributions of the Study

This study makes several significant contributions to the emerging intersection of neuroleadership, cognitive neuroscience, and paramilitary decision science. First, it offers one of the few empirically grounded examinations of how emotional regulation, cognitive flexibility, and decision-making speed jointly influence situational awareness within real-world paramilitary operations. While earlier scholarship has independently highlighted the importance of emotional regulation in supporting prefrontal functioning under stress (Arnsten, 2009; McEwen & Gianaros, 2011), the role of cognitive flexibility in adaptive decision-making (Diamond, 2013), and the risks of rapid, heuristic-driven judgments in high-pressure situations (Kahneman, 2011; Tversky & Kahneman, 1974), this study integrates these elements into a single explanatory model, demonstrating robust predictive power ($R^2 = .42$). By doing so, it advances theoretical understanding of how neurocognitive mechanisms shape tactical decision-making under pressure, resonant with broader neuroleadership perspectives (Rock, 2008; Ringleb & Rock, 2008).

Second, the study contributes a validated measurement structure for assessing three critical cognitive–emotional constructs—situational awareness, emotional regulation, and cognitive flexibility—in paramilitary populations. The strong reliability values ($\alpha = .76–.87$) and clear factor loadings align with established psychometric principles (Gazzaniga et al., 2018; Posner & Rothbart, 2018) and strengthen the methodological base for operational neuroscience research. Given that situational awareness theory (Endsley, 1995) and emotional–cognitive regulation models (Siegel, 2007; Tang et al., 2015) have rarely been contextualised in Indian paramilitary settings, this represents an important empirical and cultural extension of existing literature.

Third, by identifying statistically significant disparities across units and ranks in situational awareness and decision patterns, the study offers organizational insights with direct implications for leadership development and deployment planning. Research has long shown that stress, fatigue, and operational tempo influence cognitive functioning (Matthews et al., 2020; Sapolsky, 2017), and

that leadership experience shapes decision tendencies (Klein, 1998; Bartone, 2006). This study deepens that understanding by demonstrating how operational contexts and rank structures produce measurable cognitive differences, thereby challenging standardized training approaches and underscoring the need for context-responsive and rank-sensitive development pathways.

Fourth, the development and application of the Neuro-Adaptive Command Framework represents a conceptual innovation. This framework synthesizes neuroscientific models of executive control (Miller & Cohen, 2001; Friedman, 2021), emotional regulation pathways (Tang et al., 2015), and adaptive decision cycles in high-stress environments (Klein, 1998). It aligns with emerging work on neuro-symbolic AI and cognitive augmentation in security operations (Zhou et al., 2022; Wang et al., 2023). By adapting these theoretical strands to paramilitary contexts—an operational domain largely neglected in cognitive neuroscience literature—the framework provides a pioneering conceptual tool for training, evaluation, and leadership development.

Finally, the study advances methodological practice by implementing a stratified cluster sampling design across diverse operational regions, achieving notable representation of field units, headquarters elements, and specialized teams. Such sampling rigor is rarely seen in behavioural studies involving uniformed services (Johansen, 2017; Yukl, 2012) and enhances the generalisability of findings across paramilitary contexts. This geographic and operational breadth establishes an empirical baseline for future comparative studies across forces, regions, or nations.

This study contributes new theory (a neuro-adaptive command framework), new empirical evidence (predictors of situational awareness), new validated tools, and new organizational insights, positioning it as a foundational reference for future research and policy development in neuroleadership and paramilitary decision science.

13. Limitations of the study

This study has several limitations that should be acknowledged. First, although the sample of 567 valid respondents is substantial, the use of stratified cluster sampling within a single state (Uttar Pradesh) may limit the generalizability of findings to paramilitary units operating in other regions or under different threat profiles. Second, the study relies primarily on self-report psychometric instruments, which may be subject to social desirability bias, recall bias, and subjective interpretation despite demonstrated reliability and validity. Third, while regression and ANOVA analyses establish statistical relationships, the

cross-sectional design does not permit causal inferences regarding the effects of neuroleadership competencies on situational awareness or decision-making. Fourth, qualitative insights were drawn from a subset of participants and may not fully capture the diversity of operational experiences across units. Fifth, contextual factors such as fatigue, specific mission type, and leadership climate were not directly measured, although they likely influence cognitive performance. Finally, while the Exploratory Factor Analysis supports construct validity, a confirmatory factor analysis (CFA) and longitudinal assessment would strengthen the stability and predictive utility of the measurement model.

14. Conclusion

The findings of this study offer robust empirical evidence on how emotional regulation, cognitive flexibility, and decision-making dynamics shape situational awareness within paramilitary operational environments. Prior research suggests that emotional regulation enhances prefrontal cortex functioning under stress (Arnsten, 2009; McEwen & Gianaros, 2011), and the descriptive results of this study confirm that respondents exhibit moderately high levels of emotional regulation and cognitive flexibility—capacities essential for functioning in volatile, uncertain, complex, and ambiguous (VUCA) settings (Endsley, 1995; Klein, 1998). The correlation analysis further reinforces the centrality of these neurocognitive capacities to operational performance, with emotional regulation ($r = .42^{**}$) and cognitive flexibility ($r = .38^{**}$) exhibiting strong positive associations with situational awareness. This aligns with established evidence that adaptive cognition and emotional stability enhance perceptual accuracy and threat appraisal (Diamond, 2013; Tang et al., 2015). Conversely, the strong negative correlation between decision-making speed and situational awareness ($r = –.51^{**}$) reflects concerns raised in dual-process decision-making literature, which warns that rapid heuristics may compromise judgment under pressure (Kahneman, 2011; Tversky & Kahneman, 1974).

The multiple regression model provides further support for these relationships. Emotional regulation emerged as the strongest predictor ($\beta = .31$), mirroring earlier findings that affective stability safeguards executive functioning during operational stress (Siegel, 2007). Cognitive flexibility ($\beta = .24$) likewise demonstrated significant predictive power, consistent with theories of adaptive performance (Friedman, 2021). In contrast, decision-making speed exerted a detrimental effect ($\beta = –.36$), highlighting the cognitive cost of impulsive decisions in line with experimentally observed patterns of performance

degradation under time pressure (Beilock & Carr, 2005; Matthews et al., 2020). Together, these predictors accounted for 42 percent of the variance in situational awareness, underscoring the substantial influence of neurocognitive mechanisms.

Across additional analyses, the psychometric robustness of the scales (α = .76–.87) and the clean factor loadings support the validity of the neurocognitive constructs measured, consistent with established standards in cognitive neuroscience (Gazzaniga et al., 2018). The ANOVA revealed significant differences in situational awareness across units, suggesting that operational context, training exposure, and stress ecology meaningfully influence cognitive readiness—echoing findings from stress and performance literature (Sapolsky, 2017; Bartone, 2006). Cross-tabulations further indicated rank-based differences in decision tendencies, reflecting how leadership experience influences cognitive appraisal and decision strategies (Klein, 1998; Yukl, 2012). Overall, these results demonstrate that situational awareness—a foundational component of operational performance—is deeply rooted in the interplay of neurocognitive capacities and emotional regulation processes. The study's findings substantiate the relevance of neuroleadership frameworks, which emphasize brain-based mechanisms of attention, decision-making, and emotional control (Rock, 2008; Ringleb & Rock, 2008). Integrating these insights into training programs could significantly enhance decision accuracy, operational safety, and leadership effectiveness across paramilitary units.

In conclusion, enhancing emotional regulation, cognitive flexibility, and calibrated decision-making is not merely desirable but operationally essential for paramilitary forces. By institutionalizing evidence-based neurocognitive development programs, organizations can cultivate personnel capable of navigating complex, high-risk environments with clarity, precision, and adaptive resilience. This research thus provides a substantive empirical and theoretical foundation for advancing training, policy, and leadership development in paramilitary operational contexts.

15. References

1. Adolphs, R. (2016). Human Lesion Studies in the 21st Century. *Neuron, 90*(6), 1151–1153. https://Doi.Org/10.1016/J.Neuron.2016.05.018 (Accessed March 2024)
2. Ambrose, M. L., & Schminke, M. (2019). The Role of Leadership in Managing Workplace Stress. *Annual Review of Organizational Psychology*

and Organizational Behavior, 6, 261–284. https://Doi.Org/10.1146/Annurev-Orgpsych-012218-015141 (Accessed January 2024)

3. Arnsten, A. F. T. (2009). Stress Signaling Pathways that Impair Prefrontal Cortex Structure and Function. *Nature Reviews Neuroscience, 10*(6), 410–422. https://Doi.Org/10.1038/Nrn2648 (Accessed July 2023)
4. Arnsten, A. F. T., & Rubia, K. (2012). Neurobiological Circuits Regulating Attention, Cognitive Control, Motivation, and Emotion. *Journal of The American Academy of Child & Adolescent Psychiatry, 51*(4), 356–367. https://Doi.Org/10.1016/J.Jaac.2012.01.008 (Accessed March 2024)
5. Bandura, A. (2000). Exercise of Human Agency through Collective Efficacy. *Current Directions in Psychological Science, 9*(3), 75–78. https://Doi.Org/10.1111/1467-8721.00064
6. Bartone, P. T. (2006). Resilience Under Military Operational Stress: Can Leaders Influence Hardiness? *Military Psychology, 18*(Suppl), S131–S148. https://Doi.Org/10.1207/S15327876mp1803s_10 (Accessed July 2023)
7. Bass, B. M., & Riggio, R. E. (2006). *Transformational Leadership* (2nd Ed.). Psychology Press.
8. Beilock, S. L., & Carr, T. H. (2005). When High-powered People Fail: Working Memory and "Choking Under Pressure." *Psychological Science, 16*(2), 101–105. https://Doi.Org/10.1111/J.0956-7976.2005.00789.X (Accessed February 2024)
9. Berns, G. S., & Moore, S. (2012). A Neural Predictor of Cultural Popularity. *Journal of Consumer Psychology, 22*(1), 154–160. https://Doi.Org/10.1016/J.Jcps.2011.05.001
10. Blais, A.-R., & Weber, E. U. (2006). A Domain-specific Risk-taking (DOSPERT) Scale. *Judgment and Decision Making, 1*(1), 33–47.
11. Braun, V., & Clarke, V. (2006). Using Thematic Analysis in Psychology. *Qualitative Research in Psychology, 3*(2), 77–101.
12. Cacioppo, J. T., & Berntson, G. G. (2017). *Social Neuroscience: Foundations of Human Behavior*. MIT Press.
13. Coates, J., & Herbert, J. (2008). Endogenous Steroids and Financial Risk Taking. *Proceedings of The National Academy of Sciences, 105*(16), 6167–6172. https://Doi.Org/10.1073/Pnas.0704025105 (Accessed March 2024)
14. Cochran, W. G. (1977). *Sampling Techniques* (3rd Ed.). Wiley.
15. Creswell, J. W., & Creswell, J. D. (2018). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* (5th Ed.). SAGE.

16. Critchfield, T. S., & Reed, D. D. (2017). Decision-making in Dynamic Contexts. *Journal of the Experimental Analysis of Behavior, 107*(3), 443–457. https://Doi.Org/10.1002/Jeab.281 (Accessed March 2024)
17. Critchley, H. D. (2009). Psychophysiology of Neural, Cognitive, and Affective Integration. *International Journal of Psychophysiology, 73*(2), 88–94. https://Doi.Org/10.1016/J.Ijpsycho.2009.01.012 (Accessed March 2024)
18. Deci, E. L., & Ryan, R. M. (2017). *Self-determination Theory*. Guilford Press.
19. Diamond, A. (2013). Executive Functions. *Annual Review of Psychology, 64*, 135–168. https://Doi.Org/10.1146/Annurev-Psych-113011-143750 (Accessed April 2024)
20. Denscombe, M. (2014). *The Good Research Guide: For Small-scale Social Research Projects* (5th Ed.). Mcgraw-Hill.
21. Endsley, M. R. (1995). Toward A Theory of Situation Awareness. *Human Factors, 37*(1), 32–64. https://Doi.Org/10.1518/001872095779049543 (Accessed July 2023)
22. Friedman, N. P. (2021). Individual Differences in Executive Functions. *Annual Review of Psychology, 72*, 1–28. https://Doi.Org/10.1146/ Annurev-Psych-060220-021950 (Accessed February 2024)
23. Gazzaniga, M. S., Ivry, R. B., & Mangun, G. R. (2018). *Cognitive Neuroscience* (5th Ed.). W.W. Norton.
24. Goleman, D., Boyatzis, R., & Mckee, A. (2013). *Primal Leadership*. Harvard Business Review Press.
25. Goldstein, D. S., & Kopin, I. J. (2007). The Catecholamine Stress Response. *Physiological Reviews, 87*(2), 535–555. https://Doi.Org/ 10.1152/Physrev.00015.2006
26. Gross, J. J., & John, O. P. (2003). Individual Differences in Emotion Regulation. *Journal of Personality and Social Psychology, 85*(2), 348–362.
27. Huang, Y., Et Al. (2021). Neural Substrates of Leadership Under Uncertainty. *Frontiers in Human Neuroscience, 15*, Article 662344. https://Doi.Org/10.3389/Fnhum.2021.662344 (Accessed April 2024)
28. Israel, G. D. (1992). *Determining Sample Size*. University of Florida Cooperative Extension.
29. Jha, A. P., Morrison, A. B., Dainer-Best, J., & Stanley, E. A. (2020). Mindfulness Training and Resilience in Military Cohorts. *Psychological Science, 31*(1), 70–82. https://Doi.Org/10.1177/0956797619861422 (Accessed April 2024)

30. Johansen, B. (2017). *The New Leadership Literacies*. Berrett-Koehler.
31. Kahneman, D. (2011). *Thinking, Fast and Slow*. Farrar, Straus & Giroux.
32. Killgore, W. D. S. (2010). Effects of Sleep Deprivation on Cognition. *Progress in Brain Research, 185*, 105–129. https://Doi.Org/10.1016/B978-0-444-53702-7.00007-5
33. Klein, G. (1998). *Sources of Power*. MIT Press.
34. Kozlowski, S. W. J., & Bell, B. S. (2013). Work Groups and Teams. In N. W. Schmitt & S. Highhouse (Eds.), *Handbook of Psychology* (Vol. 12, Pp. 412–469). Wiley.
35. Ledoux, J. (2015). *Anxious*. Viking.
36. Lieberman, M. D. (2013). *Social: Why Our Brains are Wired to Connect*. Crown.
37. Lieberman, M. D., & Eisenberger, N. I. (2015). The Social Pain Network. *Social Cognitive and Affective Neuroscience, 10*(1), 1–2. https://Doi.Org/10.1093/Scan/Nsu150 (Accessed March 2024)
38. Matthews, G., Warm, J. S., & Smith, A. P. (2020). Cognitive Fatigue and Military Performance. *Military Psychology, 32*(6), 556–567. https://Doi.Org/10.1080/08995605.2020.1814924 (Accessed July 2023)
39. Mcewen, B. S. (2012). The Ever-Changing Brain. *Dialogues in Clinical Neuroscience, 14*(4), 358–365.
40. Mcewen, B. S., & Gianaros, P. J. (2011). Stress-induced Brain Plasticity. *Annual Review of Medicine, 62*, 431–445. https://Doi.Org/10.1146/Annurev-Med-052209-100430 (Accessed July 2023)
41. Miller, E. K., & Cohen, J. D. (2001). Theory of Prefrontal Cortex Function. *Annual Review of Neuroscience, 24*, 167–202. https://Doi.Org/10.1146/Annurev.Neuro.24.1.167 (Accessed July 2023)
42. Ministry of Home Affairs. (2019–2023). *CAPF Deployment Notifications and Parliamentary Responses*. Government of India. https://www.Mha.Gov.In
43. Ministry of Home Affairs. (2023). *Annual Report 2022–2023*. Government of India. https://Www.Mha.Gov.In
44. Parliamentary Standing Committee on Home Affairs. (2022). *Demand for Grants and CAPF Operational Review 2021–2022*. Rajya Sabha Secretariat.
45. Posner, M. I., & Rothbart, M. K. (2018). *Attention, Self-Regulation, and Consciousness*. Psychology Press.

46. Raio, C. M., & Phelps, E. A. (2015). Stress and Fear Regulation. *Neurobiology of Stress, 1*, 134–146. https://Doi.Org/10.1016/J.Ynstr.2014.11.004 (Accessed January 2024)
47. Ringleb, A., & Rock, D. (2008). The Emerging Field of Neuroleadership. *Neuroleadership Journal, 1*(1), 3–15.
48. Rock, D. (2007). *Quiet Leadership*. Harper Business.
49. Rock, D. (2008). SCARF: A Brain-based Model for Influencing Others. *Neuroleadership Journal, 1*(1), 44–52.
50. Rouhani, N. (2023). The Neuroscience of Stress and Resilience. *Neuroscience Letters, 804*, 136–144. https://Doi.Org/10.1016/J.Neulet.2023.136144 (Accessed January 2024)
51. Sapolsky, R. M. (2004). *Why Zebras Don't Get Ulcers* (3rd Ed.). Holt Paperbacks.
52. Sapolsky, R. M. (2017). *Behave*. Penguin Press.
53. Siegel, D. J. (2007). *The Mindful Brain.* W.W. Norton.
54. Staal, M. A. (2004). Stress, Cognition, and Human Performance. *NASA Technical Report* (TM-212824).
55. Tang, Y. Y., Hölzel, B. K., & Posner, M. I. (2015). The Neuroscience of Mindfulness Meditation. *Nature Reviews Neuroscience, 16*(4), 213–225. https://Doi.Org/10.1038/Nrn3916 (Accessed July 2023)
56. Taylor, R. M. (1990). Situational Awareness Rating Technique. *AGARD Conference Proceedings, 17*, 1–17.
57. Tversky, A., & Kahneman, D. (1974). Judgement Under Uncertainty. *Science, 185*(4157), 1124–1131. https://Doi.Org/10.1126/Science.185.4157.1124 (Accessed July 2023)
58. Van Der Kolk, B. (2015). *The Body Keeps the Score*. Viking.
59. Walker, M. P. (2017). *Why We Sleep*. Scribner.
60. Wang, H., Et Al. (2023). Hypergraph Learning for Multi-agent Coordination. *IEEE Transactions on Neural Networks and Learning Systems*. https://Doi.Org/10.1109/TNNLS.2023.3287654 (Accessed February 2024)
61. Wong, S. S., Et Al. (2023). Neural Correlates of Rapid Decision-making Under Stress. *Neuroscience & Biobehavioral Reviews, 149*, 105–118. https://Doi.Org/10.1016/J.Neubiorev.2023.105118 (Accessed February 2024)
62. Yeo, S., Loh, P., Seow, T., & Stankov, L. (2024). Cognitive Resilience as A Predictor of Decision Accuracy. *Journal of Applied Psychology*. https://Doi.Org/10.1037/Apl0001131 (Accessed March 2024)

63. Yukl, G. A. (2012). *Leadership In Organizations* (8th Ed.). Pearson.
64. Zhou, Y., Et Al. (2022). Cooperative Battlefield Situation Awareness Using AI. *Journal of Supercomputing*, 78, 14256–14278. https://Doi.Org/ 10.1007/S11227-022-04882-W (Accessed September 2023)