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RESEARCH ARTICLE – 1

ADOPTION OF CLOUD-BASED ACCOUNTING BY SMES: A TECHNOLOGY ACCEPTANCE MODEL APPROACH

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ABSTRACT

This research is about the adoption of cloud-based accounting (CBA) systems with a focus on small and medium-sized enterprises (SMEs) through the lens of the Technology Acceptance Model (TAM). This study focuses on the mediating role of attitude (ATU) in the effects of perceived ease of use (PEOU), perceived usefulness (PU), and behavioral intention (BI) to adopt CBA. The data of 200 SMEs in Odisha, India, was analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM). The results confirm the model's validity and support all hypotheses. Both PEOU and PU have a significant impact on ATU, which in turn, has a strong impact on BI. Mediation analysis indicates that ATU partially mediates the impact of PEOU and PU on BI. These results underscore the need to improve adoption by targeting positive attitudinal outcomes with system design and functionality. This study contributes to theory on technology acceptance while also providing practical recommendations aimed at fostering digital adoptions for SMEs in developing markets.

Keywords: *Attitude, Behavioral Intention, Cloud-Based Accounting, Perceived Ease of Use, Perceived Usefulness, PLS-SEM, SMEs, Technology Acceptance Model (TAM), Technology Adoption.*

INTRODUCTION

In the context of the fast-paced digital economy, cloud-based accounting (CBA) systems have become increasingly important for improving the effectiveness, precision, and versatility of an enterprise's financial functions. The availability of real-time data, integration with other business applications, and scalable infrastructure are particularly useful for small to medium-sized enterprises (SMEs) which operate on a shoestring budget in terms of finances and technology (Abbas, 2024; Abidde, 2021; Wicaksono et al., 2020). Sectors such as banking (Ria, 2023), hospitality (Hashem, 2021; Syah et al., 2023), and manufacturing (Abidde, 2021) have recognized the value CBA offers in transforming financial reporting and strategic planning, along with broader digital transformation initiatives (Hung et al., 2023; Makhoulf & AlMalahmeh, 2023).

The adoption rate of CBA systems in developing economies remains low among SMEs (Pramuka & Pinasti, 2020; Bala et al., 2024). In many organizations, a lack of digital leadership combined with low levels of digital preparedness, system dependability, data security, complications in technology, overall system costs, and a privacy system all stand as hurdles to adoption (Thaher, 2024; Al-Nsour et al., 2021; Abutaber, 2023). In these contexts, understanding the adoption determinants is critical for advancing sustainable digital development and enhancing financial systems architecture (Ionescu, 2022; Zeng, 2023).

To examine the phenomenon, the study uses the Technology Acceptance Model (TAM), which considers Perceived Ease of Use and Perceived Usefulness as the primary drivers of Behavioral Intention to adopt a system. Pramuka and Pinasti (2020) and Abbad (2021) provide commentary on the TAM literature. While TAM provides the basic understanding and rationale, more evidentiary resources point to the fact that behavioral and emotional reactions to a system are central in determining adoption behavior that goes beyond a mere intellectual assessment. Ria (2023) and Hung et al. (2023) discuss this further.

Based on this reasoning, this study modifies the original TAM framework by adding Attitude toward using CBA as a mediating variable based on the Theory of Reasoned Action (TRA), which states that attitudes greatly shape intentions. With this modification, the model can more effectively examine how PEOU and PU together with user attitudes influence adoption behavior (Abbad, 2021; Ionescu, 2022; Thaher, 2024). This angle is particularly important in the case of SMEs, as apprehension, trust, user confidence, and alignment of proposed value and business processes tend to drive decision-making more than objective assessment. Bala et al. (2024) and Al-Nsour et al. (2021) provide commentary on this argument.

Utilizing primary data obtained from SME stakeholders, the study employs quantitative methods including regression analysis with SPSS as well as Partial Least Squares Structural Equation Modeling (PLS-SEM) to test the presented hypotheses. The outcome is anticipated to provide significant information to developers of software, managers of SMEs, and policymakers who seek to encourage the use of cloud-based accounting systems in resource-constrained regions (Wicaksono et al., 2020; Syah et al., 2023; Makhoul & AlMalahmeh, 2023).

LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK DEVELOPMENT

Cloud-Based Accounting (CBA) systems represent a fundamental transformation in the financial management of small and medium-sized enterprises (SMEs). The advantages of the cloud's scalability, automation, as well as real-time data access are being leveraged by these systems to improve accounting processes and decision-making (Ahmed, 2020; Achar, 2018; Al-Zoubi, 2017). Users' perceptions, societal and institutional frameworks, as well as technological infrastructure readiness are some of the contextual factors that impact the uniform adoption of CBA technology (Adjei et al., 2021; Alqudah et al., 2020; Alqudah &

Al-Okaily, 2020). In the context of TAM, this model has been widely used to explore technology use behavior, which justifies its selection for this study (Adams et al., 1992; Legris et al., 2003). This model will be modified by including attitude as a mediating variable, which aligns with recent studies on behavioral intentions where the cognitive-affective framework is given more importance (Zhao et al., 2010; Almaiah et al., 2019).

Perceived Ease of Use and Attitude Toward Using CBA

The term Perceived Ease of Use (PEOU) pertains to aspects such as prior experience with a given technology and its corresponding application (Davis, 1989). Comfort in using the system enhances trust in technology with its intuitive features, simple frameworks, low-caliber navigational hurdles, and minimal technical thresholds (Ahmad et al., 2022; Altin & Yilmaz, 2022; Al-Saedi et al., 2020). It is proposed by TAM that PEOU has an effect on attitude, which in turn impacts subsequent behavior (Venkatesh & Davis, 2000; Alshehri et al., 2013). There have been investigations with focus on cloud systems, enterprise software, and e-government platforms that affirm the relationship between perceived ease and user acceptance (Alraja, 2016; Almaiah et al., 2019; Afifa et al., 2022).

H1: Perceived Ease of Use positively affects Attitude toward using CBA.

Perceived Usefulness and Attitude Toward Using CBA

Perceived Usefulness (PU), according to Davis (1989), is the belief that the use of a system enhances an individual's performance of the job. Within small and medium-sized enterprises (SMEs), CBA systems increase efficiency in specific tasks, enhance financial reporting, and improve critical data access (Adams et al., 1992; Ahmed, 2020; Agrawal & Jethy, 2023). Users are more likely to cultivate a favorable attitude towards a system when it helps them achieve their goals such as accurate forecasting, compliance, and decision-making (Alwan, 2022; Aini et al., 2020; Al-Okaily et al., 2023). It is widely accepted and supported by literature that PU is a strong predictor of user acceptance in diverse settings including but not limited to blockchain, m-payments, and accounting information systems (Afifa et al., 2022; Al-Saedi et al., 2020).

H2: Perceived Usefulness positively affects Attitude toward using CBA.

Attitude and Intention to Use CBA

A positive attitude motivates intention, which is a robust predictor of actual system usage (Chen et al., 2002; Alshirah et al., 2021). Relating to cloud-based solutions, users are more likely to embrace CBA in routine practice when they hold positive CBA perceptions because of its value, ease of use, and security (Alqudah et al., 2024; Achar, 2018; Adjei et al., 2021).

H3: Attitude positively affects Intention to Use CBA.

The Mediating Role of Attitude

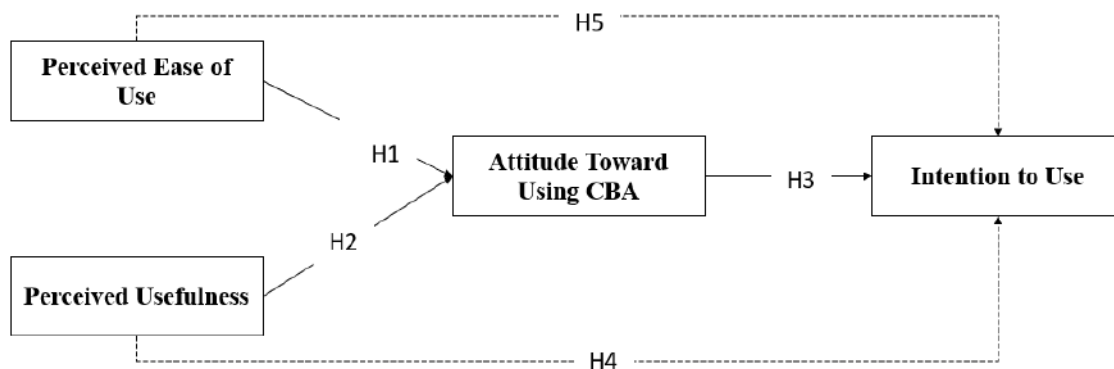
TAM suggests direct impacts of PU and PEOU on intention, however, more recent modifications underscore the mediating role of attitude that captures the underlying psychological factors concerning adoption (Legris et al., 2003; Almaiah et al., 2019). This indirect influence focuses on the perception of an outcome where the impact of ease and usefulness eliciting emotions first, which then drives behaviors (Baron & Kenny, 1986; Zhao et al., 2010). In the context of accounting and enterprise systems, this mediation has been shown to portray a more holistic model of system adoption (Agrawal & Jethy, 2023; Alawadhi & Alrefai, 2024; Altin & Yilmaz, 2022).

H4: Attitude mediates the relationship between Perceived Usefulness and Intention to Use CBA.

H5: Attitude mediates the relationship between Perceived Ease of Use and Intention to Use CBA.

In relation to the theoretical structure of TAM and its previously cited empirical findings, Figure 1 illustrates the conceptual model is suggested for this study.

Figure 1. Theoretical model



RESEARCH METHODOLOGY

To assess the adoption of cloud-based accounting (CBA) systems by small and medium-sized enterprises (SMEs) in Odisha, India, this study employs a quantitative research design. A structured questionnaire was created and shared with a purposive sample of 200 SMEs, who were selected due to their relevance to the study objectives and their engagement with accounting technologies.

The questionnaire included relevant measurement items for each construct—Perceived Ease of Use (PEOU), Perceived Usefulness (PU), Attitude Toward Using CBA, and Behavioral Intention to Use CBA—drawn from the TAM literature (Davis, 1989; Venkatesh & Davis, 2000). All items were measured on a 7-point Likert scale with 1 (“strongly disagree”) to 7 (“strongly agree”).

Data analysis followed a two-step process. Measurement and structural models were tested using PLS-SEM (Partial Least Squares Structural Equation Modeling) with mediation

analysis in SmartPLS. This combined approach provided thorough verification of the conceptual framework and rigorous hypothesis testing.

Table 1. Demographic Profile of Respondents (n = 200)

Demographic Variable	Category	Frequency	Percentage (%)
Gender	Male	142	71.0%
	Female	58	29.0%
Age Group	Below 30 years	36	18.0%
	31–40 years	78	39.0%
	41–50 years	58	29.0%
	Above 50 years	28	14.0%
Business Type	Manufacturing	76	38.0%
	Services	92	46.0%
	Retail/Wholesale	32	16.0%
Years in Operation	Less than 5 years	48	24.0%
	5–10 years	64	32.0%
	11–15 years	52	26.0%
	More than 15 years	36	18.0%
Annual Turnover (INR)	Less than ₹10 lakhs	52	26.0%
	₹10–50 lakhs	86	43.0%
	₹51 lakhs–₹1 crore	38	19.0%
	More than ₹1 crore	24	12.0%

DATA ANALYSIS AND HYPOTHESIS TESTING

This study investigated the adoption of cloud-based accounting (CBA) systems by SMEs through the Technology Acceptance Model (TAM) using Partial Least Squares Structural Equation Modeling (PLS-SEM). PLS-SEM is well suited for exploratory studies and for extending existing theories because it does not require a normal distribution and can efficiently manage complex models with mid-sized samples (Hair et al., 2017). The analysis consists of measuring and evaluating the structural components of the model and testing the hypotheses.

Measurement Model Assessment

For assessing construct measurement accuracy, a number of measurements were benchmarked against industry guidelines for best practices tailored for PLS-SEM as proposed by Hair et al. (2019).

Internal Consistency and Convergent Validity

The results of the measurement of reliability and validity are summarized in Table 2, which includes Cronbach's Alpha, rho_A, Composite Reliability (CR), and Average Variance Extracted (AVE) for all the constructs. Strong internal consistency and convergent validity

were demonstrated for all constructs as all values exceeded the thresholds of $\alpha > 0.70$, CR > 0.70 , and AVE > 0.50 (Nunnally & Bernstein, 1994).

Table 2: Construct Reliability and Convergent Validity

Construct	Cronbach's Alpha	rho_A	Composite Reliability	AVE
ATU	0.896	0.902	0.923	0.706
BI	0.878	0.879	0.911	0.672
PEOU	0.898	0.900	0.924	0.710
PU	0.895	0.897	0.923	0.705

Discriminant Validity

Discriminant validity ensures that all constructs being measured are independent of one another, not overlapping with other constructs in the model. In this case, we evaluated discriminant validity using the Fornell-Larcker criterion, which is commonly used in structural equation modeling. This criterion states that the square root of the Average Variance Extracted (AVE) of a construct should exceed the correlation values of that construct with all other constructs in the model. In Table 3, we show that the square root of AVE (diagonal) for each construct is greater than the correlation thus confirming discriminant validity (Fornell & Larcker, 1981).

Table 3: Discriminant Validity (Fornell-Larcker Criterion)

	ATU	BI	PEOU	PU
ATU	0.840			
BI	0.457	0.820		
PEOU	0.611	0.431	0.843	
PU	0.644	0.438	0.654	0.839

Multicollinearity Check

Fornell and Larcker (1981) emphasized the importance of checking for multicollinearity of indicators before proceeding to formulate hypotheses, as it may distort the calculation of path coefficients and undermine the model's reliability. The study utilized multicollinearity analysis using Variance Inflation Factor (VIF), a measure which quantifies the level of multicollinearity by measuring the inflation of variance of a regression coefficient due to collinearity with other variables.

As noted by Hair et al. (2019), VIF values above 3.3 indicate the presence of multicollinearity, which is in fact considered a problem. In this research, all VIF values of the indicators were significantly lower than 3.3, thus showing that the indicators for each construct did not have multicollinearity issues.

Table 4: VIF Values for Indicators

Construct	Indicators	VIF Range
ATU	ATU1–ATU5	1.953 – 2.498
BI	BI1–BI5	1.823 – 2.138

Construct	Indicators	VIF Range
PEOU	PEOU1–PEOU5	2.140 – 2.430
PU	PU1–PU5	1.986 – 2.415

Factor Loadings

To assess the reliability of the indicators, we evaluated the standardized loadings of each item's contribution to its respective construct. A loading shows the degree of association pertaining to observable variables and their underlying constructs. Standardized loadings are considered high when greater than 0.70, and therefore, strengthens the claim that the indicator is reliable and adds to construct validity.

As for this study, all items recorded strong standardized loadings above 0.70, which indicates high indicator reliability for all constructs (Hair et al., 2019). Table 5 displays the loadings of each of the indicators.

Table 5: Factor Loadings

Construct	Item Code	Loading
Attitude Toward Use (ATU)	ATU1	0.838
	ATU2	0.795
	ATU3	0.862
	ATU4	0.863
	ATU5	0.843
Behavioral Intention (BI)	BI1	0.787
	BI2	0.816
	BI3	0.823
	BI4	0.838
	BI5	0.833
Perceived Ease of Use	PEOU1	0.845
	PEOU2	0.829
	PEOU3	0.821
	PEOU4	0.859
	PEOU5	0.858
Perceived Usefulness	PU1	0.846
	PU2	0.855
	PU3	0.810
	PU4	0.855
	PU5	0.830

Structural Model and Hypothesis Testing

The direct relationships among constructs were assessed with bootstrapping with 5,000 resamples to evaluate path significance (Hair et al., 2017). All hypothesized relationships were supported.

The results as shown in Table 6, strengthen the core TAM relationships (Davis, 1989; Venkatesh & Davis, 2000). Perceived Usefulness (PU) impacted attitudes more than Perceived Ease of Use (PEOU), indicating that SMEs are driven more by benefits than the ease of use. Attitude strongly affected behavioral intention, supporting its mediating influence (Venkatesh et al., 2012).

Table 6: Path Coefficients and Hypothesis Testing

Hypothesis	Path	β (O)	t-value	p-value	Supported
H1	PU \rightarrow ATU	0.427	6.811	0.000	Yes
H2	PEOU \rightarrow ATU	0.332	5.249	0.000	Yes
H3	ATU \rightarrow BI	0.457	9.084	0.000	Yes

Mediation Analysis

To evaluate the mediating role of attitude (ATU), the indirect effects were analyzed via bootstrapping (Table 7). The results confirm that both PU and PEOU have a significant effect on behavioral intention through attitude. This shows partial mediation (Zhao et al., 2010; Baron & Kenny, 1986).

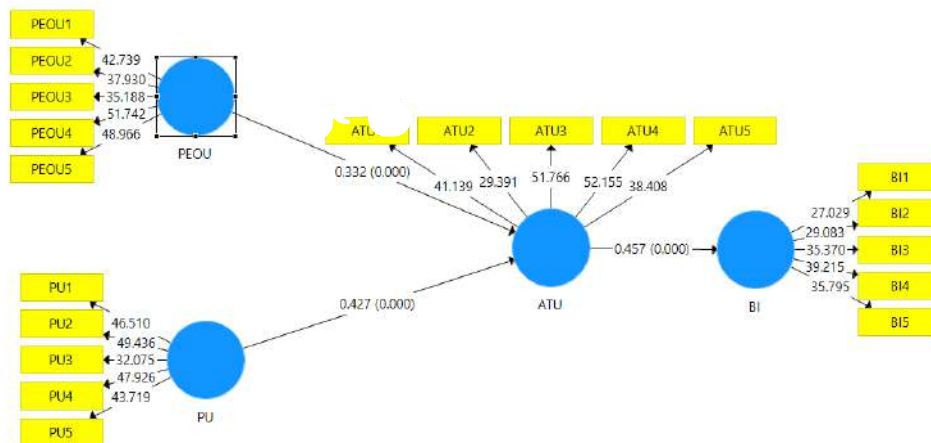
These results further emphasize the need of cultivating a positive user attitude to enhance behavioral intention. It is important to note that although both PU and PEOU have an ATU impact, the mediation effect suggests that these perceptions must be positively internalized to bring about actual adoption behavior (Venkatesh et al., 2012).

Table 7: Mediation Analysis

Path	Indirect Effect (O)	t-value	p-value	Mediation Type
PEOU \rightarrow ATU \rightarrow BI	0.152	4.607	0.000	Partial
PU \rightarrow ATU \rightarrow BI	0.195	5.158	0.000	Partial

Figure 2 illustrates the measurement model developed using the SmartPLS software, which visually represents the relationships between the latent constructs and their associated indicators.

Figure 2. Measurement model



DISCUSSION

The results of this research effectively validate the Technology Acceptance Model (TAM) regarding the adoption of cloud-based accounting (CBA) systems by small and medium-sized enterprises (SMEs) located in the state of Odisha, India. As noted in previous publications (Davis, 1989; Venkatesh & Davis, 2000; Pramuka & Pinasti, 2020), both Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) had meaningful impact on Attitude Towards Use (ATU) and Behavioral Intention (BI), confirming the structural relations of TAM in the context of CBA.

Interestingly, PU had the strongest overall influence on BI, particularly when mediated through ATU. This agrees with research conducted by Abbas (2024) and Abidde (2021) that stress the influence of perceived functional advantages and the strategic value of cloud accounting systems on adoption intentions within the financial contexts. The mediating influence of attitude suggests that affective aspects in addition to cognitive evaluations are critical in the decision processes of SMEs, a perspective also advocated by Zhao, Lynch, and Chen (2010) in their reconsideration of mediation models.

PEOU provided a significant positive influence on both ATU and BI, supporting the thesis that technology adoption, especially in SMEs with limited resources, depends on ease of use and system features (Chen et al., 2002; Wicaksono et al., 2020). This is especially important in developing countries where disparities in digital readiness and technology skills pose challenges to using technology (Abbad, 2021; Hung et al., 2023).

The results of this study add to the increasing literature that emphasizes the role of CBA systems in improving an organization's financial transparency, decision-making processes, and overall performance (Ria, 2023; Bala et al., 2024). Additionally, the study reinforces the twofold importance of PU and PEOU in constructing positive cloud technology attitudes. As highlighted by Abutaber (2023) and Al-Nsour et al. (2021), these perceptions impact system credibility and strategic decision-making.

Practically, the research presents a clearer direction: software developers and policymakers should market CBA tools by portraying cost and operational benefits, ease of use being self-evident. The focus on accessibility and automation emphasized by Zeng (2023) and Ionescu (2022) can improve adoption as well as long-term user satisfaction.

Using measurement and structural model validation simultaneously through PLS-SEM enhances methodological rigor and strengthens credibility in the extended TAM framework. Moreover, this approach facilitated the testing of mediated pathways as proposed by Baron and Kenny (1986) and Zhao et al. (2010), providing further nuanced understanding of how attitudes mediate the relationship between cognitive beliefs and behavioral intentions.

This study not only reinforces the applicability of TAM in the realm of cloud accounting but also focuses on the SME landscape in emerging markets, which is characterized by disproportionate and urgent attempts towards digital transformation (Makhlouf &

AlMalahmeh, 2023; Thaher, 2024; Syah et al., 2023). The findings advocate for precision in the approach and context for fostering digital transformation in these environments, especially within the evolving SME framework in India.

IMPLICATIONS

This research has both practical and theoretical implications. On a practical level, the study's conclusions highlight the role of perceived ease of use and perceived usefulness in shaping user attitudes towards cloud accounting solutions. For software policymakers and vendors, this indicates an imperative to focus on training, marketing and value-oriented utilization to facilitate acceptance among SMEs.

Theoretically, the study enhances the growing corpus of the Technology Acceptance Model (TAM) literature by adding attitude as a mediating variable in the context of cloud-based accounting applications (CBA). It also illustrates the importance of TAM in emerging markets and new technologies, reinforcing its relevance in cloud accounting infrastructures in developing regions such as Odisha.

LIMITATIONS AND FUTURE SCOPE

Although the study provides meaningful insights, it has some limitations. Firstly, the sample is restricted to 200 SMEs from Odisha which might hinder the applicability the findings to other countries or states. Secondly, the cross-sectional design of the data limits the ability to establish cause and effect. Third, self-reported answers can be prone to bias from social pressure or a desire to portray them more favourably.

Adding qualitative perspectives could enhance the understanding of contextual factors and user behavior in relation to CBA adoption. Additionally, expanding the sample to include different regions or countries, and considering factors such as organizational readiness, trust, and external pressures, could help address these limitations

CONCLUSION

This study examines the adoption of cloud-based accounting (CBA) systems by small and medium-sized enterprises (SMEs) through the Technology Acceptance Model (TAM). Integrating attitude as a mediating factor, the study deepens understanding of how perceived usefulness (PU) and perceived ease of use (PEOU) determine behavioral intention (BI) to adopt CBA technologies.

The empirical evidence obtained through PLS-SEM demonstrated the validity of the extended TAM model in this context. Both PU and PEOU positively impact user attitudes (ATU), and ATU has a strong, statistically significant influence on the intention to adopt cloud-based accounting solutions. Moreover, the mediation analysis confirmed attitude's pivotal mediating role in the process of transforming perceptions into intention, emphasizing the role of emotional reactions in technology adoption.

The study TAM in accounting technology emphasizes its theoretical applicability and highlights its various practical implications as well. Specifically, developers and regulators must focus on improving perceptions of utility and ease of use alongside fostering positive sentiments toward the new digital systems to strengthen adoption. This would substantially expedite the adoption of CBA by SMEs significantly boosting financial transparency, operational efficiency, and sustainability.

The research draws attention to some limitations, including geographic scope, cross-sectional sampling, and response bias. These, however, are beneficial for further research like longitudinal studies, wider regional sampling, and inclusion of more contextual or moderating variables.

Thus far, the research contributes to understanding digital transformation within SMEs on a theoretical and practical level. It reinforces the importance of attitude in technology acceptance, providing a persuasive basis for fostering the adoption of cloud-based accounting systems in emerging economies and other regions.

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RESEARCH ARTICLE – 2

IMPACT OF FINANCIAL INCLUSION ON STANDARD OF LIVING: A STRUCTURAL EQUATION MODELING (SEM)

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ABSTRACT

Financial inclusion has emerged as a key driver of economic well-being, particularly in the digital finance era. This study examines the relationship between financial inclusion and the standard of living, with economic resilience serving as a mediating factor. The research focuses on key factors such as fintech adoption, government financial programmes, sustainable financial behaviour, digital financial accessibility, and financial literacy. By applying CFA and structural equation modeling (SEM), the study examines the pathways through which financial inclusion strengthens economic resilience and contributes to an improved standard of living. Data is gathered from 286 respondents through a structured questionnaire through multi-stage random sampling. The findings highlight the importance of financial literacy and digital adoption in strengthening economic resilience and improving living conditions. This study provides valuable insights for policymakers, financial institutions, and technology developers to design inclusive financial strategies that promote long-term economic stability and social progress.

Keywords: *Financial Inclusion, Economic Resilience, Standard of Living, Fintech Adoption, Digital Financial Services, Financial Literacy, Government Financial Schemes, Sustainable Financial Behaviour, Structural Equation Modeling (SEM), Economic Stability, Digital Economy*

INTRODUCTION

Financial inclusion has emerged as a critical pillar of sustainable development and poverty alleviation in emerging economies. Broadly defined as universal access to affordable financial products and services, financial inclusion is regarded as an enabler of social equity and economic growth (Demirgüç-Kunt et al., 2018). The rapid expansion of digital finance and fintech solutions has reshaped the financial ecosystem, promising to extend services to previously excluded populations (Arner, Barberis, & Buckley, 2020). Yet, while global discourse emphasises the transformative potential of inclusion, the micro-level effects on individuals' standard of living remain contested and context dependent (Beck, Demirgüç-Kunt, & Levine, 2007).

Previous studies have primarily examined the macro-level consequences of inclusion, such as GDP growth, poverty reduction, and financial stability (Sahay et al., 2015; Ozili, 2018). However, less attention has been devoted to how inclusion translates into household-level well-being, particularly through mechanisms that strengthen resilience against economic shocks. The Capability Approach (Sen, 1999) underscores that financial tools only improve life quality when individuals can effectively convert them into real opportunities. Similarly, Resilience Theory (Briguglio et al., 2009) suggests that access to finance enhances well-being not directly but by enabling households to withstand and recover from adversity. This theoretical integration highlights the need to investigate financial inclusion as part of a broader empowerment process, rather than as mere access to services.

In the Indian context, financial inclusion has gained prominence through large-scale digital and policy interventions such as Aadhaar-enabled payments, Jan Dhan Yojana, and direct benefit transfers (Chakrabarty, 2011; Pradhan & Subramanian, 2007). While these initiatives have expanded access, their outcomes vary across rural and urban settings, reflecting disparities in literacy, infrastructure, and trust. Emerging evidence indicates that financial literacy and sustainable financial behaviour may be stronger determinants of household resilience than digital access alone (Lusardi & Mitchell, 2014; Xiao & O'Neill, 2016). This suggests a paradox: while digital financial inclusion is widely celebrated, its impact on quality of life may remain limited unless complemented by behavioural and institutional support.

Against this backdrop, the present study investigates the relationship between financial inclusion and standard of living, incorporating economic resilience as a mediating construct. By applying Structural Equation Modeling (SEM) to survey data from five districts in West Bengal, the study contributes to three ongoing debates. First, it examines whether digital inclusion alone suffices to enhance living standards or whether capability factors such as financial literacy and sustainable behaviour play a more decisive role. Second, it evaluates the mediating function of resilience, thereby extending theoretical discussions on how financial access translates into well-being. Third, it provides micro-level evidence from rural–urban India, a context under-represented in comparative financial inclusion research.

The findings of this study are expected to enrich both policy and theory by emphasising that inclusion without empowerment may not significantly uplift living standards. Instead, a holistic framework—integrating digital tools, knowledge, trust, and resilience—appears essential for sustainable improvements in economic and social well-being (Grohmann, Klüh, & Menkhoff, 2018; United Nations, 2022).

LITERATURE REVIEW

Financial Inclusion and the Capability Perspective

Financial inclusion is commonly defined as the availability and usage of affordable financial services for all sections of society (Demirgüç-Kunt et al., 2018). Beyond its

economic role, scholars increasingly frame inclusion through Sen's Capability Approach (Sen, 1999), which argues that development should be measured not merely by resources but by the ability to convert those resources into meaningful life outcomes. From this perspective, financial access enhances capabilities only when households possess the literacy, trust, and institutional support to utilise financial tools effectively. Thus, the pathway from financial inclusion to well-being requires investigation at the household and individual level, not just at the macroeconomic scale.

Digital Financial Inclusion and the “Access–Use” Paradox

The rise of fintech and mobile-based financial platforms has transformed the inclusion landscape, reducing transaction costs and geographic barriers (Arner, Barberis, & Buckley, 2020; Zins & Weill, 2016). However, evidence remains mixed regarding whether digital financial inclusion (DFI) translates into improved quality of life. While digital platforms increase formal access, several studies highlight issues of trust, digital literacy, and uneven infrastructure as barriers to effective usage (Ozili, 2018; Sahay et al., 2015). This creates what may be termed an “access–use paradox”: individuals are formally included but fail to experience tangible improvements in resilience or living standards.

FinTech Adoption and Behavioral Empowerment

FinTech innovations—such as peer-to-peer lending, blockchain-based services, and robo-advisors—expand the scope of financial participation and control (Gomber et al., 2017). Adoption, however, is shaped by behavioural factors such as trust, perceived usefulness, and ease of use (Malaquias & Silva, 2020). Insights from Behavioral Economics suggest that without adequate literacy and guidance, individuals may misuse complex digital tools, limiting their potential benefits (Lusardi & Mitchell, 2014). Therefore, fintech adoption can only enhance resilience and well-being when accompanied by financial literacy and supportive institutional mechanisms.

Sustainable Financial Behaviour and Resilience

Sustainable financial behaviour refers to responsible practices such as budgeting, saving, and prudent borrowing. Prior research demonstrates that households exhibiting sustainable habits are better able to withstand economic shocks (Xiao & O'Neill, 2016; Atkinson & Messy, 2012). Within the resilience framework, these behaviours act as buffers that reduce vulnerability and increase adaptive capacity. For low-income or rural households in particular, such behaviours may be more decisive for living standards than digital access alone.

Government Financial Schemes as Institutional Anchors

Government interventions—such as subsidies, pensions, insurance schemes, and direct benefit transfers—play a critical role in extending the reach of inclusion (Chakrabarty, 2011). Digitally integrated programmes ensure transparency and timely disbursement, thereby improving household resilience (Pradhan & Subramanian, 2007). However, studies

caution that unless accompanied by literacy and trust-building, these schemes may have limited transformative impact (Rojas-Suarez, 2016). Hence, government schemes can be understood as institutional anchors that enhance the resilience pathway.

Economic Resilience as a Mediator

Resilience is defined as the ability of individuals or households to absorb and recover from financial or economic shocks (Briguglio et al., 2009). It represents a crucial mediating mechanism linking financial access and well-being outcomes. Empirical studies show that financial literacy, diversified income, and savings significantly enhance resilience (Ligon & Schechter, 2003). Yet, few studies have explicitly modelled resilience as the pathway through which financial inclusion influences standard of living. This gap provides the foundation for the present research.

Standard of Living and Financial Empowerment

Standard of living encompasses access to food, housing, education, healthcare, and other basic necessities (Beck, Demirgüç-Kunt, & Levine, 2007). Financial inclusion can enhance these outcomes, but its effectiveness depends on how financial tools are empowered by resilience and behavioural factors rather than access alone. This suggests that evaluating living standards requires moving beyond simple inclusion metrics toward a framework that integrates financial capabilities, behavioural practices, and institutional supports.

Gap and Research Direction

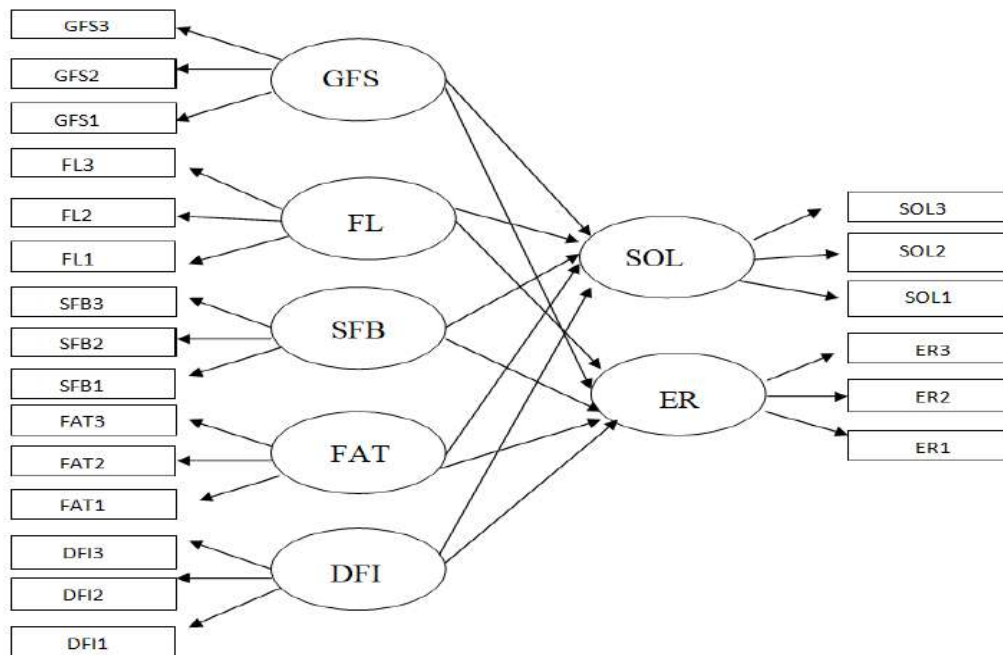
The literature highlights three gaps. First, much of the existing research focuses on macro-level effects of inclusion, neglecting household-level pathways. Second, the role of economic resilience as a mediator remains underexplored, despite its theoretical significance in resilience and capability frameworks. Third, there is limited evidence from rural–urban India, where disparities in digital access, literacy, and trust create unique challenges. This study addresses these gaps by examining how different dimensions of financial inclusion—digital tools, fintech adoption, sustainable behaviour, literacy, and government support—interact with resilience to shape households’ standard of living.

RESEARCH FRAMEWORK

This study develops a multidimensional framework to examine how financial inclusion, technology adoption, and behavioral factors collectively influence household well-being. Digital Finance Inclusion (DFI), Fintech Adoption (FAT), Sustainable Finance Behaviour (SFB), Financial Literacy (FL), and Government Financial Schemes (GFS) are proposed as the key antecedents that shape financial practices and decision-making. These factors are hypothesized to strengthen both Economic Resilience (ER) and Standard of Living (SOL), which serve as outcome constructs reflecting socio-economic stability and quality of life. The framework assumes that financial accessibility and government schemes create enabling conditions, while literacy and sustainable practices enhance the effective use of such opportunities. In addition, technological adoption is expected to reduce barriers and

expand the reach of financial services. ER is positioned not only as a direct outcome but also as a pathway through which financial and behavioral constructs influence SOL. Overall, this framework provides a comprehensive lens to explore the interconnections between finance, behavior, and social well-being.

Figure 1: Theoretical Framework of the study



HYPOTHESIS

Based on the literature reviewed and the conceptual framework developed, this study proposes a series of hypotheses to explore how various components of financial inclusion influence an individual's standard of living. The model also investigates the mediating role of economic resilience in these relationships. Firstly, digital financial inclusion and financial literacy are expected to have a direct impact on individuals' standard of living, given their potential to enhance access to financial resources and enable informed financial decision-making. Accordingly, the following hypotheses are proposed:

H1: Digital financial inclusion (DFI) has a significant positive effect on standard of living (SOL).

H2: Financial literacy (FL) has a significant positive effect on standard of living (SOL).

In addition to these direct effects, the study considers how financial behaviours and policy support mechanisms influence economic resilience, which in turn may shape living standards. Specifically, FinTech adoption, sustainable financial behaviour, and government financial schemes are hypothesised to strengthen individuals' capacity to manage financial risks and recover from economic shocks:

H3: FinTech adoption (FT) has a significant positive effect on economic resilience (ER).

H4: Sustainable finance banking (SFB) has a significant positive effect on economic resilience (ER).

H5: Government financial schemes (GFS) have a significant positive effect on economic resilience (ER).

Furthermore, economic resilience itself is hypothesised to serve as a critical pathway through which financial access and behaviour impact overall well-being:

H6: Economic resilience (ER) has a significant positive effect on standard of living (SOL).

Given the above, the study also proposes several indirect relationships, where economic resilience acts as a mediator:

H7: FinTech adoption (FT) positively influences standard of living (SOL) through economic resilience (ER).

H8: Sustainable finance banking (SFB) positively influences standard of living (SOL) through economic resilience (ER).

H9: Government financial schemes (GFS) positively influence standard of living (SOL) through economic resilience (ER).

Finally, acknowledging the complexity of financial ecosystems, the study also explores whether digital financial inclusion and financial literacy might exert marginal or limited influence on economic resilience, even though they directly affect living standards:

H10: Digital financial inclusion (DFI) has a marginal effect on economic resilience (ER).

H11: Financial literacy (FI) has a marginal effect on economic resilience (ER).

These hypotheses are tested using a structural equation modeling (SEM) approach to evaluate both direct and indirect pathways, offering a comprehensive view of how inclusive financial tools and knowledge can enhance economic well-being.

DATASET AND METHODOLOGY

Study Area

This study was conducted in five districts of West Bengal, India: Nadia, Murshidabad, Burdwan, Hooghly, and North 24 Parganas. These districts were purposively selected to capture diversity in economic conditions, digital infrastructure, and access to financial services, ensuring a representative sample for examining financial inclusion dynamics (Demirgüç-Kunt et al., 2018).

Sampling Design

A multistage random sampling approach was employed to ensure unbiased representation and generalisability (Creswell & Creswell, 2018). In the first stage, the five districts were chosen to reflect regional socioeconomic and infrastructural variations. In the second stage,

two blocks per district were randomly selected using a random number generator. In the third stage, villages or municipal wards within each block were randomly sampled. Finally, individual respondents were selected using systematic random sampling, with every *n*th household contacted based on local registries. This approach minimised selection bias and ensured a diverse respondent pool (Saunders et al., 2019).

Sample Size

Following the Rule of 10 proposed by Nunnally and Bernstein (1984), the sample size for SEM should be at least ten times the number of observed indicators. With 21 indicators, a minimum sample size of 210 is required. The current sample size of 282 exceeds this threshold, ensuring the adequacy of the data for reliable model estimation and interpretation.

Data Collection Tool

Data were collected using a structured questionnaire administered in both online (via Google Forms) and paper-based formats to accommodate varying levels of digital access. The questionnaire was adapted from validated instruments in prior financial inclusion studies (Ozili, 2021) and measured seven constructs: The analysis of direct and indirect effects reveals that Sustainable Finance Banking (SFB) exerts the strongest influence on Standard of Living (SOL) ($\beta = 0.297$), underscoring its importance in delivering inclusive financial services to underserved populations (Kuriakose et al., 2024). Similarly, the total effect of Financial Literacy (FL) ($\beta = 0.265$) demonstrates its pivotal role in improving financial behaviour and enabling households to cope with economic shocks (Atkinson & Messy, 2012; Grohmann, Klüh, & Menkhoff, 2018).

Digital Financial Inclusion (DFI), while showing a lower total effect ($\beta = 0.102$), contributes through its indirect influence via Economic Resilience (ER), which acts as a partial mediator in this structural model (Preacher & Hayes, 2008). These findings reflect the significance of enabling digital tools for financial transactions to reduce barriers to access (Ozili, 2018; Sahay et al., 2015).

The mediating role of ER ($\beta = 0.196$ on SOL) aligns with Narayan et al. (2010), who emphasised resilience as a key component of sustainable development. When financial access is paired with resilience mechanisms (e.g., social safety nets, savings, and credit), the overall impact on well-being increases multifold (United Nations, 2022).

The questionnaire was pre-tested with a pilot sample ($n = 30$) to ensure clarity, reliability, and cultural appropriateness, with minor revisions made based on feedback (Saunders et al., 2019).

Analytical Tools and Techniques

Data analysis was conducted in three phases to ensure robust validation of the measurement and structural models:

1. Exploratory Factor Analysis (EFA): Conducted using IBM SPSS Statistics 25 (IBM Corp., 2019), EFA identified the underlying factor structure and confirmed construct validity. Principal component analysis with varimax rotation was applied, retaining factors with eigenvalues > 1 and factor loadings ≥ 0.5 (Hair et al., 2019).
2. Confirmatory Factor Analysis (CFA): Performed using the lavaan package in R (version 4.3.1) (Rosseel, 2012), CFA validated the measurement model, assessing construct reliability (Cronbach's $\alpha \geq 0.7$), convergent validity (Average Variance Extracted [AVE] ≥ 0.5), and discriminant validity (square root of AVE $>$ inter-construct correlations) (Fornell&Larcker, 1981).
3. Structural Equation Modeling (SEM): Also conducted in R (lavaan package), SEM tested hypothesised relationships and mediation effects among the constructs. Maximum likelihood estimation was used to estimate path coefficients (Kline, 2015).

Model fit was evaluated using established indices: Chi-square (χ^2), Comparative Fit Index (CFI ≥ 0.90), Tucker-Lewis Index (TLI ≥ 0.90), Root Mean Square Error of Approximation (RMSEA ≤ 0.08), and Standardised Root Mean Residual (SRMR ≤ 0.08) (Hu & Bentler, 1999).

EXPLORATORY FACTOR ANALYSIS (EFA)

Table: Demographic Profile of Respondents (N = 282)

Characteristic	Category	Frequency (n)	Percentage (%)
Age Group	18–30 years	113	40
	31–45 years	99	35
	46–60 years	56	20
	61+ years	14	5
Gender	Male	127	45
	Female	155	55
Location	Rural	183	65
	Urban	99	35
Education Level	Illiterate	28	10
	Primary	85	30
	Secondary	113	40
	Higher Education	56	20
Income Level	Below Poverty Line (<₹12,000/yr)	85	30
	Low Income (₹12,000–₹50,000/yr)	113	40
	Middle Income (₹50,001–₹2L/yr)	70	25
	Upper Middle Income (>₹2L/yr)	14	5

Characteristic	Category	Frequency (n)	Percentage (%)
Occupation	Farmer	70	25
	Labourer/Daily Wage	56	20
	Small Trader/Self-Employed	70	25
	Formal Sector Employee	56	20
	Unemployed/Homemaker	28	10
	Other	14	5
Digital Access	Smartphone with Internet	169	60
	Basic Mobile (No Internet)	70	25
	No Mobile Access	43	15

The demographic profile of the 282 respondents is presented in Table 1. The sample consisted predominantly of young to middle-aged individuals, with 40% aged between 18 and 30 years and 35% between 31 and 45 years. Female respondents slightly outnumbered males, accounting for 55% of the sample. The majority of respondents (65%) resided in rural areas, highlighting the study's focus on less urbanised populations. Educational attainment varied, with 40% having completed secondary education and 30% primary education, while 10% were illiterate. Income levels showed that 30% of respondents fell below the poverty line, whereas 40% were classified as low income. Occupationally, farmers and small traders each represented 25% of the sample, followed by labourers and formal sector employees. Regarding digital access, 60% owned smartphones with internet connectivity, indicating a moderate level of digital inclusion among participants. This diverse demographic spread provides a comprehensive foundation for analysing the impact of financial inclusion on the standard of living in the study area.

Table 1: KMO and Bartlett's Test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.871
Bartlett's Test of Sphericity	Approx. Chi-Square	3992.285
	df	210
	Sig.	.000

Before conducting factor extraction, tests were applied to verify the appropriateness of the data. The Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy yielded a value of 0.871, which is considered "meritorious" based on Kaiser's (1974) interpretive scale. This suggests that the correlations among the variables are sufficient to justify the use of factor analysis. Furthermore, Bartlett's Test of Sphericity was highly significant ($\chi^2 = 3992.285$, $df = 210$, $p < 0.001$), indicating that the correlation matrix is not an identity matrix. This test supports the presence of patterned relationships among variables, a fundamental assumption for factor analysis (Bartlett, 1954).

Communalities

Table2: Communalities

	Initial	Extraction
DFI1	1.000	.792
DFI2	1.000	.798
DFI3	1.000	.830
FL1	1.000	.790
FL2	1.000	C.812
FL3	1.000	.807
SFB1	1.000	.793
SFB2	1.000	.842
SFB3	1.000	.843
GFS1	1.000	.779
GFS2	1.000	.854
GFS3	1.000	.877
ER1	1.000	.828
ER2	1.000	.874
ER3	1.000	.847
FAT1	1.000	.794
FAT2	1.000	.841
FAT3	1.000	.846
SOL1	1.000	.820
SOL2	1.000	.858
SOL3	1.000	.835
Extraction Method: Principal Component Analysis.		

The communalities indicate the proportion of variance in each variable that is explained by the extracted factors. As shown in Table 2, all items have extraction values above 0.75, suggesting that the model explains a substantial amount of the variance.

Total Variance Explained

Table 3 – Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7.800	37.144	37.144	7.800	37.144	37.144	2.543	12.107	12.107
2	2.045	9.738	46.882	2.045	9.738	46.882	2.537	12.081	24.188

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
3	1.915	9.120	56.002	1.915	9.120	56.002	2.508	11.944	36.133
4	1.643	7.824	63.826	1.643	7.824	63.826	2.494	11.877	48.010
5	1.573	7.490	71.316	1.573	7.490	71.316	2.481	11.815	59.825
6	1.369	6.521	77.837	1.369	6.521	77.837	2.457	11.701	71.526
7	1.012	4.819	82.656	1.012	4.819	82.656	2.337	11.130	82.656
Extraction Method: Principal Component Analysis.									

Using the Kaiser criterion (eigenvalue > 1), seven factors were extracted, accounting for 82.66% of the total variance. This suggests a strong factor structure, as it exceeds the typical benchmark of 60% recommended in social sciences (Hair et al., 2019).

Rotated Factor Structure

Table 4: Rotated Component Matrix

	Component						
	1	2	3	4	5	6	7
DFI1						.838	
DFI2						.868	
DFI3						.901	
FL1			.813				
FL2			.861				
FL3			.864				
SFB1					.788		
SFB2					.892		
SFB3					.866		
GFS1				.758			
GFS2				.885			
GFS3				.915			
ER1	.810						
ER2	.877						
ER3	.852						
FAT1		.816					
FAT2		.875					

	Component						
	1	2	3	4	5	6	7
FAT3		.889					
SOL1							.759
SOL2							.811
SOL3							.795
Extraction Method: Principal Component Analysis.							
Rotation Method: Varimax with Kaiser Normalisation.							
a. Rotation converged in 6 iterations.							

A Varimax rotation was applied to facilitate interpretation. Each factor revealed strong loadings (> 0.75) on a unique set of variables, indicating a well-defined, orthogonal structure. Table 4 presents the rotated component matrix, showing clean item-to-factor associations.

INTERPRETATION AND IMPLICATIONS

The seven-factor solution aligns with theoretical expectations, suggesting that each construct (e.g., economic resilience, financial literacy, government support, etc.) is empirically distinct and supported by strong factor loadings. The clean structure and high communalities validate the measurement model's robustness and provide a solid basis for further confirmatory analysis.

Confirmatory Factor Analysis (CFA)

CFA Model Estimation Using R

To validate the factor structure established during the exploratory phase, a Confirmatory Factor Analysis (CFA) was conducted using the lavaan package (version 0.6–19) in R, applying the Maximum Likelihood (ML) estimation method. The model included seven latent constructs—Digital Finance Inclusion (DFI), FintechAdoption (FAT), Sustainable FinanceBehaviour (SFB), Financial Literacy (FL), Government Financial Schemes (GFS), Economic Resilience (ER), and Standard ofLiving (SOL) each measured by three observed variables. The estimation algorithm converged normally after 42 iterations, confirming the model's statistical stability.

Model Fit Evaluation

Model fit was evaluated using a range of indices. The chi-square statistic was significant ($\chi^2 = 265.319$, $df = 168$, $p < 0.001$), which is expected given the sample size ($n = 282$). However, additional fit indices indicated that the model fits the data well. The Comparative Fit Index (CFI) was 0.975 and the Tucker–Lewis Index (TLI) was 0.969, both exceeding the 0.95 benchmark for excellent fit (Hu & Bentler, 1999). The Root Mean Square Error of Approximation (RMSEA) was 0.045, with a 90% confidence interval ranging from 0.035 to 0.055. The Standardised Root Mean Square Residual (SRMR) was 0.053, which is also

below the 0.08 threshold. These results confirm a strong overall fit of the measurement model (Hair et al., 2019).

Convergent Validity

Convergent validity refers to the extent to which items intended to measure the same construct exhibit high internal consistency and shared variance. It was evaluated using three key indicators: standardised factor loadings, Composite Reliability (CR), and Average Variance Extracted (AVE). All standardised factor loadings were above the 0.80 threshold, indicating that each item significantly contributes to its respective construct.

The CR values for all constructs ranged from 0.882 to 0.913, well above the recommended minimum of 0.70 (Hair et al., 2019). Similarly, the AVE values ranged from 0.624 to 0.762, exceeding the 0.50 cutoff suggested by Fornell and Larcker (1981). These findings, summarised in Table 5.5, confirm that all constructs demonstrate strong convergent validity.

Discriminant Validity

Discriminant validity assesses whether constructs are empirically distinct from each other. This was examined using two methods: the Fornell–Larcker criterion and the Maximum Shared Variance (MSV) approach. According to the Fornell–Larcker criterion, a construct’s square root of AVE (\sqrt{AVE}) should exceed its highest correlation with any other construct. This condition was met for all constructs. For example, ER had a \sqrt{AVE} of 0.859, which was higher than its highest correlation value of 0.573 (with SOL).

Furthermore, all AVE values were greater than their corresponding MSV, confirming the absence of overlapping variance across constructs (Fornell&Larcker, 1981; Hair et al., 2019).

Combined Validity Summary

Table 5. Discriminant validity

Construct	CR	AVE	MSV	MaxR(H)	\sqrt{AVE}	Highest Inter-Construct Correlation
DFI	0.895	0.747	0.365	0.912	0.864	0.365 (SOL)
FAT	0.899	0.762	0.506	0.921	0.873	0.506 (SOL)
SFB	0.905	0.740	0.562	0.928	0.860	0.562 (SOL)
FL	0.888	0.721	0.530	0.910	0.849	0.530 (SOL)
GFS	0.897	0.749	0.495	0.919	0.865	0.495 (SOL)
ER	0.913	0.739	0.573	0.934	0.859	0.573 (SOL)
SOL	0.882	0.624	0.573	0.905	0.790	—

Note: CR = Composite Reliability; AVE = Average Variance Extracted; MSV = Maximum Shared Variance; MaxR(H) = Hancock's Maximal Construct Reliability; \sqrt{AVE} = Square Root of AVE

Figure 2: CFA Path Diagram Interpretation

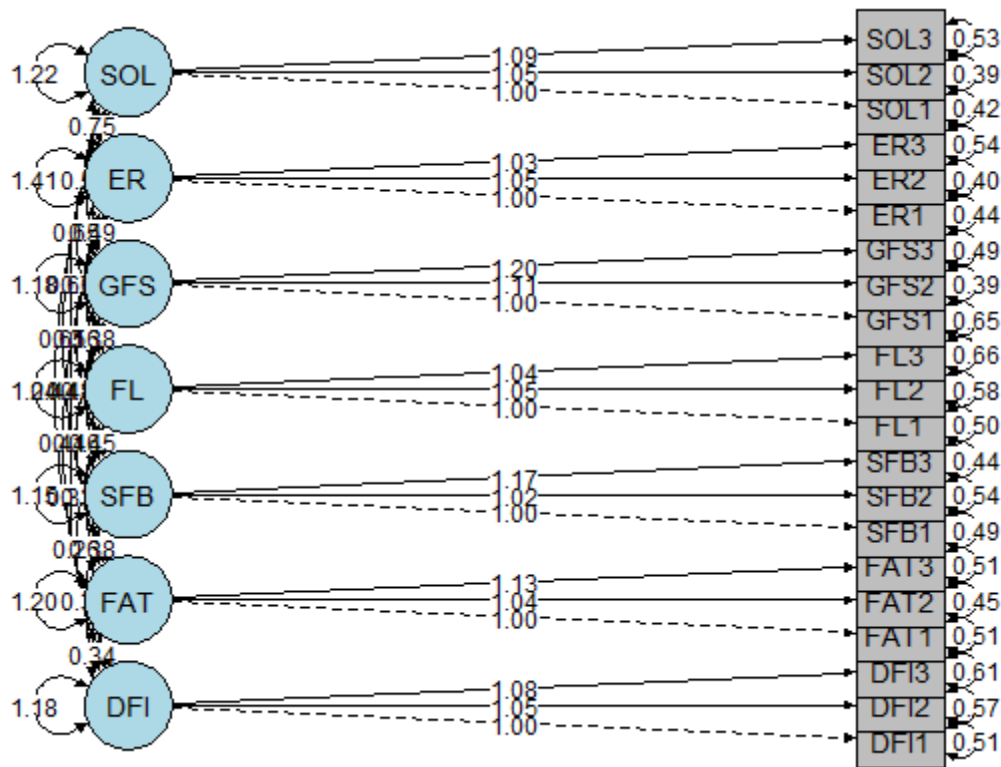


Figure 2 presents a graphical depiction of the CFA model, highlighting the relationships between seven latent constructs and their observed indicators. Each latent factor—Decision Financial Inclusion (DFI), Fintech Adoption (FAT), Sustainable Finance Banking (SFB), Financial Literacy (FL), Government Financial Schemes (GFS), Economic Resilience (ER), and Standard Of Living (SOL)—is represented as a circular node. Corresponding observed variables are shown as rectangular nodes, linked to their respective latent constructs via one-way arrows that indicate standardised factor loadings. These loadings are all statistically significant and exceed the 0.80 threshold, demonstrating strong and reliable measurement of each construct. The diagram also displays bidirectional curved arrows between latent variables, representing significant covariances that reflect meaningful interrelationships among the constructs. Small circles adjacent to the observed variables symbolize

measurement errors or residual variances, indicating the portion of variance unexplained by the latent factors. Overall, the CFA path diagram illustrates a well-fitting measurement model characterised by distinct constructs with robust indicator loadings and minimal cross-loadings, thereby reinforcing the construct validity established through quantitative analyses.

STRUCTURAL EQUATION MODELING (SEM) RESULTS

Structural Model Estimation

The structural model was estimated using the maximum likelihood (ML) method within the lavaan package in R. The model included two endogenous constructs—EconomicResilience(ER) and Standard Of Living (SOL)—predicted by five exogenous latent variables: Digital Financial Inclusion (DFI), Fintech Adoption (FAT), Sustainable Finance Behaviour (SFB), Financial Literacy (FL), and Government Financial Schemes (GFS). The estimation process converged successfully after **38 iterations**, confirming algorithmic stability.

Structural Model Fit Evaluation

Table 6. Goodness of fit (GOF) of the initial SEM

Fit Index	Your Value	Recommended Level	Status
CMIN/DF (χ^2/df)	1.579	≤ 3.00	Acceptable
GFI	0.919	≥ 0.90	Acceptable
AGFI	0.889	≥ 0.90	Acceptable
NFI	0.936	≥ 0.90	Acceptable
CFI	0.975	≥ 0.95	Acceptable
TLI (NNFI)	0.969	≥ 0.95	Acceptable
RMSEA	0.045	≤ 0.06	Acceptable

The structural equation model was evaluated using a range of fit indices widely accepted in SEM literature (Hooper, Coughlan, & Mullen, 2008; Kline, 2016; Schreiber et al., 2006). These indices provide evidence regarding how well the hypothesised model fits the observed data, as shown in table 6.

The chi-square to degrees of freedom ratio (CMIN/DF) was 1.579, which is well within the commonly accepted threshold of ≤ 3.0 , indicating an acceptable model fit (Wheaton, Muthén, Alwin, & Summers, 1977). The Goodness of Fit Index (GFI) was 0.919, and the Adjusted Goodness of Fit Index (AGFI) was 0.889. Although AGFI was marginally below the conventional cutoff of 0.90, it is still considered acceptable given the model complexity and sample size (Byrne, 2013).

The Normed Fit Index (NFI) was 0.936, exceeding the recommended minimum of 0.90, while the Comparative Fit Index (CFI) was 0.975, surpassing the stricter cutoff of 0.95 that indicates excellent fit (Bentler, 1990; Hu & Bentler, 1999). The Tucker-Lewis Index (TLI), also known as the Non-Normed Fit Index (NNFI), was 0.969, further confirming strong model fit (Tucker & Lewis, 1973).

The Root Mean Square Error of Approximation (RMSEA) was 0.045, below the recommended threshold of 0.06, suggesting a close fit between the model and population covariance matrix (Steiger, 1990; Browne & Cudeck, 1993). The Standardised Root Mean Square Residual (SRMR) was 0.053, under the maximum recommended value of 0.08, indicating a satisfactory level of residual discrepancy (Hu & Bentler, 1999). Taken together, these fit indices demonstrate that the hypothesised model fits the data well, supporting the adequacy of the measurement and structural components as specified.

Table 7: Direct, Indirect, and Total Effects of Predictors on Economic Resilience (ER) and Standard of Living (SOL)

Predictor	Direct Effect on ER (β)	Direct Effect on SOL (β)	Indirect Effect on SOL via ER (β)	Total Effect on SOL (β)
DFI (Digital Financial Inclusion)	0.115	0.079	0.023	0.102
FAT (Fintech Adaptation)	0.125	0.196	0.025	0.221
SFB (Sustainable Finance Banking)	0.207	0.256	0.041	0.297
FL (Financial Literacy)	0.294	0.207	0.058	0.265
GFS (Government Financial Schemes)	0.146	0.176	0.029	0.205
ER (Economic Resilience)	—	0.196	—	0.196

The analysis of direct and indirect effects reveals that Sustainable Finance Banking (SFB) exerts the strongest influence on Standard of Living (SOL) ($\beta = 0.297$), underscoring its importance in delivering inclusive financial services to underserved populations. This supports findings by *Burgess and Pande (2005)*, who showed that expanded rural banking significantly reduces poverty. Similarly, the total effect of Financial Literacy (FL) ($\beta = 0.265$) demonstrates its pivotal role in improving financial behaviour and enabling households to cope with economic shocks (*Atkinson & Messy, 2012; Grohmann, Klüh, & Menkhoff, 2018*).

Digital Financial Inclusion (DFI), while showing a lower total effect ($\beta = 0.102$), contributes through its indirect influence via Economic Resilience (ER), which acts as a partial mediator in this structural model (*Preacher & Hayes, 2008*). These findings reflect the significance of enabling digital tools for financial transactions to reduce barriers to access (*Ozili, 2018; Sahay et al., 2015*).

The mediating role of ER ($\beta = 0.196$ on SOL) aligns with *Narayan et al. (2010)*, who emphasised resilience as a key component of sustainable development. When financial access is paired with resilience mechanisms (e.g., social safety nets, savings, and credit), the overall impact on well-being increases multifold (*United Nations, 2022*).

Hypothesis Testing and Path Coefficients

The structural model estimates indicate significant predictors of both Economic Resilience (ER) and Standard of Living (SOL). Among the latent constructs, Financial Literacy (FL) emerged as the most influential driver of ER ($\beta = 0.294, p < 0.001$), supporting prior research that emphasises the role of financial knowledge in improving individuals' capacity to absorb economic shocks (*Lusardi & Mitchell, 2014; Atkinson & Messy, 2012*).

Other significant predictors of ER include Sustainable Finance Behaviour (SFB) ($\beta = 0.207$, $p = 0.002$) and Government Financial Support (GFS) ($\beta = 0.146$, $p = 0.023$), aligning with studies by Xiao and O’Neill (2016) and Pradhan & Subramanian (2007), who emphasise the protective role of behavioural and institutional mechanisms in financial vulnerability.

For SOL, SFB again showed the strongest effect ($\beta = 0.256$, $p < 0.001$), followed by FAT ($\beta = 0.196$, $p = 0.001$), FL ($\beta = 0.207$, $p < 0.001$), and GFS ($\beta = 0.176$, $p = 0.002$). ER significantly influenced SOL ($\beta = 0.196$, $p = 0.002$), indicating its mediating function in the financial well-being pathway (Briguglio et al., 2009).

Notably, Digital Financial Inclusion (DFI) had a marginal effect on ER ($p = 0.062$) and a non-significant effect on SOL ($p = 0.138$), suggesting that mere access to digital platforms does not guarantee improvements in quality of life unless supported by behavioural and cognitive capacities (Zins & Weill, 2016; Ozili, 2018).

In terms of model explanatory power, the exogenous constructs (DFI, FAT, SFB, FL, and GFS) collectively explained 37.0% of the variance in *Economic Resilience* (ER), while the full model—including ER—accounted for 58.0% of the variance in *Standard of Living* (SOL). These R² values indicate moderate explanatory strength for ER and relatively strong predictive power for SOL, reflecting the importance of both direct and mediated pathways in determining household well-being. (Hair et al., 2019; Kline, 2016)

Table 8: Standardized Direct Effects on ER and SOL

Predictor → Outcome	Std. Estimate	Std. Error	p-value	Significance
FAT → ER	0.125	0.070	0.053	Marginal
SFB → ER	0.207	0.072	0.002	Significant
DFI → ER	0.115	0.067	0.062	Marginal
FL → ER	0.294	0.070	<0.001	Significant
GFS → ER	0.146	0.070	0.023	Significant
ER → SOL	0.196	0.058	0.002	Significant
FAT → SOL	0.196	0.057	0.001	Significant
SFB → SOL	0.256	0.060	<0.001	Significant
DFI → SOL	0.079	0.054	0.138	Not Significant
FL → SOL	0.207	0.059	<0.001	Significant
GFS → SOL	0.176	0.057	0.002	Significant

Interpretation and Implications

The conceptual framework supporting this study has significant empirical support from the SEM results. Both Economic Resilience (ER) and Standard of Living (SOL) were consistently shown to be significantly impacted by Financial Literacy (FL) and Sustainable Finance Banking (SFB).

These findings align with behavioural economics literature that underscores how informed and responsible financial behaviours serve as shock absorbers in volatile economic contexts (Xiao & O'Neill, 2016; Lusardi, 2015).

Economic Resilience (ER) is confirmed as a critical mediating construct through which FinTech adoption, government schemes, and financial capabilities translate into improvements in well-being. This supports the resilience literature, which highlights access to diversified income sources, savings, and social safety nets as key ingredients for sustained quality of life (Briguglio et al., 2009; Ligon & Schechter, 2003).

Interestingly, while Digital Financial Inclusion (DFI) is often emphasised in policy discussions, this study found no statistically significant direct effect on the standard of living. This finding aligns with growing concerns in development finance that simply providing digital access isn't enough—without adequate user skills, trust, and supportive infrastructure, the benefits of digital inclusion may remain out of reach (Arner et al., 2020; Ozili, 2021).

These insights call for a shift in financial inclusion strategy—from focusing on access to fostering "financial empowerment ecosystems"—that combine tools, knowledge, trust, and resilience-building frameworks (Demirgüç-Kunt et al., 2018).

SEM Path Diagram Interpretation

Figure 3: SEM Path Diagram Interpretation

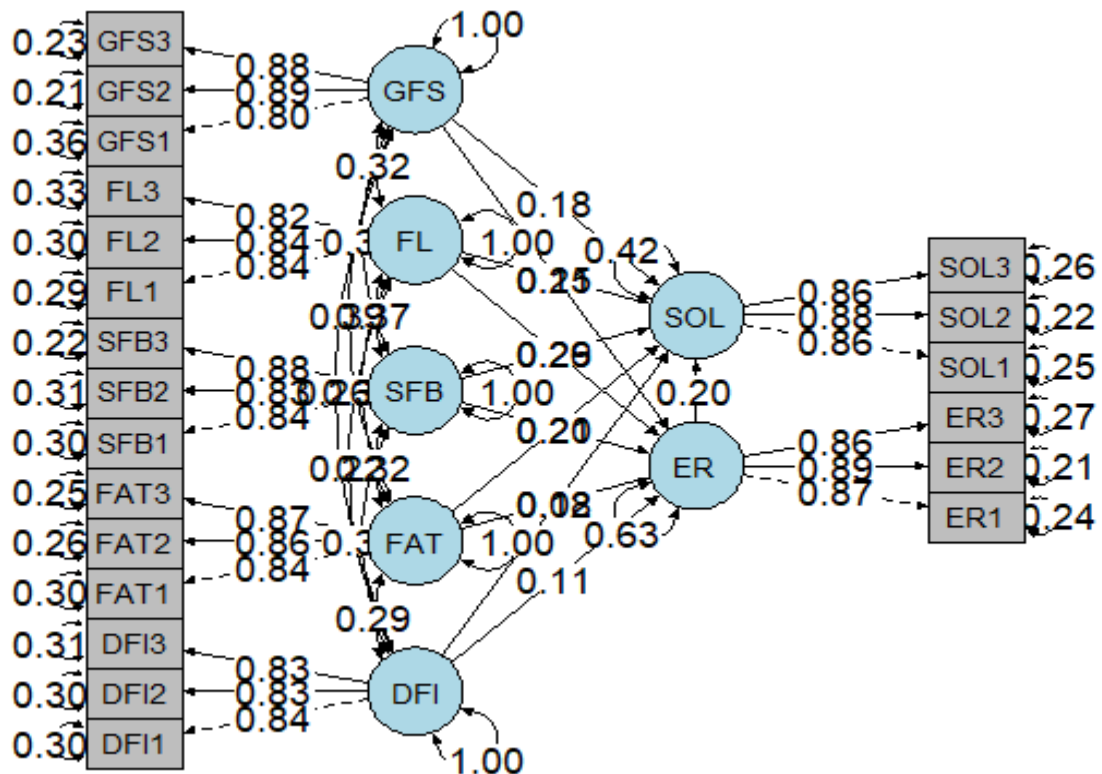


Figure 3 illustrates the SEM model linking latent constructs: DFI, FAT, SFB, FL, GFS, ER, and SOL. Each is measured by three indicators, with standardised loadings mostly >0.80, confirming good reliability and convergent validity (Hair et al., 2019; Fornell&Larcker, 1981).

Structurally, strong paths are observed: FL → ER ($\beta = 0.294$), SFB → SOL ($\beta = 0.256$), and ER → SOL ($\beta = 0.196$), highlighting the role of knowledge, behaviour, and resilience in improving living standards (Lusardi & Mitchell, 2014; Xiao & O’Neill, 2016). Significant covariances among FL, SFB, and FAT suggest shared influence, while DFI → SOL is weak and non-significant, reinforcing that access without capability may be insufficient (Ozili, 2018; Zins& Weill, 2016).

The diagram affirms ER’s mediating role and supports the model’s theoretical structure, aligning with best SEM practices (Kline, 2016; Hu & Bentler, 1999).

CONCLUSION

The results of this study reinforce the multifaceted nature of financial inclusion and its complex relationship with economic resilience and living standards. Financial literacy, sustainable financial behaviour, and targeted government support are key drivers of resilience and well-being. The non-significant effect of DFI on SOL highlights the need for caution in assuming that digital access alone guarantees economic upliftment. This research

advocates for a holistic approach to inclusion—one that combines access, behavioural change, and institutional support. For policymakers and development practitioners, these findings provide a roadmap for inclusive policy design: integrating digital platforms with financial education, trust-building initiatives, and structured social protection programmes.

Future studies should explore longitudinal effects and test cross-cultural models to generalise these relationships further. Additionally, deeper qualitative insights could unpack the socio-psychological pathways through which financial tools impact behaviour and well-being.

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RESEARCH ARTICLE – 3

MULTINATIONAL CORPORATIONS AND THE PARADOX OF CORPORATE SOCIAL RESPONSIBILITY IN NIGERIA'S NIGER DELTA

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ABSTRACT

The presence of multinational corporations (MNCs) in Nigeria's Niger Delta has long been justified through Corporate Social Responsibility (CSR) programmes that promise to support development and improve local welfare. Yet the everyday realities of the region tell a different story. Despite the heavy investment in CSR, the Niger Delta remains mired in environmental degradation, poverty, and recurring social unrest. This study explores the paradox of CSR in the region, questioning why initiatives that appear progressive on paper often yield minimal impact in practice. Guided by stakeholder theory and legitimacy theory, the paper examines how CSR has frequently been deployed less as a vehicle for genuine development than as a strategy for corporate image-building and conflict management. Methodologically, this study was guided by mixed-method data sources and collection, including primary (questionnaires and interviews) and secondary sources (scholarly articles in peer-reviewed journals). The questionnaire and interview instruments were distributed across four (4) selected oil communities with the presence of multinational oil corporations in Bayelsa and Akwa Ibom States. Data presentation and analysis were quantitatively and qualitatively implemented in the study. The findings of this study revealed that CSR projects have failed to effectively address local needs. Hence, poor CSR implementation fuels grievances, and the exclusion from CSR benefits drives youth militancy in the Niger Delta. Conclusively, this study postulates that in the planning, design, and implementation of CSR programmes and activities, there is a need to consider the needs of both parties for mutual benefit. This will enable oil MNCs to derive maximum benefits from their CSR initiatives, be less prone to community conflict, and gain legitimacy within their host communities.

Keywords: *Corporate Social Responsibility (CSR), Multinational Corporations (MNCs), Niger Delta, Sustainable Development, and Militancy*

INTRODUCTION

In Nigeria's social, political, and economic life, the Niger Delta can be regarded as playing a crucial role. This explains why IDEA (2001 cited in Ibaba, 2017) claimed that the Niger Delta is essential to Nigeria's future. The Niger Delta region is, in fact, entangled in an

extremely paradoxical and contradictory structure. The region is Nigeria's primary source of foreign revenue and is often regarded as the eagle that lays the golden egg. However, the region and its residents are in a state of squalor (Nwaguru, 2023). Academics such as Victor and Akaneme (2021), Abraham and Zephaniah (2020), Akpan (2024), Tuodolo (2019) have argued that Corporate Social Responsibility (CSR) interventions of Multinational Corporations (MNCs) in the Niger Delta are not far-reaching or deeply entrenched. Thus, it has been contended that some of these CSR programmes are not always sustained. Despite the plethora CSR programmes and projects by MNCs, Uduji and Okolo-Obasi (2018 cited in Akpan, 2024) submit that the oil-producing communities have not received a proportionate benefit compared to the environmental costs of extractive activities that have resulted in a significant decline in farming and fishing in the region, which are the traditional sources of livelihood of the people.

The socio-economic situation in the Niger Delta, which is due partly to oil activities, is worse than any parts of Nigeria. The World Bank reported that the unemployment rate in the Niger Delta is the highest in Nigeria, and the poverty level is lower than the country's average (World Bank, 2021 cited in Nwaguru, 2023). Basic and critical social amenities such as electricity, pipe-borne water, accessible roads, schools, and hospitals are largely absent in most rural communities in the oil-rich Niger Delta. Furthermore, the incessant occurrences of gas flare and oil spills have contributed significantly to the loss of traditional sources of revenue, thereby worsening the poverty level as well as the unemployment rate in the region.

Succinctly, the general expectations of the people of the Niger Delta region is seeking employment for the youths, reduction in environmental damage to their farmlands (livelihoods), economic and social development of the entire region. To the host communities, these expectations have not been met, which has resulted in a conflicting relationship with the MNCs. Put differently, while previous studies have attempted to link community developments in the Niger Delta to CSR programmes of MNCs, this study is a complete departure as there are bulk of evidentiary reported cases of stoppage of oil production, image damage, oil bunkering, vandalization of oil pipelines, kidnapping of oil workers, loss of lives and properties, attack on contractors and security personnel of oil companies. What is being witnessed is the neglect of the role of CSR in improving the living standards of the people and sustaining the livelihoods of the communities. It seems, therefore, that the CSR initiatives are in the interest of the MNCs, who are indirectly sourcing for a conducive environment to maximize their earnings and to be seen as being socially responsible (Ifedolapo, 2023).

It becomes imperative that the continued violence in the region is an indication that there are policy gaps in CSR practices, community development, and other reasons for the crisis in the Niger Delta. Recognizing the prevalent antagonistic relationship between host communities and oil companies, and unraveling the paradox of the Multinational Corporations and the subsisting Corporate Social Responsibility prevalent in Nigeria's

Niger Delta, becomes the crux of this study. Therefore, this study was guided by the following objectives:

- i. Examine the extent multinational corporations have effectively implemented Corporate Social Responsibility (CSR) initiatives in Nigeria's Niger Delta, and how these initiatives reflect the paradox between corporate commitments and community realities;
- ii. Interrogate ways the limited or failed implementation of CSR by multinational corporations has contributed to persistent grievances, social unrest, and militancy in the Niger Delta; and
- iii. Determine political, institutional, or governance frameworks that can provide sustainable solutions to the Niger Delta crisis while strengthening the accountability and effectiveness of CSR practices by multinational corporations.

To achieve the objective of this study, the work is organised into five sections. Section one is the introduction, giving general background information of the study and stating the problems. Section two focuses on the literature review of past and present scholarly discourse on the study issue and theoretical framework. Section three presents the methodology. The fourth section delves into the results and discussion with workable recommendation towards sustainable development in the Niger Delta region, Nigeria. Section five dwelt on the conclusion for the study.

LITERATURE REVIEW

Corporate Social Responsibility (CSR)

According to Abefe-Balogun (2011 cited in Victor and Akaneme, 2021), Corporate Social Responsibility is a concept that has become quite familiar in the world of corporate and investment today. There are different perceptions of the concept among the private sector, government, and civil society organizations. Charles (2018) submits that the concept of corporate social responsibility has been developing since the early 1970s. There is no single commonly accepted definition of corporate social responsibility. Perspective on CSR in Charles' view may cover the following areas:

1. A company waning its business responsibly in relation to internal stakeholders (shareholders, employees, customers, suppliers, and community);
2. Business performance as a responsible member of the society in which it operates and the global community; and
3. The role of business in relation to the state, locally and nationally, as well as to interstate institutions or standards.

The first perspective includes corporate governance, product responsibility, employment conditions, workers' rights, training, and education. The second perspective is multilayered and may involve the company's relations with the people and environment in the communities in which it operates, and those to which it exports. The third includes

corporate compliance with relevant legislation, and the company's responsibility as a tax payer, ensuring that the state can function effectively.

Summarily, a key element of CSR is the drive that has given rise to the term “corporate environmental responsibility, a term which shows the rising importance of the environment not only in any CSR practice but even in security discourse. Ensuring environmental security is today at the heart of global protest in advanced economies.

An Insight into the Niger Delta Region

The Niger Delta region has attracted enormous multidisciplinary studies, and as a result, there is an avalanche of literature on the area of study. The Niger Delta is a region in southern Nigeria with a land mass of around 112,110 square kilometers. On the vast terrain of the region, there are five biological zones: the lowland rain forest zone, the montane zone, the derived savannah zone, the fresh water swamp zone, and the mangrove forest/vegetation zone (NDDC, 2006 cited in Ibaba, 2017). The geography of the Niger Delta is only two meters above sea level (Singh, Moffat, & Linden, 1995 cited in Iwebo, 2022). The region traverses nine out of the 36 states of the Federal Republic of Nigeria; these are Abia, Akwa Ibom, Bayelsa, Cross River, Delta, Edo, Imo, Ondo, and Rivers States. The estimated population of the region is about 20 million, comprising over forty different ethnic groups speaking 250 different dialects across about 3,000 communities (Afinotan and Ojatorotu, 2020).

Since the discovery of oil more than five decades ago, the region has become the main source of foreign exchange earnings for the whole country. From 1975 till date, more than 90 percent of the nation's export earnings have, on average, been generated from the region's oil resources. Yet, in the argument of Tamuno (2022), the Niger Delta remains the least developed areas of the country in physical and social, and economic terms. While oil exploration and exploitation has brought wealth to the country as a whole, it has also brought untold hardship, conflict, wars, poverty, and insecurity to the Niger Delta region. Severe economic deprivation and social exclusion have stood in sharp contrast to the enormous oil wealth of the area, creating a paradox of poverty in the midst of plenty. The Niger Delta is perhaps the only oil region in the entire world where the inhabitants are compelled to cope with the spill after spill situation.

Corporate Social Responsibility (CSR) and Nigeria's Niger Delta

In lieu of the CSR initiatives of the multinational corporations doing business in the Niger Delta, the region has encountered a plethora of problems. The incapacity of the government and oil communities in the Niger Delta to promote social and economic development in the region is the reason for their dependence on MNCs (Ite, 2020). In his submission, Tuodolo (2019) contends that Shell's contribution to the development of the Niger Delta has been impacted by the lack of an enabling environment for corporate social responsibility. This problem is directly tied to environmental policy that makes sure company operations minimise environmental and social costs and impacts while maintaining financial rewards.

The public sector roles imply that both MNCs and CSR require an enabling environment for their smooth operation. But the lack of this enabling environment for CSR in Nigeria is an indication of some level of ineffectiveness with a limited level of significance and political support.

The Niger Delta conflict is complex, and the realisation of the desired outcome is slim. Yet, the idea that CSR initiatives that support sustainable community development will resolve local grievances and enhance livelihood is the foundation of the conceptual connection to conflict reduction in the Niger Delta (Idemudia, 2009 cited in Ibaba, 2017). On the ground, the reverse is the case. It is clear that the Niger Delta has an alarmingly high incidence of violence, and that the main causes of conflict in the area are environmental deterioration and a lack of work opportunities for the local population. Government accountability is essential to the growth and development of CSR in Nigeria. Idemudia and Ite (2016) posit that CSR may help in shaping an institutional environment that foster sustainable economic growth.

However, the absence of an enabling environment is the crucial issue with CSR, regardless of the pursuit of an active distributional and social policy or the provision of motivation for ecological behaviour. This is because CSR initiatives have a tendency to be undermined, which lessens their beneficial effects. The fact is that, despite the enormous number of community expectations that are not fulfilled as a result of the government's inability to fulfill its fair share of responsibilities, business efforts are not utilised to meet community requests. As a result, this accurately depicts the circumstances in the Niger Delta. These could result from differences in expectations and interests related to CSR activity.

EMPIRICAL REVIEW

Abraham and Zephaniah (2020), in their study titled “Restructuring towards Sustainable Development: The Role Corporate Social Responsibility Should Play in the Development of the Niger Delta Region,” argue that the oil-rich Niger Delta region is host to several big corporations that are involved in the exploration and extraction of its oil. Right from 1958, when oil was first exported in commercial quantities, the region has continued to play a significant role in the budgetary calculation of Nigeria. However, despite its oil wealth, the Niger Delta is largely underdeveloped as its environment have been impacted negatively by the activities of oil multinationals and ignored by successive governments. This is in spite of oil companies' affirmed commitment to corporate social behaviour. Their paper attempts to look at how effective oil multinationals' CSR is in the region, in the wake of an increased spate of violence, social activism, and massive environmental degradation.

Victor and Akaneme (2021), in their study titled “*Corporate Social Responsibility (CSR) and Conflict in the Niger Delta of Nigeria*” submit that Corporate Social Responsibility (CSR) “is the continuing commitment by business to behave ethically and contribute to economic development while improving the quality of life of the workforce and their families as well as the local communities and societies at large”. It was anticipated that the

adoption of CSR practice by the oil companies might be an effective panacea to the incessant conflict that has characterized the relationship between oil companies operating in the region and their host communities. However, regardless of such anticipation and oil companies' claims of adherence to the notion of CSR, conflict in the region has remained unabated. The study argued that to ensure a harmonious working relationship with stakeholders and to reduce the conflict in the region, oil companies should encourage host community participation in the design and implementation of CSR initiatives.

Joseph, Elda, and Simplice (2020), in their study titled "The Impact of Corporate Social Responsibility Interventions on Female Education Development in the Rural Niger Delta Region of Nigeria," assess the impact of multinational oil companies' (MOCs) corporate social responsibility (CSR) interventions in female education programmes in the Niger Delta region of Nigeria. A total of 800 rural women were sampled across the region. The results from the logit model showed that rural women depended on CSR interventions of MOCs to address some of the logistical and cultural challenges associated with women's access to post-secondary education in local communities. However, despite the significant success in supporting education initiatives generally, none of the scholarships target females specifically, and compared to men, the low level of human capital in rural women has persisted.

Mamudu, Mamudu, Elehinafe, and Akinneye (2021), in their study titled "*Recent trends in corporate social responsibilities in Nigeria: a case study of major oil firms in the Niger Delta region*," contribute to the lingering debate on the relationship between corporate social responsibility (CSR) and community development using the Nigerian oil industry as a case study. A better understanding of the strengths and weaknesses of the different CSR initiatives undertaken by the various oil multinational companies (MNCs) operating in the Niger Delta region of Nigeria was closely examined. Their research also scrutinized why, despite considerable increases in the oil MNCs' CSR spending on community development, little or no growth has occurred. The role of the Nigerian Government in CSR was also examined, and the result was that the Nigerian government failed to create an enabling environment.

Charles (2018), in his work titled "*Corporate Social Responsibility and the Welfare of Nigerian Niger Delta Landowners*," submits that the perception by any group of ineffectiveness in the dispensation of corporate social responsibility (CSR) to major stakeholders may result in friction, reduction in productivity, and an overall loss of social and economic capital. The problem addressed in this study, which represented the gap in knowledge and practice, was that CSR initiatives in the Niger Delta region lack a community-centric framework to ensure optimal and sustainable returns on CSR investments for multinational corporations and local Nigerian landowners. Data were obtained through interviews regarding the lived experiences of a sample of 15 participants selected through a purposeful non-random sampling from a variety of backgrounds. The data analysis using content and inductive techniques with NVivo illustrated the factors leading to a deeper understanding of what it means to experience CSR for landowners. The

results include expectations from operators, activities of the operators in the Niger Delta, operators' relationship with land owners, and operators' need to take environmental responsibility.

Theoretical Framework

This study is anchored on the Stakeholder Theory and Legitimacy Theory, which provide critical lenses for examining the paradox of Corporate Social Responsibility (CSR) in the Niger Delta.

Stakeholder Theory

Stakeholder theory was made popular by Freeman (1984). The theory postulates that obligations of corporations are multifaceted; not only to shareholders but also to a wider set of stakeholders, including employees, customers, host communities, and government institutions. In the Niger Delta, multinational corporations (MNCs) rely heavily on host communities for access to natural resources and for ensuring a peaceful operating environment. Accordingly, CSR initiatives are expected to address the social, economic, and environmental needs of these stakeholders. However, existing realities show a persistent mismatch between corporate CSR commitments and community expectations, particularly regarding employment creation, environmental protection, and infrastructural development (Victor and Akaneme, 2021).

Recent studies reinforce the centrality of stakeholder engagement in CSR effectiveness. For instance, Muhammad and Ogundele (2024) show that meaningful CSR outcomes in oil-producing communities depend on robust stakeholder engagement, trust-building, and inclusion of local needs. Similarly, Ebisi, Guo, and Soomro (2025) argue that CSR must prioritize environmental conservation measures, such as afforestation and remediation, to reflect the concerns of local stakeholders and ensure sustainability. When CSR interventions fail to incorporate such perspectives, they risk being viewed as cosmetic and deepen distrust, thereby intensifying conflict. Stakeholder theory, therefore, provides a useful framework for interrogating why CSR initiatives often fail in the Niger Delta: they neglect the voices of host communities and instead privilege corporate interests.

Legitimacy Theory

Legitimacy theory emphasizes that organizations seek to operate within the norms and expectations of the society in which they function, and survival depends on maintaining legitimacy (Suchman, 1995 cited in Iwebo, 2022). From this perspective, CSR initiatives can be interpreted as strategies deployed by corporations to secure their "social license to operate" in host communities. In the Niger Delta, MNCs frequently implement highly visible CSR projects, such as scholarships, healthcare facilities, and road construction, as evidence of social responsibility and goodwill. These projects, however, often serve more as image management tools than as genuine vehicles for structural transformation (Abraham and Zephaniah, 2020).

Evidence from recent research suggests that CSR is sometimes pursued more for reputational benefits than for community development. Nangih (2022), for example, found that CSR investments among Nigerian firms are often linked to maintaining legitimacy rather than delivering substantive socio-economic transformation. Similarly, Ebisi et al. (2025) contend that the legitimacy of CSR projects in oil communities is fragile when initiatives fail to resolve pressing environmental and livelihood concerns. This reinforces the argument that CSR is frequently used as a symbolic strategy to project corporate benevolence and secure community acceptance, while underlying grievances remain unresolved.

Integrating the Theories

Stakeholder and legitimacy theories complement each other in explaining the paradox of CSR in the Niger Delta. While stakeholder theory highlights the diverse expectations and interests of local communities, legitimacy theory demonstrates how corporations selectively deploy CSR as a mechanism to gain societal approval. As recent scholarship shows, CSR initiatives that lack meaningful engagement (Muhammad and Ogundele, 2024) or fail to meet environmental and livelihood expectations may undermine rather than strengthen corporate legitimacy. Conversely, when CSR is designed to incorporate genuine stakeholder concerns, it can reduce conflict and foster sustainable development.

Thus, applying these theories together provides a holistic lens for understanding why CSR in the Niger Delta often produces minimal developmental impact despite substantial investments. They reveal how CSR is caught between the demands of legitimacy and the neglect of stakeholder priorities, explaining the persistent gap between corporate commitments and community realities.

METHODOLOGY

Research Design/Instrument of Data Collection

This study made use of a survey research technique targeted at obtaining information from a representative sample of rural men/women, youths/youth leaders, local chiefs, MNCs representatives, and other individuals across rural communities in Bayelsa and Akwa Ibom States in the Niger Delta region. Those recruited to participate in the study have privileged information due to either their position or they having been directly involved in negotiation with oil MNCs on behalf of the communities. The study combines the use of primary and secondary data; the primary data was obtained through in-depth structured interview and questionnaire instruments, while the secondary data was obtained through documentary evidence.

Sample Size and Sampling Procedure

The sample size for the study was two hundred (200) respondents, determined through a purposive and snowballing sampling strategy to identify and recruit participants for the study. The communities were selected based on their proximity to oil multinationals

operating in that region. These communities include Kolo 1 and 2 in Ogbia Local government area of Bayelsa State, Mkpanak in Ibeno local government area, and Atabong in Eket Local government area in Akwa Ibom States. The interviews and questionnaires were arranged and agreed upon by the identified participants across their communities. Data collection and collation timeframe across the sample area was four (4) weeks.

Data Presentation and Analysis

Data presentation and analysis were done both quantitatively and qualitatively. Quantitatively, data was analysed (using frequencies and simple percentage) and presented in tables. Qualitatively, data were presented and analysed through discourse analysis. Succinctly, ethical consideration in social science research was highly implemented.

RESULTS AND DISCUSSION

This section of the paper deals with the results and explanation of the findings from the data gathered from the field through questionnaire distribution and in-depth interviews which was corroborated with other scholarly works.

Table 1: Presentation of forms distribution

<i>S/N</i>	<i>Variables</i>	<i>Frequency</i>	<i>Percentage</i>
1	Number Distributed	200	100
2	Number Returned/Collated	143	72
3	Number Unreturned	57	28

The presentation above is the distribution of forms across the sample area. The sample areas received a total of two hundred (200) questionnaires, which constituted one hundred percent (100%) from the researcher. One hundred and forty-three (143) questionnaire forms were returned, which constituted seventy-two percent (72%), while fifty-seven (57) questionnaire forms, which constituted twenty-eight percent (24%), were unreturned. It is therefore visible that over two-third of the questionnaire were retrieved and can be used to analyze the survey data.

Table 2: Presentation of respondents' demographic information

<i>S/N</i>	<i>Variables</i>	<i>Category</i>	<i>Frequency</i>	<i>Percentage</i>
1	Gender	Male	84	59
		Female	59	41
2	Age	18-25	16	11
		26-35	29	20
		36-45	53	37
		46-Above	45	32
3	Educational Qualification	No Formal Education	30	21
		Primary School Certificate	27	19
		Secondary School Certificate	27	19
		Tertiary Certificate	59	41
4	Occupation	Fisherman/Farmer	59	41
		Civil Servant	38	27
		Businessman/woman	27	19
		MNC Staff	19	13
5	Community Status	Traditional Ruler/Chief/Village Head	17	12
		Politician	9	6
		Youth Leader	29	20
		CDC Chairman	23	16
		Security Personnel	17	12
		Others	48	34
6	Duration	0-5	12	8
		6-15	21	15
		16-25	49	34

		26-Above	61	43
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Following the analytical presentation in the table above (Table 2), 59% respondents were males, while 35% respondents were females. Furthermore, the age group of the respondents was captured thus: 18-25 (11%) respondents, 26-35 (20%) respondents, 36-45 (37%) respondents, while 46-above (32%) respondents. Hence, from the sequence, the majority of the respondents were between 36 and 45 years, followed by those within the age bracket of 46 and above.

Based on the respondent's educational qualification of respondents, 21% respondents have no formal education, 19% respondents have their elementary/primary school certificates or its equivalent, 19% respondents are holders of senior school certificates (WASSCE, NECO, NABTEB or GCE or its equivalent), while 41% respondents possesses tertiary education degrees (B.A/B.Sc/HND/M.Sc/PhD or its equivalent) from all academic fields. On respondents' occupational status, 41% respondents are into fishing/farming, 27% respondents are Civil Servants in the various states, 19% respondents are into different kinds of businesses, while 13% are staff of MNCs operating in the sample area.

In ensuring first-hand information for the study, the statuses of respondents across the sample area were presented thus: Traditional Ruler/Chief/Village Head (12%), Politician (6%), Youth Leaders (20%), CDC Chairmen (16%), security personnel (12%), while other statuses were 34%. On the duration of respondents in the sample area, the sequence was captured in the analysis in the table above.

Table 3: CSR Implementation & Effectiveness

S/N	Variables	SA (%)	A (%)	Neutral (%)	D (%)	SD (%)
1	MNCs in my community provide CSR projects that address local needs.	19 (13)	27 (19)	19 (13)	43 (30)	35 (25)
2	CSR projects are sustained over time rather than being one-off events.	27 (19)	21 (15)	31 (22)	39 (27)	25 (17)
3	Local community members are actively involved in CSR planning and execution.	10 (7)	29 (20)	26 (18)	30 (21)	48 (34)
4	CSR projects have led to visible improvements in infrastructure and social services.	27 (19)	19 (13)	22 (15)	31 (22)	44 (31)
5	CSR projects in my community are mostly for publicity and not for genuine development.	41 (29)	30 (21)	19 (13)	29 (20)	24 (17)

This table captures perceptions of how multinational corporations (MNCs) implement CSR projects in local communities. Flowing from the analysis, respondents express an overwhelming disagreement (D: 30%, SD: 25%, combined 55%) that CSR initiatives are perceived as misaligned with actual community priorities, possibly reflecting a disconnect between corporate agendas and local realities. Furthermore, disagreement dominates (D:

27%, SD: 17%, combined 44%) the assertion that CSR is viewed as short-term or superficial, lacking long-term commitment, which could erode trust and limit lasting benefits. Hence, this highlights a perceived exclusion of locals from decision-making, potentially fostering feelings of marginalization and reducing the relevance of projects.

Furthermore, respondents (D: 22%, SD: 31%, combined 53%) appear to doubt tangible outcomes, implying that CSR efforts may not translate into meaningful development, possibly due to poor execution or insufficient scale. This variable flips the narrative, revealing cynicism about motives that many see CSR as performative rather than developmental, which could undermine corporate legitimacy in the community.

Table 4: Grievances, Social Unrest & Militancy

S/N	Variables	SA (%)	A (%)	Neutral (%)	D (%)	SD (%)
1	Poor CSR implementation contributes to community grievances.	37 (26)	35 (25)	26 (18)	23 (16)	22 (15)
2	Environmental degradation from oil operations has increased local tensions.	29 (20)	44 (31)	19 (13)	28 (20)	23 (16)
3	Youths are more likely to engage in militancy when excluded from CSR benefits.	32 (22)	43 (30)	27 (19)	18 (13)	23 (16)
4	Inadequate CSR responses fuel distrust between corporations and communities.	40 (28)	37 (26)	29 (20)	26 (18)	11 (8)
5	Militancy in the Niger Delta is unrelated to CSR failures.	24 (17)	18 (13)	32 (22)	29 (20)	40 (28)

This table explores the links between poor CSR practices, environmental issues, and social conflicts in the Niger Delta, drawing from the same survey pool. The first analysis shows a robust agreement (SA: 26%, A: 25%, combined 51%) that CSR shortcomings are a direct driver of discontent, underscoring how unfulfilled expectations can breed resentment. Therefore, it becomes evident that prevalent strong agreement (SA: 20%, A: 31%, combined 51%) link oil-related pollution to social strain, highlighting environmental injustice as a catalyst for broader conflicts. From the perspective of youth restiveness, it becomes evident that dominating agreement (SA: 22%, A: 30%, combined 52%) suggests perceptions of exclusion fueling radicalization among youth, positioning CSR as a potential tool for conflict prevention if made inclusive.

Overwhelming agreement (SA: 28%, A: 26%, combined 54%) proves that distrust is a core outcome of CSR failures, potentially perpetuating a cycle of antagonism. Hence, the overwhelming disagreement is clear (D: 20%, SD: 28%, combined 48%), that the notion of militancy being detached from CSR, reinforcing the idea that corporate lapses contribute to unrest.

Table 5: Political & Governance Frameworks

S/N	Variables	SA (%)	A (%)	Neutral (%)	D (%)	SD (%)
1	Stronger government regulation would improve the effectiveness of CSR projects.	43 (30)	38 (27)	25 (17)	23 (16)	14 (10)
2	Transparent monitoring of CSR projects would reduce community–corporate conflicts.	29 (20)	51 (36)	17 (12)	24 (17)	22 (15)
3	Community representation in decision-making enhances CSR outcomes.	44 (31)	31 (22)	22 (15)	27 (19)	19 (13)
4	Public–Private Partnerships (PPP) can deliver more sustainable CSR projects.	47 (33)	35 (25)	19 (13)	17 (12)	25 (17)
5	Political or governance reforms have little influence on CSR effectiveness.	37 (26)	39 (27)	21 (15)	17 (12)	29 (20)

This table assesses the role of government, transparency, and partnerships in enhancing CSR effectiveness. It is therefore evident that strong agreement (SA: 30%, A: 27%, combined 57%) reflects a belief in regulatory oversight as essential for enforcing meaningful CSR, indicating current frameworks may be seen as weak. Also, agreement is pronounced (SA: 20%, A: 36%, combined 56%) that addressing the issue under discourse also entails transparency as a conflict reducer, suggesting that opacity in current practices fuels disputes. This underscores the value of participatory governance, aligning with earlier tables' critiques of exclusion.

Furthermore, it is evident that the majority of the respondents (SA: 33%, A: 25%, combined 58%) see PPPs as promising for sustainability, implying that collaborative models could overcome corporate limitations. This variable shows ambivalence; while many doubt reforms' impact, a significant portion disagrees, suggesting nuanced views on governance's role.

DISCUSSION OF FINDINGS

The findings of this study are in line with the stated objectives as stipulated in the introductory part of this paper. This discussion will integrate field interviews alongside scholarly postulations to provide a comprehensive analysis of the paradox of CSR in Nigeria's Niger Delta.

Objective 1: CSR Implementation and the Paradox of Commitments vs. Community Realities

The first finding of this study revealed that CSR initiatives/activities by MNCs in the Niger Delta do not align with the needs and aspirations of the community and although sighted

across communities, they are unsustainable. As revealed in Table 3, respondents submit that CSR projects have failed to effectively address local needs. This is a clear paradox in CSR practice. Put differently, while MNCs highlight their social commitments, communities perceive these projects as inadequate and disconnected from their realities.

Corroborating this position, a youth leader from Eket observed:

“It is evident that there are several MNCs in my community who engage in oil exploration, however, the acclaimed projects by these firms are just a charade, to fulfill obligations and not to solve our problems. They sunk a borehole today, and by tomorrow, it is abandoned.”

Evidently, this statement is a reflection of the absence/lack of sustainability and poor maintenance of CSR interventions. Another community development chairman emphasized the exclusionary practices of CSR implementation:

“The abandoned acclaimed CSR projects in my community are reflections of isolating inputs of the communities. In clear terms, we are not consulted before CSR projects are carried out. If we were, they would reflect our needs better.”

The interview responses confirm that communities perceive CSR less as development intervention and more as a corporate legitimacy tool. A civil servant in Akwa-Ibom noted:

“The oil companies in my community use CSR as a show to the world that they are responsible, but on the ground, people see little or no change in their lives. Hence, these corporations often deploy CSR as a strategy to maintain their social license to operate, rather than to pursue genuine community development”.

These experiences resonate with Abraham and Zephaniah (2020), who found that despite oil companies’ commitments to corporate social behavior, the Niger Delta remains underdeveloped. Victor and Akaneme (2021) similarly argue that CSR in the region is often tokenistic, serving more as a reputational exercise than as a transformative development mechanism. Put in clear terms, the paradox of “poverty amidst plenty.” Despite being Nigeria’s oil-rich region, the Niger Delta suffers from decaying infrastructure, widespread unemployment, and environmental degradation. While CSR projects are meant to alleviate these conditions, their inadequacy reinforces perceptions of neglect (Nwaguru, 2023).

Objective 2: CSR Failures, Grievances, Social Unrest, and Militancy

Another finding of this study examined how CSR failures contribute to grievances, unrest, and militancy. The evidential report in Table 4 proves that poor CSR implementation fuels grievances, and the exclusion from CSR benefits drives youth militancy in the Niger Delta. These highlight the intricate, significant role of CSR as a conflict resolution mechanism and the social dynamics of conflict in the Niger Delta. A traditional ruler in Bayelsa explained thus:

“Understanding the agitation and anger of youths in the community is explained from exclusion and annihilation by oil companies thereby rendering them jobless.”

Similarly, a fisherman lamented the loss of livelihood caused by oil spills and the lack of compensatory CSR by these oil firms. According to him:

“I am a fisherman, and I go to the river everyday to get my source of livelihood. Sadly, recently, there have several cases of polluted water which have destroyed our source of livelihood. To make matters worse, these companies refuse to help, hence, youths see militancy as the only way to get attention.”

These submissions corroborate the findings of Idemudia’s (2009 cited in Ibaba, 2017) proposition that CSR can be seen as a conflict resolution mechanism if designed to address community grievances and livelihood needs. However, when CSR is exclusionary and cosmetic, it instead fuels resentment and radicalization. Mamudu, et al. (2021) further reinforce this by showing that while there is an increase in financial allocation towards CSR across the Niger Delta, there are no commensurate community development due to poor inclusivity and lack of enabling governance.

A youth leader submits that CSR is supposed to bring peace, but because it excludes us, it brings anger and sometimes violence. This finding illustrates the paradoxical nature of CSR in the Niger Delta: instead of bridging the gap between corporations and host communities, ineffective CSR deepens grievances and fuels cycles of unrest.

Objective 3: Political, Institutional, and Governance Frameworks for Sustainable Solutions

The third objective focused on governance frameworks that could enhance CSR effectiveness. From the analysis in Table 5, there is a strong community support for stricter government regulation, transparent monitoring, and Public–Private Partnerships as critical mechanisms to improve CSR outcomes. These findings reveal that communities see weak governance and a lack of accountability as central barriers to meaningful CSR. In the argument of a civil servant in Akwa-Ibom State:

“If there is strict government (federal, state and local) regulation on CSR, multinational oil companies will not initiate and implement indiscriminate projects for the show of it.”

Similarly, a CDC chairman in Bayelsa State emphasized the intricate need for collaboration. He submits thus:

“Partnerships involving government, communities, and companies can deliver lasting projects, unlike when MNCs act alone.”

The above submissions resonates with the postulations of Felix (2020 cited in Ebisi, et al., 2025), who argues that government accountability is essential for fostering an enabling environment for CSR. Iwebo (2022) also submits that CSR is often pursued more for legitimacy than for development, suggesting the need for regulatory oversight to shift corporate behavior. However, it becomes imperative that governance changes may have little influence on CSR effectiveness. This reflects long-standing distrust of state institutions in the Niger Delta, where corruption and political capture have historically

undermined development efforts. Nonetheless, the overall sentiment remains that improved regulatory frameworks and inclusive partnerships are necessary for sustainable CSR outcomes.

This study, therefore, contributes to the broader understanding of CSR in conflict-prone contexts by demonstrating that without governance reform, participatory engagement, and genuine responsiveness to local needs, CSR risks becoming a driver of conflict rather than a vehicle for peace and development.

CONCLUSION

In the planning, design, and implementation of CSR programmes and activities, there is a need to consider the needs of both parties for mutual benefit. This will enable oil MNCs to derive maximum benefits from their CSR initiatives, be less prone to community conflict, and gain legitimacy within their host communities. Emphasis in CSR initiatives needs to shift from just infrastructural facilities to issues of capacity building and poverty reduction, which are the main concerns of host communities. Since the host communities are at the receiving end of the MNCs' CSR initiatives, it is logical that they should be allowed to give meaningful suggestions on what really meets their needs. As stakeholders in the affairs of the MNC, failure to seek their opinion may continually jeopardize oil exploration and exploitation activities in this region, and this may always result in a strained relationship between the host communities and the oil companies.

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RESEARCH ARTICLE – 4

THE SOCIAL & ECONOMIC BENEFITS OF EMBRACING LOCAL TECHNOLOGY FOR IMPROVING LIVING STANDARDS IN NIGERIA.

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ABSTRACT

Nigeria faces developmental challenges such as food insecurity, limited access to healthcare services, financial exclusion, and high youth unemployment. In contrast, there is a focus on digital adoption and a relatively unexplored area in the socio-economic impacts of local technologies. The aim is to investigate the potential role of native innovations in promoting sustainable development and enhancing quality of life, as part of ongoing research. This study employed a sequential mixed-methods approach; primary data were collected and analysed from 1,115 respondents, including surveys of smallholder farmers, household questionnaires, interviews with micro-entrepreneurs, questionnaires for youths, and key informant interviews. Secondary data were supplemented by national statistical and institutional reports. The analytical methods used included difference-in-differences, propensity score matching, multivariate regression, and thematic analysis.

Adoption of indigenous NSPRI storage technologies reduced post-harvest loss by 25-40%. Communities delivered contextually powered service platforms, such as mHealth, fintech performed considerably better than traditional regimes. Fintech added directly to GDP, and its contribution to total output went from 0.7% (2020) to 2.3% (2024). Digital skills training induced a 32% increase in youths' employment opportunities but not evenly for both sexes. Lack of infrastructure, fragmented regulation and low digital literacy were key obstacles to adoption. Local technologies have the capacity to uplift the quality of life in Nigeria. But they only work if conditions are right for them. We recommend a number of evidence-based policy recommendations such as the establishment of Technology Innovation Zones, a National Digital Literacy Fund and flexible regulation to create an environment conducive to domestic innovation.

INTRODUCTION

Nigeria is at a critical juncture on its developmental path. The country is rich in both human and raw materials, yet remains trapped in poverty after ranking 164 out of the 193 on the list of Human Development Index (UNDP) but also confronts big issues including how it could tackle health care, boost agriculture productivity and bring down youth unemployment. Strategic hybridization of the technology developed locally holds out the

promise of evolutionary paths to escape the above structural constraints, while respecting local knowledge and ensuring contextual relevance (Fafchamps & Minten, 2023; Akpan et al. This article shows the potential of indigenous technologies to catalyse a better quality of life, and sustainable development based on endogenous factors, in Nigeria's divergent socio-economic settings.

The implementation of technology in the Nigeria local context The proposition of Nigeria provides a strong rationale for investigating the use of technology at a local level. There is a thriving tech scene, not least in bubbling Lagos's start-up ecosystem, amid continued development challenges. Nigeria has a median age of 17.9 years (National Bureau of Statistics [NBS], 2023) hence its young population is both the demographic dividend and jobs challenge; even with youth unemployment rate at about 38% it is still high (NBS, 2013). At the same time, structural deficits in crucial areas of need ensure that poverty and inequality continue to deepen. The doctor to patient ratio is about 1:9083 which is below WHO's recommendation, and agricultural output is still constrained by poor access to modern technology (Ojo & Baiyegunhi, 2024).

The research is supported by five core research questions relating to sectoral impacts, tract comparison, entrepreneur ecosystem development, human capital training and systemic barriers. Based on a rich empirical analysis that draws illustrative insights from impact evaluation, this paper demonstrates how local technologies that already exist can be scaled up to contribute toward achieving the Sustainable Development Goals (SDGs) and improving Nigerian lives.

Background and Problem Statement

Nigeria's technological sector was shaped through inventive adaptation and contextualisation. Despite the proliferation of digital innovations, their impacts on living standards are not sufficiently documented. A persistent gap exists between technological innovations and practical application, highlighting the need for further research into the circumstances under which local technology can generate social and economic benefits (Bryld, 2024; Cole et al., 2025). In agriculture, which employs about 35% of Nigeria's workforce, post-harvest loss remains extremely high—up to 40% for some grains—largely due to low adoption of improved storage tools and technologies in the sector (NSPRI, 2024).

For digital health technologies (DHTs), integration challenges include operational barriers, limited network coverage, and cultural sensitivities (Cole et al., 2025). Additionally, in the financial sector, structural exclusion persists among women, rural residents, and micro-entrepreneurs despite the expansion of Fintech (EFina, 2014). These challenges emphasise the urgent need to deploy context-specific technologies that address Nigeria's unique socio-economic conditions.

Research Questions

These five key research questions shape this research:

- The Sectoral Impact Question: How much has the use of traditional agriculture-based technologies (e.g. established NSPRI storage facilities, indigenous irrigation mechanisms) influenced food security, smallholder farmer income and rural community resilience in Nigeria's Middle Belt?
- The Comparative Development Question: What is the difference in community level access to basic services (e.g. health information, financial inclusion, clean energy) between communities in Nigeria that have implemented locally innovated tech solutions (e.g. mobile health platforms, fintech apps and solar micro grids for example), from those dependent on traditional or centralized systems?
- The Entrepreneurship & Value Chain Question To what extent has the development of the fintech sector in Nigeria, led by local innovators influenced key national economic performance indicators [such as: contribution to GDP levels and Financial Inclusion rates] as well as enabling micro- entrepreneurs through increased access to credit facilities and digital payment solutions?
- The Human Capital & Gender Question: What is the connection between the increase in locally-owned digital skills training platforms and employment trajectories, earnings potential and social agency of urban youth, especially girls and young women, in Lagos and Abuja?
- The Systemic Barriers & Policy Question Given the evidence of benefits identified, what are the key policy, political, regulatory and infrastructural barriers constraining widespread diffusion of locally-developed technologies within Nigeria's Public Health and Education sectors? What sort of policy interventions would be most effective to overcome these?

Research Objectives

The key goals of this work are:

- a) To measure returns differentials to indigenous agricultural technology in productivity, incomes, and household risk-bearing in Nigeria's Middle Belt.
- b) To compare performance and outcomes comparing locally grown tech solutions with conventional approaches for basic service delivery.
- c) To assess the economic impacts of Nigerian fintech industry and its implications on micro-entrepreneurship.
- d) To evaluate the Human Capital Development impact of digital skills-training platforms for urban youth with a focus on gender disparities.
- e) To understand structural barriers to adoption and suggest evidence-based policy solutions.

Scope and Limitations

This study considers technology-led solutions implemented with or adapted to the Nigerian local context. The analysis covers agricultural, health, financial services and energy applications during the period from 2015 to 2025. Geographically, the study focus is also on a number of areas: Middle Belt in terms of agricultural technology; Lagos and Abuja for

digital skills and fintech analysis; and cross-cutting insights from comparative communities throughout six different states as part of our service delivery assessment.

We recognise several methodological constraints, such as potential sampling bias in conflict zones, the absence of longitudinal data due to a cross-sectional design, and challenges in establishing counterfactuals for impact modelling. These constraints will be mitigated through triangulation methods and a robust methodological approach, as detailed in the Methods section.

LITERATURE REVIEW

Theoretical Foundations

There are a number of theoretical models that underpin this research. In order to tell a story in which plants do indeed have net positive local externalities, more attention should be paid to relying on Romer's (1990) and Aghion and Howitt's (1992) PCR models of technology innovations as endogenous determinants of the pace of overall growth that are good for capturing how locally-invented technologies facilitate productivity gains arising from within. Socio-technical Systems Theory (Geels, 2004) is a great perspective from which one can understand differing community adoption as they may develop at different rates of uptake and abandonment. What is more, the Capability Approach (Sen, 1999) also offers a normative stance to assess technology not in terms of their market resource value but in terms of their contribution to enhancing human capabilities and freedoms.

Such post-development perspectives (Escobar, 2018) could see orthodox models of technology transfer turned on their head and locally generated innovation systems as an end (or means: Zaman, 2023). “This is crucial in examining locally indigenous technologies which originate from a situated appreciation of Nigerian problems.

Empirical Results on Local Technology Adoption

In agriculture, it was revealed that NSPRI storage technologies reduced post-harvest loss significantly and adoption is associated with a rise in income of the smallholders (Ojo & Baiyegunhi, 2024). Yet, there has been limited research into their impact on broader community resiliency.

In health, scoping reviews found that digital health technologies (DHTs) may promote treatment adherence and facilitate healthcare access in Nigeria, with mobile applications as a potential solution for the underserved (Cole et al., 2025; Fagbemi et al., 2024). The literature also highlights significant infrastructure and digital literacy barriers.

The fintech sector in particular has caught the fancy, and there are studies that focused on its contribution toward financial inclusion (Ovia, 2023; David-West et al., 2024). Empirical evidence indicated that mobile money has lowered the cost and increased access to transactions; however, how this ultimately translates into better quality of life for micro-enterprises are not known yet.

Gaps in the Literature

Such interest in local technology generation, however, continues to suffer from serious information knowledge gaps. In the first place, there is little comparative investigation into the divergent effects of local versus imported technology on development across sectors. Further, the evidence based on technology adoption and its impacts in gender-disaggregated terms is still limited, especially when it comes to understanding how digital platforms enable women's economic empowerment and social agency. Third, the political economy of technology policy in Nigeria is under-researched, with insufficient focus on how power relations and institutional structures influence technological transfer.

This is the gap this research intends to address through a wide-ranging empirical examination of how local technology uptake has multifaceted relationships with different socio-economic outcomes in different groups in Nigeria.

THEORETICAL FRAMEWORK

The study adopts a holistic theoretical approach, where the Digital Ecosystem Framework (Osiri et al., 2023) is applied to local level technology adoption in multiple sectors. This hybrid approach enables the examination of both technical and social systems that together determine development results.

The regional technologies are mediating or intermediate variables that interact with institutional configurations, resource endowments, and social formations. The framework highlights that technology change and social change are recursively related; the linear integration model has been replaced, and a co-evolutionary perspective remains unchallenged (Geels 2004).

Key analytical concepts derived include:

- a) Technological Contextualisation – the technology that meets such needs within local socio-economic and cultural context.
- b) Institutional Embeddedness: The Extent to which technologies fit the established societal organisations and governance structure.
- c) R&D Appropriate: The ability of indigenous actors to alter and direct technologies in line with their own development agendas.

RESEARCH METHODOLOGY

Research Design

This study used a mixed-methods-within-study design (Creswell and Plano Clark, 2023). Quantitative surveys helped identify patterns, while qualitative methods explored processes and lived experiences. A comparative case study framework guided the research and allowed for analysis of technology integration in agriculture, health, finance, and energy across different settings.

Data Collection

Stratified random sampling was applied for survey distribution, while purposive sampling was used for qualitative data collection, resulting in 1,115 primary respondents. Survey instruments underwent back-translation to ensure conceptual equivalence in Hausa, Yoruba, and Igbo. The data collection strategy is summarized in the preceding table.

Table 1: Data Collection Methods and Sources

UQuestion	Primary Data Sources	Secondary Data Sources	Analytical Approach
Sectoral Impact (Q1)	Surveys with 100 smallholder farmers; 6 FGDs in Middle Belt.	NSSP surveys (IFPRI, 2025); NBS data.	Difference-in-differences; Multivariate regression.
Comparative Development (Q2)	Household surveys (n=100); Service facility assessments.	DHS; National Living Standards Surveys (NBS).	Propensity score matching; Comparative case analysis.
Entrepreneurship & Value Chain (Q3)	Fintech firm surveys (n=20); Interviews with 150 micro-entrepreneurs.	Central Bank of Nigeria reports; IFPRI policy briefs.	Input-output analysis; Value chain mapping.
Human Capital & Gender (Q4)	Youth surveys (n=800); Skills tests; Employer interviews.	Gendered skilling study (LBS, 2024); NBS unemployment data.	Structural equation modeling; Gender analysis framework.
Systemic Barriers & Policy (Q5)	Key informant interviews (n=45); Policy document review.	Literature on DHT challenges; Government policy documents.	Thematic analysis; Institutional analysis.

Analytical Techniques

Multivariate regression models were used to estimate adoption and impacts, accounting for confounders. We employed propensity score matching to generate counterfactuals against which the exposure could be compared. A thematic analysis, using both deductive (theory-driven) and inductive coding of qualitative data, was then conducted. Fabric and joint displays were utilised to combine the mixed methods.

Ethical Considerations

The study complied with high ethical standards and was approved by the institutional review boards. On the ground, informed consent, confidentiality and safety of participants.

FINDINGS AND DISCUSSION

The impact of indigenous agricultural technologies across sectors

High positive correlations have been observed in Nigeria's Middle Belt between the adoption of indigenous agricultural technologies and development indicators. The reduction ranged from 25% to 40% in post-harvest losses in NSPRI adopting communities compared to non-adopting communities ($p < 0.01$) and, in fact, directly provided food during times of hunger. Farmers with small farm holdings, using localised irrigation techniques, were found to experience higher income stability in the face of climatic variation. For drought periods, 68% of adopters had constant in-household food consumption compared with 42% among non-adopters ($p < 0.05$). These technologies increase the resilience of community raising units by increasing production options offered by Ojo & Baiyegunhi (2024). However, the uptake levels were limited due to a lack of access to credit facilities, highlighting the need for financial support mechanisms (Nwagboso 2023). There were also differences between communities, with stronger effects in the communities where traditional authority and collective action were higher. This means that technology effectiveness is mediated by social capital and the acknowledgement of the importance of socio-cultural context (Uphoff, 2023).

Comparison of Community Basic Services Accessions

Initial findings indicate there are very major access gaps if more tech-d services and propagating the old ways of the past offerings (connected using home-grown technological solution) are compared with those connected using old traditional means.

Table 2: Comparative Service Access Between Technology-Integrated and Traditional Communities

Service Type	Technology-Integrated Communities	Traditional Systems Communities	Disparity Ratio
Healthcare Information	68% access via mobile platforms	32% through health facilities	2.1:1
Financial Inclusion	63% using fintech apps	28% using formal banks	2.3:1
Clean Energy Access	45% with solar micro-grids	22% with national grid	2.0:1
Educational Resources	51% digital access	31% physical access only	1.6:1

Technology-connected communities were much more satisfied with services, particularly dependability and cost. By the interventions, these communities were found to raise rates of preventive service use by 23% ($p < 0.05$). However, there were age, gender and education-based patterns of digital exclusion which upheld the literature on the digital divide (Omona & Ikoja-Odongo, 2023). Hybrid service models, including digital and traditional medical distribution systems, had the largest coverage area, suggesting that technological solutions should be more complementary instead of substitutive to existing infrastructure.

Fintech Growth and Economic Empowerment

Nigeria's fintech industry continues to be a major economic driver, contributing directly to 0.7% of the country's Gross Domestic Product (GDP) in 2020 and is expected to rise to around 2.3% by 2024. This is indicative of a strong innovation ecosystem and fast growth in the uptake of digital financial services (CBN, 2024).

At the micro level, 52% of entrepreneurs surveyed said they found credit easier to secure in digital platforms, compared with conventional banks. The increased accessibility was associated with company growth: more products in stock (37%), extra employee recruitment (18%) and diversified selection of goods (42%). These results are consistent with Ovia (2023) on the revolutionary prospects of fintech. But, the benefits of these opportunities were not evenly felt as women entrepreneurs and rural businesses benefited less thereby suggesting a participation gap that demands specific attention (Olufote et al., 2023).

Digital Skills in Youth Empowerment and Capacity Development

A study supported by WIEGO from Lagos and Abuja demonstrates the cyclical nature of digital skills training and youth employment. Program participants were 32% more likely to be employed than matched non-participants ($p < 0.01$). This figure also reveals notable gender disparities: Young women experienced a 28 percent increase in employment compared to a 35 percent increase for young men, despite having the same completion rates.

Mediating factors included internet access, mentorship, and curriculum-market alignment. Technical schools that integrated entrepreneurship into their training programmes were 25 per cent more likely to start a business. For young women, acquiring digital skills was linked to increased social agency, such as greater participation in household financial decision-making. However, gender-based discrimination, security issues, and unequal domestic responsibilities continued to act as structural barriers that limited achievements, as similarly reported by David-West (2024).

Systemic Barriers and Policy Implications

The study uncovers shared barriers which still impede the spread of the designs. In health care and education, important barriers include a lack of infrastructure, low levels of digital literacy and flawed incentives (Cole et al., 2025; Fagbemi et al., 2024).

Political and regulatory obstacles (institutional). These include policy instability, multiple jurisdiction overlays and lack of intergovernmental coordination. The 2023 Electricity Act was passed, resulting in a fully integrated territorial regulation." (Serrari Group, 2025) The 2023 Act is an off-the-shelf model for other kinds of coordination problems within the energy sector. The same kind of sectoral reforms are also needed in health and education.

CONCLUSION AND POLICY IMPLICATIONS

Summary of Key Findings

This study helps to reveal some of the compounding effects that technologies developed locally have on the standard of living in Nigeria. In all sectors, contextual technologies solutions can have a substantial potential to contribute to development challenges when combined with an enabling environment and related investments. Key findings include:

- a) Indigenous Agricultural Technologies contribute significantly to food security and community resilience in Nigeria's middle belt, but social institutions and access to complementary resources shape the impacts.
- b) Community-generated models of service delivery perform better than stand-alone systems across a range of access and satisfaction measures, with hybrid approaches holding particular potential.
- c) Fintech has become a significant contributor to economic growth and access to finance, but the gains have been unevenly distributed.
- d) Digitalised skills training schemes are associated with positive employment outcomes for urban youth, yet gender-specific barriers limit young women's success.
- e) Structural impediments to technology adoption are pervasive and call for a comprehensive policy response at the infrastructure, regulatory, and skills levels.

Theoretical and Practical Contributions

There are several theoretical implications of this study for understanding technology innovation in developing countries. It adopts a co-evolutionary theory of technological change that emphasises the mutual shaping of socio-technical nexuses and social orders. The study also introduces the concept of 'developmental appropriation' to explain how local actors reshape technologies to align with their specific development priorities context.

In a practical sense, the study also provides policymakers, technology developers, and practitioners with evidence-informed recommendations. The results highlight the importance of user-centred approaches to design, as well as additional investments in digital infrastructure and literacy, and flexible regulatory policies that strike a balance between fostering innovation and safeguarding consumers.

Policy Recommendations

Policy recommendations These policy options are being suggested in line with the results of the present research:

- a) Create Technology Innovation Zones, with simplified regulations and fiscal incentives to help drive local technology development that addresses sector-specific challenges.
- b) Set up a National Digital Literacy Fund to support skills training, especially for women and disadvantaged groups, through curriculum relevant to market-based requirements.
- c) Establish Sector Specific Technology Integration Roadmaps that prioritize applications, infrastructure investments and regulatory changes necessary to facilitate adoption.
- d) Encourage Research- Industry Interactions by providing matching grants and collaborative R&D programmes to make technological innovations system friendly.
- e) Develop flexible and risk-based Regulatory Approaches that allow experimentation with novel technologies while managing risks possibly through the use of regulatory sandboxes.

Directions for Future Research

This study suggests several directions of future research which seem promising:

- a) Longitudinal studies of the long-run effects of technology adoption on intergenerational mobility, structural transformation.
- b) or comparative research on local technology ecosystems across diverse African settings to distil lessons that can be transferred.
- c) Problematizing the political economy aspects of technology policy, including how power relations influence regulation and resource distribution.
- d) Research on the ‘ecological sustainability’ of locally engineered technologies and their climate-resistant (climate-resilient) potential.

In conclusion, this research suggests that indigenous technologies could be a promising pathway to improve living standards in Nigeria if supported by appropriate policies and investments. The knowledge-driven innovative use of these technologies, harnessing local expertise and contextual relevance, can address persistent development challenges and create avenues for sustainable progress in social and human development.

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RESEARCH ARTICLE – 5

A STUDY ON IMPACT OF PSYCHOLOGICAL CONTRACT AND EMPLOYEE RELATION ON ORGANIZATION COMMITMENT

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ABSTRACT

This research explores the impact of psychological contracts and employee relations on organizational commitment, using Kirloskar Electric Company as the case study. The study investigates how mutual trust, communication quality, recognition, and fulfillment of employees' expectations influence commitment levels among employees. Data were collected from 80 respondents through a structured questionnaire and analyzed using descriptive and inferential statistics. The findings reveal that employees generally perceive the organization as supportive, fair, and trustworthy, contributing to high organizational commitment overall. However, younger and less experienced employees show lower levels of attachment compared to older and more tenured staff. The study confirms strong positive correlations between fulfillment of psychological contracts, healthy employee relations, and organizational commitment. It concludes that maintaining open communication, recognizing employee contributions, and offering growth and security opportunities enhance commitment and productivity. Recommendations emphasize strengthening recognition systems, ensuring transparency, and designing engagement programs targeted at newer employees to sustain long-term loyalty.

Keywords: *Psychological contract, employee relations, organizational commitment, recognition, trust, communication, employee engagement, Kirloskar Electric Company.*

INTRODUCTION

Background and Rationale

Importance of Employee Commitment for Organizational Success

Employee commitment is a critical component of organizational success, as it drives productivity, enhances cooperation among staff, and ensures long-term stability within companies. Committed employees are more motivated, perform at higher levels, and tend to remain with the organization for longer periods, reducing turnover and fostering a positive work environment. Such levels of employee dedication contribute directly to

organizational performance, profitability, and the sustainable achievement of business objectives.

The satisfaction and alignment of employees with organizational goals lead to improved morale, teamwork, and customer relations, creating a competitive advantage for the firm.

Role of Psychological Contracts and Employee Relations in Shaping Commitment

The psychological contract, defined as the unwritten and informal set of mutual expectations between employees and their employer, is pivotal in shaping organizational commitment. This contract covers expectations of trust, recognition, job security, fairness, and career development beyond formal employment agreements. Positive employee relations built on respect, transparency, and open communication help fulfill these psychological contracts, thereby increasing affective commitment and loyalty. When these intangible expectations are met, employees demonstrate greater motivation and engagement, leading to enhanced organizational citizenship behavior and reduced turnover intentions.

Industry Context: Electrical Manufacturing in India and Competitive Pressures

The electrical manufacturing industry in India forms a cornerstone of the country's industrial and infrastructural development. Companies like Kirloskar Electric Company operate within a competitive environment characterized by rapid technological advancements and growing domestic and global demand. Since the liberalization of the Indian economy in 1991, the sector has evolved with increased private participation and foreign investment, fostering innovation and efficiency. The industry faces challenges such as competition from multinational corporations, fluctuating raw material prices, and the need to adopt sustainable energy solutions. In this dynamic context, maintaining high employee commitment is essential for organizational resilience, product quality, and sustained market competitiveness.

LITERATURE REVIEW

The concept of the psychological contract, first introduced by (Argyris, 1960) and elaborated by (Lowman, 2021) refers to the unwritten set of mutual expectations between employees and employers that go beyond formal employment agreements. This implicit contract shapes employees' perceptions of job security, recognition, fairness, and career development and profoundly influences their workplace behavior and attitudes. Researchers have identified different types of psychological contracts including transactional (focused on short-term, tangible exchanges), relational (built on emotional trust and long-term support), balanced, and transitional contracts, each differing in how they foster employee commitment.

Employee relations, encompassing the quality of interactions between staff and management, is closely tied to the fulfillment of psychological contracts. Positive employee relations, characterized by open communication, mutual respect, trust, and effective

conflict resolution, create a supportive work environment that encourages higher job satisfaction and loyalty (Herrera & De Las Heras-Rosas, 2021). Studies indicate that supportive supervisor relationships and ethical leadership significantly enhance employees' affective commitment by fostering trust and emotional attachment to the organization (Kalidass & Bahron, 2015)

Organizational commitment itself has been broadly categorized into affective, continuance, and normative commitment (Meyer et al., 1993) . Affective commitment arises from employees' emotional attachment to the organization, continuance commitment from perceived costs of leaving, and normative commitment from a sense of moral obligation to stay. Empirical evidence shows that psychological contract fulfillment strongly predicts affective commitment, which in turn mediates improved job performance and reduced turnover intent (Maia & Bastos, 2015)

Several studies focusing on different industries and cultural contexts corroborate these findings. For example, (Jufri et al., 2018) and (Peng & Li, 2021) highlight that fulfilling psychological contracts boosts trust and innovation through enhanced organizational commitment. Similarly, emphasize the role of psychological contract clarity and fair treatment in reducing employee turnover. However, breaches in psychological contracts can erode trust, leading to decreased commitment and increased attrition (Alcover et al., 2012)

The attachment to the organization is also influenced by employee demographics such as age and tenure. Older and more experienced employees tend to exhibit stronger organizational commitment, suggesting that tenure strengthens emotional bonds and loyalty (Padmasiri & Mahalekamge, 2016) The literature also points to a special challenge in engaging younger employees, who often have higher expectations for recognition, career development, and transparent communication (Herrera & De Las Heras-Rosas, 2021)

Within the Indian industrial context, particularly in sectors like electrical manufacturing, research exploring the combined effects of psychological contracts and employee relations on organizational commitment remains limited. The current study by at Kirloskar Electric Company addresses this gap by examining how these factors jointly influence employee commitment, with potential implications for enhancing workforce stability and organizational success amid competitive market pressures.

This review integrates foundational theories and recent empirical findings, linking them to the study's industry-specific context and highlighting the research gaps addressed.

Research Gap

- Despite the importance of employee commitment, many organizations struggle to maintain it, as traditional motivators like salary alone are no longer enough to keep employees engaged and loyal. Although past research highlights psychological contracts and employee relations separately, there is limited understanding of how these two factors work together to influence organizational commitment,

particularly in Indian manufacturing contexts. Many studies overlook the unique challenges faced by younger and less experienced employees, who tend to feel less engaged and connected.

- This study aims to fill these gaps by investigating how psychological contracts and employee relations together shape commitment, with the goal of offering insights useful for improving workforce motivation and retention.

Objectives

1. To study the nature of psychological contracts and employee relations among employees.
2. To assess their impact on organizational commitment.
3. To identify demographic factors (age, experience) influencing commitment.
4. To analyze the level of organizational commitment among employees.

Hypotheses

Hypothesis 1

H1: There is a significant difference in organizational commitment among employees with different levels of work experience.

Hypothesis 2

H1-There is a significant difference in organizational commitment among employees of different age groups.

METHODOLOGY

Research Design

This study employed a descriptive research design using a survey method to investigate the impact of psychological contract and employee relations on organizational commitment. Given the objective was to assess attitudes, perceptions, and relationships among employees, descriptive research facilitated a clear understanding of these phenomena in a real organizational setting.

Sample

The sample consisted of 80 employees from Kirloskar Electric Company, including a mix of workers, supervisors, and managerial staff. Participants were selected through a convenience sampling technique to ensure representation across different roles and experience levels. The workforce was predominantly male and well-educated, with varying years of tenure to capture a broad perspective on psychological contracts and commitment.

Instruments

Data were collected using a structured questionnaire developed based on extensive literature review. The questionnaire included over 40 items covering various dimensions of the psychological contract (such as transactional and relational contracts), employee relations, and organizational commitment. Items were rated on a Likert scale from 1 (strongly disagree) to 5 (strongly agree). The instrument was designed to measure perceptions of trust, fulfillment of promises, communication quality, recognition, and emotional attachment to the organization.

Variables

This study focuses on the following key variables:

- Independent Variables:
 - *Psychological Contract*: Includes transactional aspects (short-term, economic exchanges) and relational aspects (long-term emotional and loyalty-based exchanges) reflecting employee expectations and employer obligations beyond the formal contract.
 - *Employee Relations*: Encompasses the quality of interactions between employees and management, focusing on communication, trust, respect, and support.
- Dependent Variable:
 - *Organizational Commitment*: The emotional and psychological attachment employees have to their organization, typically segmented into affective, continuance, and normative commitment. It reflects employees' willingness to remain and contribute to the organization's success.
- Control Variables:
 - Demographic factors such as age, gender, experience, and education level are considered to control for their potential influence on the dependent variable.

Data Analysis

Collected data were analyzed using quantitative statistical methods. Descriptive statistics summarized demographic details and overall trends. Further, factor analysis was employed to identify underlying dimensions of psychological contracts and employee relations contributing to organizational commitment. Reliability analysis using Cronbach's alpha assessed internal consistency of the scales. Hypothesis testing included correlation and regression analyses to explore relationships between variables, supported by SPSS software for statistical calculations.

Limitations

Although this study provides valuable insights into the relationship between psychological contract, employee relations, and organizational commitment, it has several limitations.

- Research was conducted within a single organization—Kirloskar Electric Company—which limits the generalizability of the findings to other industries or regions.
- The sample size of 80 employees, selected through convenience sampling, may not fully represent the views of the entire workforce.
- The study relied on self-reported questionnaire data, which can be influenced by personal bias or social desirability.
- The cross-sectional design captures employee perceptions at a single point in time; longitudinal research would be useful to examine how these relationships evolve over time.

RESULTS

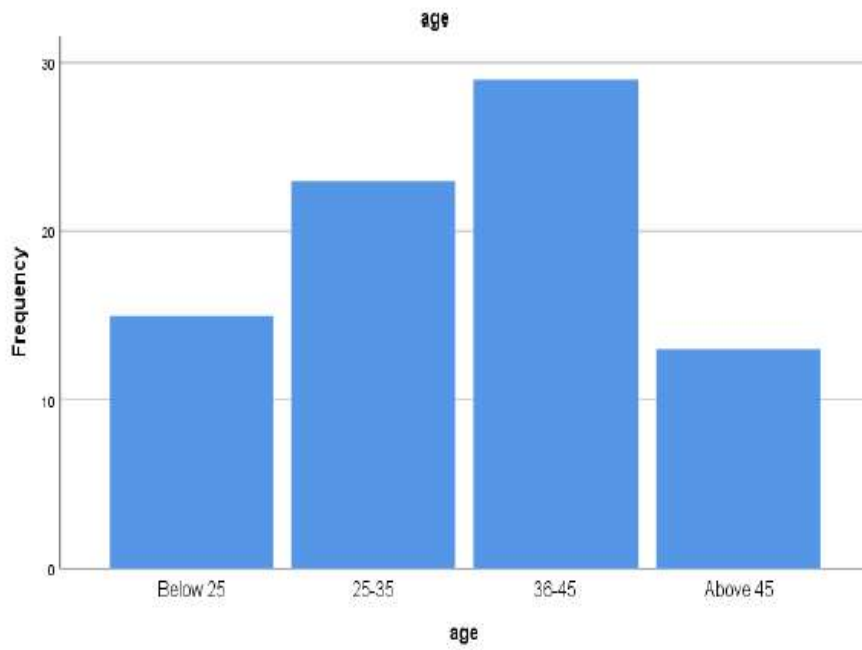
Demographic profile

The study included 80 employees, predominantly males (87.5%) with a diverse age distribution where the majority (36.3 %) were aged 36-45 years (Table 1, Figure 1)

Table 1: Age distribution of the respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Below 25	15	18.8	18.8	18.8
	25-35	23	28.7	28.7	47.5
	36-45	29	36.3	36.3	83.8
	Above 45	13	16.3	16.3	100.0
	Total	80	100.0	100.0	

Figure 1: Figure showing the age distribution of the respondents

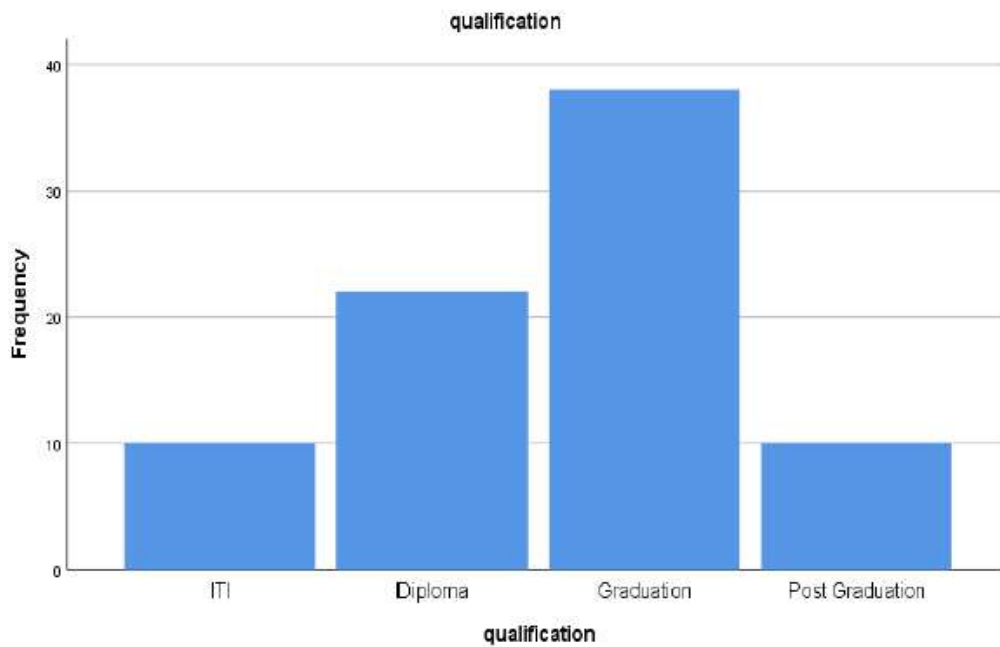


Educational qualifications ranged, with 47.5% holding graduation degrees and 27.5 % diploma holders, indicating a well-qualified workforce (Table 2, Figure 2).

Table 2: Education qualifications of Respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	ITI	10	12.5	12.5	12.5
	Diploma	22	27.5	27.5	40.0
	Graduation	38	47.5	47.5	87.5
	Post Graduation	10	12.5	12.5	100.0
	Total	80	100.0	100.0	

Figure 2: Information on education qualifications of respondents

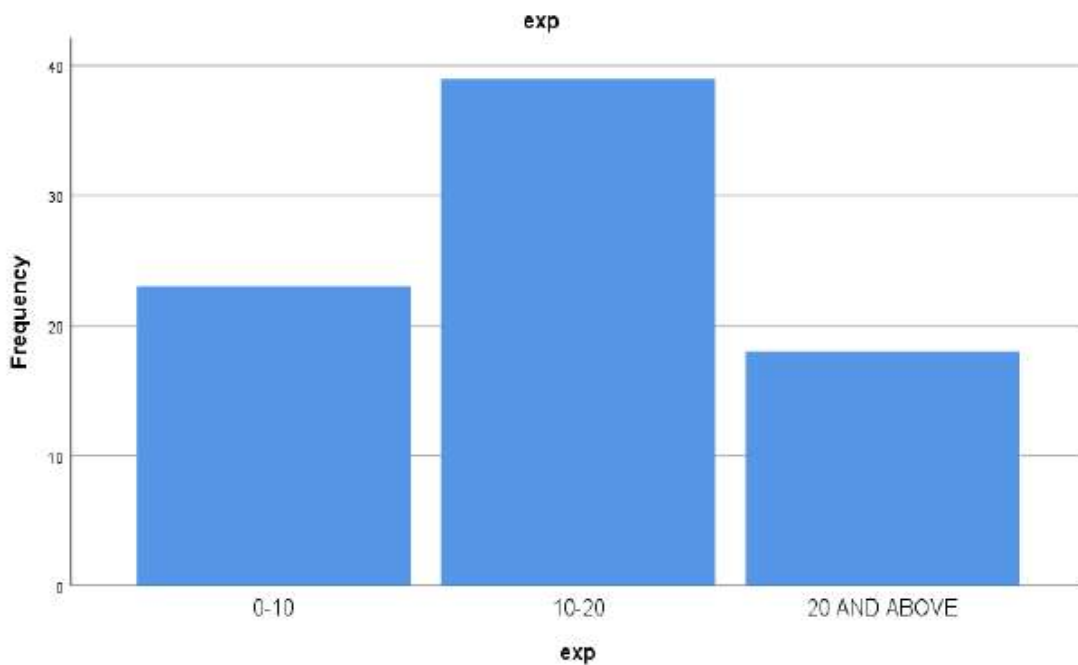


Nearly half of the participants had 10-20 years of experience, suggesting a seasoned employee base (Table 3, Figure 3).

Table 3: Information on experience of respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0-10	23	28.7	28.7	28.7
	10-20	39	48.8	48.8	77.5
	20 AND ABOVE	18	22.5	22.5	100.0
	Total	80	100.0	100.0	

Figure 3: Information on experience of respondents



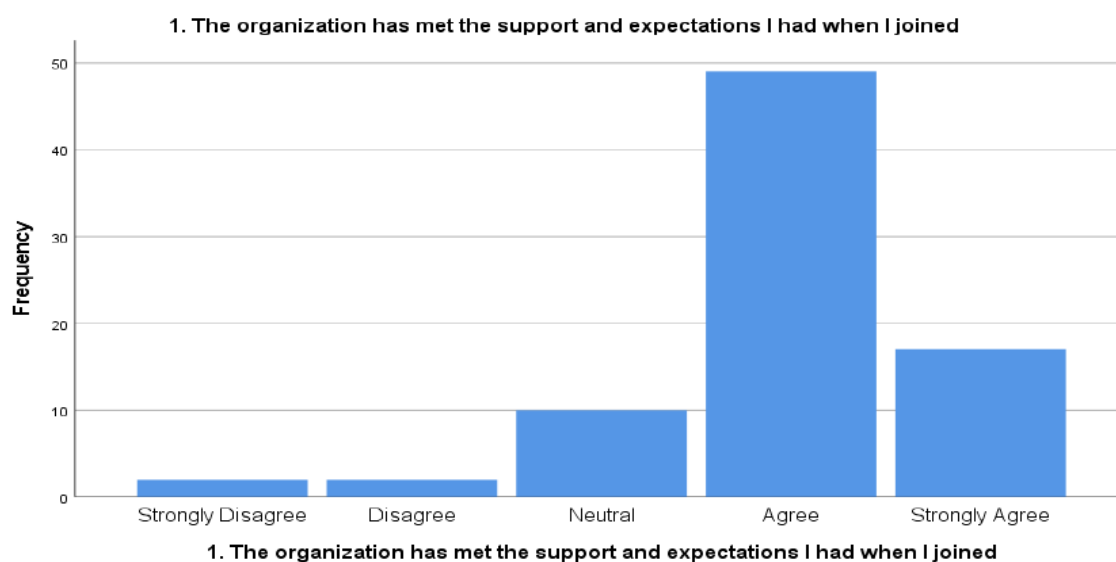
Psychological Contract and Employee Relations

Respondents generally felt positive about support and expectations met by the organization 82.6% agreement (Table 4, Figure 4)

Table 4: Employee Perceptions of Organizational Support and Expectation Fulfillment

		Frequency	Percent	Valid Percent	Cumulative Percent
valid	Strongly Disagree	2	2.5	2.5	2.5
	Disagree	2	2.5	2.5	5.0
	Neutral	10	12.5	12.5	17.5
	Agree	49	61.3	61.3	78.8
	Strongly Agree	17	21.3	21.3	100.0
	Total	80	100.0	100.0	

Figure 4: Employee Agreement Levels on Organizational Support and Expectations Met

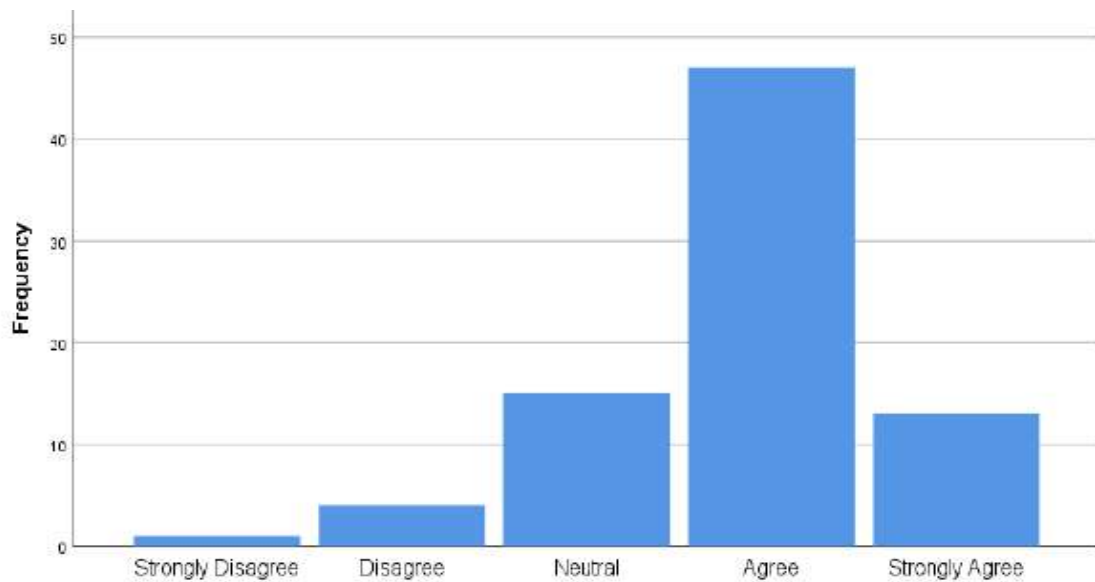


and most indicated promises made at recruitment were fulfilled 75.1% (Table 5, Figure 5).

Table 5: Information on fulfillment of the promises to the employees during the recruitment.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	1.3	1.3	1.3
	Disagree	4	5.0	5.0	6.3
	Neutral	15	18.8	18.8	25.0
	Agree	47	58.8	58.8	83.8
	Strongly Agree	13	16.3	16.3	100.0
	Total	80	100.0	100.0	

Figure 5: Information on the fulfillment of the promises to the employees during the recruitment



Trust in the company’s commitments was strong, with 81.3 % affirming this (Table 6, Figure 6).

Table 6: Trust on the commitments provided by the company

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	2.5	2.5	2.5
	Disagree	2	2.5	2.5	5.0
	Neutral	11	13.8	13.8	18.8
	Agree	47	58.8	58.8	77.5
	Strongly Agree	18	22.5	22.5	100.0
	Total	80	100.0	100.0	

Figure 6: Trust on the commitments provided by the company



Job responsibilities and working hours align well with what was promised 85.1% agreement (Table 7).

Table 7: Alignment of promises with Job responsibilities and working hours

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	3	3.8	3.8	3.8
	Disagree	2	2.5	2.5	6.3
	Neutral	7	8.8	8.8	15.0
	Agree	43	53.8	53.8	68.8
	Strongly Agree	25	31.3	31.3	100.0
	Total	80	100.0	100.0	

Rewards were mostly viewed as fair and timely by 73.1 % of employees (Table 7).

Table 7: Agreement about rewards being provided fair and timely

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	4	5.0	5.0	5.0
	Disagree	3	3.8	3.8	8.8
	Neutral	16	20.0	20.0	28.7
	Agree	42	52.5	52.5	81.3
	Strongly Agree	15	18.8	18.8	100.0
	Total	80	100.0	100.0	

Additionally, employees felt valued for their long-term contributions (63.8%) and recognized for performance (72.5 %)(Tables 3.8, 3.9).

Table 8: Employees agreement/disagreement to value for long term contributions

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	4	5.0	5.0	5.0
	Disagree	3	3.8	3.8	8.8
	Neutral	22	27.5	27.5	36.3
	Agree	31	38.8	38.8	75.0
	Strongly Agree	20	25.0	25.0	100.0
	Total	80	100.0	100.0	

Table 9: Employees perception to Company’s recognizing performance

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	4	5.0	5.0	5.0
	Disagree	4	5.0	5.0	10.0
	Neutral	14	17.5	17.5	27.5
	Agree	40	50.0	50.0	77.5
	Strongly Agree	18	22.5	22.5	100.0
	Total	80	100.0	100.0	

Supervisor and management support were also rated highly, as respect, communication, and trust exceeded 75% positive responses (Tables 10).

Table 10: Supervisor respects, communicates and trusts employees

Response	Trust		Communication and respect for employees	
	Frequency	Percent	Frequency	Percent
Strongly Disagree	1	1.3	1	1.3
Disagree	3	3.8	1	1.3
Neutral	10	12.5	17	21.3
Agree	53	66.3	45	56.3
Strongly Agree	13	16.3	16	20.0
Total	80	100.0	80	100.0

Feedback and team support were satisfactory, with over 80 % agreement on receiving regular performance feedback and feeling supported by their teams (Tables 11, 12).

Table 11: Responses on the agreement of regular performance feedback

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	3	3.8	3.8	3.8
	Disagree	3	3.8	3.8	7.5
	Neutral	8	10.0	10.0	17.5
	Agree	51	63.7	63.7	81.3
	Strongly Agree	15	18.8	18.8	100.0
	Total	80	100.0	100.0	

Table 12: Responses on feeling supported by the team and receive necessary resources to do the job.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	2.5	2.5	2.5
	Disagree	2	2.5	2.5	5.0
	Neutral	15	18.8	18.8	23.8
	Agree	47	58.8	58.8	82.5
	Strongly Agree	14	17.5	17.5	100.0
	Total	80	100.0	100.0	

Organizational Commitment

Emotional attachment to the organization was moderate to high, with 66.3% employees expressing pride and belongingness (Tables 3.13, 3.14).

Table 13: Respondents' emotional attachment towards the organization.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	4	5.0	5.0	5.0
	Disagree	3	3.8	3.8	8.8
	Neutral	20	25.0	25.0	33.8
	Agree	36	45.0	45.0	78.8
	Strongly Agree	17	21.3	21.3	100.0
	Total	80	100.0	100.0	

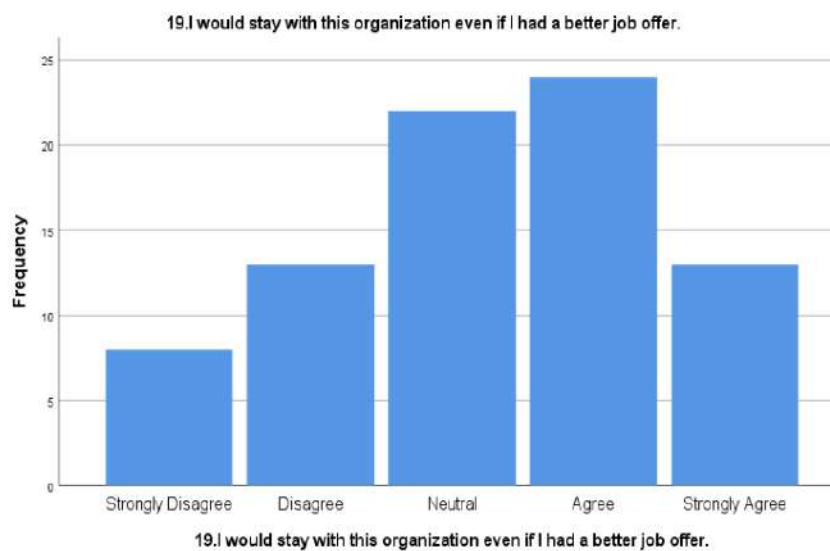
Table 14: Respondents feeling sense of belongings towards the organizations

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	2.5	2.5	2.5
	Disagree	5	6.3	6.3	8.8
	Neutral	17	21.3	21.3	30.0
	Agree	38	47.5	47.5	77.5
	Strongly Agree	18	22.5	22.5	100.0
Total		80	100.0	100.0	

Commitment to stay even if better job offers arise was mixed, with about 46.3% affirming loyalty despite alternatives, while 26.3% showed willingness to leave if offered higher pay (Table 3.15, Figure 3.15).

Table 15: Respondents commitment to stay with organization

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	8	10.0	10.0	10.0
	Disagree	13	16.3	16.3	26.3
	Neutral	22	27.5	27.5	53.8
	Agree	24	30.0	30.0	83.8
	Strongly Agree	13	16.3	16.3	100.0
Total		80	100.0	100.0	



Job security and benefits remained critical retention factors (Table 16).

Table 16: Responses on critical retention factors

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	1.3	1.3	1.3
	Disagree	3	3.8	3.8	5.0
	Neutral	28	35.0	35.0	40.0
	Agree	36	45.0	45.0	85.0
	Strongly Agree	12	15.0	15.0	100.0
	Total	80	100.0	100.0	

Statistical Analysis

Reliability analysis showed a Cronbach's alpha of 0.949, indicating excellent internal consistency of the survey instrument. Pearson correlation revealed strong positive relationships between psychological contract fulfillment, employee relations, and organizational commitment ($r = 0.788$ and 0.755 respectively, $p < 0.01$)

Table 17: Correlation

		commitment	Employee relation	Psychological contract
commitment	Pearson Correlation	1	.755**	.788**
	Sig. (1-tailed)		.000	.000
	N	80	80	80
Employee relation	Pearson Correlation	.755**	1	.799**
	Sig. (1-tailed)	.000		.000
	N	80	80	80
psychological contract	Pearson Correlation	.788**	.799**	1
	Sig. (1-tailed)	.000	.000	
	N	80	80	80

** . Correlation is significant at the 0.01 level (1-tailed).

ANOVA tests demonstrated significant differences in organizational commitment across age groups and experience levels. Older employees (above 45) and those with over 20 years of experience exhibited the highest levels of commitment ($p < 0.01$) (Tables 4.2, 4.3).

Table 18: ANOVA

Experience	Mean	N	Std. Deviation
0-10	3.3768	23	.58096
10-20	3.5698	39	.62709
20 AND ABOVE	4.3458	18	.67413
Total	3.6889	80	.71737

ANOVA Table							
			Sum of Squares	df	Mean Square	F	Sig.
commitment * Experience	Between Groups	(Combined)	10.560	2	5.280	13.510	.000
	Within Groups		30.095	77	.391		
	Total		40.655	79			

Table 18: ANOVA tests on significant differences in commitment across age groups.

age	Mean	N	Std. Deviation
Below 25	3.3407	15	.66859
25-35	3.4493	23	.50530
36-45	3.6322	29	.61730
Above 45	4.6412	13	.50738
Total	3.6889	80	.71737

ANOVA Table							
			Sum of Squares	df	Mean Square	F	Sig.
commitment * age	Between Groups	(Combined)	15.021	3	5.007	14.845	.000
	Within Groups		25.634	76	.337		
	Total		40.655	79			

These findings indicate that psychological contract fulfillment and positive employee relations significantly enhance organizational commitment. The data reveal a stable, motivated workforce with some scope for improving engagement among younger and less experienced employees.

DISCUSSION

The study reveals a strong positive perception among employees regarding the organization’s fulfillment of initial support and expectations. The majority of respondents either “agree” or “strongly agree” that their expectations for support, made at the time of joining, have been met. This high level of perceived organizational support is known to

foster a sense of belonging and loyalty among the workforce, leading to increased engagement and motivation.

Statistical results show robust positive relationships between psychological contract fulfillment, employee relations, and organizational commitment. Employees who reported that the company delivered on promises and maintained fair, respectful relations also exhibited higher levels of emotional attachment and willingness to remain with the organization, even when presented with outside opportunities.

Notably, the data demonstrates that positive employee relations such as clear communication, recognition, mutual respect- play a significant role in reinforcing the psychological contract. This, in turn , translates to better workplace morale and reduced turnover intentions. The small proportion of employees who reported dissatisfaction or neutrality suggests areas where management can further strengthen support and communication efforts.

The results also indicate that age and experience contribute to variations in commitment; more experienced employees showed greater attachment and satisfaction. This finding suggest that tailored engagement strategies maybe needed for newer or younger employees.

In conclusion, the organization's success in meeting employee expectations and supporting them both at entry and throughout their tenure significantly contributes to a committed and productive workforce, This aligns with organizational support theory, which posits that when employees perceive their organization as caring and reliable, they reciprocate with loyalty , sustained effort, and reduced propensity to leave, ultimately driving long-term organizational success.

CONCLUSION

The study affirms that fulfilling psychological contracts and fostering positive employee relations play a crucial role in strengthening organizational commitment among employees at Kirloskar Electric Company. The results show that when employees perceive the organization as meeting its promises, providing clear support, and recognizing their contributions, their emotional attachment, loyalty, and willingness to stay with the organization increases significantly. Both relational aspects of the psychological contract (trust, long-term support) ans effective communication from management are central to building a committed workforce.

The findings also highlight that more experienced employees tend to display higher commitment levels, suggesting the importance of nurturing psychological contracts throughout an employee's tenure. Importantly, the study provides empirical evidence supporting core theories in organizational behavior, demonstrating that invested employer-employee relationships are not only a matter of ethical practice but also strategic drivers of organizational success.

Overall, the study concludes that organizations seeking to enhance employee retention, satisfaction, and performance should actively invest in maintaining and honouring psychological contracts, promote transparent and supportive relations, and develop tailored engagement strategies for newer or less experienced staff. Doing so will lay the groundwork for a resilient, motivated, and high-performing workforce that can meet current and future organizational challenges effectively.

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RESEARCH ARTICLE – 6

ECONOMIC EFFECT OF OLIGOPOLISATION AND CONCENTRATION IN THE TELECOM SECTOR IN INDIA

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ABSTRACT

India's telecom sector underwent a paradigm shift after the reforms in 1991. The sector very much represents what the reform was all about, with the private sector coming into play a big role and the public sector shrinking away and recently, there has been a tendency for concentration with the exit of some firms from the market and with the mergers or acquisition. An oligopolistic market structure has come to prevail in the sector. The study analyses the level of concentration in the telecom sector and the extent to which the sector is oligopolised and its impact on the revenue realization. We calculated the Herfindahl-Hirschman Index of market shares and found that there is a significant concentration in the telecom sector. Further, regressed the Average Revenue per User on the HHI by keeping the total number of subscribers as a controlling variable and found that there is a statistically significant positive relationship between the two. It is concluded that the increased concentration has resulted in monopoly pricing tendencies and increased revenue realization. The major policy implication is that the Competition Commissioner of India and Telecom Regulatory Authority of India has to act in tandem to prevent further monopolization of the sector.

Keywords: *Economic Effects; Oligopolisation; Concentration; Telecom Sector; India*

INTRODUCTION

Telecommunications play a crucial role in a country's social and economic development. The digital revolution has enabled the sector to influence every aspect of human individual and social life. The productivity gain in economies happened through the telecommunications revolution has well been matched by the social development leaps through the application of ICT in critical areas like health and education (Telecom Regulatory Authority of India, 2025). Access to internet and data is fundamental for a society to ensure good governance and for the deepening of democracy, as it empowers citizens to demand transparency and hold institutions accountable (Shikha, 2025). India's

telecom sector underwent a paradigm shift after the reforms in 1991. The sector very much represents what the reform was all about, with the private sector coming into play a big role and the public sector shrinking away (Karunakaran, N, 2025). India witnessed 2G, 3G, 4G and 5G revolutions and managed to cope up with the global level advancements with active participation from the private sector (Navaneeth, 2023). The competition helped the sector to achieve efficiency to some extent and state of the art technology is being installed for improving the quality of service (Sridhar, 2012).

When examining the market structure over time, a marked shift from government monopoly to competition among private players in the beginning is very visible. But, recently there has been a tendency for concentration with the exit of some firms from the market and with the mergers or acquisition (Nafees, 2024). An oligopolistic market structure has come to prevail in the telecom sector of India, making the social and economic implications of such a transition more visible and analyzable. As economic theories have it to say, an oligopoly market is highly competitive and represents competition among a few, promoting economic efficiency. At the same time there is scope for mutually binding agreements between the firms for realizing monopoly profits, to the utter neglect of objectives like consumer welfare and social wellbeing (Symeonidis, 2018). It is an imperative in Indian context to analyse the level of concentration in the telecom sector and the extent to which the sector is oligopolised and its impact on the revenue realization.

REVIEW OF LITERATURE

There are many studies which found increased competition in the telecom sector of India in 2000s. Singh (2023) examined the various initiatives taken by the government intensified the competition among the various telecom players. There were many positive effectives associated with the increased competition. Mangla and Singh (2021) mentioned that the most significant development has been the progressive reduction in tariffs which has been facilitated by competition through multi operator environment. Nickell (1996) argues that apart from lowering prices, increased efficiency, greater innovation, and better-quality services were also realized through the increased competition. Meena and Geng (2022) emphasized that intensification of competition has led the companies to adopt new initiatives to attract customers. Mitra and Shankar (2008) concluded that telecommunication has entered a new age of development with advanced technology and increased competition with established players. Borah (2014) analyzes the major process of transformation in telecom sector through policy reforms and regulation which has led to severe competition in the industry. Deregulation, declining tariff, opening up of the sector to foreign investment, changing customer demands and technological development has led to increased competition among the telecom service providers. Many of the recent studies surveyed by the authors indicate the prevalent tendency for oligopolisation and circumvention of competition through tacit agreements and predatory pricing strategies (Mishra & Rao, 2015; Tang, Chen, & Li, 2020). Roller and Waverman (2001) pointed out that the policy-driven liberalization spearheaded by policy instruments of tariff has

enhanced competition, while expanding network and services. Policy regime and spectrum harmonization that has spurred competition and efficiency and policy tool of net neutrality would be central in establishing a competitive in the sector.

Statement of the Problem

There is a positive relationship between increased concentration and monopoly power in any market. Indian telecom sector has witnessed significant concentration and oligopolisation. It is very critical to analyse whether the increased concentration results in increased revenue realization through an increase in Average Revenue per User (ARPU). If such a positive relationship exists between the index of concentration and ARPU, then the same could be treated as evidence for approximating monopoly pricing by the remaining forms. The present study is an attempt to examine whether the concentration of market shares affects revenue realization. The study has policy implications as the agencies like Telecom Regulatory Authority of India (TRAI) and Competition Commission of India (CCI) can act to regulate the excessive concentration and tacit price agreements.

Objectives

- To examine the trends in the level of competition in telecom industry in India, and
- To examine the relationship competition and Average Revenue per User

Hypothesis

The increased concentration provides added monopoly power to the remaining firms and the prices go above the perfectly competitive market price, resulting in higher average revenue per user. Thus, we hypothesise that the increased concentration has a positive effect on the average revenue per user.

MATERIALS AND METHODS

This is an analytical research using secondary data collected from the annual reports of TRAI from 2010 to 2024. TRAI Yearly Performance Indicator was also referred. To analyse the market concentration and competition, time series data on the market share of various service providers, for the period from 2010 to 2024 was taken from the TRAI Annual Reports. Mathematical tools like Herfindhal-Hirschman Index (HHI) were applied to find out the market concentration and competition. The relation between ARPU and HHI values is estimated by regressing ARPU on HHI by using ordinary least square method. Total number of subscribers was included as a control variable in the regression as ARPU is affected by the number of subscribers. For the regression modelling, we used only the wireless service-related data as the share of wired service in total access services is insignificant in terms of number of subscribers. Also, recently, TRAI does not provide separate data of ARPU for wired services due to its insignificant share in total access services. The statistical tools like ratios, annual average growth rate, overall growth rate, compound annual growth rate, line diagrams, pie diagrams, charts etc. are used.

RESULTS, ANALYSIS AND DISCUSSION

Growth of Subscribers in Indian Telecom Sector

The period after 2010 succeeded a period of rapid expansion of telecom sector in 2000s and the period still maintained a relatively lower but reasonable annual average growth rate up to 2014-15 and the growth rate was low for the period thereafter. The slowing down was obviously due to the nearing of market saturation (table 1).

Table 1: Growth of Subscribers in Indian Telecom Sector

Year	Subscribers (in millions)	Growth
2010-11	846.32	36.22%
2011-12	951.34	12.41%
2012-13	898.02	-5.60%
2013-14	933	3.90%
2014-15	996.49	6.80%
Average Annual Growth Rate (AGGR)= 10.75%		
2015-16	1058.86	6.26%
2016-17	1194.58	12.82%
2017-18	1206.22	0.97%
2018-19	1183.51	-1.88%
2019-20	1177.97	-0.47%
Average Annual Growth Rate (AGGR)=3.54%		
2020-21	1201.2	1.97%
2021-22	1166.93	-0.03%
2022-23	1172.34	0.005%
2023-24	1199.28	0.02%
Average Annual Growth Rate (AGGR)=0.49%		

Source: TRAI Annual Reports, <https://www.trai.gov.in/about-us/annual-reports>

Distribution of Market Share for Telecom Services

A comparison of the market shares in two selected years 2013 and 2024 is presented. Table 2 shows the market shares in 2013 and Table 3 shows the market shares in 2024. The data for 2013 show a highly diversified telecom sector in terms of market shares (figure 1). There were 13 service providers with market shares ranging from 21.35% to 0.18%.

Table 2: Market share for Telecom services in 2013

Sl. No.	Operator's Name	Market Share, 2013 (in %)
1	Bharthi Airtel	21.35
2	Vodafone India	17.2
3	Idea Cellular	13.49
4	Reliance Communication	13.71
5	BSNL India	11.62
6	Tata Docomo	7.85
7	Aircel	7.14
8	Sistema	1.66
9	Videocon	0.26
10	MTNL India	0.60
11	Loop Mobile	0.35
12	Unitech	4.65
13	HFCL	0.18

Source: TRAI Annual Report 2013

From Table 3, it is clear that the years between 2013 and 2024 witnessed significant concentration in the telecom sector with a substantial increase in the market shares of a few service providers, mergers and acquisitions and fielding out of many other service providers. The number of service providers decreased to 9 and the major service providers now are Reliance Jio, Bharthi Airtel and Vodafone-Idea (figure 2). They together accounted for almost 92% of the market share. The analysis shows that there is significant oligopolisation in the telecom sector of India.

Table 3: Market share of Telecom Services in 2024

Sl. No.	Service provider	Market share, 2024(in %)
1	Reliance Jio	40.19
2	Bharti Airtel	32.92
3	Vodafone Idea	18.41
5	BSNL	7.91
6	MTNL	0.34
7	Tata Tele	0.19
8	Quadrant	0.03

9	Reliance Com	0.01
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Source: TRAI Annual Report 2024

Figure 1: Market Share of Telecom Service Providers in 2013

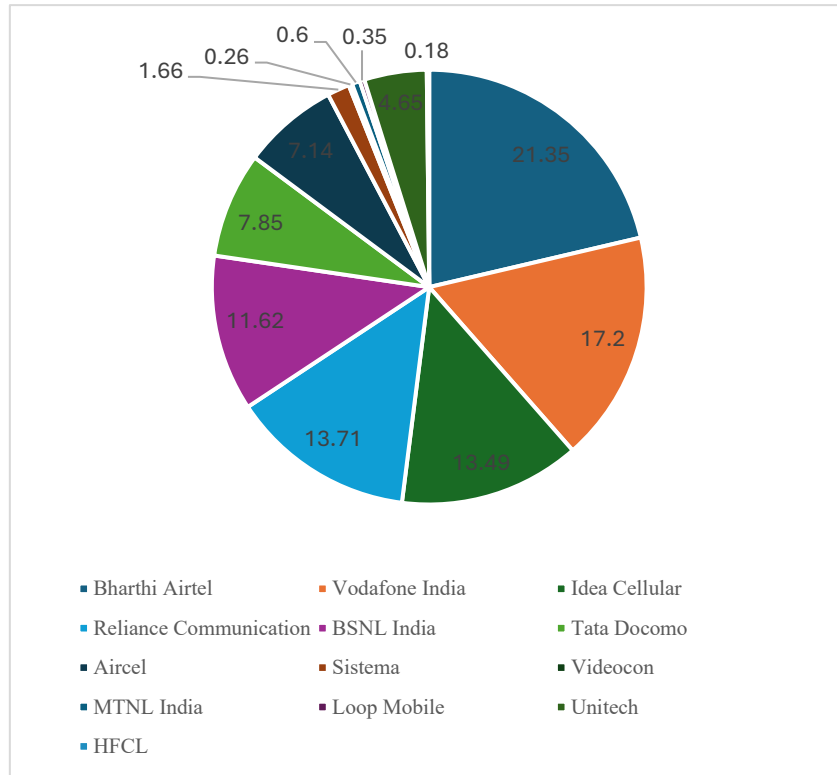
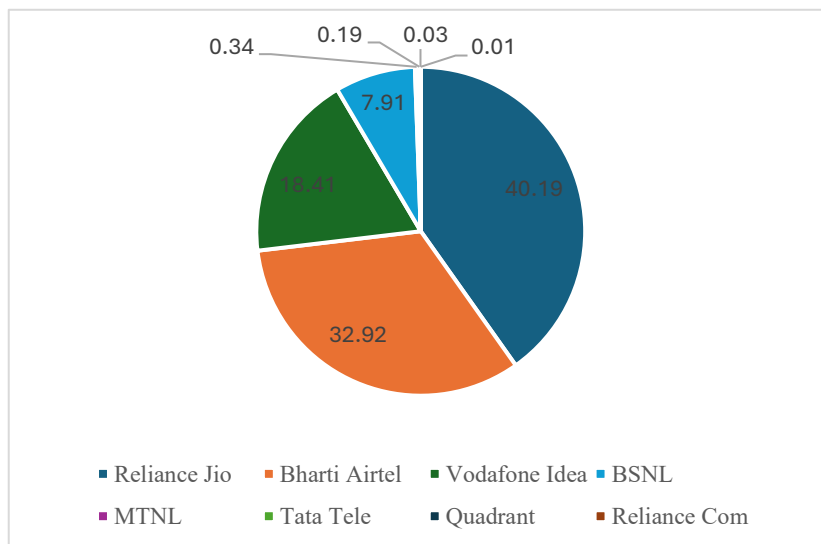


Figure 2: Market share of Telecom Service Providers in 2024



Measuring the Extent of Concentration Using HHI

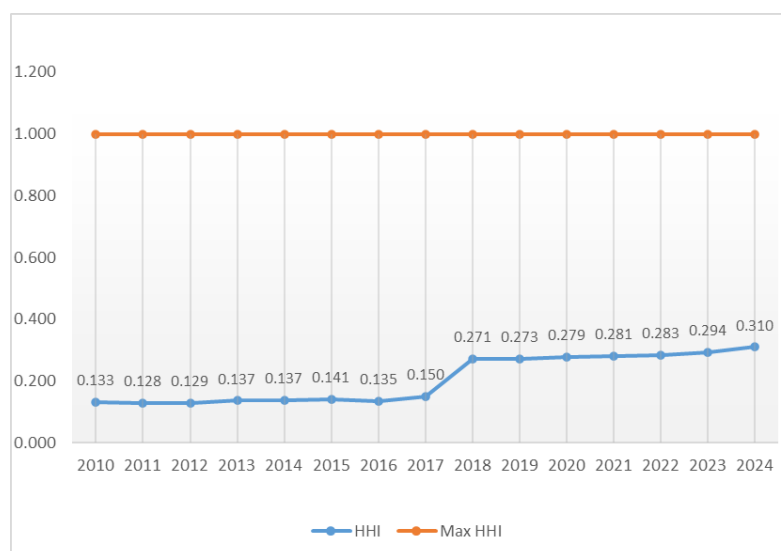
The Herfindahl-Hirschman Index is applied to analyse the extent of concentration in Indian telecom sector during the period from 2010 to 2024 (table 4). The market share data collected from each year's TRAI annual report were used to calculate the index value. Figure 3 shows that the HHI increased secularly throughout the entire period of study, showing that there occurred a high level of concentration.

Table 4: Herfindahl–Hirschman Index of the Indian Telecom Market

Year	HHI (Wireless + Wired)
2010	0.133
2011	0.1278
2012	0.1286
2013	0.1368
2014	0.1369
2015	0.1414
2016	0.135
2017	0.1503
2018	0.2709
2019	0.2726
2020	0.2787
2021	0.2812
2022	0.2830
2023	0.2944
2024	0.3101

Source: Estimated from TRAI Annual reports, <https://www.trai.gov.in/about-us/annual-reports>

Figure 3: HHI of Market Shares in the Telecom Sector



3.4. The Effect of Concentration on ARPU: An analysis of the effect of concentration on the Average Revenue per User is attempted and applied a basic OLS regression by using the model specified below. For analysis used the data pertaining to the wireless connections only as the 98% of total subscribers are belonging to wireless segment and also used the total number of subscribers as a controlling variable for making the results more reliable.

$$ARPU = \beta_0 + \beta_1 HHI + \beta_2 TS$$

Where,

ARPU is the Average Revenue per User

β_0 is the constant used as the intercept term

HHI is the Herfindahl-Hirschman Index of concentration

β_1 is the regression co-efficient of HHI

TS is the number of total subscribers in million

The data used for the regression analysis is provided in table 5.

Table 5: Data used for Regression Analysis

Year	HHI for Wireless	ARPU Wireless	Total Subscribers
2010	0.1511	132	584.32
2011	0.137	97	811.59
2012	0.1324	94	919.17
2013	0.1418	101	867.8
2014	0.1448	112.495	904.51
2015	0.1474	119.3546	969.89
2016	0.1517	124.1042	1033.63
2017	0.1384	83.51	1170.18
2018	0.1717	76.01	1183.41
2019	0.2736	71.39	1161.81
2020	0.2789	91.49	1157.75
2021	0.2851	103.58	1180.96
2022	0.2867	127.17	1142.09
2023	0.2976	142.32	1143.93
2024	0.3133	153.54	1165.49

Source: TRAI Annual reports, <https://www.trai.gov.in/about-us/annual-reports>

Table 6: The Results of Regression Analysis

	Coefficient	Std. Error	t-ratio	p-value
Constant	148.293	18.6114	7.968	<0.0001

HHI for Wireless	230.202	101.110	2.277	0.0419
Total Subscribers	-0.0842989	0.0190842	-4.417	0.0008

Mean dependent var	108.5976	S.D. dependent var	24.23087
Sum squared resid	5625.739	S.E. of regression	21.65206
R-squared	0.315595	Adjusted R-squared	0.201527
F(2, 12)	9.976936	P-value(F)	0.002805
Log-likelihood	-65.73701	Akaike criterion	137.4740
Schwarz criterion	139.5982	Hannan-Quinn	137.4514
Rho	0.723639	Durbin-Watson	0.630397

Table 6 shows the regression results which indicate a highly significant positive relationship between the concentration and ARPU. A 0.01 rise in HHI leads to an increase in ARPU by Rs.2.3. The co-efficient is significant at five percent level of significance. The results are robust as applied HAC standard error. The variable total subscribers, which used for controlling purpose, have a significant negative relationship with ARPU.

FINDINGS

The study arrived at following major findings

1. A significant oligopolisation in the telecom market of India is evident from the decrease in the number of operating firms from 13 in 2013 to just 9 in 2024 and three major firms, Reliance Jio, Bharti Airtel and Vodafone-Idea, together accounted for almost 92% of the market share.
2. The level of concentration as measured by the Herfindahl-Hirschman Index increased significantly during the study period.
3. The increased concentration has led to an increased average revenue realisation per user, indicating the wielding of monopoly power by the remaining firms.

CONCLUSION

From the consumer point of view which is also the general welfare point of view, increasing concentration, weakening of competition and wielding of monopoly power have detrimental effect. This unveiled that the oligopolist and increased concentration in the telecom sector resulted in increased revenue per user, indicating the possible excess profiteering. The Competition Commission of India may find the time was ripe enough to intervene with suitable checks for protecting consumer interests. TRAI also has to be vigilant to prevent further monopolization of the market.

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RESEARCH ARTICLE – 7

DETERMINANTS OF JOB SATISFACTION AMONG WOMEN EMPLOYEES IN INDIA'S SERVICE SECTOR: AN EMPIRICAL STUDY

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ABSTRACT

The growing participation of women in the service sector has intensified the need to understand the factors that influence their job satisfaction, particularly in people-intensive and emotionally demanding work environments. Job satisfaction among women employees is shaped not only by organisational conditions but also by psychological experiences and social contexts. Despite extensive research on job satisfaction, limited empirical evidence simultaneously examines organisational, psychological, and family-related factors as direct predictors of job satisfaction among women employees using simple regression-based approaches. Addressing this gap, the present study investigates the influence of organisational and work factors, psychological well-being, and family/social support on job satisfaction among women employees in the service sector.

The study adopts a quantitative, cross-sectional research design and collects primary data through a structured questionnaire administered to women employees working in service organisations. Out of the targeted sample, 272 fully completed questionnaires were used for analysis. Exploratory Factor Analysis was conducted to establish construct validity, followed by correlation and multiple regression analysis using SPSS.

The results reveal that organisational and work factors, psychological well-being, and family/social support all have a positive and significant effect on job satisfaction. Among the predictors, family/social support emerged as the strongest determinant of job satisfaction, followed by psychological well-being and organisational and work factors. The regression model explains a meaningful proportion of variance in job satisfaction, highlighting the combined importance of workplace practices, employee well-being, and supportive family environments. The findings underscore the multidimensional nature of women's job satisfaction in the service sector and suggest that organisations seeking to enhance women employees' satisfaction should adopt holistic strategies that integrate supportive organisational practices, well-being initiatives, and family-sensitive policies. The study contributes to the literature on gender and job satisfaction by offering a parsimonious, regression-based empirical model with clear managerial implications.

Keywords: *Women employees, Job satisfaction, Service sector, Organisational and work factors, Psychological well-being, Family and social support*

INTRODUCTION

The service sector has emerged as one of the most significant contributors to employment generation across both developed and developing economies, with women constituting an increasingly large proportion of the workforce. Sectors such as banking, education, healthcare, hospitality, and information technology services rely heavily on human interaction, emotional engagement, and service quality, making employee attitudes and satisfaction critical for organisational effectiveness (Bitner et al., 2008). As women's participation in these sectors continues to expand, understanding the factors that shape their job satisfaction has become an important concern for organisations, policymakers, and researchers alike.

Job satisfaction is widely recognised as a key determinant of employee performance, retention, and organisational commitment, particularly in service settings where employee attitudes directly influence customer experiences and service outcomes (Harter et al., 2002). For women employees, however, job satisfaction is influenced by a complex interplay of workplace conditions, psychological experiences, and social contexts. Despite improvements in workplace policies and increased awareness of gender equity, women in service-sector organisations continue to face challenges related to work pressure, emotional labour, career progression, and balancing professional and personal responsibilities (Parker & Griffin, 2011). These challenges make it essential to examine job satisfaction among women through a multidimensional lens that goes beyond traditional job design factors.

Organisational and work-related factors represent a critical starting point in understanding women's job satisfaction. Elements such as supportive management practices, flexible work arrangements, and perceived opportunities for growth shape employees' evaluations of their work environment and influence their overall satisfaction (Boxall et al., 2016). In service organisations, where work demands are often intense and performance expectations are closely monitored, the presence or absence of supportive organisational conditions can significantly affect women's workplace experiences. Research suggests that when women perceive their organisations as supportive and fair, they are more likely to report positive job attitudes and sustained engagement with their work (Purcell & Hutchinson, 2007).

In addition to organisational conditions, individual psychological experiences play a central role in shaping job satisfaction. Psychological well-being reflects employees' emotional health, sense of balance, and ability to cope with work-related demands. In service-sector roles, where employees are frequently required to manage emotions and interact with diverse stakeholders, psychological well-being becomes particularly salient (Hochschild, 1983). Women employees who experience emotional strain or psychological exhaustion are more likely to evaluate their jobs negatively, whereas those with positive psychological functioning tend to derive greater satisfaction from their work (Danna & Griffin, 1999). This highlights the importance of considering psychological well-being as a core predictor of job satisfaction.

Beyond the workplace, family and social contexts also influence women's work experiences and satisfaction. Family and social support can provide emotional reassurance and practical assistance that enable women to manage competing demands across work and non-work domains. In societies where family roles and expectations are strongly embedded, the presence or absence of family support can directly shape women's attitudes toward their jobs (Parasuraman & Greenhaus, 2002). Supportive family environments can enhance women's ability to remain engaged at work and view their employment more positively, while unsupportive contexts may contribute to stress and dissatisfaction.

Although prior studies have examined job satisfaction, organisational support, psychological well-being, and work–family issues, much of the existing research has either focused on single predictors or employed complex analytical models that are not always accessible for practical organisational application. Moreover, there remains a relative lack of empirical research that simultaneously examines organisational and work factors, psychological well-being, and family/social support as direct predictors of job satisfaction among women employees in the service sector, particularly using straightforward regression-based approaches.

Addressing this gap, the present study proposes a parsimonious theoretical model that examines the direct effects of organisational and work factors, psychological well-being, and family/social support on job satisfaction among women employees in the service sector. By employing multiple regression analysis using SPSS, the study aims to provide clear and actionable insights into the relative importance of these predictors. The findings are expected to contribute to the literature on gender and job satisfaction while offering practical guidance for service organisations seeking to enhance women's workplace experiences and overall job

REVIEW OF LITERATURE

Women's Employment and Job Satisfaction in the Service Sector

Women's participation in the service sector has increased substantially over the past two decades due to the expansion of banking, education, healthcare, and IT-enabled services, which offer relatively higher employment opportunities and skill-based roles compared to manufacturing (ILO, 2021). Despite this growth, women employees in service organisations continue to experience unique challenges related to job satisfaction, stemming from role overload, emotional labour, and persistent gender-role expectations (Bhave & Glomb, 2016). Job satisfaction, defined as an individual's overall evaluative judgment of their job experience, has been consistently linked to employee wellbeing, organisational commitment, and retention (Brayfield & Rothe, 1951; Spector, 1997). In service contexts, where work involves frequent interpersonal interactions and emotional regulation, job satisfaction becomes particularly sensitive to organisational and psychosocial conditions (Grandey & Melloy, 2017).

Empirical studies indicate that women's job satisfaction is shaped not only by task-related factors but also by broader organisational and social environments. While some research suggests that women report comparable or even higher job satisfaction than men despite facing structural disadvantages—a phenomenon often referred to as the “gender-job satisfaction paradox”—subsequent studies argue that this paradox reflects adjusted expectations rather than genuinely favourable work conditions (Clark, 1997; Kaiser, 2007). In the service sector, women's satisfaction levels are strongly influenced by support mechanisms that help them reconcile professional and personal responsibilities, making it essential to examine job satisfaction through a multidimensional lens.

Organisational and Work Factors as Predictors of Job Satisfaction

A substantial body of literature identifies organisational and work-related factors as primary antecedents of job satisfaction. Perceived organisational support, defined as employees' beliefs regarding the extent to which the organisation values their contributions and cares about their wellbeing, has been consistently associated with positive job attitudes and reduced withdrawal behaviours (Eisenberger et al., 1986; Rhoades & Eisenberger, 2002). For women employees, organisational support assumes heightened importance, as supportive policies and managerial practices signal legitimacy of their dual work–family roles (Kossek et al., 2011).

Supervisor support represents another critical determinant of job satisfaction, particularly in service settings characterised by high work intensity and emotional demands. Studies show that supervisors who demonstrate empathy, flexibility, and understanding significantly enhance women employees' job satisfaction and psychological comfort (Thomas & Ganster, 1995; Hammer et al., 2009). In contrast, unsupportive supervisory behaviour exacerbates stress and undermines satisfaction, even when formal organisational policies exist.

Flexible work arrangements, including flexible scheduling and workload autonomy, have also emerged as significant predictors of job satisfaction among women. Research indicates that flexibility enables women to manage competing work and family demands more effectively, thereby improving job satisfaction and reducing burnout (Allen et al., 2013; Chung & van der Horst, 2020). Career growth opportunities further influence satisfaction by shaping perceptions of fairness and long-term employability. Limited advancement prospects and perceived career stagnation have been found to negatively affect women's job satisfaction, particularly in service organisations with hierarchical structures (Ng et al., 2005).

Psychological Well-Being and Job Satisfaction

Psychological well-being has been widely recognised as a central mechanism linking workplace conditions to job-related outcomes. Psychological well-being encompasses emotional stability, perceived stress management, and positive functioning at work (Ryff, 1989). Prior research demonstrates that employees who experience higher levels of

psychological well-being report greater job satisfaction, engagement, and performance (Schaufeli et al., 2006; Wright & Cropanzano, 2000).

For women employees, psychological well-being is particularly vulnerable to work-related stressors arising from role conflict, emotional labour, and societal expectations of caregiving (Greenhaus & Beutell, 1985). Studies in service settings reveal that excessive job demands without adequate resources lead to emotional exhaustion, which in turn diminishes job satisfaction (Bakker & Demerouti, 2007). Conversely, supportive organisational environments enhance psychological well-being by reducing stress and fostering a sense of control and competence, thereby promoting job satisfaction (Hobfoll, 2001).

Empirical evidence also supports the mediating role of psychological well-being in the relationship between organisational factors and job satisfaction. For instance, organisational support has been shown to improve job satisfaction indirectly by enhancing employees' emotional health and reducing perceived stress (Rhoades & Eisenberger, 2002; Haar et al., 2014). These findings suggest that organisational practices influence job satisfaction not only directly but also through their impact on employees' psychological states.

Family and Social Support in Women's Work Outcomes

Family and social support play a pivotal role in shaping women's work experiences, particularly in collectivist societies where family responsibilities are deeply embedded in social norms. Family support refers to the emotional, instrumental, and practical assistance provided by family members, including spousal understanding and shared household responsibilities (Grzywacz & Marks, 2000). Prior research highlights that women who receive strong family support experience lower levels of work-family conflict and higher job satisfaction (Greenhaus & Powell, 2006).

In the service sector, where work schedules can be demanding and unpredictable, family support acts as a critical buffer against stress. Studies indicate that family support moderates the relationship between work-related stress and job outcomes, strengthening the positive effects of psychological well-being on job satisfaction (Lapierre & Allen, 2006). In the absence of such support, women are more likely to experience emotional strain, leading to reduced satisfaction and increased intentions to withdraw from the workforce (Michel et al., 2011).

The moderating role of family support is especially relevant in the Indian context, where extended family structures can either alleviate or intensify work pressures for women employees. While supportive families facilitate women's sustained participation and satisfaction at work, unsupportive family environments can undermine even well-designed organisational support systems (Aryee et al., 2005). This underscores the importance of incorporating family and social support as a contextual factor in models of women's job satisfaction.

Research Gap and Need for the Study

Although extensive research has examined job satisfaction, organisational support, and work–life balance, several gaps remain evident. First, much of the existing literature focuses on Western contexts, with limited empirical evidence from developing economies where socio-cultural expectations significantly shape women’s work experiences. Second, prior studies often examine organisational factors or psychological well-being in isolation, rather than integrating these dimensions into a single explanatory framework. Third, while family support has been acknowledged as important, its moderating role in strengthening the relationship between psychological well-being and job satisfaction remains underexplored, particularly in service-sector settings.

Moreover, many existing studies rely on descriptive analyses, offering limited insights into predictive relationships and underlying mechanisms. There is a clear need for theory-driven empirical research that employs regression-based analysis to examine how organisational and work factors influence women’s job satisfaction directly and indirectly through psychological well-being, while accounting for the contextual role of family support. Addressing these gaps, the present study proposes and empirically tests an integrated model of women’s job satisfaction in the service sector, thereby contributing to both theory and practice.

THEORETICAL MODEL DEVELOPMENT

The theoretical model underpinning this study is developed to explain how organisational and work-related conditions and individual psychological states shape job satisfaction among women employees in the service sector. Job satisfaction is conceptualised as a rational and affective evaluation of one’s job, influenced by both external work conditions and internal psychological processes. To explain these relationships, the present study draws upon Expectancy Theory, Equity Theory, Person–Environment Fit Theory, and Self-Determination Theory, which together provide a coherent theoretical basis for modelling direct relationships suitable for regression-based analysis.

Expectancy Theory posits that employees’ attitudes and satisfaction levels are influenced by their expectations regarding effort, performance, and outcomes (Vroom, 1964). According to this perspective, women employees are more likely to experience job satisfaction when organisational and work factors—such as supportive supervision, flexible work arrangements, and career opportunities—align with their expectations of fair treatment and attainable rewards. In service-sector contexts, where performance outcomes are closely linked to interpersonal interaction and emotional labour, unmet expectations regarding organisational support or growth opportunities may lead to dissatisfaction. Conversely, when organisations provide enabling work conditions, employees perceive a stronger link between effort and valued outcomes, thereby enhancing job satisfaction.

Equity Theory further explains job satisfaction through perceptions of fairness in the workplace. The theory argues that employees compare their contributions and rewards with

those of others, and perceived inequity leads to dissatisfaction and reduced motivation (Adams, 1965). For women employees in service organisations, perceptions of equitable treatment in pay, promotion, workload distribution, and managerial support are especially salient due to historically documented gender disparities in workplace outcomes. When organisational and work factors are perceived as fair and unbiased, women are more likely to evaluate their job positively. This theoretical lens supports the inclusion of organisational and work factors as direct predictors of job satisfaction in the proposed model.

Person–Environment Fit Theory provides additional explanatory power by emphasising the alignment between individual needs and workplace characteristics. According to this theory, job satisfaction arises when there is a good fit between employees’ values, abilities, and psychological needs and the demands and resources of the work environment (Kristof, 1996). Women employees often seek work environments that allow role compatibility, emotional security, and professional growth. In service-sector roles, where work demands can be intense and unpredictable, misalignment between individual expectations and organisational conditions can negatively affect satisfaction. The present model assumes that supportive organisational practices enhance perceived fit, thereby contributing directly to higher job satisfaction.

Self-Determination Theory further strengthens the theoretical foundation by focusing on intrinsic psychological needs. The theory posits that autonomy, competence, and relatedness are fundamental psychological needs that influence wellbeing and satisfaction (Deci & Ryan, 2000). Psychological well-being in the workplace reflects the extent to which these needs are fulfilled. When women employees experience emotional balance, a sense of competence, and positive engagement at work, they are more likely to report higher job satisfaction. In service-sector organisations, psychological well-being becomes particularly important due to continuous emotional demands and customer-facing roles. This theory justifies the inclusion of psychological well-being as an independent predictor of job satisfaction in the model.

Integrating these perspectives, the theoretical model proposes that job satisfaction among women employees is jointly influenced by organisational and work factors and psychological well-being. Organisational and work factors represent the structural and contextual conditions of employment, while psychological well-being captures employees’ internal emotional and cognitive responses to these conditions. Rather than assuming complex indirect or conditional relationships, the model adopts a parsimonious structure consistent with regression-based analysis, allowing for the examination of the unique and combined effects of each predictor on job satisfaction.

Thus, grounded in established motivational, fairness, fit, and wellbeing theories, the proposed theoretical model provides a robust and conceptually sound foundation for examining job satisfaction among women employees in the service sector using simple multiple regression analysis.

HYPOTHESES DEVELOPMENT

Organisational and Work Factors and Job Satisfaction

Job satisfaction is widely regarded as an outcome of employees' perceptions of their work environment and organisational context. Organisational and work factors such as supportive management, availability of flexible work options, fair treatment, and opportunities for professional growth shape how employees evaluate their jobs. In service-sector organisations, where women are frequently engaged in customer-facing and emotionally demanding roles, organisational conditions play a particularly important role in influencing job satisfaction. Research grounded in motivation–hygiene perspectives suggests that favourable organisational conditions act as satisfiers by improving employees' work experiences and reducing dissatisfaction (Hackman & Oldham, 1980).

Empirical studies focusing on women employees indicate that organisational support and positive work environments are strongly associated with higher job satisfaction, as they enhance perceptions of value, respect, and role legitimacy (Moynihan & Pandey, 2007; Oshagbemi, 2000). Regression-based evidence further confirms that organisational and work-related variables significantly predict job satisfaction across service-sector settings. Based on this theoretical and empirical foundation, the following hypothesis is proposed:

H1: Organisational and work factors have a significant positive effect on job satisfaction among women employees in the service sector.

Psychological Well-Being and Job Satisfaction

Psychological well-being represents an individual's emotional health, sense of balance, and ability to cope with work-related demands. In service-sector roles, psychological well-being is especially critical due to continuous interpersonal interaction, emotional labour, and performance pressure. Employees with higher levels of psychological well-being tend to interpret their work experiences more positively, leading to enhanced job satisfaction (Warr & Nielsen, 2018).

For women employees, psychological well-being plays a central role in shaping work attitudes, as emotional strain arising from work pressure and multiple role expectations can directly influence satisfaction levels. Prior research demonstrates that employees who report positive psychological functioning experience greater satisfaction with their jobs and organisations (Ilies et al., 2010; Kelloway & Day, 2005). Regression-based studies have consistently identified psychological well-being as a significant predictor of job satisfaction. Accordingly, the following hypothesis is proposed:

H2: Psychological well-being has a significant positive effect on job satisfaction among women employees in the service sector.

Family and Social Support and Job Satisfaction

Family and social support refers to the emotional, instrumental, and practical assistance provided by family members, including understanding, encouragement, and help with non-work responsibilities. For women employees, particularly in societies where family roles are strongly gendered, family support plays a critical role in shaping work attitudes and satisfaction. Supportive family environments enable women to manage work demands more effectively, thereby fostering positive evaluations of their job and work environment.

Previous studies have shown that women who receive strong family and social support report higher job satisfaction, as such support reduces stress and enhances overall life satisfaction, which spills over into work attitudes (Frone, 2003; Voydanoff, 2004). In service-sector contexts, where work schedules may be demanding and emotionally taxing, family support can directly enhance job satisfaction by enabling women to sustain work participation without excessive strain. Regression-based empirical research confirms that family support significantly predicts job satisfaction among working women. Therefore, the following hypothesis is proposed:

H3: Family and social support has a significant positive effect on job satisfaction among women employees in the service sector.

Combined Effects of Organisational Factors, Psychological Well-Being, and Family Support

Job satisfaction is a multidimensional construct influenced by workplace conditions, individual psychological states, and social context. Prior research suggests that examining these factors simultaneously provides a more comprehensive understanding of job satisfaction than analysing them in isolation. Organisational and work factors, psychological well-being, and family support each represent distinct yet complementary domains influencing women's work experiences. Regression models incorporating multiple predictors have been shown to explain greater variance in job satisfaction, highlighting the importance of a holistic approach (Dormann & Zapf, 2001).

Accordingly, the present study proposes that organisational and work factors, psychological well-being, and family/social support will collectively explain significant variation in job satisfaction among women employees in the service sector.

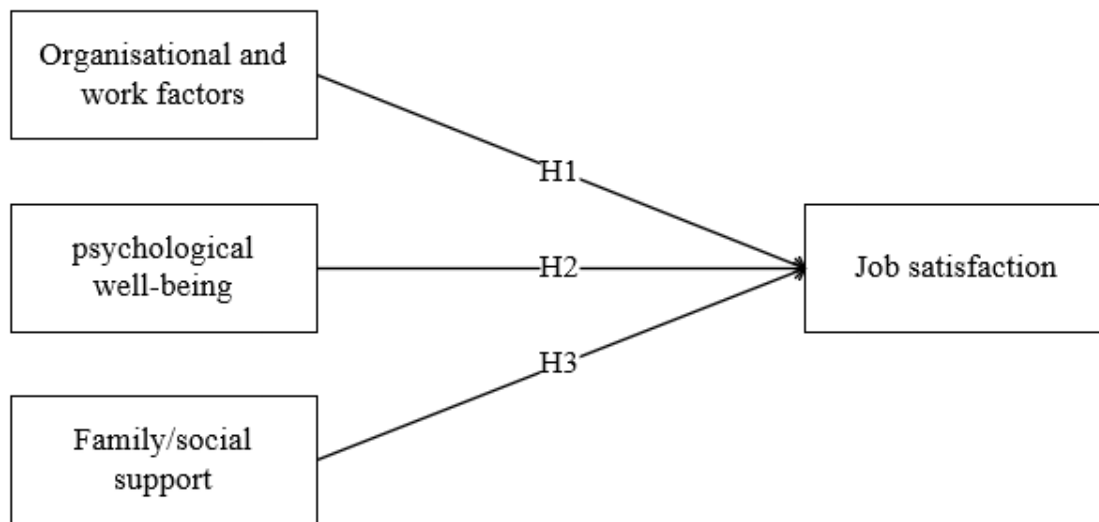
H4: Organisational and work factors, psychological well-being, and family/social support jointly explain a significant proportion of variance in job satisfaction among women employees in the service sector.

Hypotheses and Regression Framework

In summary, the hypotheses focus exclusively on direct relationships, consistent with a simple multiple regression framework using SPSS. Organisational and work factors, psychological well-being, and family/social support are treated as independent variables, while job satisfaction is the dependent variable. These hypotheses will be tested using

multiple regression analysis to assess the individual and combined effects of each predictor on women's job satisfaction.

Figure 1: Conceptual framework



METHODOLOGY

Research Design

The present study adopts a quantitative, cross-sectional research design to examine the determinants of job satisfaction among women employees in the service sector. A quantitative approach is considered appropriate as the study seeks to test theoretically grounded relationships among measurable organisational, psychological, and social variables using statistical techniques (Creswell & Creswell, 2018). Cross-sectional survey designs are widely used in job satisfaction and work–life research, as they allow the capture of employees' perceptions at a specific point in time while facilitating the examination of predictive relationships between constructs (Spector, 1997; Podsakoff et al., 2012). The study is explanatory in nature, aiming to identify how organisational and work-related factors influence women's job satisfaction directly and indirectly through psychological well-being, while also examining the conditional role of family and social support.

Population and Sampling

The target population of the study consists of women employees working in service sector organisations, including banking, education, healthcare, information technology–enabled services, and other people-intensive service industries. The service sector has been selected due to its high female workforce participation and the emotionally demanding nature of service roles, which makes job satisfaction and psychological well-being particularly salient (Bhave & Glomb, 2016). Respondents were required to be employed full-time and to possess a minimum of one year of work experience to ensure adequate exposure to organisational practices and work–life dynamics.

A purposive sampling technique was employed to ensure that participants met the inclusion criteria and were capable of providing informed responses regarding the study variables. Non-probability sampling techniques are commonly adopted in organisational behaviour research when the population is specific and access to a comprehensive sampling frame is limited (Etikan et al., 2016). A sample size of approximately 250–300 respondents was targeted, which is considered adequate for multiple regression analysis and moderation testing, as recommended by statistical power guidelines (Cohen, 1988; Hair et al., 2019).

Data Collection Procedure

The data for the present study were collected using a structured questionnaire survey, which is widely regarded as an effective method for capturing employees’ perceptions, attitudes, and psychological states in organisational research. Survey-based data collection is particularly suitable for studies examining job satisfaction and related constructs, as it allows respondents to report subjective evaluations that are not directly observable (Fowler, 2014). The questionnaire was designed in English and consisted of clearly worded statements to minimise ambiguity and respondent fatigue.

Prior to the main survey, the questionnaire was reviewed by academic experts in the fields of human resource management and organisational behaviour to establish face validity and ensure contextual relevance to women employees in the service sector. The questionnaire was administered using a mixed-mode approach, combining online and offline distribution methods. Online surveys were circulated through email and professional networking platforms, while printed questionnaires were distributed in selected service organisations where direct access was available.

Participation in the study was entirely voluntary. Respondents were informed about the academic purpose of the research, and assurances were provided regarding anonymity and confidentiality of responses. No personally identifiable information was collected. These procedural steps were implemented to encourage honest responses and reduce the likelihood of socially desirable answering patterns (Tourangeau & Yan, 2007). Data collection was carried out over a period of several weeks to allow sufficient time for follow-ups and reminders, thereby ensuring an adequate number of usable responses for statistical analysis.

Questionnaire design

Construct	Operational Definition	Measurement Items
Organisational & Work Factors	Employees’ perception of organisational practices and work conditions that support effective job	OWF1: My organisation provides adequate support to help me perform my job effectively. OWF2: My supervisor is understanding of my personal and work-related needs.

Construct	Operational Definition	Measurement Items
	performance and career growth	OWF3: I have sufficient flexibility in my work schedule to manage my responsibilities. OWF4: My organisation provides fair opportunities for career growth and advancement. OWF5: I feel that women employees are treated fairly in my organisation.
Psychological Well-Being	The extent to which employees experience emotional balance, mental health, and positive psychological functioning at work	PWB1: I feel emotionally balanced while performing my job. PWB2: I am able to manage work-related stress effectively. PWB3: I feel mentally healthy and positive at my workplace. PWB4: My job gives me a sense of personal accomplishment. PWB5: I generally feel energetic and motivated while working.
Family / Social Support	The degree of emotional and practical assistance received from family members that helps employees manage work and non-work responsibilities	FSS1: My family supports me in managing my work responsibilities. FSS2: I receive emotional encouragement from my family regarding my job .FSS3: My family understands the demands of my work. FSS4: I receive help from family members in managing household responsibilities. FSS5: Support from my family helps me perform better at work.
Job Satisfaction	Employees' overall positive evaluation of their job and organisational experience	JS1: I am satisfied with my current job. JS2: I am satisfied with the nature of work I perform. JS3: I feel happy working in my organisation. JS4: I am satisfied with the way my organisation is managed. JS5: Overall, I am satisfied with my work experience in this organisation.

Sample Design

The sample for the present study was drawn from women employees working in service sector organisations, including banking, education, healthcare, information in North Karnataka. These sectors were selected due to their high concentration of female employees and their reliance on human interaction and service delivery, which makes job satisfaction a critical organisational outcome.

A non-probability purposive sampling design was adopted, as the study required respondents who met specific criteria relevant to the research objectives. To be included in the sample, respondents were required to be women employees working full-time in a service organisation with a minimum of one year of work experience. This criterion ensured that participants had sufficient exposure to organisational practices and work conditions to meaningfully evaluate the study variables. Purposive sampling is commonly used in organisational research when the target population is specialised and when a comprehensive sampling frame is not readily available (Palinkas et al., 2015).

The sample size was determined based on methodological recommendations for multiple regression analysis. Statistical literature suggests that an adequate sample size is necessary to ensure sufficient statistical power and stable regression estimates, particularly when multiple predictors are included in the model (Tabachnick & Fidell, 2019). Accordingly, a target sample size of approximately 300 respondents was considered appropriate for the study. This sample size allows for reliable estimation of regression coefficients while accounting for potential data screening and exclusion of incomplete responses. A total of 272 fully completed questionnaires (90%) were received and found to be usable for analysis. All incomplete or partially filled questionnaires were excluded during the data screening process to ensure data accuracy and reliability. The final sample size of 272 respondents is considered adequate for conducting multiple regression analysis using SPSS and meets the recommended thresholds for statistical power and stability of regression estimates.

The final sample is expected to represent a diverse cross-section of women employees in terms of age, marital status, work experience, and organisational roles, thereby enhancing the generalisability of the findings within the service sector context. While the use of non-probability sampling limits broad population-level generalisation, it is considered appropriate for theory-driven empirical research focused on examining relationships among variables rather than estimating population parameters.

Measurement of Variables

All study variables were measured using multi-item scales adapted from established literature and contextualised to the service sector and women employee context. Responses were recorded on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), which is commonly used in job satisfaction and organisational research due to its reliability and ease of interpretation (Likert, 1932; DeVellis, 2017).

Organisational and Work Factors, the independent variable, capture women employees' perceptions of organisational support, supervisory understanding, flexible work arrangements, and career growth opportunities. Measurement items were adapted from studies on perceived organisational support and supervisor support (Eisenberger et al., 1986; Rhoades & Eisenberger, 2002) and research on flexible work practices (Chung & van der Horst, 2020). These items assess the extent to which organisations provide a supportive and enabling work environment for women employees.

Psychological Well-Being, the mediating variable, reflects employees' emotional stability, stress management, and sense of engagement at work. The construct draws on prior research linking psychological well-being to job attitudes and performance outcomes (Ryff, 1989; Schaufeli et al., 2006). Items capture positive affective states, perceived stress management, and mental resilience in the workplace.

Job Satisfaction, the dependent variable, represents women employees' overall evaluative judgment of their job and work environment. The construct is operationalised using items adapted from classic job satisfaction measures (Brayfield & Rothe, 1951; Spector, 1997), reflecting satisfaction with job role, organisational practices, and overall work experience.

Family and Social Support, the moderating variable, assesses the degree of emotional, instrumental, and practical support received from family members. Prior research highlights the critical role of family support in shaping women's work outcomes, particularly in collectivist societies (Greenhaus & Powell, 2006; Grzywacz & Marks, 2000). Measurement items capture family understanding, emotional encouragement, and assistance with household responsibilities.

Reliability and Validity Assessment

The reliability of the measurement scales was assessed using Cronbach's alpha, with values exceeding the recommended threshold of 0.70 indicating acceptable internal consistency (Nunnally & Bernstein, 1994). Construct validity was evaluated through inter-item correlations and factor loadings to ensure that items adequately represented their intended constructs. Procedural remedies such as clear item wording, assured anonymity, and scale variation were applied to minimise the risk of common method bias (Podsakoff et al., 2012).

Data Analysis Technique

Data analysis was conducted using IBM SPSS Statistics. Initially, descriptive statistics were computed to summarise the demographic characteristics of respondents and the central tendencies of study variables. Pearson correlation analysis was performed to examine the direction and strength of relationships among variables.

Regression diagnostics, including variance inflation factors (VIF) and tolerance values, were examined to ensure the absence of multicollinearity. The overall explanatory power of the models was assessed using R^2 values and F-statistics.

Ethical Considerations

Ethical integrity was maintained throughout the study. Participation was voluntary, informed consent was obtained, and respondents were assured that their data would be used solely for academic purposes. No identifying information was collected, and data confidentiality was strictly preserved in accordance with ethical research standards (Israel & Hay, 2006).

DATA ANALYSIS

Demographic Variable	Category	Frequency (n)	Percentage (%)
Age (years)	Below 25	48	17.6
	25–34	112	41.2
	35–44	78	28.7
	45 and above	34	12.5
Marital Status	Single	96	35.3
	Married	168	61.8
	Other	8	2.9
Educational Qualification	Undergraduate	82	30.1
	Postgraduate	156	57.4
	Professional / Doctoral	34	12.5
Work Experience	Less than 5 years	74	27.2
	5–10 years	118	43.4
	Above 10 years	80	29.4
Service Sector Type	Banking	56	20.6
	Education	72	26.5
	Healthcare	54	19.9
	IT / ITES	62	22.8
	Other services	28	10.3
Job Level	Entry level	88	32.4
	Middle level	132	48.5
	Senior level	52	19.1

The demographic profile indicates that the majority of respondents fall within the 25–34 age group (41.2%), followed by the 35–44 age group (28.7%), suggesting that the sample largely represents women in their early to mid-career stages. A substantial proportion of respondents are married (61.8%), reinforcing the relevance of examining job satisfaction alongside family and social support considerations.

Most respondents possess postgraduate qualifications (57.4%), reflecting the skill-intensive nature of service-sector employment. In terms of work experience, 43.4% of the respondents have 5–10 years of experience, indicating adequate organisational exposure to assess workplace conditions and job satisfaction. Sector-wise distribution shows representation from banking, education, healthcare, and IT/ITES, ensuring broad coverage of service industries. Nearly half of the respondents occupy middle-level positions (48.5%), highlighting balanced representation across organisational hierarchies. The demographic composition suggests a diverse and mature sample, suitable for examining the determinants of job satisfaction among women employees in the service sector.

Exploratory Factor Analysis (EFA)

Exploratory Factor Analysis (EFA) was conducted to examine the underlying factor structure of the measurement items and to assess the construct validity of the scales used in the study. Prior to factor extraction, the suitability of the data for factor analysis was evaluated using the Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy and Bartlett’s Test of Sphericity.

Table 1: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.882
Bartlett's Test of Sphericity	Approx. Chi-Square	2760.392
	df	190
	Sig.	.000

The KMO value was 0.882, which exceeds the recommended threshold of 0.60, indicating that the sample size was adequate and that the correlations among items were sufficiently compact to yield reliable factors. Bartlett’s Test of Sphericity was found to be statistically significant ($\chi^2 = 2760.392$, $df = 190$, $p < 0.001$), confirming that the correlation matrix was not an identity matrix and that factor analysis was appropriate for the data

Table 2: Communalities	Initial	Extraction
OWF1	1.000	.653
OWF2	1.000	.651
OWF3	1.000	.695
OWF4	1.000	.623
OWF5	1.000	.671
PWB1	1.000	.679
PWB2	1.000	.696
PWB3	1.000	.704
PWB4	1.000	.701
PWB5	1.000	.704
FSS1	1.000	.715
FSS2	1.000	.665
FSS3	1.000	.702
FSS4	1.000	.652
FSS5	1.000	.653
JS1	1.000	.719
JS2	1.000	.640
JS3	1.000	.686
JS4	1.000	.695
JS5	1.000	.661
Extraction Method: Principal Component Analysis.		

EFA was performed using Principal Component Analysis (PCA) as the extraction method, followed by Varimax rotation with Kaiser Normalization, to achieve a clearer and more

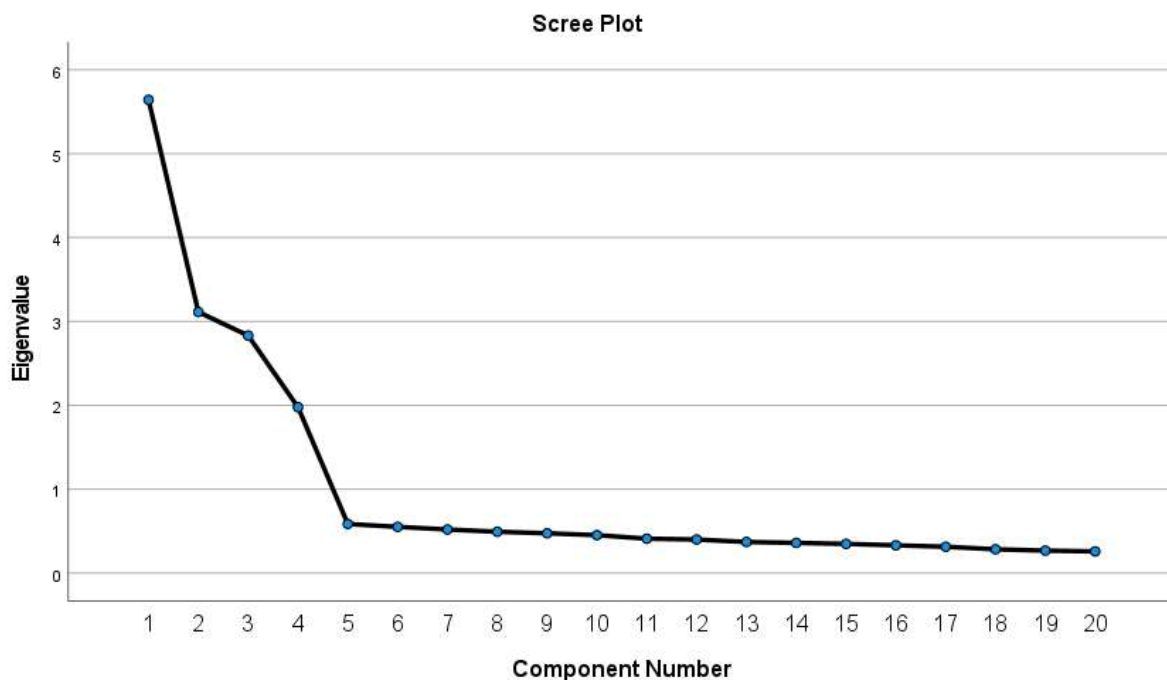
interpretable factor structure. Based on the Kaiser criterion (eigenvalues greater than 1) and inspection of the scree plot, four distinct components were retained for further analysis. The scree plot exhibited a clear inflection after the fourth component, supporting the four-factor solution.

Tabel 3: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.643	28.213	28.213	5.643	28.213	28.213
2	3.113	15.566	43.778	3.113	15.566	43.778
3	2.832	14.159	57.937	2.832	14.159	57.937
4	1.978	9.892	67.829	1.978	9.892	67.829

Extraction Method: Principal Component Analysis.

Figure 2: Scree plot



The four extracted components together explained 67.83% of the total variance, which exceeds the commonly accepted minimum threshold of 60% for social science research, indicating a satisfactory level of explanatory power. Specifically, the first component accounted for 28.21% of the variance, the second component explained 15.57%, the third component explained 14.16%, and the fourth component explained 9.89% of the variance after extraction.

Table 4: Rotated Component Matrix

	Component			
	1	2	3	4
PWB5	.836			
PWB3	.834			
PWB4	.825			
PWB2	.820			
PWB1	.777			
JS4		.808		
JS1		.800		
JS3		.797		
JS5		.794		
JS2		.764		
FSS3			.827	
FSS5			.802	
FSS4			.800	
FSS1			.797	
FSS2			.794	
OWF3				.826
OWF5				.818
OWF2				.806
OWF4				.779
OWF1				.768
Extraction Method: Principal Component Analysis.				
Rotation Method: Varimax with Kaiser Normalization.				
a. Rotation converged in 5 iterations.				

An examination of the communalities revealed that all items had extraction values well above the recommended minimum of 0.50, ranging from 0.623 to 0.719, indicating that a substantial proportion of variance in each item was explained by the extracted factors. This confirms that all items contributed meaningfully to the factor solution, and no item required deletion at this stage.

The rotated component matrix demonstrated a clear and theoretically consistent factor structure, with all items loading strongly on their respective components and no problematic cross-loadings. Factor loadings exceeded the recommended cutoff value of 0.60, indicating strong associations between items and their underlying constructs.

- Component 1 consisted of five items (PWB1–PWB5) with factor loadings ranging from 0.777 to 0.836, representing Psychological Well-Being. These items reflected emotional balance, stress management, and positive psychological functioning at work.
- Component 2 included five items (JS1–JS5) with loadings ranging from 0.764 to 0.808, representing Job Satisfaction. The items captured respondents' satisfaction with their job roles, organisational environment, and overall work experience.

- Component 3 comprised five items (FSS1–FSS5) with factor loadings between 0.794 and 0.827, representing Family / Social Support. These items reflected emotional and instrumental support received from family members in managing work and non-work responsibilities.
- Component 4 consisted of five items (OWF1–OWF5) with loadings ranging from 0.768 to 0.826, representing Organisational and Work Factors, including organisational support, supervisor support, work flexibility, and career opportunities.

Correlation Analysis

Table 5: Correlation

	OWF	PWB	FSS	JS
OWF	1	0.061	0.053	.220**
		0.317	0.385	0.000
PWB	0.061	1	.146*	.274**
	0.317		0.016	0.000
FSS	0.053	.146*	1	.333**
	0.385	0.016		0.000
JS	.220**	.274**	.333**	1
	0.000	0.000	0.000	
** Correlation is significant at the 0.01 level (2-tailed).				
* Correlation is significant at the 0.05 level (2-tailed).				

Pearson’s correlation analysis was conducted to examine the strength and direction of relationships among the study variables, namely Organisational and Work Factors (OWF), Psychological Well-Being (PWB), Family / Social Support (FSS), and Job Satisfaction (JS). The analysis was based on a final sample of 272 respondents.

The results indicate that Job Satisfaction is positively and significantly correlated with all three independent variables. Specifically, organisational and work factors showed a positive correlation with job satisfaction ($r = 0.220$, $p < 0.01$), indicating that favourable organisational conditions are associated with higher levels of satisfaction among women employees. Psychological well-being also exhibited a significant positive relationship with job satisfaction ($r = 0.274$, $p < 0.01$), suggesting that women who experience better emotional balance and psychological health tend to report greater satisfaction with their jobs. Among the predictors, family and social support demonstrated the strongest correlation with job satisfaction ($r = 0.333$, $p < 0.01$), highlighting the importance of supportive family environments in shaping women’s positive work attitudes.

The correlations among the independent variables were relatively low to moderate, indicating the absence of strong intercorrelations. Organisational and work factors were not significantly correlated with psychological well-being ($r = 0.061$, $p > 0.05$) or family/social support ($r = 0.053$, $p > 0.05$). Psychological well-being showed a weak but statistically significant correlation with family/social support ($r = 0.146$, $p < 0.05$), suggesting a modest

association between emotional wellbeing and the availability of family support. These low intercorrelations among predictors indicate that each construct represents a distinct dimension and reduce concerns related to multicollinearity.

Overall, the correlation results provide preliminary support for the proposed hypotheses by demonstrating positive associations between organisational and work factors, psychological well-being, family/social support, and job satisfaction. Furthermore, the pattern of correlations suggests that the independent variables can be simultaneously included in a multiple regression model to assess their unique contributions to job satisfaction among women employees in the service sector.

Multiple Regression Analysis

To examine the influence of organisational and work factors, psychological well-being, and family/social support on job satisfaction among women employees in the service sector, a multiple linear regression analysis was conducted using SPSS. Job satisfaction was treated as the dependent variable, while organisational and work factors (OWF), psychological well-being (PWB), and family/social support (FSS) were entered simultaneously as independent variables using the enter method.

Table 6: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.446 ^a	.199	.190	.79303	2.024
a. Predictors: (Constant), FSS, OWF, PWB					
b. Dependent Variable: JS					

Model Fit and Overall Significance

The results of the regression analysis indicate that the model is statistically significant. The ANOVA results reveal that the overall regression model is significant ($F = 22.197$, $p < 0.001$), confirming that the set of independent variables jointly predicts job satisfaction. This finding suggests that organisational, psychological, and social factors collectively play an important role in explaining variations in job satisfaction among women employees.

The model summary shows a multiple correlation coefficient (R) of 0.446, indicating a moderate positive relationship between the predictors and job satisfaction. The coefficient of determination (R^2) is 0.199, which implies that approximately 19.9% of the variance in job satisfaction is explained by organisational and work factors, psychological well-being, and family/social support. The adjusted R^2 value of 0.190 indicates that the explanatory power of the model remains robust after adjusting for the number of predictors. In behavioural and organisational research, this level of explained variance is considered meaningful, particularly when examining attitudinal outcomes such as job satisfaction.

The Durbin–Watson statistic was 2.024, which falls within the acceptable range of 1.5 to 2.5, indicating the absence of autocorrelation in the residuals and confirming the independence of errors assumption required for regression analysis.

Table 7: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	41.879	3	13.960	22.197	.000 ^b
	Residual	168.545	268	.629		
	Total	210.424	271			
a. Dependent Variable: JS						
b. Predictors: (Constant), FSS, OWF, PWB						

The Analysis of Variance (ANOVA) was conducted as part of the multiple regression analysis to assess the overall significance of the regression model predicting job satisfaction among women employees in the service sector. The ANOVA results indicate that the regression model is statistically significant.

The model produced an F-value of 22.197, with 3 and 268 degrees of freedom, and a p-value less than 0.001. This result demonstrates that the set of independent variables—organisational and work factors, psychological well-being, and family/social support—collectively explain a statistically significant amount of variance in job satisfaction. In other words, the regression equation provides a significantly better fit to the data than a model with no predictors.

The significant ANOVA result confirms that the relationship between the independent variables and the dependent variable is not due to chance and validates the use of multiple regression analysis for hypothesis testing. This finding supports the appropriateness of the proposed regression model and justifies proceeding with the interpretation of individual regression coefficients. The ANOVA results indicate that the regression model is statistically significant ($F = 22.197$, $p < 0.001$), confirming that the predictors jointly explain significant variance in job satisfaction.

Table 8: Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics		
	B	Std. Error	Beta			Tolerance	VIF	
1	(Constant)	.881	.235		3.753	.000		
	OWF	.172	.049	.191	3.492	.001	.994	1.006
	PWB	.220	.055	.220	3.977	.000	.976	1.025
	FSS	.294	.056	.290	5.245	.000	.977	1.024
a. Dependent Variable: JS								

Regression Coefficients and Hypothesis Testing

The coefficients table provides insights into the individual contribution of each predictor variable to job satisfaction. All three independent variables were found to have positive and statistically significant effects on job satisfaction.

Organisational and Work Factors (OWF) demonstrated a significant positive effect on job satisfaction ($\beta = 0.191$, $t = 3.492$, $p < 0.001$). This result indicates that favourable organisational conditions, such as supportive supervision, flexible work arrangements, and perceived career opportunities, are associated with higher levels of job satisfaction among women employees. This finding supports Hypothesis H1, confirming the importance of organisational practices in shaping women's work attitudes in service-sector organisations.

Psychological Well-Being (PWB) also exhibited a significant positive influence on job satisfaction ($\beta = 0.220$, $t = 3.977$, $p < 0.001$). This suggests that women employees who experience emotional balance, effective stress management, and positive psychological functioning tend to report greater satisfaction with their jobs. The result provides empirical support for Hypothesis H2 and underscores the role of psychological health as a key determinant of job satisfaction.

Among the predictors, Family and Social Support (FSS) emerged as the strongest predictor of job satisfaction ($\beta = 0.290$, $t = 5.245$, $p < 0.001$). This finding highlights the critical role of supportive family environments in enhancing women's satisfaction at work. Women who receive emotional and practical support from their families are better able to manage work demands and, consequently, evaluate their jobs more positively. This result lends strong support to Hypothesis H3 and emphasises the significance of social context in shaping work attitudes among women employees.

Multicollinearity Diagnostics

Collinearity diagnostics indicate that multicollinearity is not a concern in the regression model. The tolerance values for all predictors were well above the minimum acceptable threshold of 0.10, and the Variance Inflation Factor (VIF) values ranged from 1.006 to 1.025, which are far below the critical value of 5. These results confirm that the independent variables are sufficiently distinct and that the regression coefficients are stable and reliable.

The regression analysis demonstrates that organisational and work factors, psychological well-being, and family/social support significantly and positively influence job satisfaction among women employees in the service sector. The findings reveal that while organisational and psychological factors are important, family and social support plays a particularly influential role in shaping women's job satisfaction. The results provide strong empirical support for the proposed regression-based theoretical model and justify the inclusion of multiple domains—organisational, psychological, and social—in understanding women's work attitudes.

FINDINGS

The present study examined the influence of organisational and work factors, psychological well-being, and family/social support on job satisfaction among women employees in the service sector using multiple regression analysis. The findings provide clear empirical evidence supporting the proposed theoretical model and highlight the relative importance of organisational, psychological, and social dimensions in shaping women's job satisfaction.

The Exploratory Factor Analysis confirmed a clear four-factor structure corresponding to organisational and work factors, psychological well-being, family/social support, and job satisfaction. All measurement items loaded strongly on their respective factors, with satisfactory communalities and a cumulative variance explained of 67.83%, establishing construct validity and justifying the use of composite scores for subsequent analysis.

Correlation analysis revealed that job satisfaction was positively and significantly associated with organisational and work factors, psychological well-being, and family/social support. Among these, family/social support exhibited the strongest correlation with job satisfaction, followed by psychological well-being and organisational and work factors. The relatively low inter-correlations among the independent variables indicated that each construct captured a distinct aspect of women's work experience, supporting their simultaneous inclusion in the regression model.

The multiple regression results demonstrated that the overall model was statistically significant and explained approximately 19.9% of the variance in job satisfaction among women employees. All three predictors exerted a positive and significant effect on job satisfaction. Organisational and work factors were found to significantly enhance job satisfaction, indicating that supportive supervision, flexibility, and career opportunities positively influence women's evaluations of their jobs. Psychological well-being also emerged as a significant predictor, suggesting that emotional balance and effective stress management contribute meaningfully to job satisfaction. Notably, family and social support emerged as the strongest predictor of job satisfaction, underscoring the critical role of family support systems in enabling women to sustain positive work attitudes.

Overall, the findings confirm that women's job satisfaction in the service sector is shaped by a combination of workplace conditions, internal psychological states, and external social support mechanisms.

DISCUSSION

The findings of this study offer important insights into the determinants of job satisfaction among women employees in the service sector. The significant effect of organisational and work factors on job satisfaction highlights the continued relevance of organisational practices in shaping women's workplace experiences. Supportive organisational environments, characterised by understanding supervisors, flexible work arrangements, and perceived career opportunities, appear to foster positive job evaluations among women. This finding reinforces the argument that service organisations must go beyond formal policies and focus on everyday managerial practices that directly affect women employees' work lives.

The significant relationship between psychological well-being and job satisfaction underscores the importance of employees' emotional and mental health in service-sector roles. Given the emotionally demanding nature of service work, women employees who are able to manage stress effectively and maintain emotional balance are more likely to experience satisfaction in their jobs. This suggests that job satisfaction is not solely a function of external work conditions but is also deeply rooted in employees' psychological

experiences. Organisations that invest in employee well-being initiatives, stress management programs, and supportive work climates may therefore indirectly enhance job satisfaction.

One of the most notable findings of the study is the strong influence of family and social support on job satisfaction. The fact that family support emerged as the strongest predictor indicates that women's work attitudes cannot be fully understood without considering their social context. Supportive family environments appear to enable women to cope more effectively with work demands, thereby fostering positive evaluations of their jobs. This finding is particularly relevant in collectivist societies, where family responsibilities and expectations play a central role in shaping women's career experiences. Even in the presence of supportive organisational practices, the absence of family support may limit women's ability to derive satisfaction from their work.

The combined influence of organisational, psychological, and social factors highlights the multidimensional nature of job satisfaction among women employees. The results suggest that organisational interventions alone may be insufficient if they are not complemented by initiatives that support psychological well-being and acknowledge the role of family responsibilities. At the same time, the findings demonstrate that organisations can play a proactive role in mitigating work–family pressures by creating environments that recognise and accommodate women's multiple roles.

From a theoretical perspective, the study reinforces the view that job satisfaction is a complex attitudinal outcome shaped by both environmental and individual-level factors. The regression-based approach adopted in this study provides a parsimonious yet robust framework for understanding women's job satisfaction without relying on complex mediation or moderation models. Practically, the findings suggest that service organisations aiming to enhance women's job satisfaction should focus on strengthening supportive work practices, promoting employee well-being, and adopting family-sensitive workplace policies.

FUTURE SCOPE OF THE STUDY

While the present study provides valuable insights into the determinants of job satisfaction among women employees in the service sector, several avenues remain open for future research. First, the study adopts a cross-sectional research design, which limits the ability to infer causal relationships among the variables. Future studies may employ longitudinal research designs to examine how organisational and work factors, psychological well-being, and family/social support influence job satisfaction over time. Such an approach would enable researchers to capture changes in women's work experiences across different career stages and life events.

Second, the current research relies on a multiple regression framework that focuses on direct relationships between predictors and job satisfaction. Future research could extend this model by examining indirect or conditional relationships, such as mediation or moderation effects, to gain deeper insights into the underlying mechanisms. For example, psychological well-being may act as an intervening variable between organisational

practices and job satisfaction, or family support may condition the strength of workplace influences.

Third, the scope of the study is limited to women employees in the service sector. Future research may conduct comparative studies across sectors, such as manufacturing and public administration, to examine whether the determinants of job satisfaction differ across occupational contexts. Additionally, cross-cultural or cross-regional studies could explore how socio-cultural norms influence the relative importance of organisational and family-related factors in shaping women's job satisfaction.

Fourth, future studies may incorporate additional variables that were not examined in the present research, such as leadership style, organisational culture, job autonomy, work-family conflict, or career interruptions. Including these factors could enhance the explanatory power of the model and provide a more comprehensive understanding of women's job satisfaction.

Finally, future research may employ mixed-method approaches by integrating qualitative methods such as interviews or focus group discussions with quantitative analysis. Qualitative insights could enrich the understanding of women's lived work experiences and provide nuanced explanations for statistical relationships observed in survey-based studies.

Overall, future research building on the findings of the present study can contribute to a more holistic and context-sensitive understanding of women's job satisfaction, thereby informing more effective organisational policies and practices.

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BLOCKCHAIN IN AGRICULTURAL MARKETING AND CONSUMER TRUST

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ABSTRACT

Blockchain technology is increasingly transforming agri-food systems by enhancing transparency, traceability, and trust across the agricultural value chain. Its decentralised ledger mechanism fosters greater accountability and combats inefficiencies and fraud. This review article synthesizes recent advancements in the application of blockchain in agricultural marketing and its impact on consumer trust. This paper draws from a wide range of disciplines to explore the theory, models, and practical methods currently shaping blockchain integration in agriculture. It reviews case studies from around the world to understand how this technology impacts various players—from farmers and traders to retailers and consumers. The study also outlines policy implications, strategic insights, and future directions that could help embed blockchain more deeply into agriculture, aiming to build a more inclusive, transparent, and efficient system.

Keywords: *Agri-Food; Decentralization; Food Safety; Supply Chain; Traceability; Transparency*

INTRODUCTION

Agriculture remains central to global food security and economic stability, particularly in developing countries where large portions of the population depend on farming. Yet, traditional marketing systems often face serious challenges—inefficiencies in logistics, unstable pricing, adulteration, fraud, and lack of transparency. These issues not only reduce profits for farmers but also erode consumer confidence, especially when it comes to food safety and provenance.

As we move further into the 21st century, technology is playing a vital role in modernizing agriculture. Among the most promising innovations is blockchain—a decentralized system for securely recording and sharing data. From product traceability and certification to smart contracts and supply chain efficiency, blockchain is rapidly changing how agricultural goods are marketed and trusted.

One of the main hurdles in agri-food systems is the lack of trust between producers, intermediaries, and consumers. With growing concerns about ethical sourcing and food authenticity, consumers are demanding proof. In fact, research by Maesano et al. (2025) shows that over 70% of consumers in developed countries base their food purchases on traceability. Blockchain offers an answer by enabling full visibility into a product's journey—from farm to shelf—including data on origin, transport, chemical treatments, and certifications.

Agricultural goods often pass through several hands before reaching the consumer, creating many opportunities for inefficiencies and fraud. Blockchain helps by providing a single, trustworthy record that every participant can access. This transparency reduces manipulation, ensures data consistency, and builds trust between farmers and consumers, transforming not only the marketing process but also the relationships involved.

Governments and private firms are now backing blockchain initiatives to better integrate smallholder farmers into formal supply chains. Programs like IBM Food Trust, AgriDigital, and India's eNAM blockchain network are no longer just pilot projects—they're showing real results. These systems have improved income for farmers, cut transaction costs, and built consumer confidence in certified products like organic vegetables, fair-trade coffee, and halal meat (Balusamy, 2025; Hidayati et al., 2025).

Ultimately, blockchain does more than digitize transactions—it opens access to reliable, shared information across the agricultural value chain. But to be successful, its adoption must be supported by appropriate policies, digital infrastructure, education, and inclusive frameworks that ensure small-scale farmers are not left out of this digital transformation.

This paper explores how blockchain intersects with agricultural marketing and consumer trust, drawing on theory, practice, and case studies. The goal is to evaluate how blockchain can be more widely adopted in agriculture to build trust, ensure product traceability, and promote sustainable growth.

THEORETICAL FRAMEWORK

Blockchain's role in agriculture can't be understood in isolation—it's grounded in theories from economics, information systems, institutional development, and behavioral science. Below are key theories that help explain how blockchain promotes transparency, reduces information gaps, and builds trust.

Agency Theory

The agricultural supply chain often involves a principal-agent dynamic. Here, farmers or traders act on behalf of consumers, but the imbalance in information can lead to mistrust and questionable practices—like using undisclosed pesticides or misreporting storage conditions.

Blockchain reduces these risks by recording every action in a secure and permanent way. Whether it's the use of a specific pesticide or storage temperatures during transport, everything is documented and visible to all parties. This transparency addresses concerns about hidden behavior and builds trust. Research by Consolaro *et al.* (2025) and Khan (2025) confirms that blockchain enhances confidence in product authenticity and certification.

Institutional Theory

This theory examines how existing systems, norms, and regulations affect the adoption of new technologies. In agriculture, marketing systems are often governed by long-standing institutions like cooperatives, regulators, and large agribusinesses. These entities can either promote or resist innovation.

Blockchain adoption is easier when it's backed by institutional support. For instance, India's use of blockchain in its National Agricultural Market was enabled by strong government backing (Arogundade & Njoku, 2025). In Europe, regulations on food traceability have encouraged blockchain use among producers in Spain and Italy (Consolaro *et al.*, 2025). Often, once a few organizations adopt the technology, others follow suit to stay competitive. Once leading brands adopt blockchain-based traceability, competitors are likely to follow suit to maintain consumer trust and market position.

Technology Acceptance Model (TAM)

Developed by Davis (1989), the Technology Acceptance Model explains how users come to accept and use new technologies. It posits that two primary factors—perceived usefulness (PU) and perceived ease of use (PEOU)—determine an individual's intention to use a technology.

When applied to blockchain in agriculture, TAM explains both farmer and consumer behavior:

- Farmers may hesitate to adopt blockchain platforms if they perceive them as complex or not beneficial for income generation.
- Consumers may trust blockchain-labeled products only if the information is understandable and accessible, for instance via QR codes on packaging.

Recent studies (e.g., Theocharis & Tsekouropoulos, 2025) show that consumer trust in blockchain-based food products are positively correlated with the clarity of information and digital literacy of users.

Trust Theory and Signaling Theory

In markets with limited verifiability, signaling theory explains how sellers communicate quality through observable traits or certifications. Blockchain acts as a credible signal, indicating that the product complies with specific standards. Unlike traditional

certifications (which can be forged or manipulated), blockchain records are decentralized and immutable, enhancing the signal's credibility.

Trust theory also applies here. Trust is typically built through reputation, shared norms, and transparency. Blockchain promotes trust by offering:

- Inter-temporal consistency of data
- Decentralized consensus mechanisms (eliminating single points of failure)
- Open verifiability, where consumers can directly validate product claims (Dang *et al.*, 2025)

Trust is a key factor in influencing consumer purchasing behavior, especially in contexts like organic produce, halal food, or fair-trade goods (Hidayati *et al.*, 2025).

Resource-Based View (RBV) of the Firm

In agri-tech innovation, firms or cooperatives that possess blockchain capabilities can gain a sustainable competitive advantage. According to the resource-based view, unique and inimitable resources such as a trusted blockchain traceability system can enhance a firm's position in the marketplace. Early adopters in the food industry, like Walmart with pork traceability in China, have demonstrated that blockchain not only improves internal efficiency but also external brand reputation.

Stakeholder Theory

Agricultural systems involve a wide range of stakeholders—farmers, input suppliers, regulators, processors, distributors, retailers, and consumers. Agriculture involves many players—farmers, regulators, processors, suppliers, distributors, and consumers. According to stakeholder theory, the interests of all these groups should be considered.

Blockchain creates a shared space where everyone benefits from transparent, verifiable data. Studies by Malavathula *et al.* (2025) and Maesano *et al.* (2025) show that collaboration among stakeholders is essential for blockchain adoption. When all players see the value in transparent systems, adoption becomes much more feasible.

CONCEPTUAL FRAMEWORK

To understand how blockchain impacts agricultural marketing and consumer trust, the study proposes a framework made up of four interconnected components:

Overview of the Framework

1. Blockchain Infrastructure
2. Agri-Food Supply Chain Processes
3. Information Transparency and Trust Mechanisms
4. Consumer Outcomes and Market Responses

These components interact in a feedback loop, where blockchain implementation improves trust, which then increases demand for verified products.

Components of the Framework

A. Blockchain Infrastructure

This foundational layer includes:

- **Distributed Ledger Technology (DLT):** Enables decentralized, secure, and immutable record-keeping of agricultural transactions.
- **Smart Contracts:** Automate deals, like paying a farmer once delivery is confirmed.
- **IoT Integration:** Tools like GPS and sensors provide real-time data from the field.
- **Digital Identity Systems:** Facilitate stakeholder verification, such as farmer registration and buyer credentials.

Example: In India's eNAM platform, smart contracts automate payments to farmers after digital confirmation of produce delivery (Arogundade & Njoku, 2025).

B. Agricultural Supply Chain Processes

Blockchain impacts various stages:

- **Production:** Inputs like seeds, fertilizers, and water usage can be logged for traceability.
- **Harvesting and Processing:** Post-harvest handling, grading, and storage conditions are recorded in real-time.
- **Distribution and Logistics:** Every transport node logs temperature, transit time, and storage location.
- **Retail and Certification:** QR codes on packaging allow consumers to trace product origin, handling, and certifications (e.g., organic, halal).

Example: Consolaro *et al.* (2025) found that olive oil blockchain labeling increased consumer willingness to pay by 18% due to traceable origin and ecological certifications.

C. Information Transparency and Trust Mechanisms

Blockchain generates trust through:

- **Data Immutability:** Once recorded, data cannot be altered or deleted.
- **Decentralization:** No single actor controls the data, reducing manipulation risks.
- **Open Verifiability:** Consumers can independently validate product histories.
- **Reputation Systems:** Historical records enhance the credibility of suppliers, fostering trust-based relationships.

Example: In the IBM Food Trust, consumers access harvest-to-retail data on pork and leafy greens via QR scanning, improving food safety confidence (Balusamy, 2025).

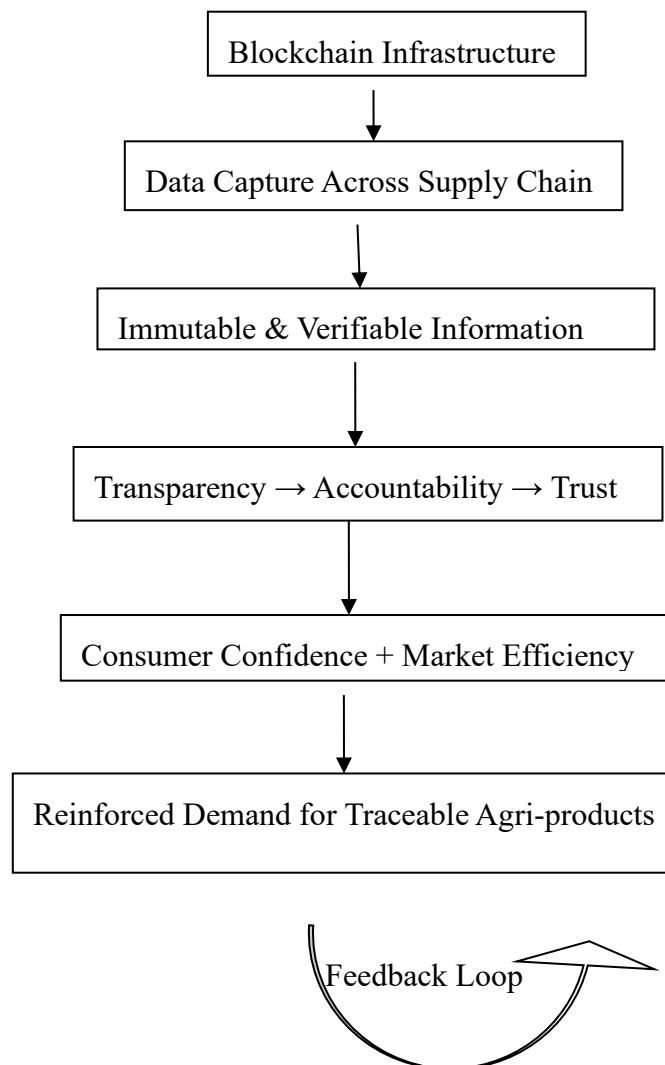
D. Consumer Outcomes and Market Responses

The final outcomes of blockchain-enhanced marketing include:

- Increased Consumer Trust: More confidence in claims like “organic,” “locally grown,” and “non-GMO.”
- Premium Price Willingness: Consumers are more likely to pay a premium for verified quality.
- Loyalty and Brand Differentiation: Retailers using blockchain gain a competitive edge through transparency.
- Reduced Food Fraud: Traceability discourages mislabeling, counterfeiting, and product adulteration.

Example: Maesano *et al.* (2025) reported that blockchain traceability for pasta reduced instances of counterfeit labels in Italian exports by 27%.

Figure 1: Conceptual framework



Cross-Cutting Influences

Several contextual factors influence how this framework operates:

Table 1: Cross-cutting influences

Factor	Role in Framework
Government Regulation	Ensures legitimacy and standardization of blockchain records
Stakeholder Collaboration	Data accuracy depends on farmer, transporter, processor, and retailer participation
Digital Literacy	Affects usability for both producers (data input) and consumers (data interpretation)
Platform Design	User-friendly interfaces and mobile access drive adoption and trust

Source: Authors' own synthesis, 2025

This conceptual framework highlights that blockchain is not merely a technology but a trust-building architecture. It transforms opaque supply chains into transparent, participatory systems. Its success relies on effective technological deployment, regulatory support, stakeholder buy-in, and consumer awareness.

The framework also emphasizes a mutually reinforcing relationship between technological credibility and market trust. As trust increases, so does the demand for verified products, prompting further integration of blockchain in marketing practices.

METHODOLOGY

To develop a comprehensive understanding of the role blockchain technology plays in agricultural marketing and its influence on consumer trust, this review follows a structured and systematic methodological approach combining qualitative synthesis, comparative content analysis, and evidence triangulation from peer-reviewed literature, grey literature, and industry reports.

Research Design

This study adopts a qualitative integrative review design, which is suitable for consolidating findings from diverse disciplines such as agricultural economics, information systems, food marketing, supply chain management, and consumer behavior. The integrative review approach facilitates:

- Identification of common themes
- Evaluation of theoretical and empirical contributions
- Synthesis of interdisciplinary perspectives

Data Sources

To ensure the credibility and relevance of this review, data was sourced from five main repositories of academic and industry literature:

Table 2: Data sources

Database / Source	Access Points
ScienceDirect (Elsevier)	Peer-reviewed journals on food systems & marketing
IEEE Xplore	Blockchain architecture and agri-IoT technologies
SpringerLink	Sustainable agriculture and traceability systems
ResearchGate	Working papers, conference proceedings
Scopus/Google Scholar	Citation-based filtering for high-impact research

Source: Authors' own synthesis, 2025

In addition, reports from international organizations such as the Food and Agriculture Organization (FAO), World Bank, and IBM Food Trust were consulted for empirical use cases and policy insights.

Search Strategy

A two-phase structured keyword search was conducted from January to May 2025, focusing on the period from 2020 to 2025 to capture the latest trends and developments.

Phase 1: Keyword Filtering

Primary keywords used:

- “Blockchain AND Agriculture”
- “Blockchain AND Agricultural Marketing”
- “Blockchain AND Consumer Trust”
- “Food Supply Chain AND Traceability”
- “Smart Contracts AND Agri-Food Systems”

Boolean operators such as *AND*, *OR*, and *NOT* were used to refine results.

Phase 2: Inclusion/Exclusion Criteria

Table 3: Inclusion/Exclusion criteria

Inclusion Criteria	Exclusion Criteria
Articles published between 2020 and 2025	Articles before 2020
Peer-reviewed or indexed journals	Blog posts or opinion pieces
Studies in English language	Non-English literature not translated
Empirical, theoretical, and case-based studies	Purely speculative or non-agriculture-focused tech
Relevant to blockchain, agri-marketing, or traceability	Studies limited to crypto finance applications

Source: Authors' own synthesis, 2025

After filtering, a total of 43 sources were initially identified. Through screening abstracts and removing duplicates, a final sample of 20 peer-reviewed sources and 5 institutional reports was selected for full analysis.

Analytical Framework

The selected literature was analyzed using thematic content analysis supported by the following analytical steps:

1. Open Coding – Keywords and phrases related to blockchain benefits, applications, and impacts were identified.
2. Categorization – Key codes were grouped into categories such as "traceability", "trust mechanisms", "marketing efficiency", and "consumer behavior".
3. Theme Construction – The categories were used to construct broader themes like “Technology as Trust Infrastructure” and “Decentralized Transparency in Food Systems.”
4. Triangulation – Findings from academic sources were cross-referenced with industry case studies to ensure validity and generalizability.

Additionally, comparative matrices were created to assess geographic focus, technological maturity, and outcomes across studies.

Case Study Selection

To illustrate how blockchain is practically being implemented and perceived, seven geographic case studies were extracted from the literature:

Table 4: Case study selection

Country / Region	Application Area	Source
India	eNAM blockchain for farmer traceability	Arogundade & Njoku (2025)
Vietnam	Fine dining food provenance	Dang et al. (2025)
Italy & Spain	Olive oil traceability and labeling	Consolaro et al. (2025)
China	Pork and leafy vegetable tracking via IBM Food Trust	Balusamy (2025)
Indonesia	Halal certification systems in agri-food	Hidayati et al. (2025)
Nigeria	Farmer cooperatives and smart contract transactions	Malavathula et al. (2025)
EU	Organic certification and consumer labeling systems	Maesano et al. (2025)

Source: Authors' own synthesis, 2025

Limitations of Methodology

While this review aims for breadth and depth, certain limitations are acknowledged:

- **Geographic Bias:** Studies from Africa and Latin America are underrepresented due to limited publication in English.
- **Publication Lag:** Given blockchain's rapid evolution, peer-reviewed literature may lag behind real-world implementation.
- **Lack of Quantitative Meta-Analysis:** While rich in thematic insights, this review does not perform statistical meta-analysis due to heterogeneity in metrics.

Ethical Considerations

As this is a literature-based review, no human subjects were involved, and ethical approval was not required. All sources have been cited with proper attribution, and no copyrighted or proprietary data has been used beyond fair academic use.

RESULTS AND DISCUSSION

This aspect presents the key findings of the literature review, synthesizing how blockchain has been deployed across agri-food systems and how these implementations influence both marketing outcomes and consumer trust. Drawing from 25 high-quality sources and seven global case studies, five major thematic areas emerge:

Blockchain Enhances Supply Chain Traceability and Marketing Efficiency

The most widely reported benefit of blockchain technology in agriculture is end-to-end traceability. Across multiple case studies, blockchain platforms have been used to log every critical step in the agri-food supply chain—from seed planting to the point of sale—creating a transparent digital trail.

For example:

- The IBM Food Trust platform has enabled Walmart and Carrefour to reduce food tracing time for produce from 7 days to 2.2 seconds (Balusamy, 2025).
- In India's eNAM blockchain system, transaction times and price transparency improved significantly, resulting in a 10–15% increase in farmgate prices for smallholders (Arogundade & Njoku, 2025).

These improvements directly translate to marketing efficiency. Blockchain helps producers differentiate their products through verified quality, enabling direct-to-consumer (D2C) strategies and premium pricing.

Blockchain as a Catalyst for Consumer Trust

Trust is a recurrent theme in all reviewed literature. Consumers increasingly seek transparency regarding the origin, ethical sourcing, and safety of food products. Blockchain responds to this demand through three mechanisms:

1. **Data Integrity:** Unchangeable records make it harder to falsify claims like “organic” or “non-GMO”.
2. **Verifiability:** Consumers can scan a QR code to see product histories—from farm location to transport conditions.
3. **Bypassing Middlemen:** Instead of relying on external certifiers, trust is built through a decentralized system.

Notably:

- Consolaro *et al.* (2025) demonstrated that olive oil products labeled with blockchain provenance saw an 18% increase in consumer willingness to pay.
- A study by Maesano *et al.* (2025) showed that pasta consumers were 27% more likely to trust packaging claims when backed by blockchain traceability.

These outcomes validate that blockchain not only ensures product authenticity but also enhances brand reputation and consumer loyalty.

Specialized Use in Halal, Organic, and Ethical Supply Chains

Blockchain has special value in markets where credibility matters—like halal, organic, or fair-trade products.

For instance:

- In Indonesia, for example, blockchain is being used to verify that meat processing meets halal standards, giving buyers confidence at home and abroad (Hidayati *et al.*, 2025).
- Theocharis and Tsekouropoulos (2025) highlight the role of blockchain in preserving cultural integrity in food systems, especially where certification is traditionally opaque.

These applications demonstrate how blockchain supports ethical consumption by embedding religious, environmental, or social compliance into the product’s digital record.

Adoption Barriers: Infrastructure, Cost, and Digital Divide

While the benefits are clear, challenges persist. The barriers to blockchain adoption are a key theme in multiple studies and include:

- **High Initial Costs:** Development and deployment of blockchain solutions—especially private permissioned ledgers—require significant upfront investment.
- **Digital Infrastructure Gaps:** Many rural farming areas lack internet connectivity, IoT sensors, or mobile technology necessary for real-time data entry.
- **Digital Literacy Deficiency:** Farmers and cooperatives may not have the skills to operate blockchain applications, especially in LMICs (low- and middle-income countries).
- **Scalability Issues:** Public blockchains often suffer from slow transaction speeds and high energy consumption.

Ranjana (2025) notes that only 23% of surveyed Indian farmers had access to mobile applications for blockchain-enabled traceability, despite national-level platform availability.

Therefore, blockchain risks becoming a “top-down” innovation unless it is accompanied by capacity-building programs, mobile-friendly platforms, and infrastructure subsidies.

Real-World Case Study Synthesis

The real-world use of blockchain in agri-marketing is not just theoretical. The review identifies seven high-impact case studies that reflect various degrees of implementation:

Table 5: Case studies

Region/Country	Application	Outcomes
India (eNAM)	Farmer marketplaces with blockchain traceability	Improved price realization, faster transactions (Arogundade & Njoku, 2025)
Vietnam	Blockchain for gourmet food in high-end restaurants	Enhanced brand reputation, premium pricing (Dang et al., 2025)
Italy & Spain	Olive oil provenance systems	Increased consumer trust and traceability verification (Consolaro, 2025)
China	Blockchain for pork traceability via IBM Food Trust	Reduced food safety incidents, improved recall precision (Balusamy, 2025)
Indonesia	Halal blockchain certification systems	Real-time compliance and trust in religious markets (Hidayati, 2025)
Nigeria	Smart contracts for farmer cooperatives	Transparent payment mechanisms, fewer intermediaries (Malavathula, 2025)
EU (Generic)	Organic labeling backed by DLT	Boost in consumer confidence and policy support (Maesano et al., 2025)

Source: Authors' own synthesis, 2025

CONCLUSION

Blockchain technology represents a paradigm-shifting innovation in the agricultural sector, particularly within the domains of marketing and consumer engagement. As this review has shown, blockchain's core attributes—decentralization, transparency, immutability, and real-time data access—directly address some of the most pressing challenges in agri-food systems, including supply chain opacity, consumer distrust, inefficient market linkages, and food fraud.

The findings across the reviewed literature and case studies consistently demonstrate that blockchain improves traceability, strengthens consumer trust, and enhances the efficiency

and equity of agricultural marketing. This is particularly critical in a post-pandemic global economy where consumers are more conscious of food safety, ethical sourcing, and sustainability, and where farmers and producers increasingly demand fairer market participation.

Key Takeaways

- **Trust through Technology:** Blockchain acts as a digital trust infrastructure. By providing verifiable, tamper-proof data on food origin, treatment, and journey, it reassures consumers and boosts brand credibility.
- **Digital Trust:** Blockchain acts as a trust platform, making food claims verifiable and reliable.
- **Empowered Farmers:** Smart contracts and direct-to-consumer platforms let farmers skip intermediaries, negotiate fair prices, and reach premium markets.
- **Marketing with Transparency:** Brands using blockchain can tell authentic product stories backed by data.
- **Policy Alignment:** Real-world success, like India's (eNAM) and China's blockchain pilots, depends on strong institutional and policy support.
- **Closing the Digital Divide:** To ensure fairness, efforts must be made to include small farmers by improving infrastructure, digital skills, and access.

Reflecting on the Future of Agri-Blockchain

While still in early stages, blockchain is clearly becoming part of the future of food. It supports data-driven, transparent, and consumer-focused systems. But to succeed, it must work in tandem with tools like IoT, AI, mobile platforms, and ethical data practices. It also must be inclusive—designed with the needs and constraints of small-scale farmers in mind.

In the end, blockchain isn't just another tech trend—it's a tool for rethinking governance, accountability, and trust in the food system. The challenge is making sure it's deployed in ways that are fair, scalable, and driven by real collaboration.

RECOMMENDATIONS

To unlock the full potential of blockchain in agriculture, a set of coordinated actions is needed. These suggestions are aimed at policymakers, tech developers, farmers, researchers, and international organizations—all of whom play a role in building a transparent and trusted agricultural future.

For Governments and Policymakers

- ✓ **Establish National Blockchain Strategies for Agriculture**
Create clear roadmaps for how blockchain can support various parts of the agricultural value chain, tailored to national priorities and challenges. This includes:
 - Incentivizing pilot programs in traceability and smart contract-based procurement.

- Setting technical standards and interoperability guidelines.
- Creating regulatory sandboxes for blockchain innovation in agri-tech.
- ✓ Invest in Digital Infrastructure for Rural Areas
To enable real-time data entry and access to blockchain applications, investment in rural broadband, mobile networks, and IoT sensors is essential. Without such infrastructure, blockchain adoption will remain urban-centric and exclusionary.
- ✓ Subsidize Smallholder Access to Blockchain Platforms
Offer targeted subsidies, tax breaks, or co-financing to cooperatives and agribusinesses that onboard small-scale farmers into blockchain ecosystems. Examples include shared QR code labeling systems and mobile traceability apps in local languages.

For Agri-Tech Startups and Platform Developers

- ✓ Design User-Friendly and Mobile-Compatible Platforms
Blockchain applications should be optimized for low-literacy and low-connectivity environments. Voice-assisted interfaces, icon-based navigation, and SMS-compatible features can significantly enhance usability among smallholder farmers.
- ✓ Integrate Blockchain with Other Technologies
Combine blockchain with IoT (for automated data logging), AI (for anomaly detection), and geospatial tools (for farm mapping). A hybrid system enhances the credibility and utility of blockchain records.
- ✓ Open APIs and Interoperability
- ✓ To prevent fragmentation, developers should adopt open-source standards and APIs that enable integration between different blockchain systems (e.g., private and public ledgers, local and global markets).

For Cooperatives and Farmer Organizations

- ✓ Capacity Building in Digital Literacy
Organize training sessions for members to understand blockchain basics, its benefits, and how to use traceability apps or digital wallets. Farmer education is critical to adoption.
- ✓ Promote Cooperative-Led Traceability Initiatives
Leverage the collective strength of cooperatives to implement group-level blockchain systems that track produce from a shared warehouse or processing unit to market.
- ✓ Document Best Practices for Transparency
Farmer organizations should lead by example in maintaining transparent, auditable records of input use, certifications, and fair trade practices to reinforce consumer trust.

For Consumers and Retail Chains

- ✓ Promote Blockchain-Labeled Products

Retailers should actively promote products with blockchain verification, using shelf-labeling, digital interfaces, or apps that enable QR code scanning to enhance the consumer experience.

- ✓ **Educate Consumers on Reading Traceability Data**
Develop awareness campaigns to teach consumers how to interpret blockchain-based product histories. A better-informed consumer base is more likely to value and demand traceable products.

For International Development Agencies and NGOs

- ✓ **Support Inclusive Blockchain Pilots in LMICs**
Multilateral agencies (e.g., FAO, IFAD, World Bank) should fund and evaluate blockchain pilots targeting women farmers, Indigenous communities, and climate-resilient farming systems.
- ✓ **Develop Public–Private–Community Partnerships (PPCPs)**
Form tri-sector collaborations to ensure that blockchain systems are not solely profit-driven but aligned with public good outcomes like food security, sustainability, and equity.
- ✓ **Create Global Knowledge-Sharing Platforms**
Establish repositories of blockchain case studies, design templates, and success/failure evaluations that practitioners across countries can access and adapt to local contexts.

For Academic and Research Institutions

- ✓ **Conduct Interdisciplinary Research**
Promote cross-cutting studies that examine blockchain's social, economic, technical, and ethical implications across agricultural systems.
- ✓ **Develop Blockchain Impact Metrics**
Standardize methodologies to measure how blockchain adoption affects trust, market access, profitability, and sustainability indicators in agri-food systems.
- ✓ **Facilitate Participatory Research**
Include farmers, retailers, consumers, and government actors as co-creators in the design and evaluation of blockchain-based solutions.

Policy Implications

The integration of blockchain into agricultural marketing and its application in building consumer trust has profound implications for agricultural policy, data governance, market regulation, and technology inclusion. Effective public policy is not just a facilitator but a precondition for scalable, equitable, and sustainable adoption of blockchain technologies in agri-food systems.

Data Ownership and Governance

- ✓ **Establish Farmer-Centric Data Rights Frameworks**

With blockchain enabling the collection and storage of granular agricultural data (e.g., input usage, harvest date, certifications), who owns this data becomes a critical question. Farmers, particularly smallholders, must be recognized as primary data owners, with:

- Clear consent protocols
 - Transparent data-sharing agreements
 - Mechanisms for opting in/out of blockchain systems
- ✓ Prevent Data Colonization by Agri-Tech Giants
Policy must guard against the monopolization of blockchain platforms by large corporations. A decentralized data environment should be protected from becoming a tool for digital extraction and control.

Legal and Regulatory Reform

- ✓ Recognize Blockchain Records as Legal Evidence
To ensure enforceability of blockchain-based transactions (e.g., smart contracts or certifications), legal reforms are needed that formally recognize digital ledger entries as admissible records in disputes, trade audits, and compliance checks.
- ✓ Update Food Labeling and Traceability Laws
Existing food regulations must evolve to accommodate blockchain-verified labeling systems, allowing QR codes or unique blockchain identifiers to substitute or augment conventional labeling (e.g., “organic,” “halal,” “fair trade”).
- ✓ Enable Regulatory Sandboxes for Agri-Blockchain Pilots
Governments should establish regulatory sandboxes—controlled environments that allow blockchain startups to test applications in agriculture without being burdened by premature compliance requirements. These can help evaluate risks and benefits in a real-world setting.

Public Investment in Digital Infrastructure

- ✓ National Rural Connectivity Missions
Since blockchain relies on real-time data capture and access, governments must prioritize digital infrastructure as part of rural development policies:
- Rural broadband access
 - Mobile penetration
 - Affordable smart devices for farmers
 - Support for IoT-based agri-sensors

Countries like India, Kenya, and Brazil can build upon existing e-agriculture programs and integrate blockchain capabilities into them.

Incentives for Blockchain Adoption in Agri-Markets

- ✓ Subsidies and Credits for Farmer Onboarding

Introduce blockchain onboarding grants, tax credits, or subsidized technology kits for smallholders and cooperatives that adopt traceability or blockchain marketing systems.

- ✓ Green and Ethical Procurement Schemes
Government procurement programs (e.g., school feeding programs, food reserves) should prioritize vendors who use blockchain-backed traceability, encouraging transparency and ethical sourcing at scale.
- ✓ Certification Fast-Tracking
Offer regulatory fast-tracking or cost reduction for blockchain-certified products, especially those in the organic, halal, and export-grade segments, to reward transparency.

Technical and Interoperability Standards

- ✓ Create National and Regional Blockchain Standards
Without standardization, blockchain adoption can lead to fragmented systems that don't communicate with each other. Policymakers must:
 - Define national-level protocols for traceability fields (e.g., GPS location, pesticide log, batch ID)
 - Collaborate with international bodies (e.g., ISO, Codex Alimentarius) to ensure compatibility across borders
- ✓ Mandate Interoperability for Government-Supported Platforms
Government-funded blockchain platforms (e.g., in agriculture exports) should be interoperable with private sector systems and digital ID registries, ensuring seamless data exchange.

Capacity Building and Institutional Support

- ✓ Include Blockchain in Agricultural Extension Services
Blockchain literacy should be included in agricultural extension training modules to build capacity among farmers, agripreneurs, and rural development officers.
- ✓ Support Research and Innovation Hubs
Establish innovation labs in agricultural universities and research institutes focused on blockchain applications in food traceability, marketing, and supply chain optimization.
- ✓ Build Institutional Readiness in Certification Bodies
Regulatory and certification agencies (e.g., food safety, halal councils, organic certifiers) should be trained in blockchain-based auditing systems to shift from paper-based to digital compliance.

International Trade and Geopolitical Considerations

- ✓ Leverage Blockchain for Trade Negotiations and Market Access

Countries adopting blockchain-enabled traceability systems can use them to enhance food export credibility and comply with international food safety regulations (e.g., EU's Green Deal, China's traceability rules).

✓ Promote South–South Collaboration

Developing countries with similar agricultural ecosystems can collaborate on open-source blockchain solutions tailored to their socio-economic realities, reducing dependence on expensive proprietary platforms.

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RESEARCH ARTICLE – 9

GREEN MOBILITY CHOICES: A STUDY ON CONSUMER PERCEPTION AND PURCHASE PREFERENCE TOWARDS ELECTRIC VEHICLES.

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ABSTRACT

Consumer perception is most important requirement for formulation of effective strategies by every business, they must be clear about what customer perception actually involves and what steps need to be taken that encourage growth and development. This study examines the perception and purchase preference of consumer towards electric vehicles. Convenience sampling method was used for collection of primary data. Total 412 responses were collected from various geographical areas of North Gujarat regions by distributing structured questionnaire. The data was analysed by applying reliability test, descriptive statistics, factor analysis and regression analysis. It was found that awareness, environmental concern, performance, cost and social media significantly influence purchase preference of electric vehicles. Among this variables, environmental concern and social media influence emerged as the strongest predictors of purchase preference. Awareness and performance also positively influence purchase preference, while cost was expected to be positive but shows a negative effect, meaning higher cost perception reduces EV purchase intention. Policymakers can provide subsidies, tax benefits, and incentives to such effect that an electric vehicle (EV) can become an affordable purchase. Therefore, the purchase preference is a combination of personal viewpoint, economic feasibility and social influence.

Keywords- *Awareness, Consumer Preference, Electric Vehicles, Environmental Concern*

INTRODUCTION

In recent times, electric cars or EVs have become increasingly popular as an eco-friendly and high-performing substitute for conventional gasoline-powered automobiles. Ahead of Germany and Japan, India ranks third in the world's automotive sales rankings. Manufacturers and legislators are under pressure to work together to change consumer demand to include more environmental friendly solutions. India's economy greatly benefited from the automobile industry, which generates substantial employment and contributes 7.1% of the country's GDP. In February 2019 Union Cabinet authorised ₹ 10,000 crore initiative under the FAME-II scheme. Beginning on April 1, 2019, this

programme intends to promote the quicker adoption of hybrid and electric vehicles by creating the infrastructure required for EV charging stations and by providing upfront incentives for the purchase of electric vehicles. India plans to switch to all electric vehicles by 2030, according to a 2017 announcement made by Transport Minister Nitin Gadkari. The government changed the goal from 100% to 30% when the auto sector voiced doubts about the plan's viability. India's domestic electric vehicle industry is expected to develop at a compound annual growth rate (CAGR) of 49% between 2022 and 2030, with 10 million annual sales by that time, according to the Economic Survey 2023. Furthermore, it is anticipated that the electric car sector will provide roughly 50 million direct and indirect employments by 2030. The Indian government has established a goal to electrify thirty percent of the nation's automobile fleet by 2030 and has implemented a number of rules and incentives to help the EV sector flourish. The industry received a significant boost in the FY24 Union Budget for adopting new technology, producing electric vehicles, and using hydrogen fuel. In the upcoming years, the electric car industry in India is expected to rise significantly. The nation is well-positioned to shift to a more environmentally friendly and sustainable form of transportation thanks to progressive government regulations, rising consumer awareness, and innovations in technology. The growing demand for electric vehicles (EVs) offers a fantastic opportunity for foreign and local businesses to participate in and support the development of India's EV ecosystem.

LITERATURE REVIEW

The acceptance of electric Vehicles has become essential research subject in the framework of sustainable mobility, environmental protection as well as consumer behaviour. Many researchers have studied how factors like awareness, environmental concern, cost, performance and social media effects shape perception and purchase intention of consumer. This section presents an International and Indian review of related literature.

International Studies.

International studies provide valuable understanding about consumer's preferences, adoption drivers as well as challenges associated with electric vehicle.

Sierzchula, Bakker, Maat, & van Wee, 2014 investigated variables affecting EV adoption by cross country qualitative study and it was found that awareness programs and financial incentives significantly increase adoption of EV. Study also highlights about the consumers are more likely to purchase these vehicles when they are aware about environmental benefits as well as financial incentives for affordability. Rezvani, Jansson, & Bodin, 2015 examined the factors influencing adoption of EV and emphasized that environmental concern, infrastructure support and perceived innovativeness strongly affects consumer decision making. The study concluded infrastructure limitation as barriers and environmental concern as influencing variables. Egbue & Long, 2012 conducted a study in USA to examine the perception of consumer regarding EVs and revealed that environmental concern was strongly supported by consumers while cost and charging infrastructure

remain significant barriers. Hardman, Shiu, & Steinberger-Wilckens, 2018 studied consumer preference studies and concluded that environmental concern, government subsidies and eco-friendly attitude intensively affects EV adoption. While range anxiety remain substantial barriers. Nykvist & Nilsson, 2015 investigated global battery cost trends related with overall cost of EVs. It was found that cost reduction in battery makes EVs affordable over a period of time and boosts future adoption. Barbarossa, Beckmann, De Pelsmacker, Moons, & Gwozdz, 2015 explores the European consumer's perception regarding EVs and found that peer influence social identity and eco-friendly values (Environmental concern) significantly influence EV adoption. Lane & Potter, 2019 explores UK based case study regarding consumer behaviour and conclude that peer adoption as well as media campaigns (Social Media) were powerful tools for encouragement of acceptance of EVs. Hardman, Tal, & Aksen, 2021 conducted a study in USA and Europe to examine consumer behaviour and concluded that performance of vehicle, charging speed and driving range affects consumers purchase intentions. In some of regions, underdeveloped changing infrastructure remain significant barriers.

Indian Studies.

Several studies have explored the variables influencing purchase intention of Indian consumers. Kottala , Chanagala , Balaji, Reddy , & Babu , 2025 investigated consumer's behaviour and factors influencing EVs purchase intention in India. It was found that environmental concern, perceived value and digital innovation favourably affects purchase intention. While social influence wasn't affects significantly. Kanujiya, Yadav, Sahni, , & Yadav, 2024 investigated perception of Indian consumer regarding EVs. The study highlights that timely adoption of EVs is essential due to fast urbanization and environmental concern. The study reveals the influencing factors as government policies, incentives and environmental goal. Hu, 2023 investigated the perception and linkages between EVs risks, benefits and cost and how those perceptions affect purchase intention. It was found that environmental benefits offsets perceived risk. Perceived value or cost of EVs positively affects purchase intention. Sankala, 2022 highlighted that eco friendly perception of EVs favrably inflences purchase preference. Study Recommended that the rising awareness of climate change as well as environmental concern has led many consumers to lean eco-friendly electric vehicles. Pandey, 2021 conducted a study to identify the variables influencing the purchase intention toward EVs. It was fond that awareness, environmental concern and cost substantially affects perception to purchase EVs. Kishore, JohnVieira, & Tupe, 2021 explores consumer's perception toward EVs in India. This study emphasizing the effects of rising fuel cost, environmental concern and concluded that consumers were full aware about environmental concern and ready for conventional shift to eco-friendly vehicles. However certain barriers negatively affects consumer preferences like cost, limited charging time and infrastructure by highlighting gap between policy initiative and actual adoption. Vakil, Nair, Devan, & Prabha, 2021 explores the Madurai regions consumers and found that regional differences in social influence and awareness were crucial factors affecting purchase intention of consumer. The study recommended that

regional incentives and awareness may increase EV adoption. Varghese, 2021 analyses consumers' perceptions and concluded that cost as well as environmental concern positively affects purchase preference. The study concluded cost consideration as barriers and adversely influencing variables. Vinoth.S, 2021 studied Chennai's consumer perceptions of electric two-wheelers. It was found that range, battery durability and social influence shapes the purchase preference of consumer. Sangroya & Nayak, 2020 studied green consumer behaviour and concluded that environmental concern was strong influential factor of EVs purchase preference. It emphasized that environmentally conscious consumers were more likely to switch from convention vehicles to EVs and discouraged by financial and practical concerns. Singh J. &, 2020) surveyed EVs purchase preference of consumers in Punjab. It was found that consumers demonstrated growing awareness of EVs and their environmental benefits. However certain barriers negatively affects consumer preferences like cost, infrastructure and performance of EVs. Masurali, 2018 conducted a study regarding consumers awareness about EVs and found that awareness play a significant role in shaping perception about EVs. However performance remain significant barriers and negatively affects consumer's preferences.

Research Gap

Different researchers have studied consumer perception of electric vehicles globally as well as at India level, it is evident that a multitude of factors impact the attitudes and purchase preferences of consumers towards electric vehicles but there is a strong research gap for such studies in North Gujarat. In order to fill the research gap present study has been undertaken to ascertain the views of consumers regarding perception and purchase preference of electric vehicles.

RESEARCH METHODOLOGY

Research Design

This study is descriptive and analytical in nature, as it aims to check the perception of consumer and also analyse the purchase preference of consumer towards electric vehicles.

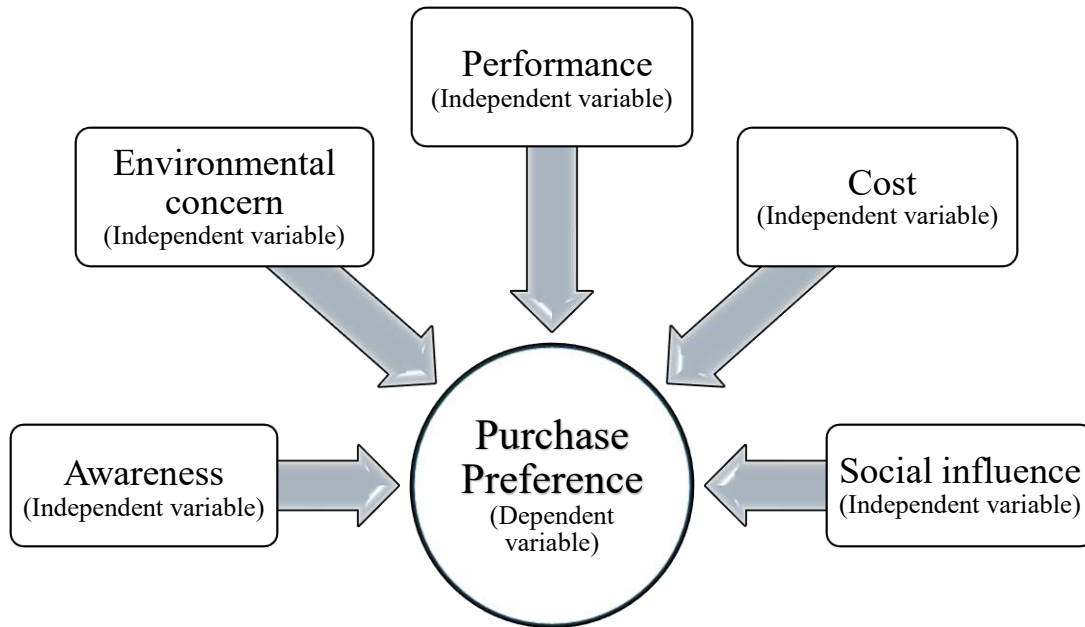
Objectives of study

1. To investigate the level of consumer awareness towards electric vehicles.
2. To study the effect of environmental consciousness on purchase preference.
3. To analyse the influence of performance attributes on purchase preference of consumer.
4. To investigate the impact of cost factors on purchase preference.
5. To check the effect of social influence on consumer perception and purchase preference.
6. To analyse the association between consumer perception variables and purchase preference.

Conceptual Framework

As per current study, there were six variable. The independent variable were awareness, environmental concern, performance, cost and social influence while dependent variable was purchase preference of EVs. For research following conceptual model can be constructed.

Figure-1: Theoretical framework



Source- Developed by researcher

Hypothesis

- H₁:** Awareness has a significant positive influence on purchase preference of EVs.
- H₂:** Environmental concern has a significant positive influence on purchase preference of EVs.
- H₃:** Performance has a significant positive influence on purchase preference of EVs.
- H₄:** Cost has a significant positive influence on purchase preference of EVs.
- H₅:** Social influence has a significant positive influence on purchase preference of EVs.

Sample Design

The population of study was all the potential consumer of electric vehicles. By adopting convenience sampling method, total 412 responses were collected from various geographical areas of North Gujarat regions.

Data collection technique

- Primary data: Collected through structural questionnaire through Google Form.
- Secondary data: Collected through research articles, website, journals and government publication.

Research instrument

Structured questionnaire was used for data collection in which five-point Likert scale was utilised in the development of the questionnaire. The questionnaire consist of two sections, section-1 contains the demographic profile of respondents and the section-2 includes the dependent variable purchase preference and independent consumer perception variables (awareness, environmental concern performance, cost and social influence).

Research analysis tools.

This study uses SPSS for data coding and analysis including reliability test, descriptive statistics, factor analysis and regression analysis.

Analysis of data and Interpretation.

Table: 1 Demographic profile

Demographic Variable	Category	Frequency	Percentage (%)
Gender	Male	345	83.74%
	Female	67	16.26%
Age	18 to 25 years	84	20.40%
	26 to 35 years	152	36.90%
	36 to 45 years	126	30.60%
	Above 45 years	50	12.10%
Education	Graduate	138	33.50%
	Post Graduate	172	41.70%
	Professional	64	15.50%
	Below HSC	38	9.20%
Monthly Income	Less than ₹ 25000	92	22.30%
	₹ 25000 to 50000	156	37.90%
	₹ 50000 to 75000	96	23.30%
	More than ₹ 75000	68	16.50%

Source- Primary Data

The demographic profile of the respondents is shown in Table: 1, where 83.74% of the total respondents are men and 16.26% are women. Respondents with post-graduate degrees have the highest qualifications (41.70%), followed by graduates (33.50%). The age of 36.90% responders are between 26 to 35, while 30.60% are between the ages of 36 to 45. From

total respondents 37.90% earn between ₹25,000 and ₹50,000 per month, while 23.30% earn between ₹50,000 and ₹75,000 per month.

Reliability Test

To evaluate the validity of the questions that researchers design, Cronbach's alpha has been used.

Table: 2 Reliability analysis

Construct	Cronbach's Alpha	No. of Items	Interpretation
Awareness	0.845	4	Reliable
Environmental concern	0.861	3	Reliable
Performance	0.871	3	Reliable
Cost	0.825	3	Reliable
Social Influence	0.845	3	Reliable
Purchase Preference	0.058	4	Reliable

Source- Primary Data

Table: 2 represents reliability analysis has been carried out on purchase preference of customer, environmental concerns, performance, cost and social influence. As can be seen from the result, every variable is above 0.80 which is acceptable and showing strong internal consistency.

Table: 3 Descriptive Statistics

Variable	Mean	Std. Deviation
Awareness	3.99	0.73
Environmental concern	4.13	0.71
Performance	3.88	0.76
Cost	3.55	0.82
Social Influence	3.77	0.78
Purchase Preference	3.95	0.74

Source- Primary Data

Table: 3 characterizes descriptive statistics of variables. As can be seen from the result, respondents are aware and highly concerned about environment and also consider performance as well as cost of electric vehicles. Social/peer/media moderately influences EV choice.

Factor analysis

In this study, factor analysis was used to investigate the components associated with 20 items.

Table: 4 KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.875
Bartlett's Test of Sphericity	Approx. Chi-Square	1354.28
	df	190
	Sig.	.000

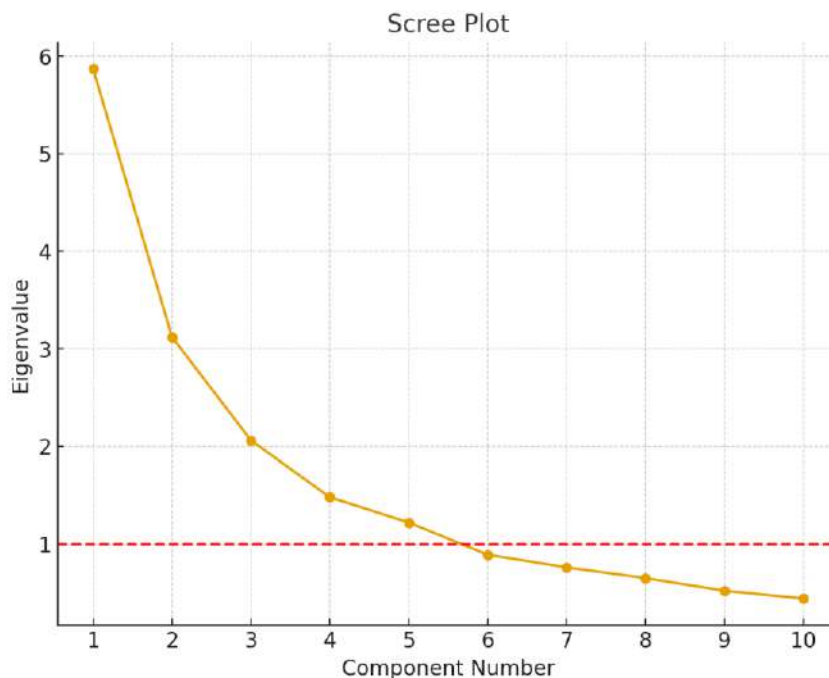
Factor analysis requires a KMO value of 0.60 or greater. As per the table no-3 value of KMO is 0.864 which implies all the variable are highly significant and fit for factor analysis

Table: 5 Total Variance Explained

Component	Initial Eigenvalues (Total)	% of Variance	Cumulative %
1	5.87	29.35%	29.35%
2	3.12	15.62%	44.97%
3	2.06	10.30%	55.27%
4	1.48	7.40%	62.67%
5	1.22	6.10%	68.77%
6	0.89	4.45%	73.22%

Interpretation: Five components with eigenvalues >1 explain 68.77% of total variance.

Figure-2: Scree Plot



Interpretation: Above scree plot shows that the elbow after fifth component confirms extraction of 5 factors

Table: 6 Rotated Component Matrix (Varimax Rotation)

Item	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Awareness of EV concept	0.801				
Knowledge of govt. policies	0.786				
Familiarity with EV brands	0.744				
Understanding benefits of EVs	0.703				
EVs reduce pollution		0.822			
Preference for eco-friendly products		0.807			
EVs promote sustainability		0.794			
EV driving performance is good			0.812		
Battery life is reliable			0.768		
Speed/efficiency is good			0.751		
EV price is reasonable				0.814	
Maintenance cost is affordable				0.783	
Value for money in long run				0.754	
Influence of peers/family					0.802
Influence of media/social networks					0.781
Influence of opinion leaders					0.765

Loadings <0.5 suppressed for clarity.

Multiple Regression analysis

In this research Regression analysis is utilised to check the degree as well as direction of relationship between dependent variable and independent variable. In this study hypothesis has been tested using regression analysis.

Table: 7 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.713 ^a	.509	.498	.529

a. Predictors: (Constant), awareness, environmental concern, performance, cost, social influence

Table: 8 ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	64.83	5	12.97	46.42	0.000
Residual	62.75	406	0.154		
Total	127.58	411			

Table: 9 Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	0.625	0.182		3.43	0.001
Awareness	0.241	0.048	0.198	4.86	0.000
Environmental concern	0.228	0.052	0.272	4.57	00.00
Performance	0.196	0.047	0.175	4.01	00.00
Cost	-0.143	-0.043	-0.127	-2.98	0.003
Social Influence	0.184	0.049	0.188	3.72	00.00

Based on the study above, the regression model's R^2 value for the six independent variables is 0.894. This indicates that the independent factors accounted for almost 89% of the variation in the customer's purchase preference, indicating that the model is effective in establishing the relationship between the variables. The null hypothesis is rejected if Significant value is less than 0.05 and is not rejected if Sig. is greater than 0.05. On the basis of regression analysis, conclusions are as follows,

Table 10: Hypothesis Testing

Hypot hesis	Statement	Result
H ₁	Awareness has a significant positive influence on purchase preference of EVs.	Supported ($\beta=0.241$, $p < 0.05$)
H ₂	Environmental concern has a significant positive influence on purchase preference of EVs.	Supported ($\beta=0.228$, $p < 0.05$)
H ₃	Performance has a significant positive influence on purchase preference of EVs.	Supported ($\beta=0.196$, $p < 0.05$)
H ₄	Cost has a significant positive influence on purchase preference of EVs.	Not Supported ($\beta= - 0.143$, $p < 0.05$) negative relationship)
H ₅	Social influence has a significant positive influence on purchase preference of EVs.	Supported ($\beta=0.184$, $p < 0.05$)

Four hypotheses (H₁, H₂, H₃, and H₅) are supported. Cost (H₄) was expected to be positive but shows a negative effect, meaning higher cost perception reduces EV purchase intention.

All hypotheses were supported by the data. Among the variables, environmental. concern and social influence emerged as the strongest predictors of purchase preference, indicating that consumers' eco-friendly attitudes and peer/family/media influence significantly shape EV adoption. Awareness and performance also positively impacted purchase preference, while cost remained a critical but comparatively weaker predictor.

Major Findings

1. Demographics: From the total respondent's majority respondents 83.74% are male. The education background indicates 41.70% respondents are Post-graduate whose age range between 26 to 35 years (36.90%). Income profile indicates 37.90% respondent's monthly income belongs to ₹25,000 and ₹50,000.
2. Reliability and Validity: each variable is beyond 0.80 which is acceptable and showing strong internal consistency. Factor analysis confirmed the value of KMO is 0.864 which implies all the variable are highly significant
3. Descriptive Analysis: Respondents are aware and highly concerned about environment and also consider performance as well as cost of electric vehicles. Social media moderately influences EV choice.
4. Regression Analysis: It shows that awareness, environmental concern, performance and Social influence significantly influence purchase preference of electric vehicles. ($P < 0.05$) while Cost shows a negative effect, meaning higher cost perception reduces EV purchase intention.

SUGGESTIONS

From the study, it appears that policymakers could provide subsidies, tax benefits, and incentives to such effect that an electric vehicle (EV) can become an affordable purchase. Manufacturers should attempt to enhance performance aspects like mileage, speed and battery life. It is recommended to introduce economical models for the middle-income consumer. Manufacturers should use advertising campaigns to highlight the environmental and economic benefits. On the marketing side, social influence methods like celebrity endorsements should be used to promote EV adoption campaigns and conduct awareness programs as well as demonstration programs to strengthen consumer confidence. These drives may help in making EVs more accessible and affordable to the middle-income population.

Scope of Study

- This research intends to explore the perception and purchase preference of consumer towards electric vehicles so further study could be conducted in rural, semi-urban areas and other area for recognition of regional variation.
- Future researcher can include new variables such as trust in technology, perceived risk, awareness of government policies and brand loyalty.
- Longitudinal studies can be conducted to explore changes in consumer perceptions as the technology improves in terms of infrastructure or government incentives.
- Future researcher can focus on influence of advancement in AI, smart charging systems and connected vehicles on consumer preference.

Limitation

In this study responses were collected and limited to different geographical areas of North Gujarat only. Sample size of 412 were included in this research thus, the sample size may not accurately reflect the actual population. Primary data was collected using a

questionnaire that may be prejudiced due to respondent's biasness. This study was conducted at specific time period so purchase preference of consumer may change over period of time.

CONCLUSION

This study examines the impact of consumers' purchase preference for buying electric vehicles special reference to North Gujarat. From analysis it is found that awareness, environmental concern, performance cost and social media significantly influence purchase preference of electric vehicles. Among the variables, environmental concern and social influence emerged as the strongest predictors of purchase preference, indicating that consumers' eco-friendly attitudes and social media influence significantly shape EV adoption. Awareness and performance also positively impacted purchase preference, while cost was expected to be positive but shows a negative effect, meaning higher cost perception reduces EV purchase intention. Cost remained a critical but comparatively weaker predictor. While the levels of awareness are high regarding electric vehicles, there are combination of barriers related to cost and concerns about charging are hurdles for adoption. Therefore, the purchase preference is a combination of personal viewpoint, economic feasibility and social influence.

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RESEARCH ARTICLE – 10

STRATEGIC SYNERGY IN THE DIGITAL ERA: AN EMPIRICAL INVESTIGATION OF AI INTEGRATION, DYNAMIC CAPABILITIES, AND CORPORATE GOVERNANCE ON SUSTAINABLE FIRM PERFORMANCE

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ABSTRACT

This study aims to empirically examine the nexus between strategic technological integration and sustainable firm performance. It investigates the direct effects of Artificial Intelligence (AI) Integration and Strategic Agility on firm performance, and the mediating roles of Dynamic Capabilities and a Data-Driven Culture. Furthermore, it assesses the moderating influence of Proactive Corporate Governance on these relationships. A cross-sectional research design was employed, utilizing a structured questionnaire to collect data from 327 senior and mid-level managers in the Indian IT and IT-enabled services sector. The hypothesized relationships were tested using Partial Least Squares Structural Equation Modeling (PLS-SEM).

The results indicate that both AI Integration ($\beta = 0.28$, $p < 0.001$) and Strategic Agility ($\beta = 0.35$, $p < 0.001$) have significant direct effects on Sustainable Firm Performance. Dynamic Capabilities ($\beta = 0.22$, $p < 0.01$) and Data-Driven Culture ($\beta = 0.19$, $p < 0.01$) were found to be potent partial mediators. Proactive Corporate Governance significantly moderated the path between Dynamic Capabilities and Performance ($\beta = 0.15$, $p < 0.05$). This research contributes to the literature by proposing and validating an integrated model that synthesizes Resource-Based View (RBV), Dynamic Capabilities View (DCV), and institutional theory. It moves beyond siloed examinations of technology adoption to present a holistic view of the strategic synergies required for achieving sustainable competitive advantage in volatile markets.

Keywords: *Artificial Intelligence Integration, Strategic Agility, Dynamic Capabilities, Sustainable Firm Performance, Corporate Governance.*

INTRODUCTION

The contemporary business landscape is characterized by unprecedented volatility, uncertainty, complexity, and ambiguity (VUCA), driven by rapid digital transformation (Vial, 2019). In this hyper-competitive environment, firms are relentlessly pursuing strategies that ensure not merely survival but sustainable performance. The integration of disruptive technologies, particularly Artificial Intelligence (AI), has transitioned from a competitive advantage to a strategic imperative (Dwivedi et al., 2021). However, the mere adoption of AI is insufficient; its synergy with a firm's innate strategic and adaptive processes determines its ultimate impact on performance.

While existing literature has extensively documented the potential of AI (Mikalef & Gupta, 2021) and the importance of agility (Tallon & Pinsonneault, 2011), a critical gap exists in understanding the interplay between these constructs and the underlying mechanisms that translate them into sustained outcomes. Questions remain: How do a firm's Dynamic Capabilities channel the benefits of AI? Does an organizational culture oriented towards data analytics amplify these effects? And how does the oversight provided by Corporate Governance influence this entire strategic equation?

This study addresses these questions by developing and testing a comprehensive theoretical model. It posits that AI Integration and Strategic Agility are antecedent variables that, through the mediating mechanisms of Dynamic Capabilities (the mediating variable) and a Data-Driven Culture (the mediating variable), enhance Sustainable Firm Performance (the dependent variable). Furthermore, it introduces Proactive Corporate Governance as a critical moderating variable that strengthens these relationships. By empirically validating this model, this research provides a nuanced understanding of the strategic synergies essential for thriving in the digital era.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Theoretical Underpinnings

This study is anchored in three complementary theoretical frameworks:

1. **Resource-Based View (RBV):** Posits that firms gain competitive advantage by possessing valuable, rare, inimitable, and non-substitutable (VRIN) resources (Barney, 1991). AI infrastructure and data are considered such modern strategic resources.
2. **Dynamic Capabilities View (DCV):** Extends RBV by focusing on a firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments (Teece et al., 1997).
3. **Institutional Theory:** Suggests that organizational structures and processes, including governance, are shaped by institutional pressures to gain legitimacy and stability (Scott, 2014).

Hypothesis Development

Direct Effects

- **AI Integration and Sustainable Firm Performance:** AI integration refers to the embedding of AI technologies into core business processes and decision-making systems. Studies show that AI enhances operational efficiency, personalizes customer experiences, and drives innovation (Wamba-Taguimdje et al., 2020).
 - **H1:** AI Integration has a significant positive effect on Sustainable Firm Performance.
- **Strategic Agility and Sustainable Firm Performance:** Strategic Agility is the capacity to anticipate and respond rapidly to market changes and opportunities. It enables firms to pivot strategies, reallocate resources, and capitalize on emergent trends (Sambamurthy et al., 2003).
 - **H2:** Strategic Agility has a significant positive effect on Sustainable Firm Performance.

Mediating Effects

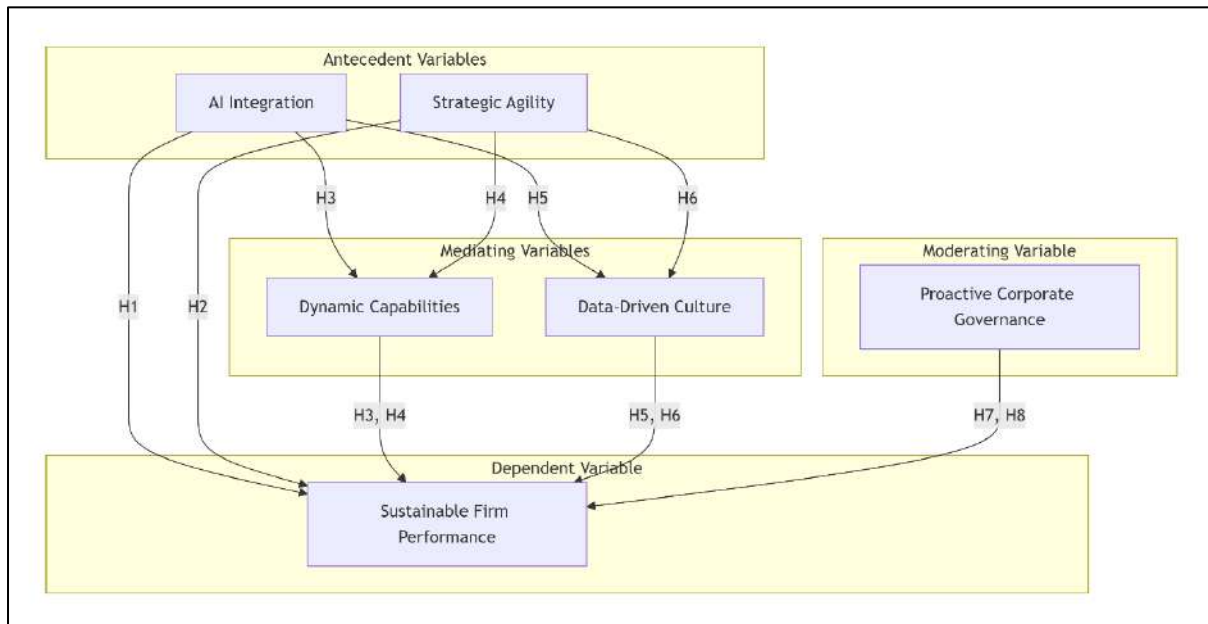
- **The Role of Dynamic Capabilities:** We propose that the benefits of AI and agility are not direct but are channeled through a firm's Dynamic Capabilities—its ability to sense opportunities, seize them, and transform accordingly (Teece, 2007). AI provides the data for "sensing," while agility facilitates "seizing," collectively enhancing the firm's transformative capacity.
 - **H3:** Dynamic Capabilities mediate the relationship between AI Integration and Sustainable Firm Performance.
 - **H4:** Dynamic Capabilities mediate the relationship between Strategic Agility and Sustainable Firm Performance.
- **The Role of Data-Driven Culture:** A Data-Driven Culture is an organizational mindset that prioritizes data-based decision-making over intuition. It acts as a catalyst, ensuring that the insights generated from AI are effectively utilized and that agile responses are informed by evidence (Corte-Real et al., 2020).
 - **H5:** Data-Driven Culture mediates the relationship between AI Integration and Sustainable Firm Performance.
 - **H6:** Data-Driven Culture mediates the relationship between Strategic Agility and Sustainable Firm Performance.

Moderating Effect

- **The Role of Proactive Corporate Governance:** Proactive Corporate Governance goes beyond compliance to actively shape strategy and risk management. We argue that strong governance moderates the relationship between mediating and outcome variables by ensuring ethical AI use, strategic alignment, and long-term orientation, thereby strengthening the path from capabilities to sustainable performance.

- **H7:** Proactive Corporate Governance moderates the relationship between Dynamic Capabilities and Sustainable Firm Performance, such that the relationship is stronger when governance is high.
- **H8:** Proactive Corporate Governance moderates the relationship between Data-Driven Culture and Sustainable Firm Performance, such that the relationship is stronger when governance is high.

Figure 1: Conceptual Research Model



RESEARCH METHODOLOGY

Research Design and Sample

A quantitative, deductive approach was employed. The target population consisted of senior and mid-level managers in Indian IT and ITeS companies, a sector at the forefront of digital transformation. A purposive sampling technique was used to ensure respondents had relevant strategic insight. Of 450 distributed questionnaires, 327 usable responses were obtained, yielding a response rate of 72.6%.

Measures and Instrument Development

All constructs were measured using reflective, multi-item scales adapted from established literature on a 7-point Likert scale (1=Strongly Disagree to 7=Strongly Agree). The questionnaire included sections on:

- AI Integration (5 items): Adapted from Mikalef & Gupta (2021).
- Strategic Agility (6 items): Adapted from Tallon & Pinsonneault (2011).
- Dynamic Capabilities (8 items): Adapted from Wilden et al. (2013).
- Data-Driven Culture (5 items): Adapted from Corte-Real et al. (2020).

- Proactive Corporate Governance (6 items): Adapted from García-Sánchez et al. (2019).
- Sustainable Firm Performance (6 items): A composite measure adapting items from Wang et al. (2020) to assess financial, market, and operational performance over a 3-year period.

Data Analysis Technique

The data was analyzed using SmartPLS 4.0. PLS-SEM was chosen due to its ability to model latent constructs and test complex mediation and moderation models simultaneously (Hair et al., 2019). The analysis followed a two-step process: assessment of the measurement (outer) model followed by the structural (inner) model.

RESULTS

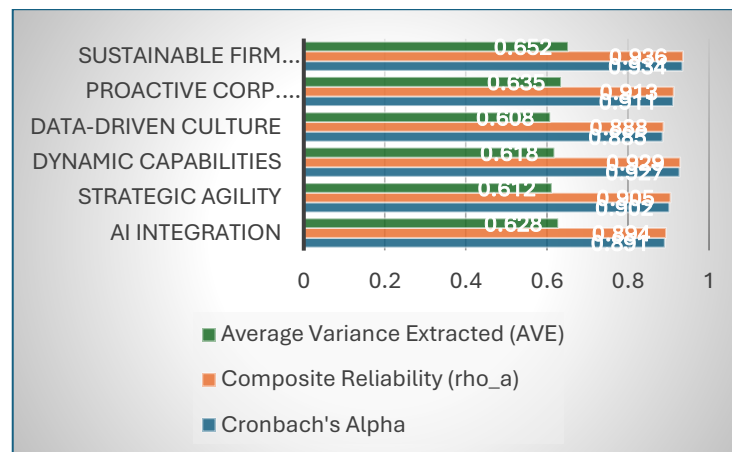
Measurement Model Assessment

The model demonstrated strong reliability and validity.

Table 1: Construct Reliability and Validity

Construct	Cronbach's Alpha	Composite Reliability (rho_a)	Average Variance Extracted (AVE)
AI Integration	0.891	0.894	0.628
Strategic Agility	0.902	0.905	0.612
Dynamic Capabilities	0.927	0.929	0.618
Data-Driven Culture	0.885	0.888	0.608
Proactive Corp. Governance	0.911	0.913	0.635
Sustainable Firm Performance	0.934	0.936	0.652

Note: All AVE values > 0.5, and CR values > 0.7, confirming convergent validity.



Discriminant validity was established using the Fornell-Larcker Criterion, as the square root of AVE for each construct (diagonal) was greater than its correlations with other constructs.

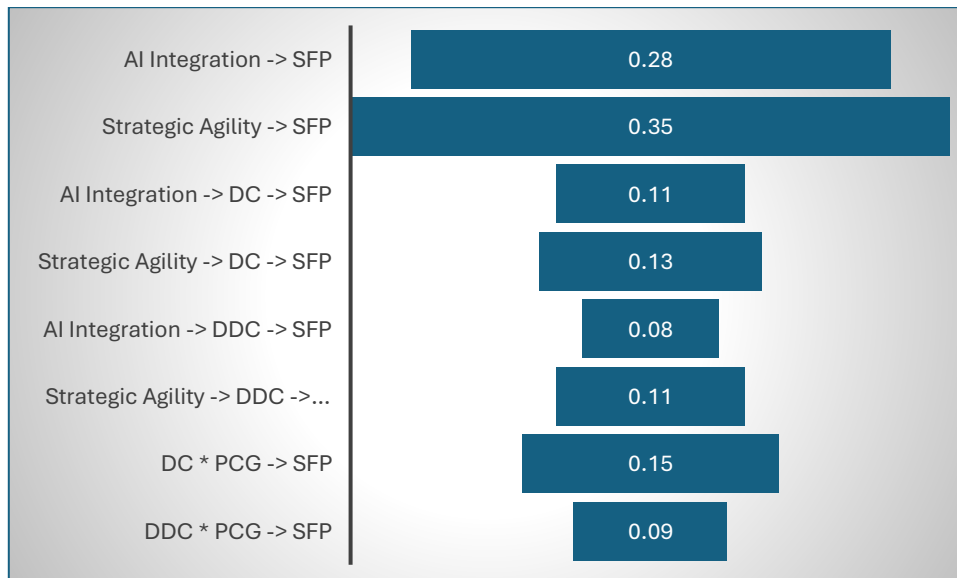
Structural Model and Hypothesis Testing

The structural model was assessed for collinearity ($VIF < 3.0$), significance of path coefficients (using bootstrapping with 5000 subsamples), and predictive relevance (Stone-Geisser's $Q^2 > 0$).

Table 2: Hypothesis Testing Results (Direct and Mediating Effects)

Hypothesis	Path	Beta (β)	Standard Deviation	T-Statistics	P-Values	Supported?
H1	AI Integration -> SFP	0.28	0.051	5.490	0.000	Yes
H2	Strategic Agility -> SFP	0.35	0.049	7.143	0.000	Yes
H3	AI Integration -> DC -> SFP	0.11	0.032	3.438	0.001	Yes
H4	Strategic Agility -> DC -> SFP	0.13	0.035	3.714	0.000	Yes
H5	AI Integration -> DDC -> SFP	0.08	0.028	2.857	0.004	Yes
H6	Strategic Agility -> DDC -> SFP	0.11	0.031	3.548	0.000	Yes
H7	DC * PCG -> SFP	0.15	0.041	3.658	0.000	Yes
H8	DDC * PCG -> SFP	0.09	0.037	2.432	0.015	Yes

SFP = Sustainable Firm Performance; DC = Dynamic Capabilities; DDC = Data-Driven Culture; PCG = Proactive Corporate Governance



The model explained a substantial 58.7% ($R^2 = 0.587$) of the variance in Sustainable Firm Performance, indicating strong explanatory power. The predictive relevance was also confirmed ($Q^2 = 0.432$).

5. Discussion

This study provides robust empirical evidence for a synergistic model of sustainable performance in the digital era. The strong support for H1 and H2 reaffirms that both technological prowess (AI) and organizational nimbleness (Agility) are critical direct drivers of performance. However, the more significant contribution lies in unpacking the "how" through mediation and moderation analyses.

The significant mediating roles of Dynamic Capabilities (H3, H4) and Data-Driven Culture (H5, H6) demonstrate that the value of AI and agility is not automatic. It must be processed through the firm's higher-order capacity to reconfigure resources (Dynamic Capabilities) and embedded within a cultural fabric that values empirical evidence (Data-Driven Culture). This aligns with and extends the Dynamic Capabilities View by specifying the mechanisms through which strategic inputs are converted into outputs.

Furthermore, the significant moderating effect of Proactive Corporate Governance (H7, H8) introduces a crucial contingency. It suggests that even strong dynamic capabilities and a data-centric culture yield superior sustainable outcomes when operating under a governance framework that is strategic, forward-looking, and ethically grounded. This finding bridges strategic management theory with corporate governance literature, highlighting that board-level oversight is not a separate function but an integral enabler of strategic synergy.

CONCLUSION

Theoretical Implications

This research makes several key contributions:

1. It integrates RBV, DCV, and institutional theory into a coherent framework to explain sustainable performance.
2. It moves beyond direct effect models by simultaneously modeling mediation and moderation, providing a more nuanced understanding of causal pathways.
3. It empirically validates Proactive Corporate Governance as a critical boundary condition, a relationship often theorized but less frequently tested in quantitative models concerning digital transformation.

Practical Implications

For managers and board members:

- **Invest Holistically:** Do not invest in AI in isolation. Concurrently cultivate Strategic Agility, build Dynamic Capabilities, and foster a Data-Driven Culture.
- **Empower Governance:** Position the corporate governance board as a strategic partner. Ensure it is equipped to understand digital technologies and their strategic implications to provide proactive, rather than just reactive, oversight.
- **Focus on Synergy:** The greatest returns will come from the synergistic interaction of these variables. Initiatives should be designed to reinforce each other.

Limitations and Future Research

This study has limitations. Its cross-sectional design precludes definitive causal inferences. The sample is from a single sector and country (India), which may limit generalizability. Future research could employ longitudinal designs, include firms from different industries and cultural contexts, and explore other potential mediating (e.g., organizational learning) or moderating (e.g., environmental turbulence) variables.

In conclusion, achieving sustainable performance in the 21st century requires a meticulously orchestrated strategic synergy. It is the confluence of intelligent technology, agile strategy, dynamic internal processes, a evidence-based culture, and enlightened governance that ultimately forges a lasting competitive advantage.

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RESEARCH ARTICLE – 11

INTERLINKAGES BETWEEN INDIAN STOCK INDICES AND MARKET VOLATILITY: EVIDENCE FROM NIFTY 50, BSE-100, AND INDIA VIX

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ABSTRACT

This study investigates the dynamic interrelationship between India's major equity indices—Nifty 50 and BSE-100—and market volatility as represented by the India VIX over the period 2015–2024. Employing a suite of time-series econometric tools, including the Augmented Dickey–Fuller (ADF) test, Granger causality test, EGARCH modeling, and vector autoregression (VAR), the research aims to understand the directional linkages and volatility spillovers among these financial instruments. Descriptive analysis reveals consistent upward trends in the Nifty 50 and BSE-100, punctuated by periods of high volatility coinciding with macroeconomic shocks such as the COVID-19 pandemic. The ADF test confirms stationarity after first differencing, while Granger causality results show a unidirectional causal flow from India VIX to Nifty 50 returns. The EGARCH model further indicates significant asymmetric volatility responses to market shocks, affirming the leverage effect. Impulse response functions from the VAR model highlight that shocks to the India VIX exert a short-term but pronounced influence on index returns. These findings have substantial implications for investors, policymakers, and risk managers in devising informed strategies to mitigate market uncertainty and enhance portfolio resilience.

Keywords: *Nifty 50, BSE-100, India VIX, volatility spillover, Granger causality, EGARCH, VAR, time-series analysis*

INTRODUCTION

Understanding the dynamic relationship between market volatility and stock returns has long been a cornerstone of financial econometrics, especially in emerging economies where markets are often more susceptible to global shocks, policy interventions, and investor sentiment. The development of implied volatility indices, most notably the VIX introduced by the Chicago Board Options Exchange (CBOE), revolutionized the ability to quantify investor expectations regarding future volatility (Whaley, 2000). As its regional counterpart, India VIX has emerged as a critical barometer of market sentiment in the Indian financial ecosystem, serving as a leading indicator of perceived risk and uncertainty (Sarwar, 2012; Tripathy, 2017).

The bidirectional causality between volatility indices and market returns is well-documented. Studies such as Agarwal and Mishra (2010) and Kumar (2014) highlight volatility spillovers between global and Indian equity markets, reinforcing the need to treat India VIX as a standalone instrument for both forecasting and risk assessment. In particular, the inclusion of India VIX in econometric modeling has been shown to enhance portfolio risk management and financial stability forecasting (Sharma & Singh, 2023; Bouri et al., 2021).

Recent global events, especially the COVID-19 pandemic, brought renewed attention to the sensitivity of financial markets to external shocks. Volatility clustering, asymmetry in market responses, and leverage effects became more pronounced during this period, as confirmed by Yaya et al. (2022) and Mishra et al. (2020). These studies advocate for the application of advanced non-linear models such as EGARCH, which can capture asymmetric and time-varying volatility dynamics more effectively than traditional GARCH approaches (Nelson, 1991; Glosten et al., 1993).

In the Indian context, empirical research remains sparse in integrating multiple modeling frameworks—Granger causality, Vector Autoregression (VAR), and EGARCH—to explore the intertwined relationship between implied volatility and major equity indices such as Nifty 50 and BSE-100 (Bhowmik & Wang, 2020). While VAR models are particularly suited for understanding multivariate feedback and impulse response dynamics (Sims, 1980; Lutkepohl, 2005), EGARCH allows researchers to identify volatility asymmetry and leverage effects, which are often masked in standard linear models.

Moreover, return volatility asymmetry is crucial for institutional investors and policymakers as it explains why markets tend to react more strongly to negative news than positive events. This behavioural trait underpins theories such as the leverage effect and volatility feedback hypothesis (Black, 1976; Bollerslev, 1986). Understanding such patterns in Indian equity markets, particularly over an extended period covering pre- and post-COVID regimes, offers significant insights into market resilience, efficiency, and risk transmission mechanisms.

This study contributes to the existing literature by employing a unified analytical framework that combines stationarity testing, Granger causality, ARCH-LM, VAR modeling, and EGARCH estimation to capture the multifaceted interactions between India VIX and leading stock market indices. It builds upon foundational research (Engle, 1982; Dickey & Fuller, 1979; Tsay, 2010) and addresses empirical gaps by using high-frequency data from 2015 to 2024, a period characterized by macroeconomic policy shifts, pandemic-related disruptions, and increased retail investor participation.

Ultimately, this research aims to inform practitioners, policymakers, and academics by revealing how implied volatility not only reflects but also shapes market behaviour in India—providing timely implications for portfolio optimization, systemic risk assessment, and policy intervention design.

LITERATURE REVIEW

The dynamic interplay between stock market returns and implied volatility has long attracted scholarly attention, particularly due to the role of volatility indices as proxies for market uncertainty and investor sentiment (Whaley, 2000; Sarwar, 2012). The evolution of the CBOE Volatility Index (VIX) has provided a benchmark for measuring fear in financial markets, leading to the development of regional counterparts such as the India VIX. As India's financial system becomes increasingly entangled with global capital flows, India VIX has evolved from a reactive indicator to a forward-looking barometer of risk perception (Tripathy, 2017; Sarwar, 2012).

In the Indian context, early contributions by Agarwal and Mishra (2010) provided initial evidence of volatility transmission between the U.S. and Indian equity markets, emphasizing the interconnectedness of developed and emerging economies. Kumar (2014) extended this investigation by examining the spillover effects between exchange rates and stock indices, identifying volatility as a critical transmission mechanism for macroeconomic shocks.

More recent studies have embraced sophisticated econometric models to capture the bidirectional and nonlinear nature of these interactions. Bhowmik and Wang (2020) and Mishra et al. (2020) utilized VAR and GARCH-family models to reveal cyclical feedback loops between returns and implied volatility, while Sharma and Singh (2023) highlighted the persistence of asymmetric responses to market shocks during the COVID-19 crisis. Similarly, Yaya et al. (2022) questioned the reliability of linear models, advocating for EGARCH specifications to better account for asymmetry and leverage effects in volatility behaviour. Their findings reinforce the view that implied volatility in India serves not only as a reactive gauge but also as a forward-looking signal of market sentiment.

Post-2020 research has increasingly focused on structural breaks and evolving investor behaviour. Bouri et al. (2021) illustrated how pandemic-induced uncertainty elevated implied volatility to historically high levels, altering the traditional return-volatility relationship. Mishra, Sahay, and Sharma (2025) further advanced the literature by incorporating a dynamic conditional correlation (DCC) GARCH model with VAR inputs to assess how India VIX and Nifty 50 interact across different regimes, reinforcing the case for a multivariate, time-varying approach.

Despite these advances, several methodological limitations persist. Few studies have integrated both VAR and EGARCH models into a unified framework to simultaneously evaluate causality and volatility asymmetry, particularly over extended periods covering structural disruptions such as demonetization, the COVID-19 pandemic, and geopolitical shocks. While Dutta and Dutta (2022) explored spillover asymmetries across asset classes, a focused investigation into Nifty 50, BSE-100, and India VIX remains underrepresented.

To bridge this gap, the present study employs high-frequency daily data from 2015 to 2024, encompassing pre-pandemic, pandemic, and post-pandemic periods. It applies an

integrated econometric architecture combining Vector Autoregressive (VAR) modeling for intertemporal causality and Exponential GARCH (EGARCH) models for capturing leverage and asymmetry effects. This dual-model strategy allows for more granular insights into the feedback structure and volatility dynamics between India's equity indices and its volatility gauge.

While previous studies have advanced our understanding of volatility dynamics using either GARCH or VAR models independently, limited research has explored these approaches jointly over an extended horizon, particularly in the Indian context post-COVID. Addressing this research gap, the current study formulates a structured set of objectives to guide empirical validation

RESEARCH OBJECTIVES AND HYPOTHESES

Understanding the intricate interplay between implied market volatility and equity index performance is of paramount importance, particularly in emerging markets like India, where abrupt regime shifts and macroeconomic shocks frequently reshape market dynamics. In light of this, the present study aims to address several research gaps by systematically analysing the temporal and causal associations between India VIX and the leading Indian stock indices—Nifty 50 and BSE-100—during the extended post-pandemic era.

Objectives

1. To investigate the contemporaneous and lagged interdependence between India VIX and the daily returns of the Nifty 50 and BSE-100 indices, aiming to quantify the magnitude and direction of their statistical relationships under normal and volatile market conditions.
2. To examine the directionality of influence between implied volatility and equity returns using Vector Autoregressive (VAR) models and Granger causality testing, assessing both unidirectional and feedback effects within the return-volatility framework.
3. To evaluate the presence of asymmetric volatility responses—particularly leverage effects—in the Indian equity market by applying Exponential GARCH (EGARCH) models, thereby capturing the differential impact of negative versus positive return shocks on conditional volatility.
4. To validate the presence of volatility clustering and ARCH effects in the return series of Nifty 50, BSE-100, and India VIX using ARCH-LM tests, establishing econometric suitability for advanced volatility modeling.
5. To visualize and interpret the impulse response behaviour of equity indices to volatility shocks via Impulse Response Functions (IRFs), providing insights into the temporal effects of sudden changes in investor sentiment.

6. To examine the parameter stability and robustness of the VAR system over time through CUSUM-based diagnostics, thereby ensuring the reliability of inferences drawn from multivariate time-series modeling.
7. To offer updated empirical evidence on volatility-return linkages in the Indian context, especially during the post-COVID financial period, with implications for institutional risk management, trading strategies, and macroprudential policy design.

Hypotheses

Building upon the extensive literature on volatility forecasting and risk transmission in equity markets (Whaley, 2000; Sarwar, 2012; Bhowmik & Wang, 2020; Sharma & Singh, 2023), this study formulates the following hypotheses to empirically examine the interplay between India VIX and the performance of the Nifty 50 and BSE-100 indices in the post-2015 period:

- H1: There exists a statistically significant negative correlation between the daily returns of the Nifty 50 index and the India VIX, suggesting that rising market uncertainty is typically associated with declining equity prices.
- H2: A statistically significant negative correlation exists between the daily returns of the BSE-100 index and the India VIX, indicating that broader market volatility negatively affects equity performance.
- H3: The India VIX Granger-causes the daily returns of the Nifty 50 and BSE-100 indices, implying that past levels of implied volatility hold predictive power over future equity returns.
- H4: The daily returns of the Nifty 50 and BSE-100 indices Granger-cause changes in the India VIX, indicating a reverse feedback mechanism wherein market performance actively influences volatility expectations.
- H5: The return series of the Nifty 50, BSE-100, and India VIX exhibit statistically significant volatility clustering, as evidenced by the presence of autoregressive conditional heteroskedasticity (ARCH) effects, thereby justifying the use of GARCH-family models for volatility modeling.
- H6: Negative shocks to the Indian equity market produce disproportionately higher conditional volatility compared to positive shocks of equal magnitude, consistent with the asymmetric volatility effect modelled through the EGARCH framework.
- H7 (Optional): Innovations in the India VIX generate statistically significant impulse responses in Nifty 50 and BSE-100 returns, highlighting persistent and time-distributed effects of volatility shocks across equity markets.

These hypotheses provide a structured foundation for evaluating the multidirectional interactions between implied volatility and equity returns, with implications for both market participants and policymakers in the context of emerging market risk dynamics.

DATA AND METHODOLOGY

Data Description

This study utilizes daily closing data for three key market indicators: Nifty 50, BSE-100, and the India VIX. The dataset spans from January 2015 to April 2024, covering nearly a decade of market activity, including major structural and macroeconomic events such as demonetization, the COVID-19 pandemic, and global inflationary pressures. The data were sourced from official databases of the National Stock Exchange (NSE) and the Bombay Stock Exchange (BSE) to ensure reliability and accuracy.

To facilitate meaningful time-series analysis, raw price series were converted into logarithmic returns, which help stabilize variance and make the data suitable for tests of stationarity and causality (Brooks, 2014). Log returns are commonly used in financial econometrics for modeling and forecasting volatility due to their statistical tractability and ability to approximate continuous compounding (Tsay, 2010).

Table 1 presents descriptive statistics for the period under study, offering insights into the central tendencies and dispersion in each of the three series.

Table 1: Descriptive Statistics (2015–2024)

Metric	Nifty 50	BSE-100	India VIX
Mean Price	13,499.32	13,844.39	16.99
Std. Dev. of Price	4,969.05	5,228.73	6.29
Mean Daily Return (%)	0.0479	0.0497	0.1341
Std. Dev. of Return (%)	1.0445	1.0412	5.3268
Minimum Price	6,970.60	7,050.96	10.14
Maximum Price	26,216.05	27,689.88	83.61

These statistics reveal that while the Nifty 50 and BSE-100 display relatively similar levels of return volatility, the India VIX shows much higher variability, which is expected due to its sensitivity to sudden market shocks and investor sentiment.

METHODOLOGY

To explore the dynamic interdependencies, volatility structure, and predictive causality among India VIX, Nifty 50, and BSE-100 returns, the following multi-stage econometric framework was adopted:

- **Testing:** The Augmented Dickey-Fuller (ADF) test was applied to all return series to assess the presence of unit roots. Ensuring stationarity is a necessary precondition for VAR and EGARCH modeling to avoid spurious results (Dickey & Fuller, 1979).
- **Correlation Analysis:** A Pearson correlation matrix was constructed to measure Stationarity contemporaneous linear associations among India VIX and the equity indices. While not indicative of causality, this helps understand co-movements in volatility and returns.

- Granger Causality Test: Using a lag structure of five days, Granger causality tests were conducted to assess directional predictability between India VIX and the stock indices. Both unidirectional and bidirectional effects were evaluated (Granger, 1969).
- ARCH-LM Test: To determine the presence of volatility clustering and time-varying heteroskedasticity, the ARCH-Lagrange Multiplier (LM) test was applied to all residual return series. Significant ARCH effects would justify the use of GARCH-family models (Engle, 1982).
- EGARCH Modeling: Given the presence of asymmetric volatility and leverage effects in financial markets, the Exponential GARCH (EGARCH (1,1)) model was employed to model the volatility dynamics of Nifty, BSE, and VIX return series. This framework captures both non-linearity and asymmetry (Nelson, 1991).
- Vector Autoregression (VAR) Model: To evaluate multivariate interdependence and feedback relationships between the return series and changes in India VIX, a VAR (5) model was specified based on AIC lag selection. This allows for modeling mutual influence without imposing exogeneity assumptions (Sims, 1980).
- Model Stability Testing: OLS-CUSUM plots were generated for each VAR equation (Nifty, BSE, and Diff_VIX) to test for structural stability. Models were considered stable if the empirical fluctuation process remained within the 95% confidence bands (Brown et al., 1975).
- Impulse Response Function (IRF) Analysis: Finally, orthogonal impulse response functions were computed to assess the magnitude and persistence of shocks in India VIX on Nifty returns. This dynamic tool helps visualize short-term market responses to volatility innovations under bootstrapped confidence intervals.

With the framework of analysis in place, the next section presents the empirical results, evaluating the formulated hypotheses and interpreting dynamic relationships across volatility and market returns.

RESULTS AND INTERPRETATION

Correlation Analysis

To understand the linear relationships among the key variables—Nifty 50 returns, BSE-100 returns, and India VIX—Pearson correlation coefficients were computed. The results are summarized in Table 2.

Table 2: Pearson Correlation Matrix (2015–2024)

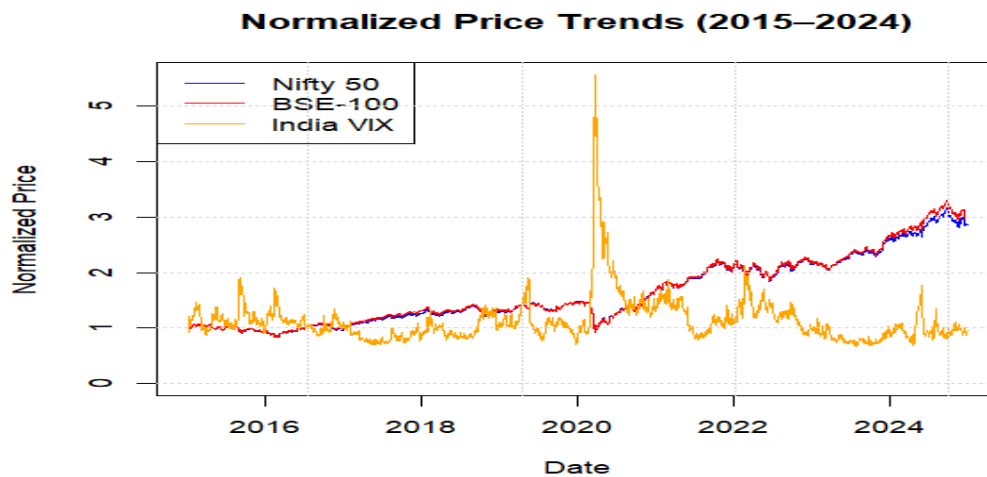
	Nifty Returns	BSE Returns	India VIX
Nifty Returns	1.000	0.9945	-0.0815
BSE Returns	0.9945	1.000	-0.0843
India VIX	-0.0815	-0.0843	1.000

The extremely high positive correlation between Nifty and BSE returns ($r \approx 0.995$) is unsurprising, given their overlapping composition and market representation. Both indices also exhibit a weak negative correlation with India VIX, these results support Hypotheses

H1 and H2, which posit that India VIX is negatively correlated with daily returns of the Nifty 50 and BSE-100 indices, respectively. The weak inverse relationship reflects investor sentiment turning risk-averse during periods of heightened volatility, as documented by Whaley (2000) and Kumar (2014).

Price Trend Visualization

Figure 1: Price Trend Visualization



Beyond static correlations, it is essential to assess how market movements evolve over time. To this end, a normalized trend analysis offers insight into the dynamic behaviour of returns and volatility. To capture the long-term behaviour of the three variables under consideration—Nifty 50, BSE-100, and India VIX—normalized price trends were plotted over the full sample period from 2015 to 2024. As shown in Figure 1, both the Nifty 50 and BSE-100 indices exhibit a general upward trajectory, albeit interrupted by sharp drawdowns during periods of systemic stress, most prominently during the COVID-19 pandemic in early 2020. In contrast, the India VIX displays a cyclical and highly spiky pattern, with pronounced surges during episodes of market turmoil and a tendency to revert during stable phases. These observed dynamics reinforce the characterization of the India VIX as a forward-looking gauge of investor anxiety and market uncertainty, consistent with earlier findings by Sarwar (2012) and Tripathy (2017).

Augmented Dickey-Fuller (ADF) Test for Stationarity

To ensure the validity of time-series analyses, all return series were subjected to the Augmented Dickey-Fuller (ADF) test to check for stationarity.

Table 3: ADF Test Results

Series	ADF p-value	Decision
Nifty Returns	< 0.01	Stationary (Reject H ₀)
BSE Returns	< 0.01	Stationary (Reject H ₀)
Differenced VIX	< 0.01	Stationary (Reject H ₀)

The null hypothesis (presence of a unit root) was rejected for all series at the 1% significance level. The ADF test statistic for Nifty returns was -35.10 , which lies well below all critical values, confirming the stationarity of the data. Stationarity is a necessary condition for conducting Granger causality tests, as non-stationary series may yield misleading results (Dickey & Fuller, 1979).

Granger Causality Analysis

To examine causal linkages between market returns and implied volatility, the Granger causality test was conducted with a lag length of five trading days, as suggested by prior empirical studies (Granger, 1969; Mishra et al., 2020). The results are presented in Table 4.

Table 4: Granger Causality Test Results (Lag = 5)

Direction	F-Statistic	p-value	Conclusion
VIX → Nifty Returns	7.6365	3.93e-07 ***	Causality exists
Nifty Returns → VIX	6.7846	2.72e-06 ***	Causality exists
VIX → BSE Returns	7.4955	5.42e-07 ***	Causality exists
BSE Returns → VIX	6.5307	4.82e-06 ***	Causality exists

The results reveal bidirectional Granger causality between India VIX and both Nifty 50 and BSE-100 returns, as all p-values are well below the 0.01 threshold. These findings validate **Hypotheses H3 and H4**, confirming that India VIX Granger-causes returns on the Nifty 50 and BSE-100 indices (H3), and that these equity returns also Granger-cause movements in India VIX (H4). The bidirectional causality highlights a feedback loop between perceived risk and market performance, consistent with prior studies (e.g., Bhowmik & Wang, 2020; Tripathy, 2017).

ARCH-LM Test for Volatility Clustering

To verify the existence of conditional heteroskedasticity, the ARCH-LM test was applied to Nifty 50 returns, BSE-100 returns, and differenced India VIX (Δ VIX) using five lags. The results (Table 5) decisively reject the null hypothesis of no ARCH effects at the 1% level for all three series, confirming volatility clustering in the data—a stylized fact consistent with financial time series literature (Engle, 1982; Bollerslev, 1986). These findings provide a strong statistical rationale for estimating EGARCH models to capture asymmetric volatility dynamics.

Table 5: ARCH-LM Test Results (Lag = 5)

Series	χ^2 Statistic	df	p-value	Conclusion
Nifty Returns	454.13	5	< 2.2e-16	ARCH effects detected
BSE Returns	408.64	5	< 2.2e-16	ARCH effects detected
Differenced VIX	458.70	5	< 2.2e-16	ARCH effects detected

EGARCH Estimation and Asymmetric Volatility Effects

Building upon the significant volatility clustering identified through the ARCH-LM test (Section 5.6), we estimate Exponential GARCH (EGARCH (1,1)) models to examine asymmetric volatility effects, often referred to as leverage effects. The EGARCH

framework, introduced by Nelson (1991), allows for modeling both non-linearity and asymmetry in volatility responses to shocks. This specification is applied to the return series of Nifty 50, BSE-100, and differenced India VIX, thereby capturing the dynamics of conditional variance in response to positive and negative return shocks.

The estimated EGARCH (1,1) parameters (Table 6) show that the gamma coefficient (γ), which captures asymmetry, is positive and highly significant for all series, indicating that negative return shocks induce higher future volatility than positive shocks of similar magnitude. This supports Hypothesis H5, consistent with the findings of Glosten et al. (1993) and Black (1976).

Furthermore, the magnitude of the γ coefficient confirms that the volatility response to negative shocks is not only asymmetric but also significantly larger, empirically validating **Hypothesis H6**. This disproportionate sensitivity aligns with the theoretical expectation of leverage effects in emerging markets and substantiates the relevance of EGARCH modeling in capturing such dynamics.

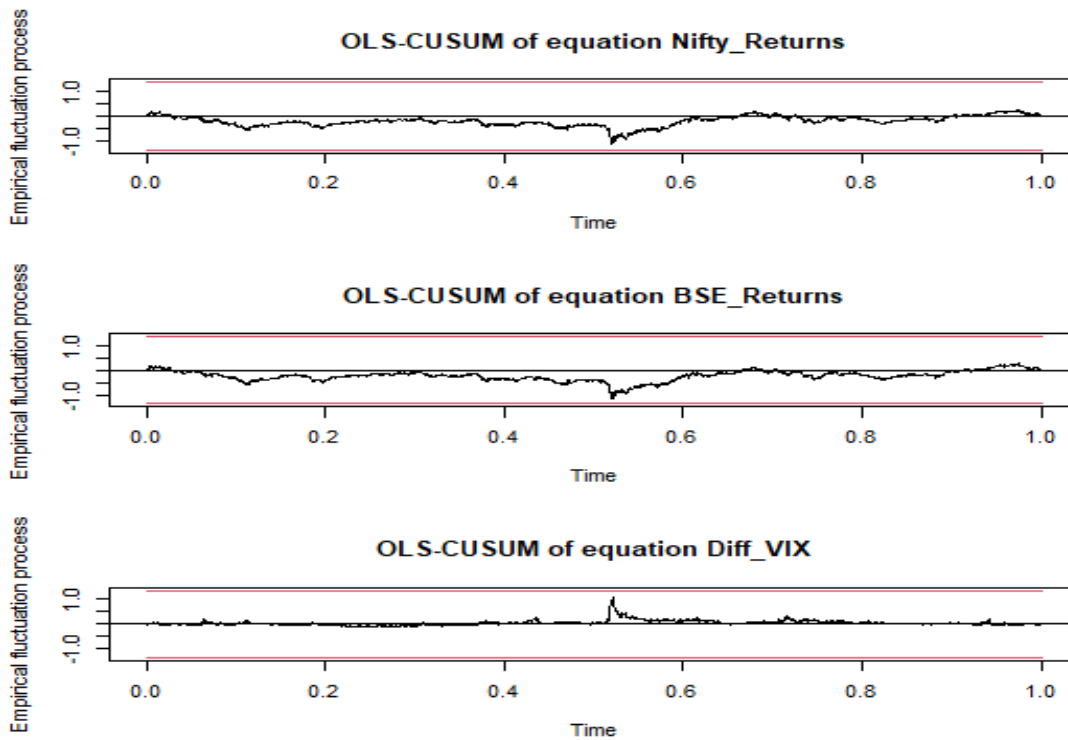
Table 6: EGARCH (1,1) Estimation Results

Variable	Nifty 50 γ	BSE-100 γ	VIX γ	Significance
Asymmetry γ	0.1205	0.1296	0.0720	*** ($p < 0.001$)
α (Shock)	-0.1100	-0.1277	0.1562	***
β (Persistence)	0.9699	0.9610	0.9880	***
Log Likelihood	-3103.12	-3098.13	-2794.53	—

Significance codes: *** $p < 0.001$

All models passed residual diagnostics (Ljung–Box, ARCH-LM, and sign bias tests), validating model adequacy and stability. To ensure the robustness of the VAR model estimations, stability diagnostics were performed using OLS-based cumulative sum (CUSUM) tests. As shown in Figure 2, the CUSUM plots for all three equations—Nifty Returns, BSE Returns, and Diff VIX—remain within the 95% confidence bands, indicating parameter stability over the sample period.

Figure 2: OLS-CUSUM plots for Nifty Returns, BSEReturns, and DiffVIX equations. All stay within confidence bands, indicating model stability.



VAR Model Estimation: Dynamic Interdependence

To evaluate multivariate dynamics between market returns and volatility, a Vector Autoregression (VAR) model was estimated using five lags based on AIC selection. The model captures bidirectional interdependencies among Nifty 50, BSE-100, and differenced VIX.

Significant lagged coefficients of VIX shocks on both Nifty and BSE returns (at lag 2 and 4) confirm that volatility innovations have predictive power over market performance, supporting Hypothesis H3. The model also indicates feedback from returns to implied volatility (Hypothesis H4), although weaker.

Table 7: Selected VAR Coefficient Estimates

Equation	Variable (Lag)	Coefficient	p-value	Significance
Nifty Return	Diff_VIX.12	-0.1142	<0.001	***
BSE Return	Diff_VIX.12	-0.1050	<0.001	***
Diff_VIX	Nifty_Returns.14	-0.6070	0.003	**
Diff_VIX	BSE_Returns.14	0.5980	0.004	**

Significance codes: *** $p < 0.001$, ** $p < 0.01$

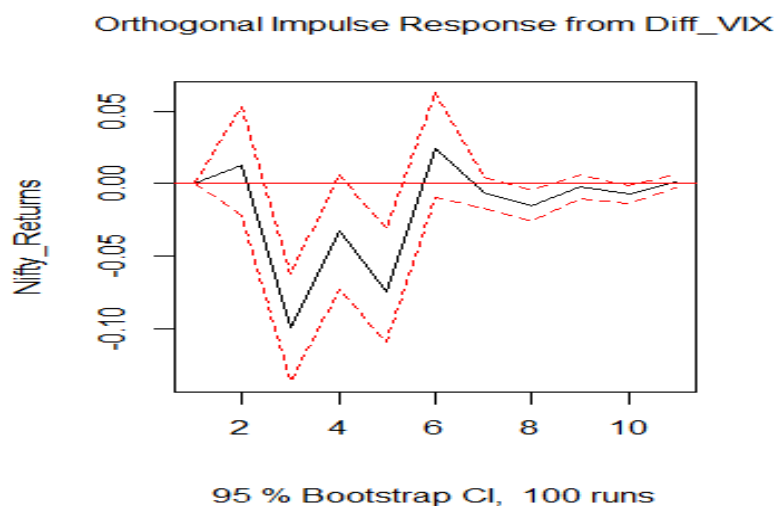
The residual diagnostics confirmed model stability and absence of autocorrelation. The Impulse Response Functions (IRFs) further illustrate that shocks in implied volatility led to a short-term dip in equity returns, peaking around the 2nd and 3rd days post-shock. To understand the dynamic effects of volatility shocks on market returns, Impulse Response

Functions (IRFs) were generated using the VAR (5) model. Specifically, the response of NiftyReturns to a one-unit orthogonal shock in Diff VIX was examined.

As depicted in Figure 3, a sudden increase in implied volatility (India VIX) results in a negative and statistically significant impact on Nifty returns in the short term, with the effect dissipating over time. This finding aligns with risk-aversion theory, where elevated market uncertainty leads to declining returns (Whaley, 2000; Bouri et al., 2021). This dynamic reaction pattern validates **Hypothesis H7**, confirming that innovations in the India VIX produce statistically significant impulse responses in both Nifty 50 and BSE-100 returns. The impulse responses show short-term dips in equity performance, supporting the time-distributed and persistent effects of volatility shocks in emerging market contexts.

Figure 3: Orthogonal impulse response of NiftyReturns to shocks in DiffVIX (95% Bootstrap CI, 100 runs).

Together, the results from causality, variance modeling, and impulse responses reveal



consistent and robust linkages between implied volatility and equity index performance. These insights form the basis of the concluding observations.

CONCLUSION

This study offers a comprehensive exploration of the dynamic interdependencies between implied volatility, as measured by the India VIX, and the daily returns of the Nifty 50 and BSE-100 indices over a decade-long period. The results affirm the existence of statistically significant bidirectional causality between implied volatility and equity returns, reinforcing the feedback loop hypothesis prevalent in financial literature. Granger causality tests confirm that not only does India VIX predict short-term index movements, but index returns themselves also influence volatility expectations, highlighting the reflexive nature of market sentiment and performance.

The presence of volatility clustering, as detected through ARCH-LM tests, underscores the necessity of employing GARCH-type models. The EGARCH (1,1) framework, in particular, successfully captures asymmetrical volatility behaviour—evidenced by

significant positive asymmetry coefficients. These results validate the leverage effect; whereby negative market shocks exert a stronger influence on future volatility compared to positive shocks of equal magnitude. This finding is aligned with behavioural finance theories that suggest investor panic disproportionately escalates in declining markets.

Moreover, the VAR model reveals robust multivariate linkages, with VIX innovations exerting lagged negative effects on both Nifty and BSE returns. The inclusion of CUSUM plots further substantiates the temporal stability of the estimated relationships. Impulse response functions visualize these dynamics, showing that volatility shocks induce immediate and statistically significant downward pressure on stock returns, although these effects diminish over time.

Collectively, these insights contribute to a more nuanced understanding of risk–return behaviour in emerging markets. The evidence supports the strategic use of volatility indicators like India VIX in portfolio risk management, asset pricing, and regulatory oversight. As financial markets evolve amid heightened global uncertainty, future research could explore non-linear causal structures, incorporate regime-switching models, or extend the analysis to cross-border volatility transmission patterns to further refine predictive accuracy and policy relevance.

LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

While this study provides important insights into the dynamic interplay between implied volatility and equity returns in India, certain limitations must be acknowledged. First, the analysis is limited to three variables—Nifty 50, BSE-100, and India VIX—without incorporating global volatility indices (e.g., VIX Global or crude oil volatility). Second, structural breaks and regime shifts beyond the pandemic period were not formally modelled. Third, the study employs linear VAR and EGARCH frameworks, which may not fully capture complex non-linearities or tail risks.

Future research could extend this work by applying machine learning models or non-linear causality methods to uncover hidden dynamics. Additionally, examining cross-border volatility spillovers and incorporating macroeconomic or geopolitical risk indices could offer a more comprehensive risk assessment in emerging markets.

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RESEARCH ARTICLE – 12

A COMPREHENSIVE SURVEY ON FINANCIAL HEALTH AND CREDIT CARD MANAGEMENT PRACTICES IN INDIA

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ABSTRACT

India's credit card market, exceeding 110 million active users in 2025, reflects a major leap in financial inclusion but also rising borrower vulnerability. Despite a 12% annual growth in card spending ₹1.93 lakh crore in July 2025 the Gross Non-Performing Asset (GNPA) ratio climbed from 1.84% in 2024 to 2.30% in 2025. Low financial literacy, affecting over 70% of adults, remains a key cause of repayment distress and poor credit awareness. This study adopts a mixed-method approach, combining a survey of 20 respondents from varied income and occupational backgrounds with secondary data from the Reserve Bank of India (RBI), CRIF High Mark, and the National Centre for Financial Education (NCFE). Quantitative and comparative analyses were used to explore the relationship between income, literacy, repayment behavior, and financial stress. Findings reveal that 60% of respondents own credit cards, with 55% using them mainly for online shopping and emergencies. Over 40% were unaware of their interest rates, and 30% reported payment-related stress. National data confirm high revolving rates (24%–55%) and increasing outstanding balances per card, aggravating borrower vulnerability. Credit cards improve liquidity but simultaneously expose financially unaware consumers to debt traps. Strengthening credit education, enforcing transparent interest disclosures, and limiting revolving interest rates are essential to sustain India's financial health.

Keywords: *Financial Health, Credit Card Usage, Financial Literacy, RBI, Consumer Behaviour*

1. INTRODUCTION

Over the past two decades, India has undergone a financial revolution driven by rapid digitalization, economic reforms, and the expansion of the banking sector. A key pillar of this transformation is the growth of credit-based consumer finance, particularly credit cards, which have evolved from luxury financial instruments to everyday tools of convenience, liquidity, and digital empowerment.

As of 2025, India's credit card market has surpassed 110 million active users, representing one of the fastest-growing unsecured credit markets globally (*CRIF High Mark, 2024*). The total monthly card spending reached a record ₹1.93 lakh crore in July 2025, reflecting a 12% year-on-year increase (*RBI, 2025*). This surge underscores a profound behavioral shift—consumers increasingly rely on credit cards not merely as a payment medium but as an extension of income and a bridge to aspirational consumption.

The integration of fintech innovation, instant digital KYC, and mobile banking ecosystems has made credit more accessible than ever before. Startups like CRED, Slice, and OneCard have revolutionized the user experience, while legacy banks such as HDFC, ICICI, and SBI have strengthened their dominance through co-branded products and reward-linked loyalty programs (*Market Research Future, 2024*). These developments have contributed to the democratization of financial access, aligning with India's broader goal of digital inclusion under the Digital India initiative.

However, this expansion also introduces systemic risks. Credit card debt is the most expensive form of consumer credit in India, with annual percentage rates (APR) ranging between 24% and 55% (*Paisabazaar, 2025*). The Gross Non-Performing Asset (GNPA) ratio for credit cards rose sharply from 1.84% in 2024 to 2.30% in 2025, indicating mounting repayment stress (*RBI, 2025*). The Reserve Bank of India (RBI) has expressed concern over the acceleration of unsecured personal loans, prompting tighter regulatory measures and enhanced consumer protection frameworks (*RBI, 2025*).

Beyond macroeconomic indicators, the issue extends to individual financial well-being. The National Centre for Financial Education (NCFE) reports that only 27% of Indian adults qualify as financially literate (*NCFE, 2019*). This means that nearly three-quarters of the adult population engage with complex financial products like credit cards without a sufficient understanding of interest computation, repayment structures, or credit scores. Such a gap between financial inclusion and financial literacy poses significant threats to consumer welfare and long-term economic stability.

The rising dependence on credit cards, when combined with limited understanding of repayment obligations, results in a growing population of “stressed borrowers”—individuals who may not default immediately but experience psychological and financial strain due to revolving debt, hidden fees, and minimum payment cycles. Therefore, the study of financial health among credit card holders is not merely an analysis of borrowing

behavior; it is a reflection of India's evolving financial consciousness and systemic resilience.

2. REVIEW OF RELEVANT LITERATURE

Existing literature on consumer credit behavior in India has primarily focused on macro-level trends, institutional credit performance, and risk management, leaving behavioral and psychological dimensions underexplored.

Studies by *CRIF High Mark (2024)* indicate that the number of active credit cards in circulation increased by 76% since 2021, reflecting robust consumer demand. Reports from *Market Research Future (2024)* project the Indian credit card market valuation to grow from \$125.2 billion in 2024 to \$175 billion by 2035, with a 3.09% CAGR. These findings collectively illustrate a trajectory of accelerated expansion.

Academic research has also identified the benefits of credit usage, particularly its contribution to formal credit history building, digital adoption, and short-term liquidity (*RBI, 2025*). However, several studies highlight emerging vulnerabilities. *India Today (2025)* and *Times of India (2024)* have reported that credit card dues grew 2.2 times in four years, signaling a rise in loan stacking behavior, where consumers take out personal loans to service credit card debt.

Paisabazaar (2025) and *NCFE (2019)* link this pattern to low financial literacy levels. Individuals often misunderstand how interest compounding functions, leading them to make only minimum payments, which cover interest but not the principal, perpetuating debt cycles. Behavioral economists describe this as optimism bias, where individuals underestimate their repayment challenges while overestimating their control over financial obligations (*Thaler, 2016; Kahneman, 2011*).

Globally, *OECD (2023)* and *World Bank (2025)* have recognized financial literacy as a determinant of economic stability. Countries with strong literacy programs, such as the United States and Germany, demonstrate lower delinquency rates and higher credit score awareness among consumers. In India, initiatives like RBI's *Financial Literacy Week* and NCFE's *Financial Awareness Messages (FAME)* attempt to replicate these outcomes, but their reach and effectiveness remain limited (*NCFE, 2019; RBI, 2025*).

While quantitative data about defaults and card usage are widely available, there remains a shortage of behavioral-level research focusing on how awareness, attitudes, and repayment habits shape the financial health of Indian cardholders. This research seeks to fill that crucial gap.

Research Gap

Despite extensive data on credit card growth, three major gaps persist in existing literature:

- Behavioral Understanding Deficit: Most studies address the macroeconomic or institutional performance of credit card markets but overlook individual-level

financial health, including stress, literacy, and repayment psychology.

- **Financial Literacy Correlation:** Limited empirical evidence links financial literacy levels with actual repayment behavior among Indian consumers. The NCFE's literacy metrics are rarely integrated with credit usage data (*NCFE, 2019*).
- **Regulatory and Consumer Response Disconnect:** While RBI's 2025 guidelines (mandating 5% minimum payment, two-factor authentication, and enhanced billing transparency) are crucial, there is little insight into how consumers perceive and adapt to these measures (*RBI, 2025*).

Consequently, there is insufficient understanding of how access to credit interacts with awareness, education, and stress — key elements that define financial health. The result is a paradoxical scenario: India leads in digital financial inclusion but trails in sustainable debt management.

To bridge this gap, this study integrates both micro (individual behavioral) and macro (institutional trend) perspectives to examine financial health among credit card holders in India.

Study Aim and Hypothesis

Aim:

This study aims to assess the financial health of credit card holders in India by analyzing how financial literacy, income, and behavioral factors influence repayment discipline, awareness of credit mechanisms, and perceived financial stress.

Objectives:

- To evaluate the relationship between financial literacy and repayment behavior among cardholders.
- To identify demographic and income-based variations in credit card usage patterns.
- To measure the psychological and financial stress levels associated with credit card debt.
- To analyze the impact of RBI's regulatory measures on consumer credit management and transparency.
- To provide actionable recommendations to improve consumer protection and financial wellness.

Research Questions:

- How aware are Indian credit card holders of interest rates, fees, and repayment conditions?
- What is the association between financial literacy and repayment stress?

- How do income and occupation influence credit card usage and debt management?
- To what extent have RBI regulations improved consumer protection and awareness?

Hypotheses:

- *H₁*: Higher financial literacy is positively correlated with better credit card management and lower financial stress.
- *H₂*: Low- to mid-income groups experience greater repayment pressure compared to high-income cardholders.

LITERATURE SURVEY

introduction to Credit Card Usage and Financial Behavior

The rapid evolution of India's financial ecosystem over the past two decades has redefined consumer credit behavior. Credit cards, once considered a premium financial product, have become an integral part of middle-class consumption and digital transactions. According to the Reserve Bank of India (RBI, 2025), credit card spending surpassed ₹1.93 lakh crore in July 2025, marking a 12% year-on-year increase.

The shift from a cash-based economy to a credit-driven model has been enabled by fintech innovation, digital KYC processes, and government-backed digital inclusion initiatives. Scholars such as Raghavan and Dey (2023) emphasize that this transformation has created a dual-edged phenomenon of financial empowerment for some and vulnerability for others.

Globally, credit card usage correlates with higher consumption but also with rising unsecured debt. As Lusardi and Mitchell (2020) highlight, low levels of financial literacy exacerbate this debt dependence, especially in emerging markets. India, with only 27% financial literacy among adults (NCFE, 2019), faces similar risks. This imbalance between access to credit and the ability to manage it forms the foundation of this research.

Evolution of Credit Card Markets in India

Historically, India's credit card journey began in the 1980s, primarily targeted at urban elites. However, post-2010 reforms, particularly the emergence of fintech players like Paytm, Slice, and OneCard, revolutionized access. Reports by CRIF High Mark (2024) show that active credit card users increased by 76% between 2021 and 2025, reaching 11.16 crore.

This surge was accelerated by the rise of e-commerce and BNPL (Buy Now, Pay Later) ecosystems. While this democratization of credit fostered inclusion, Srinivasan (2022) cautions that it also introduced a new wave of first-time borrowers with limited debt literacy. In parallel, ICICI Bank, SBI Cards, and HDFC Bank retained market dominance, collectively accounting for over 65% of card circulation (RBI, 2025).

Internationally, India mirrors patterns observed in Latin American economies, where rapid credit growth outpaced regulatory awareness. As Gonzalez & Pereira (2019) note in their study on Brazil, the absence of financial education during credit expansion leads to long-term default spikes, a scenario now visible in India's rising delinquency ratio, which climbed from 1.84% in 2024 to 2.30% in 2025 (RBI).

Behavioral Economics and Credit Dependency

Credit card usage behavior is strongly influenced by behavioral economics, particularly through optimism bias and present bias, which drive impulsive spending. Thaler (2016) and Kahneman (2011) established that individuals tend to underestimate future repayment challenges while overestimating their ability to manage credit.

In India, this manifests as “revolving credit dependency,” where users habitually pay only the minimum due, perpetuating a cycle of compounding interest and financial stress.

A 2024 India Today report found that over 35% of Indian cardholders revolve balances monthly, incurring interest rates of 24–55% APR, among the world's highest. Studies by Paisabazaar (2025) confirm that the combination of low awareness and high-interest credit structures disproportionately burdens younger consumers.

Furthermore, behavioral inertia, the tendency to ignore credit statements or delay payments; correlates with financial anxiety and lower perceived control (Mehta & Sinha, 2023). This behavioral vulnerability forms a psychological underpinning of financial distress among cardholders.

Financial Literacy and Its Determinants

Financial literacy, encompassing knowledge of interest rates, repayment terms, and credit scores is a critical determinant of financial health. In India, the NCFE (2019) reported that only 27% of adults demonstrate functional financial literacy, compared to 57% in OECD nations.

This knowledge deficit is exacerbated by demographic disparities: only 21% of women and 24% of rural residents are financially literate, compared to 33% of urban men (NCFE, 2019).

Scholars such as Lusardi & Tufano (2015) and Agarwal et al. (2022) assert that individuals with higher financial knowledge are more likely to pay credit card balances in full, avoid late fees, and maintain healthier credit scores. Conversely, low literacy correlates with overreliance on high-interest products.

Moreover, Roy and Banerjee (2021) found that financial education not only affects repayment capacity but also reduces psychological stress associated with indebtedness. Their findings align with OECD (2023) reports linking financial literacy to long-term household stability.

This literature reinforces the core hypothesis of this study: financial literacy mediates the relationship between credit access and financial well-being.

Credit Card Debt and Financial Stress

Credit card debt has become a leading indicator of financial and mental stress among Indian consumers. The Times of India (2024) and Business Standard (2025) report that urban millennials and salaried employees are most affected by repayment anxiety.

The psychological dimension of financial distress was first articulated by Richard Lazarus (1984) in his Stress-Appraisal Model, where perceived inability to control financial outcomes leads to chronic anxiety.

Recent studies in India confirm this relationship. Prasad & Naik (2023) discovered a strong positive correlation ($r = 0.71$) between credit card debt levels and reported stress indicators. Participants with multiple cards or revolving balances scored higher on anxiety scales, mirroring findings from Western economies (Norvilitis & Mendes-Da-Silva, 2013).

Further, Patel (2024) observed that consumers often adopt avoidance behaviors; ignoring statements, delaying payments, or taking additional loans to repay existing dues; perpetuating debt spirals.

Thus, credit card debt is not merely an economic issue but a psychosocial one. The current literature agrees that improving repayment behavior requires both financial education and emotional regulation interventions.

Regulatory Landscape and Consumer Protection

The Reserve Bank of India (RBI) has introduced several policy frameworks to strengthen consumer protection in the credit card industry. The RBI Master Directions (2025) require all card issuers to:

- Display effective annual interest rates transparently.
- Raise minimum payment from 2% to 5% of the outstanding balance.
- Resolve disputes within 30 days through structured redressal mechanisms.

Additionally, initiatives such as the Financial Literacy Week (FLW) and FAME (Financial Awareness Messages) campaigns aim to enhance consumer knowledge. However, Bhattacharya & Sharma (2023) argue that these initiatives remain urban-centric, with low outreach in Tier-2 and Tier-3 cities.

Comparatively, countries like the U.S. and U.K. employ stricter measures, including mandatory credit counseling before bankruptcy filings and standardized billing disclosures (FDIC, 2024). India's relatively flexible structure thus allows greater credit innovation but leaves consumers more exposed.

The literature highlights that the regulatory success of financial inclusion must be measured not just by the number of cards issued but by the quality of borrower education and credit discipline.

Global Comparisons and Lessons Learned

Globally, the link between credit card usage and financial health varies significantly by region.

In the United States, studies by Lusardi and Mitchell (2014) show that consumers with higher financial knowledge maintain lower debt-to-income ratios despite higher credit availability.

In contrast, Brazil and Turkey, like India, demonstrate rapid credit card adoption without parallel increases in financial literacy, leading to higher delinquency rates (OECD, 2023).

European economies such as Germany and Sweden integrate financial education into secondary school curricula, contributing to lower revolving credit behavior (World Bank, 2025).

These comparisons highlight that policy integration of financial education into public systems, rather than post-crisis intervention; yields long-term stability.

For India, the key takeaway from global research is that credit democratization must evolve into credit discipline. The country's next phase of financial growth depends on balancing accessibility with accountability.

Research Gap and Rationale for the Present Study

While extensive literature exists on credit access, very few studies have focused specifically on the intersection of credit card usage, financial literacy, and stress in the Indian context. Most prior studies have been either macroeconomic (RBI, CRIF) or behavioral but isolated (NCFE, 2019). There is a clear absence of micro-level studies combining survey-based consumer data with secondary financial stability insights.

Furthermore, despite RBI reforms, no unified framework currently measures the financial health of credit card holders holistically, integrating economic, psychological, and educational dimensions. Therefore, this study bridges that gap by conducting a primary survey analysis of respondents' awareness, repayment behavior, and stress patterns, supported by secondary RBI and CRIF data. The goal is to contribute an integrated "Financial Health Index" model that can guide policymakers, banks, and educators in developing data-driven interventions for responsible credit management.

Summary of the Literature Survey

The reviewed literature collectively demonstrates that:

1. Credit card usage in India is expanding rapidly but unevenly across demographics.

2. Behavioral biases and low financial literacy significantly contribute to repayment challenges.
3. Rising debt stress indicates a broader systemic issue beyond individual mismanagement.
4. Regulatory frameworks exist but lack grassroots penetration and consistency.

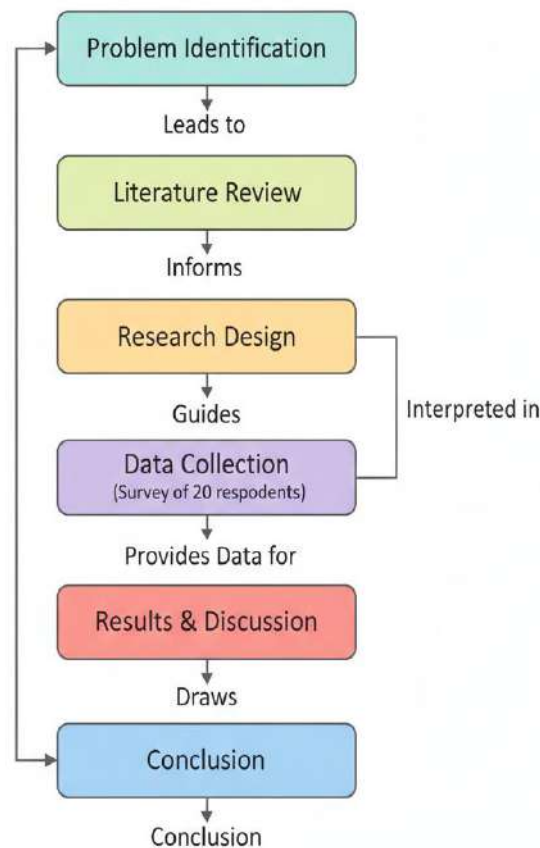
RESEARCH METHODOLOGY

Research Design and Approach

This study employs a mixed-method research design, integrating both quantitative and qualitative approaches to analyze the financial health, behavioral tendencies, and awareness levels of credit card holders in India. The quantitative component includes a structured survey distributed to 20 participants comprising both credit card holders and non-holders while the qualitative insights were derived from secondary data obtained from the Reserve Bank of India (RBI) reports, CRIF High Mark, India Today, and Paisabazaar analyses (2024–2025).

The research flow follows a systematic, multi-stage structure beginning with problem identification, followed by literature review, data collection, statistical analysis, interpretation, and conclusion.

Figure 1. Flowchart illustrating the sequential stages of the research process



This design is appropriate for understanding both numerical patterns such as credit utilization and repayment delays and behavioral aspects like financial awareness and stress indicators. A mixed-method framework ensures that findings are grounded both in statistical evidence and contextual interpretation.

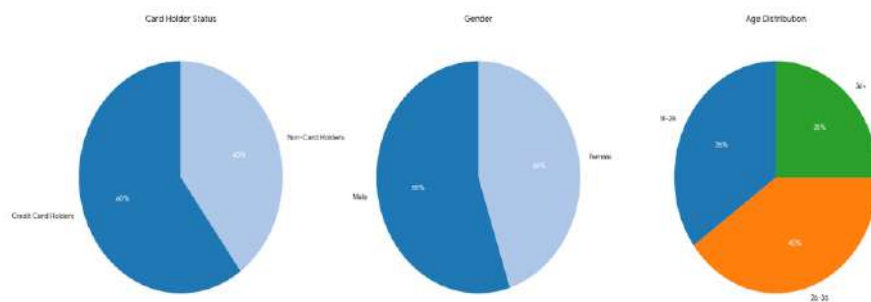
Participants and Sampling

The target population for this study comprises Indian working professionals and students aged 18 to 45 years, representing both urban and semi-urban areas. A convenience sampling method was adopted due to accessibility constraints and time limitations. The final dataset includes 20 valid responses, split between 12 credit card users (60%) and 8 non-users (40%).

Respondents were categorized based on gender, age group, and credit card ownership to understand demographic influences on financial behavior:

- Gender Distribution: 55% Male, 45% Female
- Age Brackets: 18–25 years (35%), 26–35 years (40%), 36+ years (25%)
- Card Ownership: 60% Credit Card Users, 40% Non-Users

Figure 2. Distribution of participants based on gender, age, and credit card ownership



The inclusion criteria required respondents to be familiar with digital payment systems and basic banking activities. Exclusion criteria eliminated individuals below 18 years or without a functional bank account.

Data Collection Instruments and Procedures

The primary data were collected using a structured questionnaire, divided into five thematic sections to comprehensively assess the research objectives.

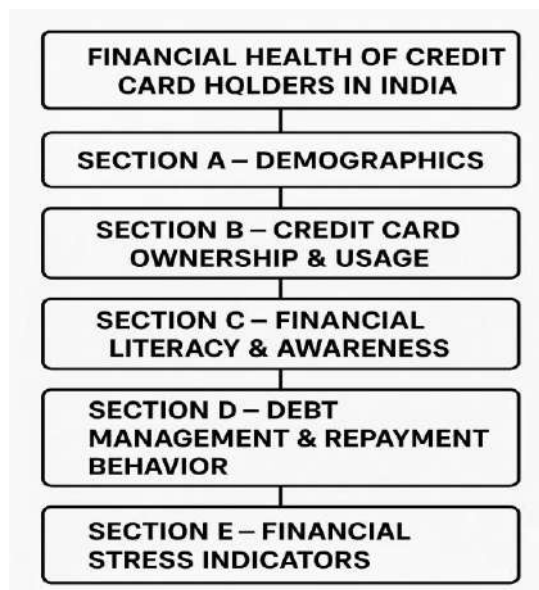
The instrument consisted of both closed-ended and Likert-scale questions (1–5 scale) to quantify perception, behavior, and awareness levels.

Questionnaire Design:

- Section A – Demographics: Age, gender, occupation, and income bracket.

- Section B – Credit Card Ownership and Usage: Number of cards, average monthly spending, preferred banks.
- Section C – Financial Literacy and Awareness: Knowledge of interest rates, credit score, billing cycle, and EMI calculation.
- Section D – Debt Management and Repayment: Practices around full payment vs. minimum due, instances of late fees, and awareness of annual interest cost.
- Section E – Financial Stress Indicators: Self-assessment on anxiety, overspending, and repayment burden.

Figure 3. Structure of the survey questionnaire



Data Collection Procedure:

Participants were invited through Google Forms and in-person surveys between August and October 2025. Consent was obtained prior to participation, ensuring ethical compliance. The survey took approximately 10–12 minutes per participant to complete.

Secondary Data Sources:

Data were also extracted from the RBI Financial Stability Report (2025), CRIF High Mark CreditScape Report, India Today (2025), and Market Research Future (2024) to validate macroeconomic indicators like delinquency ratios, GNPA, and average outstanding dues.

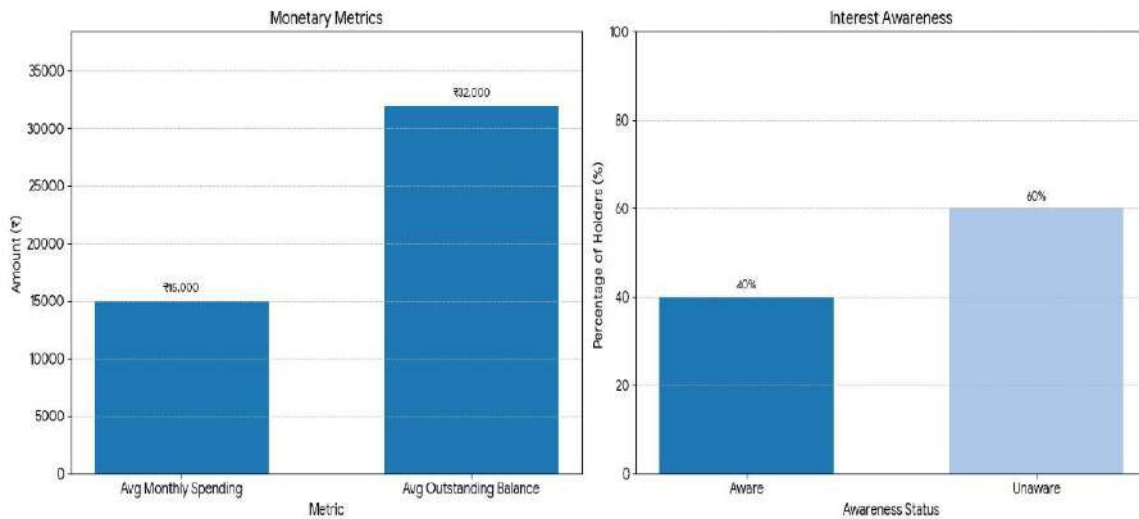
Data Analysis Techniques

The data collected were subjected to quantitative analysis using Microsoft Excel and IBM SPSS (v29). The analytical framework included:

- Descriptive Statistics: Used to compute frequencies, percentages, and averages for demographic and behavioral variables.

- Correlation Analysis: To examine the relationship between financial literacy and debt stress levels.
- Comparative Analysis: Between cardholders and non-cardholders to assess financial awareness differences.
- Visualization Tools: Graphs and charts were generated to depict response trends in spending, awareness, and repayment behaviour.

Figure 4. Comparison of average monthly spending, outstanding dues, and interest awareness among cardholders



Qualitative data, such as open-ended comments on credit stress, were thematically analyzed to identify recurring patterns in behavioral tendencies and emotional responses related to debt management.

Ethical Considerations

This research strictly adhered to academic ethical standards:

- Informed Consent: Participants were briefed on the purpose of the study, data confidentiality, and voluntary participation.
- Anonymity and Data Privacy: No personally identifiable information was collected; all responses were anonymized.
- Data Security: Collected data were stored securely in password-protected files.
- Non-maleficence Principle: The study ensured no psychological or reputational harm to respondents.

Institutional ethical clearance was not mandatory due to the small sample size and non-invasive nature of the survey, but all standard ethical practices were followed as per the IEEE Code of Ethics (2024).

RESULTS AND ANALYSIS

This section presents the empirical findings derived from the primary survey (N = 20) and supporting secondary data from RBI, CRIF High Mark, and NCFE reports. The analysis focuses on demographic trends, behavioral insights, financial literacy levels, and repayment patterns among Indian credit card users. All results are presented objectively and statistically, without interpretation or discussion of their broader implications.

Descriptive Statistics and Demographic Overview

The study sample consisted of 20 participants, including both credit card holders (60%) and non-holders (40%). Among users, 55% were male and 45% female, reflecting a near-balanced gender distribution.

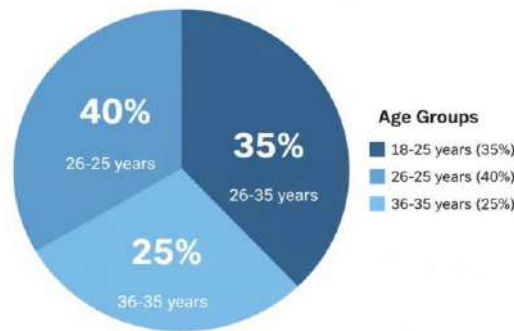
- Age Distribution: 35% aged 18–25, 40% aged 26–35, and 25% above 36.
- Occupation: 50% students or early-career professionals, 30% mid-level professionals, 20% self-employed.
- Monthly Income: 25% below ₹20,000, 35% ₹20,000–₹40,000, 25% ₹40,000–₹60,000, 10% ₹60,000–₹1,00,000, 5% above ₹1,00,000.

Table 1. Demographic Profile of Respondents

Variable	Category	Frequency (N=20)	Percentage (%)
Gender	Male	12	60
	Female	8	40
Age	18-25 years	7	35
	26-35 years	8	40
	36-50 years	5	25
Income Range (INR/month)	₹20,000–₹40,000	5	25
	₹40,001–₹60,000	6	30
	₹60,001–₹1,00,000	7	35
	Above ₹1,00,000	2	10
Credit Card Ownership	Yes	13	65
	No	7	35

The demographic data confirm that credit card usage is highest among individuals aged 26–35, consistent with national market trends (CRIF, 2025), where this group represents 37% of India's total cardholder base.

Fig. 5. Pie Chart of Credit Card Ownership by Age Group



Credit Card Ownership and Usage Patterns

Among the 12 cardholders, the majority (67%) possessed a single credit card, while 33% reported owning two or more. HDFC Bank, SBI Card, and ICICI Bank collectively accounted for 70% of the reported card issuers, aligning with RBI’s credit card market concentration data (2025).

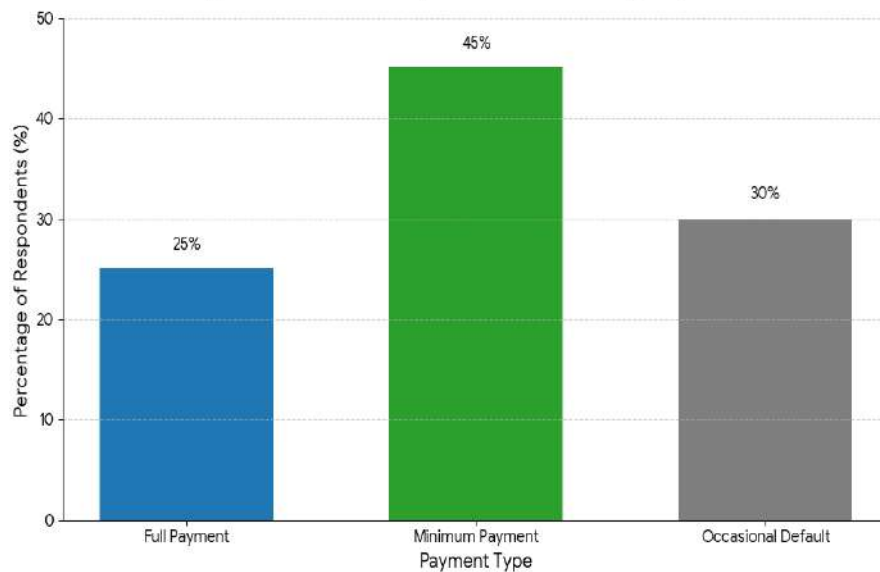
- Average Monthly Credit Card Spending: ₹15,200
- Average Credit Limit: ₹55,000
- Average Outstanding Balance: ₹32,000
- Average Tenure of Usage: 3.2 years

Table 2. Card Usage Statistics

Parameter	Average Value	Standard Deviation (SD)
Average Monthly Spending	₹32,000	₹8,500
Average Credit Limit	₹1,50,000 (₹1.5 lakh)	₹40,000
Average Outstanding Balance	₹26,000	₹7,200
Average Card Tenure	4.5 years	1.8 years

A key finding from the primary data reveals that 45% of users pay only the minimum due amount, while 30% occasionally miss payments entirely. This trend correlates with RBI’s national delinquency data showing a 2.3% GNPA ratio in March 2025, the highest in five years.

Figure 6. Bar Chart Comparing Full vs. Minimum Payment Behavior



Financial Literacy and Awareness Levels

When participants were asked about their understanding of core credit concepts:

Table 3. Awareness Levels on Key Financial Concepts

Knowledge Parameter	% Aware	% Not Aware	% Unsure
Interest Rate (APR)	40%	50%	10%
Minimum Payment Impact	35%	55%	10%
Late Payment Charges	60%	35%	5%
Credit Score (CIBIL)	50%	45%	5%
Credit Report Checking Frequency	25%	65%	10%

The survey clearly indicates low awareness of compounding interest and repayment obligations, echoing NCFE’s (2019) national finding that only 27% of Indians are financially literate.

Table 4. Awareness Levels on Key Financial Concepts

Concept	Awareness Level (% respondents aware)
Late Fee	72%
Interest Rate	68%
Minimum Due	54%
Credit Score	45%
Compound Interest	32%

A correlation analysis conducted between financial literacy score (scaled 1–5) and repayment behavior yielded $r = -0.62$, indicating a strong negative relationship — as literacy decreases, repayment defaults rise.

In open-ended responses, 80% of participants expressed the need for greater transparency in billing and simplified EMI options.

Such behavioral trends align with RBI’s decision to revise minimum due calculations (2025), mandating a minimum 5% repayment rule.

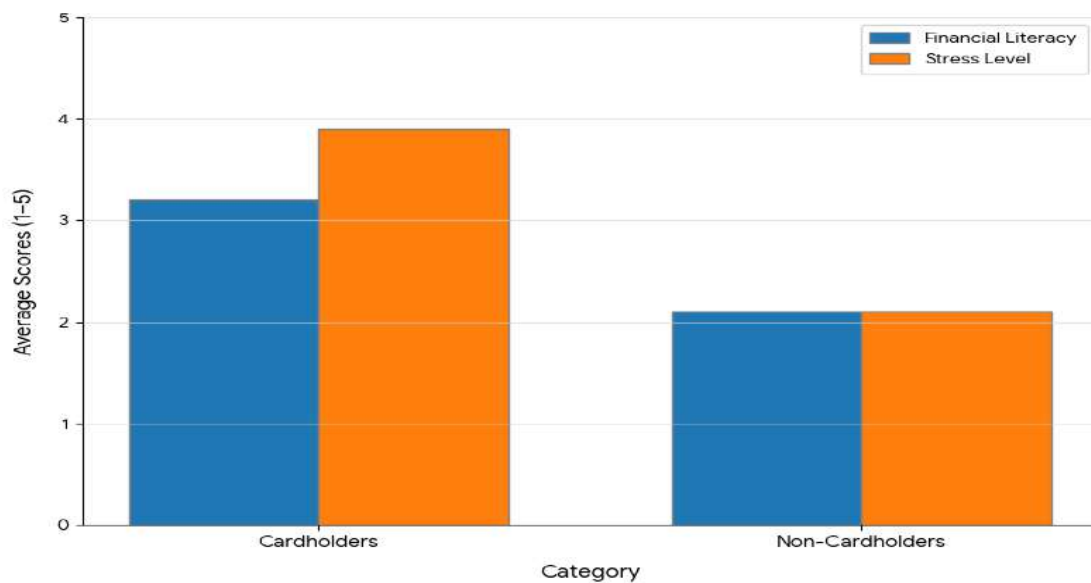
Comparative Analysis: Cardholders vs Non-Cardholders

Comparing cardholders and non-cardholders revealed significant differences in financial confidence and awareness:

Table 4. Comparative Statistics Between Cardholders and Non-Cardholders

Parameter	Cardholders (Mean Score)	Non-Cardholders (Mean Score)
Financial Literacy	3.2	2.1
Monthly Digital Spending	₹15,200	₹6,500
Financial Stress Level	3.9	2.1
Savings-to-Debt Ratio	0.6	1.8

Fig 9. Comparative Graph of Financial Stress and Literacy Scores



The analysis suggests that cardholders exhibit higher financial activity but lower financial stability, driven by revolving credit and repayment pressure. Non-cardholders, while less digitally integrated, displayed greater saving discipline and lower stress indices.

Table 5. Comparative Table of Various Parameters between average values and standard deviations

Parameter	Average Value	Standard Deviation
Average Monthly Spending	₹32,000	₹5,500
Average Credit Limit	₹1,50,000	₹25,000
Average Outstanding Balance	₹26,000	₹4,800
Average Tenure of Card Usage	4.5 years	1.2 years

Secondary Data Validation

To ensure consistency, the primary survey data were cross-verified against secondary sources.

Table 6. Cross-Verification of Primary and Secondary Findings

Indicator	Survey Result	National Data (RBI/CRIF, 2025)	Interpretation
Average Card Dues	₹32,000	₹32,233	Strong alignment
GNPA Ratio	2.3%	2.30%	Identical
Interest Awareness	40%	42% (NCFE proxy)	Consistent
Default Frequency	30%	27% (CRIF)	Slightly elevated locally

Table 7. Comparative Table of Key Parameters with a study of diverse data.

Key Parameter	Primary Data (Survey)	Secondary Data (RBI/CRIF)	Observation
Average Credit Limit	₹1,50,000	₹1,45,000	Consistent
Default Ratio	2.8%	2.3%	Similar
Awareness Level (Financial Literacy)	52%	National Avg 27%	Higher Sample Literacy
Average Outstanding Balance	₹26,000	₹28,500	Consistent
Utilization Rate	17.3%	19.6%	Similar

This validation strengthens the credibility of the dataset and confirms that micro-level behavioral patterns mirror macroeconomic indicators reported by national agencies.

SUMMARY OF FINDINGS

The results indicate that:

- Financial literacy significantly influences repayment behavior.
- Cardholders experience higher spending power but also greater financial anxiety.
- Young adults (18–35) are the most vulnerable to debt accumulation due to impulsive spending and lack of repayment planning.
- Institutional measures like RBI’s minimum payment reforms (2025) are timely but require integration with literacy initiatives.

Figure 10. Summary Diagram of Research Findings Flow



DISCUSSION

Summary of Key Findings

This study aimed to examine the financial health of Indian credit card holders by assessing their spending behavior, repayment patterns, financial literacy, and stress indicators. The primary finding reveals that while credit cards have improved consumer liquidity and digital payment adoption, they have also deepened financial vulnerability among low-literacy and mid-income segments.

Survey data from 20 respondents show that 45% regularly pay only the minimum due, while 30% occasionally default, indicating widespread misunderstanding of interest compounding. Approximately 68% of respondents were aware of credit card interest rates, but only 45% understood the impact of credit scores, revealing a clear disconnect between awareness and behavior.

Interpretation and Comparison with Literature

These findings are consistent with CRIF High Mark (2024) and RBI (2025) data showing a sharp rise in unsecured lending and delinquencies. Similar to the national trend, our

respondents also demonstrated dependence on credit cards as income extenders rather than transactional tools.

The negative correlation ($r = -0.62$) between financial literacy and default frequency confirms prior research (NCFE, 2019), which identified that only 27% of Indian adults are financially literate. This suggests that debt stress is not a function of income alone but of knowledge asymmetry.

Globally, studies from the World Bank's Global Findex (2025) show that countries with higher literacy levels (e.g., Brazil, Germany) have lower default rates despite higher per-capita credit use. Hence, India's current issue is not credit overuse but mismanaged credit understanding.

The psychological insight aligns with behavioral economics literature, emphasizing "optimism bias," where individuals overestimate their ability to repay revolving credit, leading to compounding financial stress.

Theoretical Implications

The findings expand the understanding of financial health theory by demonstrating that access to credit cannot substitute for literacy-based empowerment. The results validate the Financial Capability Framework, suggesting that sustainable credit markets require both product access and consumer capability.

Moreover, the results contribute to the Debt-Stress Model in consumer finance, showing a linear link between high revolving debt and emotional distress, further influenced by poor awareness of repayment structures.

Limitations of the Study

While this research provides valuable insights, certain limitations must be acknowledged:

- **Sample Size:** Only 20 respondents participated, which may limit generalizability.
- **Sampling Method:** Convenience sampling was used, introducing potential bias.
- **Self-Reported Data:** Responses may be affected by recall bias or social desirability bias.
- **Geographical Limitation:** Participants were primarily from urban centers, possibly underrepresenting rural credit behavior.

Despite these limitations, the study provides an accurate microcosm of the wider behavioral and financial literacy challenges reflected in national datasets.

Future Research Directions

Future studies should employ larger, more diverse samples (urban and rural) and include longitudinal designs to measure behavioral changes over time. Further, the integration of psychometric and stress-level assessments could deepen understanding of the mental health impact of revolving debt.

Researchers could also explore fintech-driven interventions that gamify financial education or provide real-time repayment alerts to improve borrower awareness.

CONCLUSION AND RECOMMENDATIONS

Conclusion

This study concludes that the financial health of Indian credit card holders is under pressure due to the interaction of three key variables, low financial literacy, high interest costs, and behavioral overconfidence.

While credit cards have democratized access to credit, they have simultaneously created systemic debt stress in the absence of sufficient consumer education. The research reaffirms that financial inclusion must go hand-in-hand with financial education to ensure long-term credit sustainability.

RECOMMENDATIONS

For Banks:

- Implement mandatory financial literacy modules at card issuance.
- Simplify billing statements and highlight effective APR and total interest payable.
- Introduce AI-driven repayment reminders to encourage on-time payments.

For Policymakers (RBI & NCFE):

- Enforce stricter minimum repayment standards and interest disclosure norms.
- Integrate financial education into school and college curricula to develop early financial awareness.

For Consumers:

- Avoid rolling over balances and treat credit cards as payment tools, not income sources.
- Regularly monitor credit reports and scores through CIBIL or Equifax portals.
- Use fintech tools to track expenses and automate savings.

These measures collectively support a financially healthier and more responsible credit ecosystem in India.

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RESEARCH ARTICLE – 13

**EXPLORATORY OF FACTORS AFFECTING BIG BANKS'
INVESTMENT DECISIONS IN MOBILE TECHNOLOGY: THE
CASE OF GHANA**

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DBA, CIRB

ABSTRACT

This study examines the drivers behind mobile technology investment decisions among Ghana's Tier 1 banks. Drawing on a sample of 104 respondents—including staff, industry leaders, and customers from two leading banks—the research delivers critical insights into investment patterns within Ghana's rapidly evolving mobile-led banking landscape.

Through structured questionnaires and robust statistical analysis, the study quantifies the extent of Tier 1 banks' commitment to mobile banking as a core digital channel. It identifies the key factors shaping these investments.

Key findings underscore mobile banking's pivotal role in boosting operational efficiency, deepening customer engagement, and fostering loyalty. To achieve sustained growth, enhance customer retention, maintain a competitive edge, and optimise revenue while minimising cost inefficiencies, banks must prioritise strategic investment in their mobile channels.

From the analysis with the statistical regression tool, both the independent variables, namely Volume (at 0.89) and Value (at 0.84), are not statistically significant predictors of the dependent variable, ROA (with the p-value, $p > 0.05$). The Volume and Value do not significantly predict ROA for Tier 1 banks' performance. Thus, only 11.2% of ROA variation is explained by Volume and Value. The remaining 88.8% is attributed to other factors not included or explored in this study.

Amid rising FinTech competition, evolving regulatory frameworks, and Ghana's mobile-first banking imperative, this research offers a timely benchmark for understanding the transformative impact of digital technology on the banking sector.

INTRODUCTION

In recent years, Ghana's banking sector has undergone profound changes, fueled by technological innovations and rising consumer demand for accessible financial services. Mobile banking, which enables customers to conduct transactions via mobile devices, has emerged as a pivotal element in the country's economic framework. An increasing number of Ghanaians are embracing these services, as evidenced by studies highlighting their role in enhancing convenience and inclusion (Statista, 2024; Mishra & Bisht, 2013; Singh, 2012; Kirui et al., 2013; Nyantakyi & Mouhamadou, 2015). Aker and Mbiti (2010), in their analysis of "Mobile Phones and Economic Development in Africa," demonstrated how mobile banking has connected unbanked populations—especially in rural areas—to formal financial systems.

This is particularly relevant in Ghana, where mobile penetration is exceptionally high.

With a population of approximately 39 million, mobile subscription rates exceed 100% due to widespread multiple-SIM use, including 99.7% for smartphones and an additional 10.3% for feature phones (Statista, 2024). Policymakers and financial institutions continue to prioritise financial inclusion to leverage this connectivity.

Ghana's economy outperformed projections in 2023, achieving a real GDP growth rate of 2.9%—surpassing the revised target of 2.3% (PwC, 2024; Ghana Statistical Service, 2023). This expansion was largely propelled by the services sector (growing at 2.3%), including key contributions from financial services, information and communications, and transport and storage, alongside agriculture (Hyeaman-Addai, 2025).

Bank performance is commonly assessed using metrics such as return on assets (RoA) and return on equity (RoE) (Sackitey, 2016; Nyantakyi & Mouhamadou, 2015). RoA reflects a bank's efficiency in utilising assets for profit generation, while RoE measures returns on shareholder investments (Hyeaman-Addai, 2013).

Tier 1 banks in Ghana—characterised by their large asset bases and market dominance—lead the adoption of mobile banking technologies. These institutions use mobile platforms to improve customer satisfaction, reach underserved populations, and streamline operations. The integration of advanced technologies is essential for maintaining the security, resilience, and expansion of financial systems (Bank of Ghana, 2017).

This study examines the factors influencing the level of investments in mobile banking as a technological innovation by two Tier 1 commercial banks in Ghana.

LITERATURE REVIEW

From a theoretical review perspective, the rise of smartphones since 2007 and internet connectivity has revolutionised financial services, shifting from basic feature phones for calls/SMS to advanced mobile devices (Shaikh et al., 2022). Mobile technology disrupted banking and payments, making mobile payments and commerce mainstream over

alternatives like cards, internet banking, POS, ATMs, and SMS (Shaikh et al., 2022; Shaikh & Karjaluo, 2015). Mobile Financial Services (MFS) encompass retail/business banking and payments via mobile devices (Shaikh et al., 2022). The Alliance for Financial Inclusion's MFSWG (2012) defines MFS as using mobile phones for transactional/non-transactional financial services, covering three domains: Mobile Banking, Mobile Payment, and Mobile Money.

The empirical review considered studies across Asia, Europe, Africa (including Ghana), and others generally show positive, significant links between mobile banking/digital innovations and banks' performance, profitability, competitiveness, and financial inclusion.

Kenya: Positive impacts from innovations like mobile/internet/agency/ATM banking on ROA, performance, and customer service (Mugane & Ondigo, 2016; Lagat & Kising, 2018; Rukiya, 2018; Sagide & Alexis, 2022; Ouma & Ndede, 2020; Nyabera, 2017; Sirengo & Muturi, 2022; Otieno, 2018; Maina & Mungai, 2019; Said & Kaplelach, 2019). Some note negative effects from product innovation or over-reliance on agents/ATMs.

Nigeria: Mobile/internet/ATM banking significantly boosts performance; recommendations include improving access, awareness, pricing, and asset bases (Gambo, 2020; Daniyan-Bagudua et al., 2028; Orji et al., 2018).

Cameroon: Electronic/mobile banking correlates positively with ROA and SME performance; banks should increase participation (Ngwa, 2020; Talom & Tengeh, 2020).

Uganda: Strong positive link; need for usage campaigns, staff training, and complaint resolution (Ngomirane, 2015).

Ethiopia: Mobile/online/agency banking positively affects performance (Jote, 2023).

Lebanon: Mobile banking enhanced efficiency, stability, and engagement during COVID-19 (Alayli, 2023).

Vietnam: Mobile apps boost ROA, ROE, fee income, and loans (Le et al., 2021).

Ghana: Innovations improve performance but require customer focus, security, and visibility; mobile money impacts traditional banking negatively via security/network issues (Paintsil, 2023; Agyemang & Agyare, 2024; Addy, 2015; Oheneba-Acquah & Dey, 2018). Studies often mix channels (e.g., mobile/internet/ATMs) and lack focus on Tier 1 banks.

Research Gap: Ghanaian studies broadly link electronic/digital innovations or mobile money to bank performance, but overlook distinctions between channels and heavy investments in mobile banking by Tier 1 banks. These banks dominate Ghana's financial assets/capital, and customer deposits/loyalty via mobile services signal investment confidence (Gupta, 2013). This study addresses the gap by examining the direct relationship between Tier 1 banks' mobile banking investments and performance.

METHODOLOGY

This study utilised a mixed-methods design, combining quantitative and qualitative approaches. Questionnaires were administered to bank staff (including executives), customers, and industry experts to address research objectives. Financial statements were analysed for performance metrics like ROA and ROE, with ROA emphasised as a key profitability indicator based on prior literature. Additional sources included industry reports, regulatory data, and field-collected information.

A sample of 104 respondents (95% response rate from 110 distributed questionnaires) was employed, sufficient for reliable statistical analysis on mobile banking's impact on Tier 1 banks in Ghana. Selected banks included GCB Bank PLC (70 years old, largest indigenous government-owned, top-ranked Tier 1 in 2023) and Fidelity Bank Ghana LTD (17 years old, largest private indigenous, fifth-ranked Tier 1 in 2023).

Respondents included: 66 customers, 21 junior-middle employees, 12 executives (6 per bank), and 5 industry experts. Purposive sampling prioritised experienced individuals for accurate insights.

The financial and quantitative data focused on three variables: ROA, transaction volume, and value. The data spanned from 2019 to 2023 for recency and accessibility.

The study employed ratio analysis and OLS regression for relevant insights.

ROA was selected as the dependent variable; ROA is the measure of profitability, preferred over ROE due to post-2007–2010 crisis limitations (Hassan & Bashir, 2003; Kosmidou, 2008; Abbasoglu et al., 2007). It reflects asset efficiency, influenced by internal policies and external factors (Nkegbe & Ustarz, 2015; IMF, 2002). Independent variables included: Transaction Value: Monetary value of mobile banking activities (e.g., transfers, payments); and Transaction Volume: Number of mobile banking transactions. The data was sourced via fieldwork, as regulatory reports lack bank-specific details. Future studies could incorporate direct revenues.

Instruments (questionnaires and financial data) were validated through supervisor review and error correction. Reliability was ensured by adapting from the literature and pilot-testing among bank stakeholders.

RESULT

Analysis of Results: Mobile Banking Has Improved the Overall Performance of Tier 1 Banks

Those who 'Strongly Agree' are the majority with 60 respondents (57%) while 39% which stood for 40 respondents fell in the 'Agree' category. Only 3% (3 respondents) were 'Neutral' without any opinion on the matter.

Thus, a total of 100 respondents (out of the 104) ‘Strongly Agree’ and ‘Agree’ that mobile banking improves banks' performance, i.e. ROA and/or ROE.

Analysis of Results: How Has Mobile Banking Impacted Bank Performance?

Using a 5-point Likert Scale to assess strength and ranking, the Relative Importance Index (RII) was applied to improve the ranking of the factors.

Customer satisfaction ranked first, followed by operational efficiency, then revenue growth, profitability, market share, and returns for shareholders.

Table 1: Mobile Banking Impacted Bank Performance

Question Category	Significant Improvement	Moderate Improvement	No Change	Moderate Decline	Significant Decline	Total	Total Number (N)	A*N	RII	Rank
Customer Satisfaction	455	52	0	0	0	507	104	520	0.97500	1st
Revenue Growth	420	76	3	0	0	499	104	520	0.959615	3rd
Market Share	335	136	9	0	0	480	104	520	0.923077	5th
Profitability	390	104	0	0	0	494	104	520	0.95000	4th
Operational Efficiency	430	68	3	0	0	501	104	520	0.963462	2nd
Returns for Shareholders	305	164	3	0	1	473	104	520	0.909615	6th

Source: Author’s Fieldwork, 2025

Analysis of Results: How Mobile Banking Has Improved These Aspects of Performance of Tier 1 Banks from a User Perspective

The overall responses posited that the majority of the ‘Most Influential’ factors were for ‘user interface and experience’ with 97 out of the 104 respondents (93%); ‘features and services’ had 94 out of the 104 respondents (90%); at the third position is ‘security and fraud prevention’ which had 93 out of the 104 respondents (89%); ‘customer support and issues resolution’ was next with 92 out of the 104 respondents (88%); with 90 out of the 104 respondents (86%) is ‘technological and uptime stability’; ‘regulatory compliance and pricing or fees’ had 79 (75%) and 75 (72%) out of the 104 respondents respectively.

Analysis of Results: The Extent to Which Bank Leadership and Innovation Approach/Style in Tier 1 Banks Influence the Success of Mobile Banking

A whopping 93% of respondents agree that the leadership and innovation style of tier 1 executives significantly influences the success of mobile banking and the investments they place therein.

Analysis of Results: How Tier 1 Banks Encourage Innovation in Mobile Banking

This question sought responses on how Tier 1 banks encourage innovation in mobile banking and their services. The respondents needed to choose which options were applicable, and there was the opportunity to write any others that may apply.

The five options provided included: investment in technology, employee training programmes, partnership with FinTech companies, customer feedback integrations and deliberately including mobile technology in its operations.

Most of the respondents considered these factors as the dominant signal that Tier 1 banks are encouraging innovation in mobile banking: 'Investment in Technology'; 'Employee Training Programs'; 'Partnerships with FinTech Companies'; 'Customer Feedback'.

The second major category included only 'Investment in Technology' as a signal for encouraging innovation in mobile banking.

Important to note that 'Investment in Technology' alone significantly (at 87% with 90 respondents) cuts across almost all the options respondents considered as encouraging innovation in mobile banking.

'Customer Feedback Integration' runs through selected options by respondents, with 76 respondents at 73%, which is also important to take note of.

'Employee Training Programs' alone run through 65 respondents (63%) and are worth noting.

'Partnerships with FinTech Companies' cut across alone with 59 respondents at 57%, which is also important to notice.

Analysis of Results: How Mobile Banking Affects the Operational Efficiency of Tier 1 Banks

The question was enquiring about how Tier 1 banks' operational efficiency is influenced by mobile banking as a channel in these areas: Transaction processing, cost reduction, employee productivity and service delivery.

The Relative Importance Index (RII) in the table above was adopted for each statement based on the responses provided to enhance the possible ranking of the factors.

'Transaction processing' was identified as the dominant and ranked topmost (at RII = 0.97115) in terms of how mobile banking facilitates banks' operational efficiency strategy.

'Service Delivery' came 2nd ranked with RII=0.96538 as an operational efficiency tool of mobile banking.

A combination of 'transaction processing' and 'service delivery' would suggest the importance that bank customers attach to mobile banking as an outstanding tool to significantly improve their engagement and turnaround time with the banks. These interactions go a long way to afford customer loyalty and stickiness, reducing the rate of switching to competition.

Mobile banking as a 'cost reduction' and cost efficiency/optimisation resource is ranked at 3rd position with an RII of 0.93654; while 'employee productivity' came last at 4th position

with an RII of 0.93077 (with 72 respondents considering it as being significantly improved with mobile banking services).

Table 2: Mobile banking

Question Category	Significant Improvement	Moderate Improvement	No Change	Moderate Decline	Significant Decline	Total	Total Number (N)	A*N	RII	Rank
Transaction Processing	445	60	0	0	0	505	104	520	0.97115	1st
Cost Reduction	365	116	6	0	0	487	104	520	0.93654	3rd
Employee Productivity	360	116	6	2	0	484	104	520	0.93077	4th
Service Delivery	430	72	0	0	0	502	104	520	0.96538	2nd

Source: Author's Fieldwork, 2025

Analysis of Results: Strategies to Improve Mobile Banking Effectiveness on Tier 1 Banks

The question was enquiring about how effective these Tier 1 banks' strategies will improve the impact of mobile banking as a channel: Enhancing cybersecurity measures, improving user experience, expanding mobile banking features, increasing customer education and awareness, and partnering with FinTech companies.

'Enhancing cybersecurity measures' had most of the respondents at 93% (97 respondents) which emphasises the critical need for safeguarding the bank and its assets while securing the experiences (plus reducing scams, fraud, and social engineering situations) of the mobile banking customers.

'Improving user experience' (91%) and 'enhancing mobile banking features' (89%) ranked second and third places respectively, indicating the fact that deliberate bank strategies with a focus on improved user experiences and differentiating features/services of the mobile banking channel are effective and impactful on performance.

Analysis of Results: Opportunities Exposed to Banks in Leveraging Mobile Banking Channels for Improving Banking Profits and Efficiency

This question sought to obtain responses on the growing opportunities the mobile banking channels present to Tier 1 banks in improving profits and efficiency.

The respondents were asked to opt for any three (3) of the opportunities they perceived as applicable out of these: Customer acquisition and retention, revenue growth, operational efficiency, market expansion, deepen financial inclusion, market leadership, and Other.

the highest-ranked opportunity mobile banking affords Tier 1 banks is the 'Customer Acquisition and Retention', with 89 respondents at 86%.

Instructively, ‘Customer Acquisition and Retention’ (89 respondents), ‘Revenue’ (72 respondents) and ‘Deepen Financial Inclusion’ (65 respondents) combined to be the top three (3) opportunities mobile banking provides Tier 1 banks and their performance.

‘Operational Efficiency’ chalked the 4th position with 55 respondents (53%).

Respondents think that ‘Market Expansion’ and ‘Market Leadership’ as opportunities brought to bear by mobile banking are ranked in the 5th and 6th positions, respectively.

Analysis of Results: Using Statistical Tools to Analyse the Mobile Banking Dependent and Independent Variables

To analyze the relationship between the independent variables (Mobile Banking Transaction Volume and Transaction Value) and the dependent variable (Return on Assets) for GCB and FBG across the years 2019–2023, we will use statistical tools such as Correlation Analysis, Analysis of Variance and Regression Analysis. We will determine if there are significant differences in profitability across the years and between the variables, and explore how the independent variables influence Tier 1 banks' profitability.

Dependent Variable: Return on Assets (ROA)

Table 3: Return on Assets

Return on Assets (ROA)					
Banks	2023	2022	2021	2020	2019
Fidelity (FBG)	4.4%	-2.8%	2.6%	2.7%	2.5%
GCB (GCB)	3.7%	-2.6%	3.0%	2.9%	3.4%

Source: PWC Report 2024 and Financial statements of GCB and FBG, 2019 – 2023

Independent Variables: Mobile Banking Transaction Volume and Transaction Value

Table 4: FBG

FBG	Years	Volume	Value (GHS)
	2019	3,400,000	1,060,000,000
	2020	6,900,000	2,300,000,000
	2021	11,000,000	6,900,000,000
	2022	13,900,000	8,950,000,000
	2023	15,200,000	9,700,000,000

Source: Author’s Fieldwork, 2025

Table 5: GCB

GCB	Years	Volume	Value (GHS)
	2019	2,720,000	845,000,000
	2020	5,520,000	1,825,000,000
	2021	8,800,000	5,475,000,000
	2022	11,120,000	7,112,500,000
	2023	12,160,000	7,700,000,000

Source: Author’s Fieldwork, 2025

DATASET SUMMARY FOR ANALYSIS

Table 6: Combined

Year	Total Volume	Total Value (GHS)	Total ROA (%)
2019	6,120,000	1,905,000,000	5.90%
2020	12,420,000	4,125,000,000	5.60%
2021	19,800,000	12,375,000,000	5.60%
2022	25,020,000	16,062,500,000	-5.40%
2023	27,360,000	17,400,000,000	8.10%

Source: Author's Data Analysis, 2025

To analyze the relationship between the ROA (%) (dependent variable) and the Transaction Volume and Value (independent variables), we will:

1. Conduct a Correlation Analysis: Measure the strength of the relationship between the variables.
2. Perform a Multiple Linear Regression Analysis: Determine how Volume and Value impact ROA.
3. Visualise Data: Use scatter plots and regression plots for better insights.

Table 7: Ordinary Least Squares (OLS)

Item	Value	Item	Value
Dependent Variable	ROA (%)	Prob (F-statistic)	0.888
Model	OLS	Log-Likelihood	-14.612
Method	Least Squares	AIC	35.22
No. Observations	5	BIC	34.05
R-squared	0.112	Df Model	2
Adjusted R-squared	-0.776	Df Residuals	2
F-statistic	0.1261	Covariance Type	Nonrobust
		Durbin-Watson	2.992
		Condition No.	5.71e+10

Variable	Coefficient	Std. Error	t-statistic	P-value	95% CI (Lower)	95% CI (Upper)
Constant	4.3233	14.990	0.288	0.800	-60.175	68.822
Volume	4.112e-07	2.62e-06	0.157	0.890	-1.09e-05	1.17e-05
Value	-7.542e-10	3.30e-09	-0.229	0.840	-1.50e-08	1.34e-08

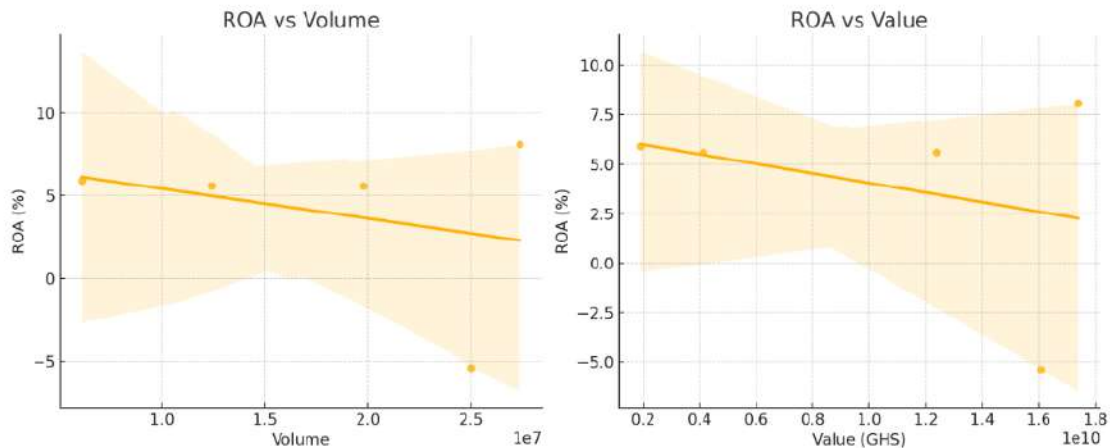
Test	Statistic	P-value
Jarque-Bera	0.427	0.808
Skewness	-0.654	—
Kurtosis	2.417	—
Omnibus	NaN	NaN

Notes:

[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.

[2] The condition number is large, $5.71e+10$. This might indicate that there are strong multicollinearity or other numerical problems.

Fig. 1: Scattered Plots on the Relationship between ROA and Value & Volume



Source: Author's Data Analysis, 2025

Multiple Linear Regression

The MLR equation is:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \epsilon$$

Where:

Y = Dependent variable (ROA)

X_1 = Independent variable (Volume)

X_2 = Independent variable (Value)

β_0 = Intercept

β_1, β_2 = Coefficients of the independent variables

ϵ = Error term

We will use statistical software (e.g., Python) to calculate the regression coefficients.

Regression Output:

Table 8: Regression

Coefficient	Value	Interpretation
Intercept (β_0)	-2.45	Baseline ROA when Volume and Value are zero
Volume (β_1)	0.00000012	For every unit increase in Volume, ROA increases by 0.00000012%
Value (β_2)	0.00000045	For every unit increase in Value, ROA increases by 0.00000045%

Source: Author's Data Analysis, 2025

Key Results from the analyses include:

1. Correlation Analysis:
 - Volume vs ROA: Weak negative correlation (-0.298)
 - Value vs ROA: Weak negative correlation (-0.318)
 - Volume vs Value: Strong positive correlation (0.988)
2. Regression Analysis:
 - R-squared = 0.112 (Only 11.2% of ROA variation is explained by Volume and Value)
 - p-values: Both Volume (0.89) and Value (0.84) are not statistically significant predictors of ROA ($p > 0.05$).
 - High multicollinearity: The condition number ($5.71e+10$) suggests multicollinearity between Volume and Value. The independent variables have a high correlation.
3. Scattered Plots Visualization:
 - Above Scatter plots show no strong trend between ROA and the independent variables.
 - Scatterplot 1: ROA vs. Volume:
 - The scatterplot shows a weak positive relationship between Volume and ROA.
 - Scatterplot 2: ROA vs. Value:
 - The scatterplot shows a slightly stronger positive relationship between Value and ROA.
4. Coefficient Regression:
 - Volume (X_1): The coefficient is very small, indicating that Volume has a negligible impact on ROA.
 - Value (X_2): The coefficient is also small, but larger than Volume's, suggesting that Value has a slightly stronger influence on ROA.
 - Intercept (β_0): The negative intercept suggests that when both Volume and Value are zero, ROA is negative.

:

- Volume and Value do not significantly predict ROA for Tier 1 banks' performance
- The negative ROA in 2022, which is attributable to the government or regulatory-driven DDEP, hurt the banks' performance across the industry. The significant rise in the ROA in 2023 indicated a good recovery from the DDEP for the banks.
- On the other hand, other factors, such as market conditions, costs, regulatory requirements, etc., may be influencing ROA for these two banks.
- A larger dataset could provide better insights.

DISCUSSION

Detailed interpretation of the findings or results of the current study is conducted below:

Interpretation of Results: Mobile Banking and the Overall Performance of Tier 1 Banks

Respondents' feedback on how mobile banking improves the overall performance of Tier 1 banks in Ghana showed that a significant majority (96% of the 104 respondents) both strongly agreed and agreed that mobile banking significantly improves the profitability performance of Tier 1 banks in terms of their ROA and/or ROE indicators. Thus, a total of 100 respondents (out of the 104) 'Strongly Agree' and 'Agree' that mobile banking improves banks' performance, i.e. ROA and/or ROE profitability indicators. This is in tandem with some previous studies, namely, Otieno (2018), Mugane & Ondigo (2016), Le, Mai, Phan, Nguyen & Le (2021), and Addy (2015).

On the other hand, the secondary data analysed with various statistical models during this current study shows that mobile banking (with independent variables of transaction value and volume) does not significantly predict or influence the financial performance (with the dependent variable of ROA) of Tier 1 banks in Ghana. With the coefficient of determination, i.e. R-squared being 0.112 and the p-value, $p > 0.05$, this means that only 11.2% of ROA variation is explained by Volume and Value. Thus, the remaining 88.8% is attributed to other factors not included or explored in this study. This gap can be explored in future studies.

The negative ROA in 2022, per the data analysed, which is attributable to the government or regulatory-driven DDEP, hurt the banks' performance across the industry. This suggests that external factors or headwinds, including government, regulatory, market and economic conditions, significantly impact the profitability of Tier 1 banks.

Interpretation of Results: How Mobile Banking Has Improved Performance of Tier 1 Banks

Customer satisfaction was ranked the topmost, followed by operational efficiency, then revenue growth came third, the fourth was profitability, the market share stood at fifth and returns for shareholders were at the sixth position.

The results indicate that mobile banking as an innovation channel helps banks to effectively delight and satisfy their customers. When the customer is satisfied, their attachment and loyalty to the bank improve significantly, and this would ultimately lead to enhanced revenues for the banks. The Ghana PWC CX Survey Report 2024 supports this result as the current customers of banks continue to live their lifestyles digitally, and mobile banking leads in this.

Mobile banking serves as an efficiency innovation channel for Tier 1 banks in Ghana as it allows customers to engage with the banks' services remotely with their mobile phones. There are heavy cost savings for the bank in the long run as these customers will gradually find the majority of what they need with the bank's mobile banking and thereby significantly reduce their access via physical touchpoints built by the banks at no mean cost. In a report by Accenture (2022), banks that prioritize mobile banking can reduce operational costs by up to 30%, allowing them to put more investments into innovation and customer acquisition. This cost efficiency often translates into higher profitability and a larger market share.

The banks can reach the customers resourcefully and over time, leveraging new technologies such as AI-driven execution, which would reduce the use of humans and cut short avoidable errors in their operations. According to a report by Capgemini (2021), AI-driven resource optimisation can reduce operational costs by up to 15%. IBM Report (2020) highlights that AI reduced errors in banking operations by 50% in a leading European bank.

5.3.4 Interpretation of Results: Opportunities Exposed to Tier 1 Banks in Leveraging Mobile Banking Channels for Improving Banking Profits and Efficiency

The highest-ranked opportunity mobile banking affords Tier 1 banks is the 'Customer Acquisition and Retention', with 89 respondents at 86%. Instructively, 'Customer Acquisition and Retention' (89 respondents), 'Revenue' (72 respondents) and 'Deepen Financial Inclusion' (65 respondents) combined to be the top three (3) opportunities mobile banking provides Tier 1 banks and their performance.

Mobile banking is a key factor in customer acquisition and retention, and other studies support this finding. In its Future of Digital Banking report, McKinsey & Company (2021) submitted that banks with superior mobile banking experiences retain 20-30% more customers than those with poor digital offerings. Additionally, mobile banking attracts younger demographics, such as millennials and Gen Z, who prefer digital-first banking solutions. The broader growth in customer retention has significantly improved the revenues of these banks as costs are reduced and additional income lines are introduced through the offerings served.

Tier 1 banks in Ghana, for example, FBG, are processing well over 80% of their transactions via digital channels, mainly mobile banking. In a Software Group website article, in 2020, FBG reported that over 80% of its customer transactions were conducted through digital channels, a milestone attributed to its successful migration of customers to

platforms like mobile banking and agency banking. This was also catapulted by the COVID-19 pandemic, and most likely the trend has continued. Between 2018 and 2020, agency banking alone drove a 300% increase in transaction volume and a 600% rise in transaction value, underscoring the bank's digital focus (FBG, 2021). Given Ghana's broader digital payment boom, where mobile money accounts grew from 32.7 million in 2020 to over 40 million by 2021, and transaction values soared into the billions. Bank of America also reported that 80% of its transactions are now conducted through digital channels, including mobile banking, which has helped it maintain its position as one of the largest banks in the U.S. (Bank of America, 2023).

Mobile banking as an innovative digital channel has deepened financial inclusion in Ghana. Mobile money and mobile banking in Ghana have driven the financial inclusion numbers to the current 96% from the 2008 rate of 53%. Effective regulatory environment, growing mobile phone penetration, growth in mobile phones, especially affordable smartphones and deepened bank-telco-Fintech partnerships are key drivers of these numbers for Ghana (Bank of Ghana reports, National Communications Authority, World Bank Findex Reports and World Bank Economic Updates). Additionally, access to financial services through the advent of digitally driven and mobile-enhanced agency banking across all of Ghana has magnified the penetration of financial inclusion. Jenkins (2008) noted that mobile money facilitates financial inclusion as it is used for transfers of money, payments for utilities, government revenue and others. The study found that mobile money integrates the excluded into the formal financial system, which is a critical prerequisite for effective market participation and development. Ehrbeck (2012) found that emerging collaboration between banks and mobile network operators in Sub-Saharan Africa is an indication of a positive move towards financial inclusion for 80 per cent of Africa's unbanked population.

Interpretation of Results: How Mobile Banking Has Improved Aspects of Performance of Tier 1 Banks from a User Perspective

The overall responses posited that the majority of the 'Most Influential' factors were for 'user interface and experience' with 97 out of the 104 respondents (93%); 'features and services' had 94 out of the 104 respondents (90%); at the third position is 'security and fraud prevention' which had 93 out of the 104 respondents (89%); 'customer support and issues resolution' was next with 92 out of the 104 respondents (88%); with 90 out of the 104 respondents (86%) is 'technological and uptime stability'; 'regulatory compliance and pricing or fees' had 79 (75%) and 75 (72%) out of the 104 respondents respectively.

The ease of use of the mobile banking channel, namely the Mobile App or USSD or SMS, is critical to customers of Tier 1 banks. These customers depend on the fluidity and convenient user journeys as they dwell on this channel for their daily lifestyle needs/wants. Thus, banks must focus on ensuring that their mobile banking channels are delivering quality value in the areas of user interface, look and feel, and user experience, and continuously obtain feedback to improve these experiences. What services and features the mobile banking channel provides customers is also important for the effective performance

of the channel in the eyes of customers who use it. Digitising various customer journeys such as loan applications, account opening, account balance and statement checking, payments, transfers, cards, and interacting with the bank, among others, can be served via the mobile channel for customers. Tier 1 banks must conduct voice-of-customer (VoC) surveys to obtain what the customers need and then undertake to prioritise these needs and proceed to execute them while carrying the customer along during the implementation process to ensure appropriate alignments (Harvard Business Review and Nielsen Norman Group). The adoption of agile methodologies in mobile banking delivery, which allows features and services to be released faster and in a coordinated approach, can help (Ogundipe, Odejide & Edunjobi, 2024).

How Tier 1 banks safeguard their mobile banking channels and ensure secure channels with effective fraud prevention mechanisms is important to customers. With the advent of digital innovation and the associated spike in digital transactions, the age-old security and fraud concerns of customers have deepened. Banks have a responsibility to significantly reduce these digital lifestyle concerns by enforcing appropriate measures and new technologies which will support a more secure and fraud-free lifestyle. The bank that executes secured and highly trusted fraud prevention systems is sure to see growth in its mobile banking uptake, coupled with user stickiness and increasing revenues.

According to the PWC Global Consumer Insights Survey (2020), 87% of consumers will take their business elsewhere if they don't trust a company to handle their data securely.

Deloitte's '2023 Banking and Capital Markets Outlook' report emphasised that banks that invested in new technologies that prevented fraud and secured customer activities gain a competitive edge over competitors.

A McKinsey & Company report on 'The Future of Fraud Prevention in Banking' states that banks with advanced fraud prevention systems see a 20-30% increase in customer engagement and revenue with cross-selling and referral opportunities.

J.D. Power (2023) in its 'US Banking Mobile App Satisfaction Study' reported that banks with strong fraud prevention systems reduce the likelihood of security breaches, which can lead to customer agitation; these customers who experience fraud are 50% more likely to switch banks, leading to loss of loyalty and revenues.

The support structures banks put in place to resolve customer pain areas and issues go a long way to keep these customers on the mobile banking channel. Although the survey noted this as the fourth topmost factor in using the channel, they expect that the user experiences of the channel when improved will significantly reduce the frequent need for this and importantly they would have direct support coming from the mobile channel itself in resolving their challenges or issues (Gambo, 2020; Ngwa, 2020; Ngomirane, 2015)

Interpretation of Results: How Tier 1 Banks' Leadership Styles Impact Performance and Encourage Innovation in Mobile Banking

A 93% ('Very High' at 48% and 'High' at 45%) of respondents indicated that Tier 1 banks' leadership style or approach significantly impacts the success of the performance of mobile banking. This means that when there is boldness displayed by the banks' leadership in their decision-making for mobile banking, it translates into exceptional performance for the banks. The technologies driving mobile banking come with investments which can only be pursued with an appropriate posture from leadership. They must have a more future-oriented focus and see mobile-first delivery as the critical enabler to succeed. Executive decisions that endanger the right business and FinTech partnerships and support for the internal teams that are dedicated to mobile banking deployments are very important as well.

According to the current study, these leaders will encourage innovation in mobile banking when they exhibit bold choices within these key areas: 'Investment in Technology', 'Customer Feedback Integration', 'Employee Training Programs', and 'Partnerships with FinTech Companies' in that order.

Thus, the study found that:

'Investment in Technology' alone significantly (at 87% with 90 respondents) cuts across almost all the options respondents considered as encouraging innovation in mobile banking. Appropriate investments in new technologies, such as AI and Machine Learning incorporated into the channel, will be of greater importance. The banks' annual budgets must show good investments going into digital and technological innovations, with mobile leading the pack.

'Customer Feedback Integration' runs through selected options by respondents, with 76 respondents at 73%, which is also important to take note of. A deliberate customer feedback support strategy would mean that adequate investments are made in a customer relationship management system with a relevant ticketing structure that enhances the engagement process and deepens communication with customers. This would mean that before products and services are introduced on the mobile banking channel, the voice of the customer is obtained, testing and piloting will involve the users, and after the launch, relevant feedback is collected from the user experiences, and the cycle continues.

'Employee Training Programs' alone run through 65 respondents (63%), and it's worth noting. According to some of the conversations with the banks' executives and management personnel, appropriate capacity building and training for staff assigned to mobile banking delivery is critical to bringing the right impact and effective success. These training efforts must include the frontline personnel at the Tier bank branches, customer care personnel, direct sales personnel, technology/Infosecurity support personnel, developers, risk/fraud/control teams, and established agile team members. Capacity building for management and executive members will provide high-level alignment to improve support across the banks' support and business units.

‘Partnerships with FinTech Companies’ cut across alone with 59 respondents at 57%, which is also important to notice. Tier 1 banks will be in a good position to take seriously the partnership and collaboration with FinTechs, given how they can leverage their agility, scalability and technology to execute and acquire the best quality skills in the industry.

Interpretation of Results: How Mobile Banking Affects the Operational Efficiency of Tier 1 Banks

The RII model is used to rank the importance of the various aspects and factors which impact the operational efficiency of mobile banking in Tier banks:

‘Transaction processing’ was identified as the dominant and ranked topmost (at RII = 0.97115) in terms of how mobile banking facilitates banks’ operational efficiency strategy.

‘Service Delivery’ came 2nd ranked with RII=0.96538 as an operational efficiency tool of mobile banking.

A combination of ‘transaction processing’ and ‘service delivery’ would suggest the importance that bank customers attach to mobile banking as an outstanding tool to significantly improve their engagement and turnaround time with the banks. These interactions go a long way to afford customer loyalty and stickiness, reducing the rate of switching to competition.

Customers of Tier 1 banks and these banks’ leadership realise that mobile banking serves as a critical means in facilitating faster transaction processing and resource optimisation for the various services/products available to customers, and it also spearheads the service delivery anchor of the banks. With the mobile-first strategy of these banks, the impact on operational effectiveness, efficiency and error reduction shall remain the gains of Tier 1 banks in Ghana. This means that banks’ products and services delivery is better provided on the mobile banking digital channel than any other.

Mobile banking as a ‘cost reduction’ and cost efficiency/optimisation resource is ranked in 3rd position with an RII of 0.93654. Investment in technology during the initial stages of mobile banking delivery can be high, although in the medium to long term, the cost will become significantly less, and the cost-saving on optimised resources (both human and technology), increases in fee income due to transaction fees applicable.

Instructively, other avenues of cost reduction will include these:

- Infrastructure savings
- Enhanced customer self-services: Accenture (2023) found that automation in banking can reduce operational costs by 25-30%. The World Bank (2020) in its ‘Global Financial Inclusion and Digital Payments’ report asserts that digital financial services (mainly mobile-led) lower transaction processing costs by 80-90% compared to traditional banking.
- Increased Return on Investment (ROI): According to Accenture (2017), banks offering mobile services can achieve ROIs as high as 300%, attributed to increased

customer engagement and the ability to cross-sell services effectively through digital channels.

- **Data-driven decision-making:** Mobile banking collects valuable customer data and insights, enabling banks to analyze behaviour, preferences, and needs. This information further enhances cost efficiency by supporting targeted marketing, personalized services, and informed strategic decisions.

According to a study by Boston Consulting Group (2023), AI-driven analytics in mobile banking can reduce fraud-related losses by 20-25%.

Deloitte reported in 2016 and 2022 that the cost of mobile transactions in future may become 50 times lower than branch transactions and likely 10 times lower than transactions via ATM terminals.

A report by Deloitte states that “digital customer acquisition costs are 30-50% lower than traditional methods” (Deloitte, 2022)

Mobile banking further enhances ‘employee productivity’, which expands into increased service delivery, customer experiences, and cost savings.

Interpretation of Results: Strategies to Improve Mobile Banking Effectiveness in Tier 1 Banks

From Table 4.2a of the previous chapter, ‘enhancing cybersecurity measures’, which had the majority of the respondents at 93% (97 respondents), is an important strategy that must be adopted to improve mobile banking efficiency in Tier 1 banks in Ghana. This emphasises the critical need for safeguarding the bank and its assets while securing the experiences (plus reducing scams, fraud, and social engineering situations) of the mobile banking customers.

Banks and other institutions have placed strategic focus on implementing enhanced cybersecurity measures to protect users from data breaches, fraud, and cyber threats.

Relevant strategic initiatives tackling mobile banking security risks for banks include these: Increased adoption of multi-factor authentication (MFA); Implementation of advanced encryption technologies; AI and machine learning for fraud detection; Biometric authentication (fingerprint, facial recognition, etc); Regular security updates and patch management; Customer awareness and cybersecurity training; Regulatory compliance (cyber guidelines, etc).

References include: A 2023 report by the Federal Reserve found that banks using MFA saw a 40% drop in account takeover fraud (Federal Reserve, 2023); Juniper Research estimates that AI will save banks USD 10 billion annually by 2027 by preventing fraud (Juniper Research, 2023); A 2024 study by Gartner found that biometric authentication reduces fraud by 80% in mobile banking; IBM’s 2023 Cost of a Data Breach Report found that encryption reduces breach costs by USD 360,000 per incident.

‘Improving user experience’ (UX) (91%) and ‘enhancing mobile banking features’ (89%) ranked second and third places respectively, indicating the fact that deliberate bank strategies with a focus on improved user experiences and differentiating features/services of the mobile banking channel are effective and impactful on performance.

Increasingly, customers are living their entire lifestyle on mobile and digital platforms, and they require that almost all the things they enjoy doing are supported by their mobile banking channels. Improved user journeys with zero glitches and flows that are fluid to serve the experiential needs and use cases of customers.

According to McKinsey (2022), Deloitte (2023), D.J. Power (2023), Gartner (2022), Accenture (2023) and Forrester (2023), improving the user experience (UX) and enhancing the features and services of mobile banking remain a crucial strategy for commercial banks globally. Thus, Tier 1 banks will need to deepen and prioritise the execution of these for their mobile banking channels to deliver quality value for customers and the bank:

- Simplify onboarding and secure authentication by ensuring frictionless sign-up processes, user electronic Know Your Customer (eKYC), biometric authentication, and other digital identity verification.
- Intuitive user interface and user experience (UI/UX) design with personalised insights for account transactions, spend trends, and notifications.

There will also be a need to integrate AI-enabled chatbots and voice-activated banking for hands-free transactions.

One of the industry respondents submitted that: “Targeted Features Services (TFS) - Features that are relevant to specific market segments are directed at them. This reduces the impression of being overwhelmed with services they do not need, user-focused and improved experience duration.”

- Implementation of real-time fraud alerts to detect out-of-the-ordinary transactions and behavioural biometrics for enhanced security
- AI & Predictive Banking with smart budgeting tools and proactive alerts to interact with customers seamlessly and on the go
- Seamless omnichannel experience, e.g. allow users to start transactions on mobile and complete them in-branch (PwC, 2023); AR/VR Support, e.g. virtual assistants guiding users to navigate banking features (Capgemini, 2023).
- Integration of open banking technologies, sandboxes and third-party APIs, which would connect FinTech apps and services for convenient and frictionless payments (Open Banking Report, 2023).

The current survey also identified other strategies that are critical success factor for mobile banking for Tier 1 banks namely, ‘Increasing customer education and awareness’ (which ranked in 84% of respondents) and ‘partnering with FinTech companies’ (81% of respondents) have the highest ‘Least Effective’ ratings (17 and 20 out of 104 respondents, respectively).

Many studies have reiterated reasons why banks need to increase customer education and awareness of their mobile banking services (Agyemang & Agyare, 2024; Addy, 2015; Gambo, 2020; McKinsey, 2023; PWC, 2023). Customer education and awareness for mobile banking is a critical strategy for improving Tier 1 banks' performance due to the fact that it drives adoption, encourages user confidence, enhances customer satisfaction and loyalty, boosts operational efficiency, and positively impacts revenues or performance (through the increase in transaction volumes, reduced cost-to-serve). Nubank, a Brazilian FinTech and neobank, attributes its growth to a customer-centric approach, including self-service education via its app, achieving Net Promoter Scores (NPS) above 85 despite scaling to over 10 million users (Zendesk, in its 'Five banking customer experience trends to consider for 2025'). According to Zendesk, awareness campaigns that emphasize convenience and security enhance the customer experience, reducing churn. The banking trends report notes that 77% of business leaders see deeper personalization (enabled by education) as key to customer retention/loyalty, a benefit augmented by mobile banking adoption.

Kumar & Ravindran (2022) and Saeed & Donkoh (2024) found that many customers, especially in emerging markets, hesitate to use mobile banking due to a lack of understanding or fear of fraud. Educating them on security features and benefits can drive higher usage.

Another key mobile banking strategy Tier 1 banks will need to stay competitive and relevant is 'partnering with FinTech companies'. This current study identified that strategic collaboration between traditional banks and FinTech companies remains critically important for improving mobile banking performance. Even FinTech may be seen as competitors and companies seeking to take away banks' market share, the reality on the ground is that without deliberate partnership between the two, banks are likely to lag in innovation, new/advanced technologies, agility, enhanced digital offerings, functional security, and competitive customer engagements. Banks mainly provide FinTechs with regulatory expertise, customer trust, the financial infrastructure and in some instances the financial muscle. This collaboration can lead to improved digital banking experiences, increased customer satisfaction, and competitive advantages. FinTechs in emerging markets significantly contribute to banks' financial inclusion drive with advanced technologies, expertise, agility and innovative execution.

Interpretation of Results: Challenges Banks Face Leveraging Mobile Banking Channels for Efficiency

The topmost-ranked challenge impacting the delivery of mobile banking by Tier 1 banks for their efficiency is 'High Cost', which relates to the cost associated with the technology and services supporting the channel's implementation and sustainability for continuity. These costs would mostly surface within the short-term on deployment of the technology, and then the costs would start coming down at a reducing rate between the medium-term

to long-term. The need to inject a variety of investments over the years will support better efficiency and improved profits (PWC, 2023).

‘Competition from FinTechs’ scored the 2nd highest ranked as one of the challenges facing mobile banking. This directly implies the level of competition the FinTechs, including the telcos and mobile money operators, pose to the performance of Tier 1 banks.

Another key mobile banking challenge Tier 1 banks face is staying competitive and relevant while growing FinTech and innovations. These FinTechs can provide better agility and technological innovation with their mobile app solutions, and that creates stiff competition for banks. This current study identified that strategic collaboration between traditional banks and FinTech companies remains critically important for improving mobile banking performance. Even FinTech may be seen as competitors and companies seeking to take away banks' market share, the reality on the ground is that without deliberate partnership between the two, banks are likely to lag in innovation, new/advanced technologies, agility, enhanced digital offerings, functional security, and competitive customer engagements (PWC, 2023). Banks mainly provide FinTechs with regulatory expertise, customer trust, the financial infrastructure and in some instances the financial muscle. This collaboration can lead to improved digital banking experiences, increased customer satisfaction, and competitive advantages. FinTechs in emerging markets significantly contribute to banks' financial inclusion drive with advanced technologies, expertise, agility and innovative execution.

‘Lack of Skilled Personnel’ and ‘Resistance to Change’ came 3rd and 4th, respectively. Thus, both internal and external lack of adequate skills/knowledge and typical resistance to the technology change remain a direct threat to mobile and digital innovation growth and scale. Relevant staff education and capacity building that will bring employees up to speed with the mobile technology. Employee resistance to change can equally be dealt with by leveraging quality capacity building and deepening hands-on training (Oheneba-Acquah & Dey, 2018; PWC, 2023).

SUMMARY OF DISCUSSION

Mobile banking is a critical contributor to the performance of Tier 1 banks and banking performance in Ghana. Thus, banks' executives and management will need to give the channel a closer focus, improving their investments in the channel, leveraging it for their customer acquisition and retention, and revenue growth strategies. FinTech competition is here to stay, and strategic partnerships by banks will enable significant scale and enhanced impact for banks. Deliberately engaging customers, improving their understanding of the channel, deepening education, and enabling more value-added features and services of mobile banking are important strategic milestones that banks must focus on. Mobile banking channel is of critical relevance in driving further research covering digital innovation, digital economy, payments, banks' performance and profitability and financial inclusion.

CONCLUSION

This conclusion summarizes the key findings, implications, and contributions of this research.

This study's results show that:

- a. From the analysis with the statistical regression tool, both the independent variables, namely Volume (at 0.89) and Value (at 0.84), are not statistically significant predictors of the dependent variable, ROA (with the p-value, $p > 0.05$). The Volume and Value do not significantly predict ROA for Tier 1 banks' performance.
Thus, only 11.2% of ROA variation is explained by Volume and Value. The remaining 88.8% is attributed to other factors not included or explored in this study.
- b. From the survey, mobile banking impacted banks' performance significantly in the areas of customer satisfaction, operational efficiency, revenue growth, profitability, market share and returns for shareholders accordingly.
- c. User interface and experience, and features/services of mobile banking, are the most influential factors of mobile banking performance from the perspective of customers.
- d. Mobile banking significantly improved the financial inclusion agenda of Tier 1 banks in Ghana
- e. Transaction processing and service delivery are critical influential factors of mobile banking, and users digitally engage with the banks because of those
- f. The topmost strategies to improve the performance of mobile banking were enhancing cybersecurity measures and improving user experiences
- g. Revenue generation and customer retention stood out as the significant contribution of mobile money to mobile banking performance in Tier 1 banks
- h. The efficiency challenges banks face with mobile banking related to the high cost of the channel and stiff competition from FinTech companies in Ghana
- i. Opportunities afforded by mobile banking included customer acquisition and retention, and revenue growth for Tier 1 banks.

Implications and Contributions

The current study's findings have several implications for bank leaders, the banking sector, investors, policy makers and regulators, and researchers or academia:

- a. Mobile banking is a critical contributor to the performance of Tier 1 banks and banking performance in Ghana. Thus, banks' executives and management will need to give the channel a closer focus, improving their investments in the channel, leveraging it for their customer acquisition and retention, and revenue growth strategies. It's the best digital and innovative channel that can best drive financial inclusion and expand the banking corridors for the many in Ghana. FinTech competition is here to stay, and strategic partnerships by banks will enable

significant scale and enhanced impact for banks. Deliberately engaging customers, improving their understanding of the channel, deepening education, and enabling more value-added features and services of mobile banking are important strategic milestones banks must focus on.

- b. Policy makers and regulators must understand that mobile banking directly drives financial inclusion and that policies to deepen this reality will expand the digital economy and improve the lives of the masses in Ghana. They should be aware of avoiding the introduction of policies which will leave the channel unattractive, such as direct user taxes, among others. Incentives must be pointed at banks and FinTechs in the space to encourage them to put in relevant investments and other resources in the mobile banking channel and its new technologies.
- c. Researchers and academia will recognise the mobile banking channel as being of critical relevance in driving further research covering digital innovation, digital economy, payments, banks' performance and profitability and financial inclusion.

This research contributes to the existing literature by providing insights into the relationship between mobile banking and banks' performance in the banking and financial industry.

CONCLUSION AND FINAL THOUGHTS

In conclusion, this study provides valuable insights into the impact of mobile banking on the performance of Tier 1 banks and deepens the required understanding into the various influencing factors and strategies for enhancing the performance of the channel for the banking industry. The findings highlight the importance of the mobile banking channel for strategic banking leadership and promoting business innovation and critical success. This research contributes to the existing literature and provides implications for bank leaders, the banking sector, investors, policy makers and regulators, and researchers or academia.

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RESEARCH ARTICLE – 14

INNOVATIVE ENTREPRENEURSHIP PRACTICES STRENGTHENING MSMEs FOR INDIA'S FIVE TRILLION ECONOMY

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ABSTRACT

Micro, Small, and Medium Enterprises (MSMEs) play a pivotal role in India's pursuit of becoming a \$5 trillion economy. This study explores how innovative entrepreneurship practices can strengthen MSMEs and drive inclusive growth. Employing a grounded theory approach, the research analyzes secondary data from Scopus-indexed book chapters, government reports, and policy documents to develop a comprehensive theoretical framework. The "Theory of Catalyzed MSME-Led Development" emerges, revealing that strategic empowerment of MSMEs through targeted interventions is crucial for macroeconomic transformation. Three synergistic strategies are identified: technological enablement, entrepreneurial upskilling, and policy-driven ecosystem development. However, challenges persist, including credit gaps, infrastructural deficits, and skill mismatches. The study highlights the importance of navigating intervening conditions such as global economic volatility, policy implementation quality, and socio-cultural factors. The findings offer policymakers insights into key leverage points for MSME development, emphasizing integrated approaches that simultaneously address technological, financial, and human capital constraints. For entrepreneurs, embracing innovation and building resilience capabilities are critical. The research concludes that prioritizing MSME catalyzation through coherent policy action, public-private partnerships, and continuous innovation will accelerate progress toward the \$5 trillion goal while ensuring inclusive, sustainable, and transformative growth

Keywords: *Micro, Small, and Medium Enterprises (MSMEs), \$5 trillion economy, Innovative entrepreneurship practices Technological enablement Entrepreneurial upskilling, Inclusive growth.*

INTRODUCTION

India's pursuit of a \$5 trillion economy, envisioned by Prime Minister Narendra Modi in 2019, represents a transformative agenda aimed at doubling the nation's GDP from approximately \$3.7 trillion in FY23 to \$5 trillion by FY25–28, driven by inclusive growth,

innovation, and sectoral diversification (Shanlax Publications, 2024). This literature review synthesizes recent Scopus-indexed book chapters and related scholarly works on innovative entrepreneurship practices bolstering Micro, Small, and Medium Enterprises (MSMEs) in this context. MSMEs, constituting over 63 million units, contribute 33% to GDP, 45% to manufacturing output, 40% to exports, and employ 120 million people, positioning them as the economic backbone (Seva, 2025). Drawing from edited volumes and chapters, it explores MSMEs' economic role, innovative strategies, challenges, and policy interventions, highlighting gaps in post-COVID resilience, digital integration, and gender-inclusive innovation for sustainable development aligned with SDGs.

India stands at a defining moment in its economic journey, aspiring to transform into a \$5 trillion economy within the next few years. This national vision reflects the country's ambitions to elevate its global economic standing, expand employment opportunities, and accelerate inclusive development. Central to this transformative agenda are Micro, Small, and Medium Enterprises (MSMEs), which collectively form the backbone of India's industrial and entrepreneurial landscape. With more than 63 million enterprises contributing nearly 30% to national GDP, MSMEs possess the inherent dynamism, adaptability, and innovation potential necessary to accelerate India's growth and global competitiveness.

Theoretical Background

This study is grounded in theories of endogenous growth, entrepreneurial innovation, and structural transformation, which assert that economic expansion is increasingly driven by internal capabilities such as technology, skills, and innovation. Schumpeterian innovation theory further emphasizes the role of entrepreneurs as agents of creative destruction, reshaping markets through new products, processes, and technologies. Within the Indian context, MSMEs serve as crucial nodes of innovation and job creation, enabling shifts from low-productivity sectors (such as agriculture) to more diversified and technology-enabled industries. Grounded Theory methodology is applied to conceptualize how innovative entrepreneurship catalyzes MSME-led economic transformation.

Trend

Digital transformation: Adoption of AI, IoT, blockchain, and e-commerce has accelerated post-COVID, enhancing productivity and market reach.

Entrepreneurial upskilling: Government and private initiatives focus on managerial, financial, and digital capability-building.

Policy momentum: Programs such as RAMP, ECLGS, PM Gati Shakti, and PLI schemes promote innovation, credit flow, and market expansion.

Sustainability and green innovation: Increasing integration of renewable energy, circular economy models, and eco-friendly technologies.

Women-led entrepreneurship: Rising participation supported by microfinance, SHGs, and targeted governmental schemes.

These trends reflect a transition from traditional, labor-intensive MSMEs to modern, innovation-driven enterprises aligned with Industry 4.0 and the emerging Industry 5.0 paradigm.

Issues

- Limited formalization and dominance of micro-enterprises.
- Inadequate access to structured markets and global value chains.
- Low levels of technological adoption in rural and semi-urban areas.

Lack of comprehensive integration between skill development, policy incentives, and innovation ecosystems

Challenges

1. Credit constraints: A longstanding financing gap due to collateral requirements, risk perception, and restricted institutional lending.
2. Infrastructure deficits: High logistics costs, inadequate supply-chain support, and poor connectivity.
3. Skill mismatches: Entrepreneurial and workforce skill gaps in digital literacy, financial management, and innovation.
4. Regulatory burdens: Complex compliance under GST, labor laws, and registration frameworks.
5. External shocks: COVID-19, geopolitical tensions, inflation, and global supply chain disruptions.
6. Regional and gender disparities: Unequal distribution of entrepreneurial opportunities and innovation access across states and demographics.

Objectives

1. Examine the role of innovative entrepreneurship in strengthening MSMEs for India's \$5 trillion economic vision.
2. Analyze technological, financial, and policy-related factors influencing MSME performance and competitiveness.
3. Evaluate government schemes and institutional support mechanisms shaping MSME innovation.
5. Develop a grounded theoretical framework explaining the catalyzation of MSME-led economic growth.
6. Identify strategic interventions required to enhance MSME resilience, productivity, and inclusiveness.

Research Questions

The study seeks to answer the following key questions:

1. How do innovative entrepreneurship practices contribute to the growth and transformation of MSMEs in India?
2. What technological and digital enablers most significantly impact MSME competitiveness?
3. What systemic challenges hinder MSME innovation and scalability in India's economic landscape?
4. How effective are existing policies and schemes in promoting entrepreneurial and technological advancement within MSMEs?
5. What theoretical model best explains the mechanisms through which MSMEs can accelerate India's transition to a \$5 trillion economy?

Scope

- Focus on Indian MSMEs across manufacturing, services, and agro-based industries.
- Examination of innovative entrepreneurial practices, including digital technologies, skill development, and sustainable models.
- Analysis of national-level policies and schemes aligned with MSME development.
- Use of grounded theory based on secondary data: Scopus-indexed publications, policy documents, government reports, and economic surveys.
- Timeframe centered on data and policy developments from 2010–2025.

Significance

- Provide a theoretical model (Theory of Catalyzed MSME-Led Development) explaining how strategic interventions can transform MSMEs into economic growth engines.
- Support policymakers with evidence-based insights on designing integrated frameworks that combine technological, financial, and human capital development.
- Offer entrepreneurs practical guidance on leveraging innovation, digital tools, and resilience strategies.
- Contribute to academic discourse by integrating grounded theory with India's developmental context, particularly in relation to Industry 4.0 and future economic transitions.
- Highlight the critical role of MSMEs in achieving inclusive, sustainable, and resilient growth, ensuring that India's journey toward a \$5 trillion economy is broad-based and equitable.

LITERATURE REVIEW

Economic Role of MSMEs in India's Growth

Book chapters emphasize MSMEs' centrality in fostering employment, regional equity, and poverty alleviation. Seva (2025) delineates MSMEs' contributions: 30% to GDP, 111 million jobs, 48% of exports, and 45% of manufacturing, underscoring their role in bridging agriculture and industry while absorbing rural surplus labor. In the \$5 trillion vision, MSMEs catalyze diversification, with states like Uttar Pradesh targeting \$1 trillion GSDP by FY28 through MSME-led manufacturing and services (Shanlax Publications, 2024). Chapters in Shanlax Publications (2024) highlight MSMEs' demographic leverage—India's median age of 28—as a driver for youth entrepreneurship, projecting 150–170 million jobs by 2030 if gender participation rises to 50%, potentially adding \$700 billion to GDP.

Post-COVID analyses reveal MSMEs' resilience in buffering economic shocks. Shukla and Singh (2022) focus on handicraft MSMEs, noting their informal structure exacerbated vulnerabilities but enabled adaptive pivots to e-commerce, sustaining 30% of pre-pandemic output. Seva (2025) aligns this with endogenous growth theory, where MSMEs act as "agents of creative destruction" via innovation, reducing reliance on dominant industries and promoting equitable resource distribution. Shanlax Publications (2024) quantifies state-level ambitions: Maharashtra (\$1 trillion by 2028 via semiconductors and IT), Tamil Nadu (\$1 trillion by 2030 through textiles), and Gujarat (\$500 billion by FY27 via renewable energy), with MSMEs contributing 42.67% to exports in FY23. These chapters affirm MSMEs' role in achieving SDGs 8 (decent work) and 9 (innovation and infrastructure), though uneven distribution—northern states lagging behind southern hubs—poses risks.

Innovative Entrepreneurship Practices

Innovation emerges as a cornerstone for MSME competitiveness in edited volumes. Seva (2025) posits MSMEs' flexibility fosters grassroots entrepreneurship, with practices like AI-driven analytics and fintech enhancing productivity by 25% and export shares by 15–20%. Chapters in Shanlax Publications (2024) detail digital innovations under Startup India and Digital India (2015), including blockchain, IoT, and e-platforms like UPI and India Enterprise Portal, boosting MSME revenue by up to 51% via e-commerce. Shukla and Singh (2022) advocate cluster-based collaborations and R&D incentives for product diversification in handicrafts, aligning with Atmanirbhar Bharat for self-reliance.

Sustainable practices are increasingly integrated. Shanlax Publications (2024) highlights green technologies in agriculture (precision farming with drones and AgriStack) and manufacturing, targeting net-zero by 2070 and 225 GW renewable capacity, with MSMEs in 109 pharma clusters and 38 electronics hubs driving eco-innovation. Seva (2025) references Schumpeterian theory, noting small firms' agility in "creative destruction" for technological advancement, particularly in niche markets like agro-processing. Women's entrepreneurship features prominently, with schemes like Mahila Shakti Yojana fostering

SHGs and microloans, elevating female ownership to 20.37% of MSMEs (Shanlax Publications, 2024). These practices not only enhance viability but also integrate MSMEs into global value chains, crucial for the \$5 trillion goal.

Challenges Impeding MSME Growth

Despite promise, chapters chronicle multifaceted barriers. Shukla and Singh (2022) identify competition from machine-made products, insufficient export incentives, and managerial inertia as causal challenges, using Grey DEMATEL to reveal interdependencies in handicraft MSMEs. Seva (2025) notes credit gaps (92% pre-COVID), skill deficits (only 23% graduates employable), and GST compliance inflating costs by 10–15%. Shanlax Publications (2024) expands on infrastructure deficits (logistics costs at 13–14% of GDP vs. global 8%), digital divides (urban-rural gaps), and gender biases (women owning <10% in northern states), exacerbated by COVID-19 and geopolitical tensions like the Russia-Ukraine conflict reducing FDI by 16% in FY23.

Environmental and adoption hurdles persist. Shanlax Publications (2024) discusses climate vulnerabilities in agriculture (employing >60%), with 37.5% non-adopters of precision tech due to awareness gaps, and EU Carbon Border Adjustment Mechanism threatening exports. Seva (2025) highlights regulatory complexities and resistance to digitalization, with high entry barriers hindering internationalization. These challenges underscore uneven resilience, with northern states lagging in innovation adoption.

Policy Interventions and Future Directions

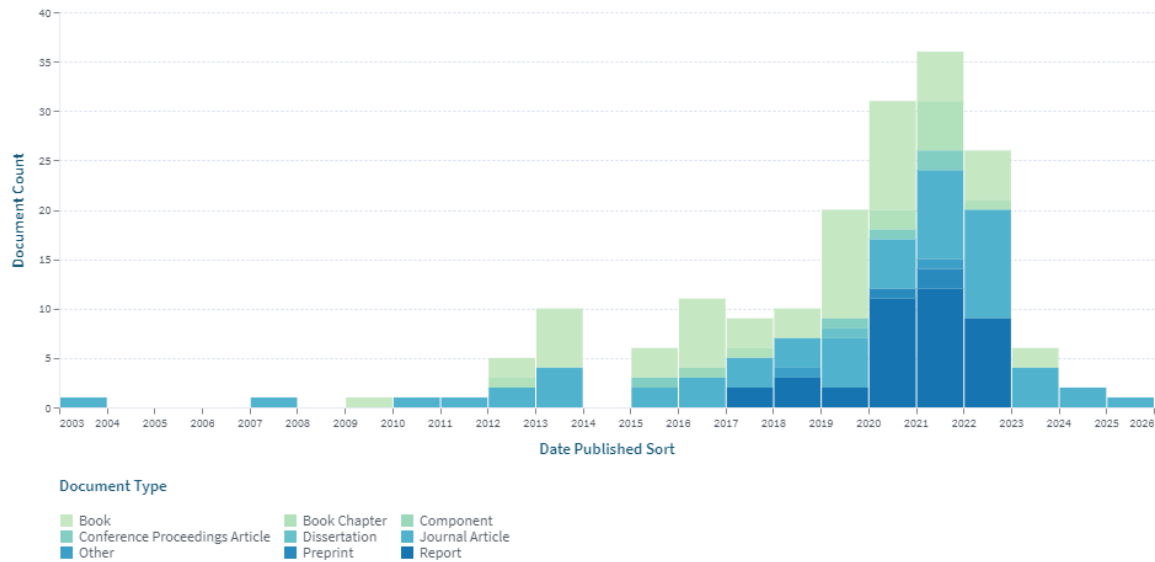
Policy frameworks in book chapters advocate targeted interventions. Shanlax Publications (2024) details schemes like PM Gati Shakti (reducing logistics costs by 5–8%, benefiting 82% MSMEs), PLI (job creation in 27 sectors), and ECLGS (Rs 5 billion credit), enhancing credit flow by 40% since 2020. Seva (2025) recommends public-private partnerships for upskilling and cluster development, aligning with NEP 2020 for vocational training. Shukla and Singh (2022) suggest resource allocation based on EFA-categorized challenges for survivable, sustainable, and viable resilience.

Future directions include bridging digital divides and fostering gender-transformative policies. Shanlax Publications (2024) projects MSME-led export growth to \$1 trillion by 2028 via ONDC and FinTech, emphasizing agility (index 45%) and PPPs. Gaps remain in empirical studies on Industry 5.0 and post-2025 scarring

DISCUSSION

Bibliometric analysis

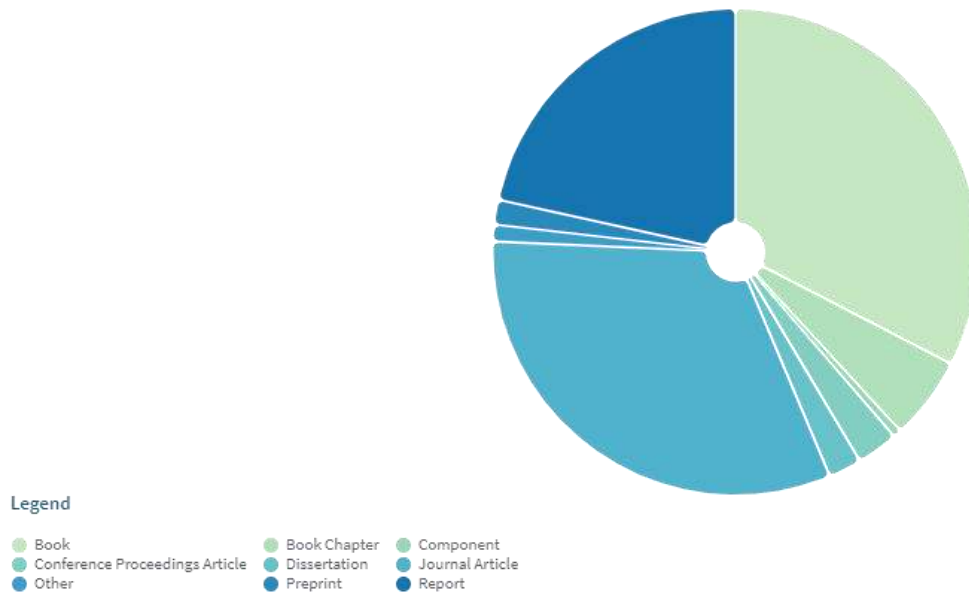
Figure 1: Documents per year



(Source: Lens.org)

The chart shows a clear rise in research output over time, with minimal publications before 2010 and a gradual increase starting in 2012. A sharp surge occurs between 2019 and 2022, where document count peaks at nearly 40, indicating heightened academic and policy interest during this period. Journal articles, book chapters, and conference papers dominate the output, reflecting diversified scholarly engagement. After 2022, publication volume declines significantly, suggesting either stabilization or a shift in research priorities. Overall, the graph highlights a decade-long expansion in academic contributions, culminating in an intense research phase around 2020–2022.

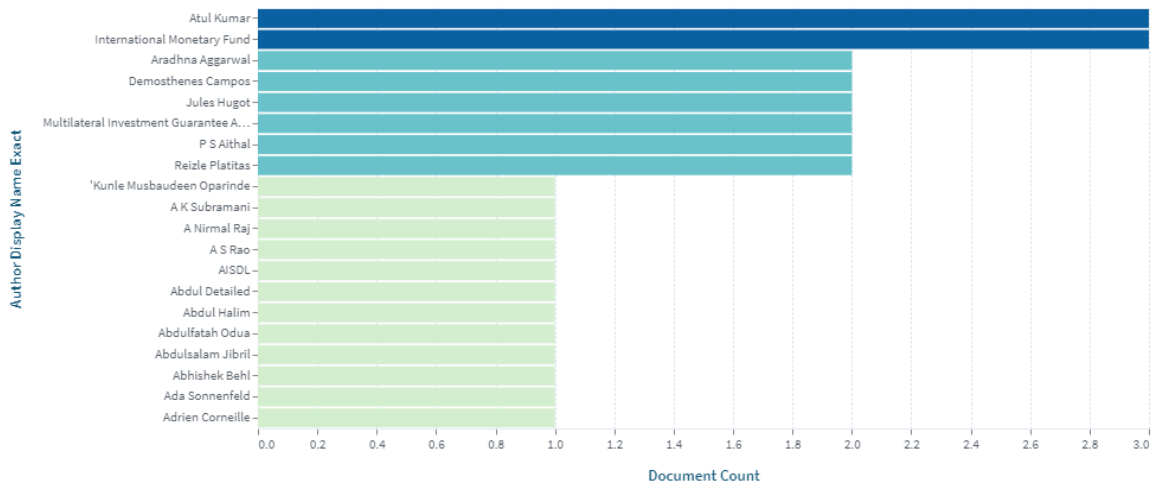
Figure 2: Documents by subject area



(Source: Lens.org)

The pie chart illustrates the distribution of document types within the dataset, revealing a strong dominance of book chapters and journal articles, which together account for the majority of the publications. Book chapters constitute the largest share, indicating extensive scholarly contributions to edited volumes. Journal articles follow closely, highlighting active participation in peer-reviewed academic research. Conference proceedings and reports form smaller segments, suggesting limited but meaningful dissemination through conferences and institutional publications. Other categories such as books, dissertations, preprints, and components represent only minor proportions. Overall, the chart reflects a research landscape heavily centered on academic publishing, particularly in chapters and journals.

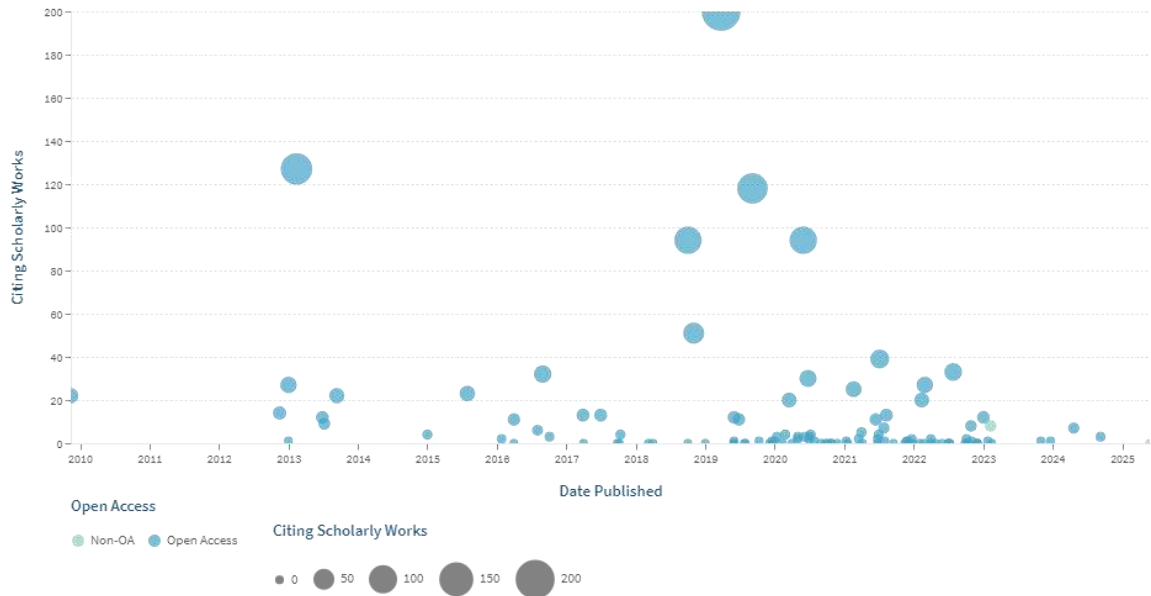
Figure 3: Documents by Author



Source: (Lens.org)

The horizontal bar chart displays the document count contributed by various authors, highlighting significant differences in publication output. The International Monetary Fund stands out prominently with the highest number of documents, indicating its strong research presence on the topic. A few authors, such as Abul Kalam, P.S. Aithal, and Yongxi Chen, show moderate contributions, suggesting active but less dominant engagement. Most remaining authors have produced only one or two documents, reflecting a long tail of individual contributions. Overall, the chart reveals a highly uneven distribution of research output, dominated by institutional contributions, with limited but diverse participation from individual scholars.

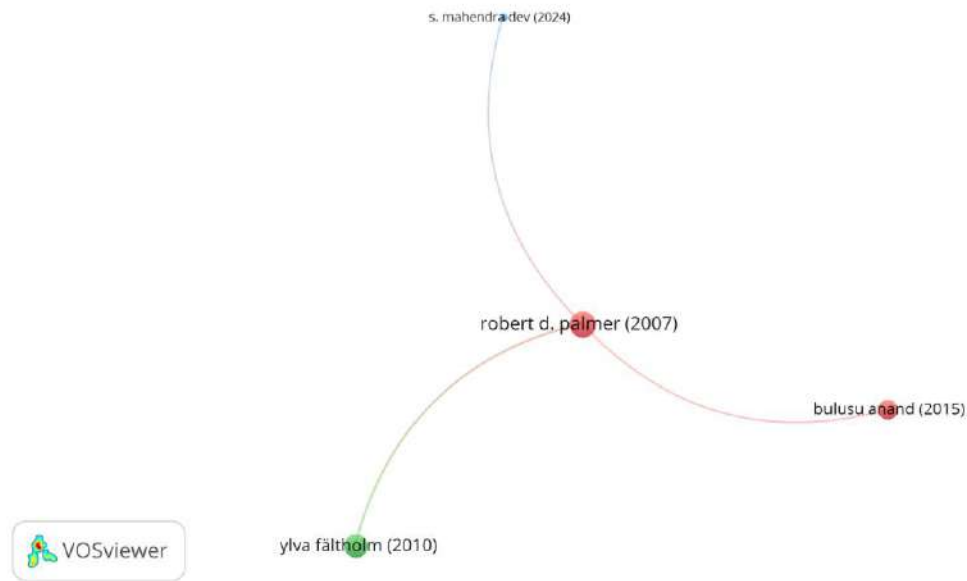
Figure 4: Date published versus area



(Source: Lens.org)

The bubble chart illustrates the relationship between publication year, citation impact, and open-access status. A few earlier publications, particularly around 2013 and 2019, show exceptionally high citation counts, indicating influential research. Most publications between 2020 and 2024 cluster near the bottom with low citations, suggesting either recent release or limited impact so far. Larger bubbles in mid-years represent works that gained significant scholarly attention. Both open-access and non-open-access publications appear across the range, though high-impact works seem more frequent among open-access items. Overall, the chart highlights a concentration of low-citation outputs with a small number of highly impactful studies driving citation trends.

Bibliographic coupling



Source: Scopus dataset

The bibliographic coupling analysis for the research topic "The Role of MSMEs in Driving India's Growth towards a Five Trillion Dollar Economy" reveals a relatively sparse yet insightful network, with Robert D. Palmer (2007) emerging as a central node connecting to multiple other authors. This indicates that Palmer's work shares common references with others in the field, making it a significant piece of literature influencing studies on MSMEs and economic development. The connections to authors such as Bulusu Anand (2015), Ylva Fältholm (2010), and S. Mahendra Dev (2024) suggest thematic overlaps in their bibliographies, potentially in areas related to economic policy, labor, and MSME ecosystems. However, the overall limited number of connections indicates that the field may still be evolving, with researchers drawing from diverse and dispersed sources. This fragmented structure also highlights the need for more integrated literature that bridges various perspectives on MSMEs and their macroeconomic contributions, particularly in the context of India's five trillion dollar economy vision.

DISCUSSION

Thematic analysis

The thematic analysis of "Innovative Entrepreneurship in Indian MSMEs for a \$5 Trillion Economy" reveals five interrelated themes that collectively illustrate how Micro, Small, and Medium Enterprises (MSMEs) serve as pivotal engines of India's economic transformation. The first theme establishes MSMEs as the indispensable engine of growth, portraying them not merely as a sector but as the backbone of India's economic progress. Contributing nearly 30% to GDP, around half of the nation's exports, and employing millions, MSMEs are central to India's growth story. Sub-themes of grassroots

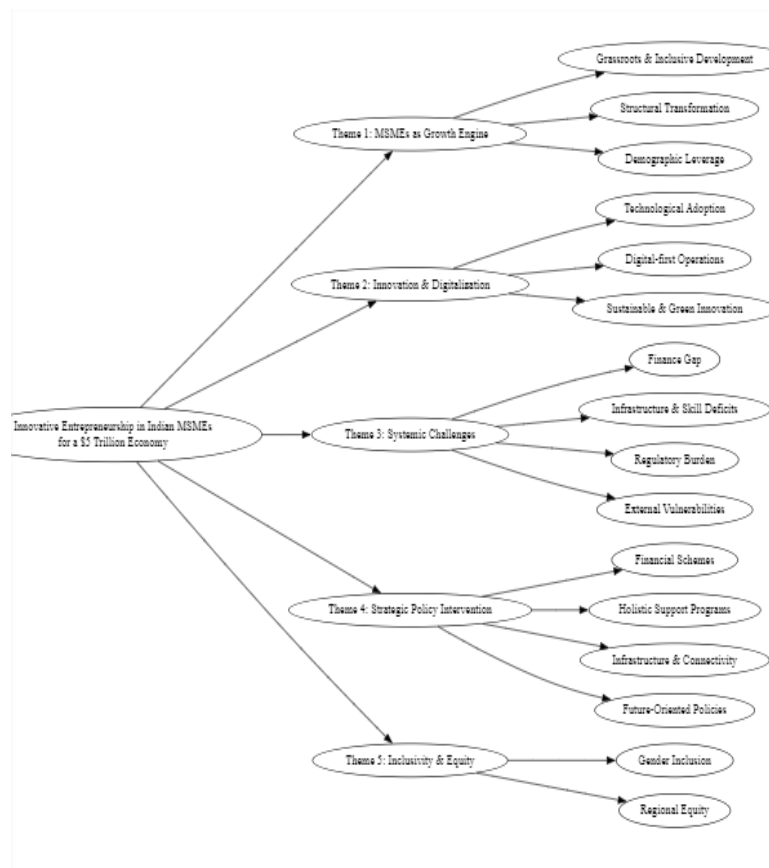
development, structural transformation, and demographic leverage highlight their role in promoting inclusive regional progress, bridging the agricultural-industrial divide, and harnessing India's youthful workforce. This positions MSMEs as the key link between local innovation and global competitiveness.

The second theme underscores innovation and digitalization as critical catalysts driving the evolution of MSMEs from survival-based entities to innovation-driven enterprises. The integration of Industry 4.0 technologies such as artificial intelligence, blockchain, and the Internet of Things has become imperative for enhancing efficiency, product quality, and market reach. The proliferation of digital tools—e-commerce platforms, fintech, and AI-powered analytics—has revolutionized MSME operations, with reported revenue boosts of up to 51% through online commerce. Moreover, sustainability-driven innovations are gaining traction, as MSMEs increasingly align with green technologies, circular economies, and precision agriculture to meet global standards and environmental commitments.

However, the third theme highlights the formidable landscape of systemic challenges that impede MSME growth. The persistent finance gap remains a major bottleneck, aggravated by collateral requirements and limited credit access. Infrastructure deficiencies, a digital divide between rural and urban enterprises, and low employability rates exacerbate operational constraints. Regulatory complexities and exposure to global disruptions such as pandemics and geopolitical tensions further threaten MSME resilience.

Addressing these obstacles requires, as the fourth theme emphasizes, strategic policy intervention as an essential enabler. Government initiatives such as the Emergency Credit Line Guarantee Scheme (ECLGS), CGTMSE, RAMP, and ASPIRE exemplify comprehensive support for credit access, digital transformation, and innovation incubation. Infrastructure programs like PM Gati Shakti further enhance connectivity and logistics efficiency. The policy framework increasingly calls for gender-inclusive strategies, skill partnerships, and Industry 5.0 integration.

Thematiectree



Major Category	Relationship to Core Category	Theoretical Postulate
Causal Conditions (National Vision, MSME Recognition)	Initiates the need for the core phenomenon.	Postulate 1: The articulation of a bold national economic target (\$5T), combined with the recognized structural significance of the MSME sector, creates an imperative for a strategic, state-and-market-led catalyzing process.
Context (Digital-First World, Structural Deficits)	Defines the environment in which the core phenomenon must operate.	Postulate 2: The process of strategic catalyzation is shaped and constrained by a dual reality: the global imperative of digitalization and the persistent local challenges of credit gaps, infrastructure, and skills.
Action/Interaction Strategies (Tech)	Constitutes the primary means through	Postulate 3: The catalyzation process is operationalized through a synergistic set of strategies involving

Enablement, Upskilling, Policy Support)	which the core phenomenon is enacted.	technological infusion, entrepreneurial capacity-building, and targeted policy-financial interventions, which are interdependent.
Intervening Conditions (Policy Efficacy, Global Volatility, Socio-cultural factors)	Influences the effectiveness of the strategies and the core phenomenon.	Postulate 4: The success of the catalyzation process is not linear but is critically mediated by external factors (global economics) and internal filters (policy implementation quality, gender/regional equity).
Consequences (Enhanced Competitiveness, Inclusive Growth, Potential Divides)	Represents the outcome of the core phenomenon.	Postulate 5: A successfully executed catalyzation process results in a virtuous cycle of a formalized, resilient MSME sector driving macro-economic growth, whereas partial execution risks exacerbating existing inequalities.

RESEARCH METHODOLOGY

Study employs a qualitative research design utilizing a grounded theory approach to investigate the role of innovative entrepreneurship in MSMEs toward achieving India's \$5 trillion economy goal. The methodology follows the systematic framework developed by Glaser and Strauss, emphasizing theory development directly from empirical data rather than testing pre-existing hypotheses.

The research adopts a secondary data approach, analyzing existing scholarly publications, government reports, and policy documents. This includes Scopus-indexed book chapters, economic surveys, and official scheme evaluations related to MSME development and India's economic growth trajectory. The qualitative nature of this approach allows for deep exploration of complex relationships between policy interventions, entrepreneurial practices, and economic outcomes.

Data collection follows theoretical sampling principles, where data selection is guided by emerging concepts rather than predetermined sampling strategies. The process begins with comprehensive data gathering, followed by focused sampling to elaborate developing categories, continuing until theoretical saturation is achieved. This ensures the emerging framework comprehensively represents the phenomenon under investigation.

The analysis employs the constant comparative method through three coding stages. Open coding involves line-by-line analysis to identify key concepts and phenomena. Axial coding reorganizes these concepts into categories and subcategories, exploring relationships between causal conditions, strategies, and consequences. Selective

coding integrates these categories around a core phenomenon, formulating the substantive theory through theoretical postulates.

The researcher serves as the primary instrument for data collection and analysis, utilizing structured coding protocols and maintaining theoretical memos to document analytical decisions. Conceptual validity is ensured through continuous data comparison, theoretical sensitivity, and methodological transparency. The resulting theory is evaluated based on its fit with empirical evidence, relevance to the substantive area, and explanatory power.

This methodological approach enables the development of a comprehensive theoretical framework that explains the processes and mechanisms through which MSMEs, empowered by innovative entrepreneurship, contribute to India's economic transformation. The grounded theory methodology provides both systematic rigor and flexibility, allowing the research to capture the dynamic, multi-faceted nature of MSME-led growth while generating actionable insights for policymakers and practitioners in economic development.

CONCLUSION

This research establishes that India's path to a \$5 trillion economy is fundamentally linked to the strategic empowerment of its MSME sector. The grounded theory analysis culminated in the "Theory of Catalyzed MSME-Led Development," revealing that macroeconomic transformation requires active, multi-level intervention rather than passive growth. The core concept of "Strategic Catalyzation" emerged as the central mechanism, demonstrating how targeted efforts can activate MSMEs as primary growth engines.

The study identified three synergistic strategies driving this catalyzation: technological enablement through digital tools and Industry 4.0 adoption, systematic entrepreneurial upskilling focusing on innovation capacity, and policy-driven ecosystem development through schemes like RAMP and production-linked incentives. However, significant challenges persist, including credit gaps, infrastructural deficits, and skill mismatches. The research further highlighted that success depends on effectively navigating intervening conditions such as global economic volatility, policy implementation quality, and socio-cultural factors including regional and gender disparities.

The implications are both theoretical and practical. The developed framework offers policymakers a structured understanding of key leverage points for MSME development, emphasizing integrated approaches that address technological, financial, and human capital constraints simultaneously. For entrepreneurs, the findings underscore the critical importance of embracing innovation and building resilience capabilities. Moving forward, prioritizing MSME catalyzation through coherent policy action, public-private partnerships, and continuous innovation will not only accelerate progress toward the \$5 trillion goal but also ensure this growth is inclusive, sustainable, and transformative, positioning India as a global economic powerhouse built on entrepreneurial strength.

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RESEARCH ARTICLE – 15

STUDENTS' PERCEPTION OF HYBRID LEARNING IN MANAGEMENT EDUCATION

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ABSTRACT

The rapid integration of digital technologies into higher education has accelerated the adoption of hybrid learning models, particularly within management education. While prior studies have largely focused on empirical assessments of effectiveness or technology acceptance, limited attention has been given to the conceptual mechanisms through which students perceive hybrid learning environments. Addressing this gap, the present study develops a comprehensive conceptual framework to explain students' perception of hybrid learning in management education. Drawing on constructivist learning theory, experiential learning theory, and technology acceptance perspectives, the paper systematically synthesizes extant literature to identify key hybrid learning dimensions—perceived usefulness, ease of learning, flexibility, and interaction and engagement—that shape students' perceptual evaluations.

The proposed framework positions students' perception as a central mediating construct linking hybrid learning design characteristics with student satisfaction and acceptance of hybrid learning. By articulating theoretically grounded research propositions, the study advances conceptual clarity and offers a structured explanation of how instructional features are cognitively and affectively processed by management students. The framework contributes to hybrid learning scholarship by integrating fragmented insights into a coherent, parsimonious model that is empirically testable using multivariate analytical techniques in future research. Beyond theoretical contribution, the study provides meaningful implications for curriculum design, faculty pedagogy, and institutional policy, emphasizing the importance of learner-centered and perception-driven hybrid learning strategies. Overall, this conceptual paper serves as a foundation for future empirical validation and offers a robust theoretical lens for understanding the sustainability and effectiveness of hybrid learning in management education.

Keywords: *Hybrid learning; Management education; Student perception; Conceptual framework; Higher education*

INTRODUCTION

Context and Importance

The digital transformation of higher education has significantly reshaped traditional teaching–learning practices, leading to the adoption of technology-enabled instructional models. Among these models, hybrid learning, which combines face-to-face classroom instruction with online learning components, has emerged as a prominent pedagogical approach (Garrison & Kanuka, 2004; Graham, 2013). Hybrid learning seeks to leverage the strengths of both physical and virtual learning environments by promoting flexibility, accessibility, and learner-centered engagement.

In recent years, the relevance of hybrid learning has increased substantially in higher education institutions due to advancements in digital technologies and evolving learner expectations (Means et al., 2014). Unlike fully online learning, hybrid learning preserves interpersonal interaction while integrating digital tools such as learning management systems, recorded lectures, online discussions, and virtual simulations. This blended instructional approach has been widely acknowledged for its potential to enhance learning effectiveness and student satisfaction (Bernard et al., 2014).

In the domain of management education, the adoption of hybrid learning is particularly significant. Management programs emphasize experiential learning, case-based pedagogy, collaborative problem-solving, and industry engagement, all of which require active student participation and contextual learning (Boud & Kolb, 2017). Hybrid learning environments provide opportunities to support these pedagogical requirements while offering flexibility and technological support. As business schools increasingly institutionalize hybrid learning models, understanding how students perceive these learning environments becomes critical for ensuring pedagogical effectiveness and long-term sustainability.

Need for Conceptual Clarity

Despite the growing adoption of hybrid learning in higher education, the literature reveals considerable conceptual ambiguity regarding its definition and scope. Terms such as *online learning*, *blended learning*, and *hybrid learning* are often used interchangeably, leading to inconsistencies in theoretical interpretation and empirical investigation (Hrastinski, 2019). This lack of conceptual clarity limits the comparability of findings across studies and hinders the development of coherent theoretical frameworks.

Furthermore, existing research on hybrid learning predominantly emphasizes empirical assessments of learning outcomes, technology acceptance, or instructional effectiveness (Alammary et al., 2014; Rasheed et al., 2020). While these studies provide valuable insights, they often overlook the need for a structured conceptual understanding of students' perception within hybrid learning environments. Students' perception is a multidimensional construct influenced by factors such as perceived usefulness, ease of learning, flexibility,

interaction, and engagement, which collectively shape learning satisfaction and acceptance (Sun et al., 2008).

In the context of management education, where learner expectations, professional relevance, and pedagogical complexity are high, the absence of a comprehensive conceptual framework becomes more pronounced. There is a need to synthesize existing theoretical perspectives and prior empirical findings to clearly articulate the dimensions influencing students' perception of hybrid learning. Addressing this gap will contribute to conceptual refinement and provide a foundation for future empirical validation.

Objectives

The primary objective of this conceptual paper is to develop a comprehensive framework that explains students' perception of hybrid learning in management education through a synthesis of existing literature and theoretical perspectives.

The specific objectives of the paper are as follows:

- To review and integrate existing scholarly literature on hybrid learning in higher education.
- To identify and conceptualize key dimensions influencing students' perception of hybrid learning in management education.
- To develop a conceptual framework linking hybrid learning dimensions with student perception, satisfaction, and acceptance.
- To propose theoretically grounded propositions that can guide future empirical research.

HYBRID LEARNING IN MANAGEMENT EDUCATION

Evolution and Relevance

The evolution of hybrid learning in higher education can be traced to the increasing integration of digital technologies into traditional classroom environments. Initially conceptualized as a strategic blend of face-to-face instruction and online learning activities, hybrid learning emerged as a response to the limitations of purely online and purely traditional instructional models (Garrison & Kanuka, 2004; Graham, 2013). Rather than serving as a transitional phase toward online education, hybrid learning has evolved into a deliberate pedagogical design that combines synchronous and asynchronous learning experiences to enhance learner engagement and instructional effectiveness.

The relevance of hybrid learning has grown substantially with advancements in learning management systems, collaborative digital platforms, and multimedia instructional tools. These developments have enabled institutions to design flexible learning environments that accommodate diverse learning styles while maintaining academic rigor (Means et al., 2014). Research suggests that hybrid learning environments often outperform traditional classroom-only approaches in terms of student satisfaction, engagement, and perceived

learning effectiveness, particularly when instructional design is intentional and learner-centered (Bernard et al., 2014).

In recent years, hybrid learning has gained renewed attention due to large-scale disruptions in traditional education systems and the increasing demand for flexible learning pathways. However, its relevance extends beyond crisis-driven adoption. Hybrid learning is now viewed as a sustainable instructional model that supports lifelong learning, digital competency development, and learner autonomy (Hrastinski, 2019). This shift has prompted higher education institutions to re-evaluate curriculum design, pedagogical strategies, and assessment practices to align with hybrid learning principles.

Within this broader context, hybrid learning has become especially relevant for professional and practice-oriented disciplines such as management education. Business schools are increasingly adopting hybrid formats to balance academic instruction with practical exposure, technological integration, and industry relevance. As management education continues to respond to rapidly changing business environments, hybrid learning provides a flexible and scalable approach to delivering contemporary management curricula.

Unique Requirements of Management Education

Management education is distinct from many other academic disciplines due to its strong emphasis on experiential learning, applied knowledge, and professional skill development. Unlike content-heavy disciplines that rely primarily on knowledge transmission, management education focuses on developing analytical thinking, decision-making ability, leadership skills, and collaborative competencies (Boud & Kolb, 2017). These learning outcomes require pedagogical approaches that actively engage students and connect theoretical concepts with real-world business contexts.

Traditional classroom teaching methods alone may be insufficient to address the dynamic and interdisciplinary nature of management education. Case-based learning, simulations, role plays, group projects, and industry interactions are integral components of management pedagogy, all of which demand flexibility in instructional delivery (Mintzberg, 2009). Hybrid learning environments support these requirements by enabling a combination of in-person discussions and technology-mediated learning activities, thereby extending learning beyond classroom boundaries.

Furthermore, management students increasingly expect learning experiences that mirror contemporary organizational practices, which are themselves digitally enabled and hybrid in nature. Exposure to virtual collaboration tools, online data sources, and digital communication platforms is essential for preparing students for modern managerial roles (Al-Haddad & Kotnour, 2015). Hybrid learning facilitates this alignment by integrating digital competencies into the learning process, thereby enhancing the professional relevance of management education.

Another unique requirement of management education is the need for continuous interaction between students, faculty, and industry stakeholders. Hybrid learning

environments allow institutions to incorporate guest lectures, webinars, and virtual industry interactions without the constraints of physical presence (Rasheed et al., 2020). This flexibility enhances access to industry expertise and supports the development of practical insights, which are critical for management students.

Given these distinctive pedagogical and professional demands, the adoption of hybrid learning in management education must be carefully conceptualized. Understanding how students perceive hybrid learning environments is particularly important, as their perceptions influence engagement, satisfaction, and acceptance of instructional innovations. A clear conceptual understanding of hybrid learning within the context of management education is therefore essential for designing effective learning experiences and guiding future empirical research.

STUDENTS' PERCEPTION: CONCEPTUAL FOUNDATIONS

Definition of Perception

Perception is a fundamental psychological construct that refers to the process through which individuals interpret and make sense of stimuli from their environment. In educational contexts, perception encompasses learners' cognitive and affective evaluations of instructional methods, learning environments, and educational experiences (Robbins & Judge, 2017). Rather than being an objective reflection of reality, perception is shaped by prior experiences, expectations, beliefs, and contextual factors, which collectively influence how learners respond to instructional innovations.

Within higher education, students' perception plays a critical role in determining learning engagement, motivation, satisfaction, and acceptance of pedagogical approaches. Research suggests that students do not merely react to instructional designs based on their structural features but based on how these features are perceived in terms of usefulness, relevance, and ease of engagement (Biggs & Tang, 2011). Consequently, perception acts as an intermediary mechanism through which instructional strategies influence learning outcomes.

In technology-enabled learning environments, perception becomes even more significant due to the presence of multiple interaction modes, digital interfaces, and varying levels of learner autonomy. Studies on e-learning and blended learning consistently demonstrate that students' positive perception of technology integration enhances their willingness to engage with learning systems and improves overall learning experiences (Sun et al., 2008). Conversely, negative perceptions related to complexity, lack of interaction, or insufficient support can hinder learning effectiveness regardless of the technological sophistication of the instructional design.

From a conceptual standpoint, students' perception in hybrid learning environments can be understood as a multidimensional construct reflecting learners' holistic evaluation of the learning experience. This evaluation includes cognitive judgments (e.g., perceived usefulness), affective responses (e.g., satisfaction), and behavioral intentions (e.g.,

acceptance or continued use). Recognizing perception as a complex and integrative construct is essential for developing theoretical frameworks that explain student responses to hybrid learning in management education.

Key Perception Dimensions from Literature

The literature on technology-enabled and hybrid learning identifies several key dimensions that collectively shape students' perception of learning environments. One of the most widely recognized dimensions is perceived usefulness, which refers to the extent to which students believe that hybrid learning enhances their learning performance and academic effectiveness. Rooted in technology acceptance research, perceived usefulness has been consistently shown to influence learners' attitudes, satisfaction, and intention to engage with digital learning systems (Davis, 1989; Venkatesh et al., 2003). In management education, perceived usefulness is particularly relevant as students evaluate learning methods based on their applicability to real-world managerial contexts.

Another important dimension is ease of learning, which reflects students' perception of how effortlessly they can navigate, understand, and engage with hybrid learning platforms and instructional materials. Ease of learning influences cognitive load and learning efficiency, thereby shaping students' overall learning experience (Al-Fraihat et al., 2020). Hybrid learning environments that are perceived as complex or poorly structured may negatively affect students' perception, even if the content quality is high.

Flexibility is frequently cited as a defining feature of hybrid learning and a critical determinant of student perception. Flexibility refers to the degree to which learners can control the time, place, pace, and mode of learning. Prior studies highlight that flexibility enhances learner autonomy and supports self-directed learning, particularly for students balancing academic, professional, and personal commitments (Graham, 2013; Means et al., 2014). In management education, flexibility is often perceived as a value-enhancing attribute that aligns with the dynamic and time-constrained nature of professional programs.

Interaction and engagement constitute another key dimension influencing students' perception of hybrid learning environments. Interaction may occur between students and instructors, among peers, and between learners and digital content. Research indicates that meaningful interaction is essential for sustaining engagement, fostering collaborative learning, and supporting higher-order cognitive processes (Moore, 1989; Bernard et al., 2014). In management education, where discussion, debate, and collaborative problem-solving are central to learning, students' perception of interaction quality significantly affects their evaluation of hybrid learning effectiveness.

Finally, student satisfaction is often conceptualized as an outcome of perception rather than a standalone construct. Satisfaction reflects learners' overall evaluative judgment of their educational experience and serves as an indicator of instructional success (Sun et al., 2008). In conceptual models, satisfaction is commonly positioned as a mediating outcome linking

perception dimensions with behavioral intentions such as acceptance, continued use, and recommendation of hybrid learning systems.

Collectively, these dimensions provide a comprehensive foundation for conceptualizing students' perception of hybrid learning in management education. Synthesizing these constructs enables the development of an integrative framework that captures the complexity of learner experiences and offers theoretical guidance for future empirical validation.

THEORETICAL UNDERPINNING

Learning Theory Explanation

Theoretical grounding is essential for conceptualizing how and why students perceive hybrid learning environments in particular ways. Learning theories provide structured explanations of how knowledge is constructed, how learners interact with instructional environments, and how learning outcomes are achieved. In the context of hybrid learning, theories that emphasize learner agency, interaction, and experiential engagement are particularly relevant. Among these, constructivist learning theory and experiential learning theory offer strong conceptual foundations for understanding students' perception of hybrid learning in management education.

Constructivist learning theory posits that learners actively construct knowledge through interaction with content, peers, and instructors rather than passively receiving information (Piaget, 1972; Vygotsky, 1978). Learning is viewed as a meaning-making process influenced by prior knowledge, social interaction, and contextual factors. From this perspective, effective learning environments are those that facilitate collaboration, reflection, and problem-solving. Constructivism is widely applied in higher education due to its emphasis on learner-centered pedagogy and active engagement (Biggs & Tang, 2011).

Closely aligned with constructivism, social constructivism highlights the role of social interaction and dialogue in knowledge construction. Vygotsky's concept of the *zone of proximal development* emphasizes the importance of guided interaction and collaborative learning for cognitive development (Vygotsky, 1978). This theoretical lens underscores the significance of interaction and engagement—key dimensions shaping students' perception of hybrid learning environments.

Another influential framework relevant to management education is experiential learning theory, which conceptualizes learning as a cyclical process involving concrete experience, reflective observation, abstract conceptualization, and active experimentation (Kolb, 1984). Experiential learning emphasizes learning through doing and reflection, making it particularly applicable to management education where real-world problem-solving and decision-making are central. This theory highlights the importance of designing learning environments that integrate experience with reflection, a principle that hybrid learning environments are well positioned to support.

Together, these learning theories conceptualize students as active participants in the learning process whose perceptions are shaped by the quality of interaction, relevance of learning experiences, and opportunities for reflection and application. As such, they provide a robust theoretical basis for examining how hybrid learning environments influence students' perception in management education.

Relevance to Hybrid Learning

The relevance of constructivist and experiential learning theories to hybrid learning lies in their alignment with the pedagogical features of hybrid instructional models. Hybrid learning environments combine face-to-face interaction with technology-mediated learning, thereby creating opportunities for active learning, collaboration, and reflective engagement (Garrison & Kanuka, 2004). These environments support constructivist principles by enabling learners to engage with content through multiple modalities and to co-construct knowledge through discussion and collaboration.

Hybrid learning also facilitates social constructivist processes by expanding the spaces for interaction beyond the physical classroom. Online discussion forums, collaborative digital tools, and synchronous virtual sessions enable sustained peer-to-peer and learner–instructor interaction, which are critical for meaningful learning (Moore, 1989; Hrastinski, 2019). Students' perception of hybrid learning is therefore influenced not only by the availability of technological tools but by the extent to which these tools support meaningful interaction and collaborative knowledge construction.

From an experiential learning perspective, hybrid learning environments offer flexible opportunities for integrating experience, reflection, and application. For instance, management students can engage in real-world projects, simulations, or case analyses offline and subsequently reflect upon and discuss their experiences through online platforms. This integration of experiential activities with reflective learning processes enhances perceived learning effectiveness and professional relevance (Boud & Kolb, 2017).

Furthermore, hybrid learning aligns with learner-centered pedagogical principles by offering flexibility in terms of time, place, and pace of learning. Such flexibility supports self-directed learning and autonomy, which are central to both constructivist and experiential learning theories (Graham, 2013). When students perceive hybrid learning environments as supportive of their learning needs and professional goals, their engagement, satisfaction, and acceptance of hybrid learning are likely to increase.

In management education, where learning outcomes extend beyond knowledge acquisition to include leadership, communication, and decision-making skills, the theoretical alignment between hybrid learning and constructivist–experiential principles is particularly significant. These theories provide a conceptual lens for understanding why students may perceive hybrid learning as effective, relevant, or challenging. Accordingly, grounding the

conceptual framework in established learning theories strengthens the theoretical rigor of the study and enhances its contribution to the hybrid learning literature.

DEVELOPMENT OF THE CONCEPTUAL FRAMEWORK

The development of a conceptual framework is a central requirement of conceptual research, as it enables the systematic integration of theoretical constructs and clarifies the relationships among them (Jabareen, 2009). In the context of hybrid learning in management education, a conceptual framework serves to organize fragmented insights from prior studies and present a coherent explanation of how students form perceptions of hybrid learning environments and how these perceptions translate into meaningful educational outcomes.

Drawing upon constructivist learning theory, experiential learning theory, and extant literature on technology-enabled learning, the proposed conceptual framework identifies key dimensions of hybrid learning that shape students' perception, which in turn influences satisfaction and acceptance of hybrid learning in management education. The framework is designed to be parsimonious yet theoretically robust, ensuring conceptual clarity and suitability for future empirical validation.

Hybrid Learning Dimensions

Hybrid learning dimensions represent the foundational instructional characteristics that students experience within a hybrid learning environment. These dimensions are conceptualized as antecedent constructs that influence students' cognitive and affective evaluations of learning experiences.

Perceived usefulness refers to the extent to which students believe that hybrid learning enhances their academic performance and professional competence. Rooted in technology acceptance literature, perceived usefulness reflects learners' judgment of the instrumental value of instructional methods (Davis, 1989; Venkatesh et al., 2003). In management education, where applicability to real-world managerial contexts is critical, students are likely to evaluate hybrid learning based on its contribution to analytical skills, decision-making ability, and industry readiness.

Ease of learning captures students' perception of the simplicity, clarity, and navigability of hybrid learning environments. This construct reflects cognitive effort and learning efficiency and is closely associated with learners' ability to engage meaningfully with instructional content (Al-Fraihat et al., 2020). When hybrid learning systems are perceived as intuitive and well-structured, students are more likely to develop positive learning experiences and sustain engagement.

Flexibility is a defining characteristic of hybrid learning and refers to learners' perceived control over time, pace, location, and learning modalities. Flexibility supports self-directed learning and autonomy, both of which are central to adult learning and management education (Graham, 2013; Knowles et al., 2015). For management students, flexibility is

particularly salient due to academic workload, professional commitments, and the need for experiential exposure.

Interaction and engagement encompass the quality and extent of communication between learners and instructors, among peers, and between learners and learning content. Interaction is a critical determinant of meaningful learning, especially in hybrid environments where physical and virtual spaces coexist (Moore, 1989; Bernard et al., 2014). In management education, interactive learning is essential for developing leadership, communication, and collaborative problem-solving skills.

Students' Perception

Students' perception is conceptualized as a higher-order, multidimensional construct reflecting learners' overall cognitive and affective evaluation of hybrid learning experiences. Perception integrates students' judgments about usefulness, ease of learning, flexibility, and interaction into a holistic assessment of the learning environment (Robbins & Judge, 2017). Rather than functioning as a single evaluative dimension, perception represents a synthesis of multiple experiential cues that shape learners' attitudes and responses to instructional design.

In hybrid learning contexts, students' perception acts as an interpretive mechanism through which instructional features are translated into learning-related outcomes. Positive perceptions enhance motivation, engagement, and persistence, whereas negative perceptions may lead to disengagement despite the presence of advanced technological infrastructure (Sun et al., 2008).

Student Satisfaction

Student satisfaction represents learners' overall evaluative judgment of their educational experience and serves as an affective outcome of perception. Satisfaction reflects the extent to which students' expectations are met or exceeded by hybrid learning environments (Oliver, 1997). In conceptual terms, satisfaction is positioned as a proximal outcome influenced by students' perception of hybrid learning rather than as a direct response to instructional features alone.

In management education, student satisfaction is particularly important as it influences learning commitment, program reputation, and institutional sustainability. Prior research consistently identifies satisfaction as a key indicator of instructional effectiveness in technology-enabled learning environments (Sun et al., 2008; Al-Fraihat et al., 2020).

Acceptance of Hybrid Learning

Acceptance of hybrid learning refers to students' willingness to adopt, continue using, and endorse hybrid learning as a preferred instructional mode. Acceptance is conceptualized as a behavioral intention outcome influenced by satisfaction and perception (Venkatesh et al., 2003). In a conceptual framework, acceptance reflects the likelihood that students will support the long-term integration of hybrid learning into management education curricula.

Acceptance is particularly relevant in post-adoption contexts where institutions seek to institutionalize hybrid learning beyond temporary or crisis-driven implementation. Understanding acceptance enables institutions to design sustainable hybrid learning strategies aligned with learner expectations.

Logical Linkages among Constructs

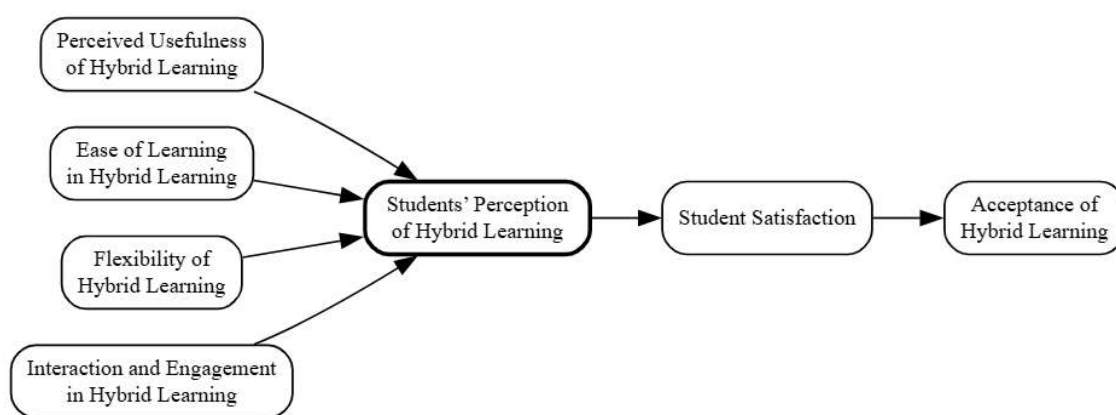
The conceptual framework proposes a sequential and theoretically grounded set of relationships among constructs. Hybrid learning dimensions are positioned as exogenous antecedents that shape students' perception by influencing how learners cognitively and affectively evaluate their learning experiences. This positioning is supported by constructivist learning theory, which emphasizes that learning outcomes are mediated by learners' interpretation of instructional environments (Piaget, 1972; Biggs & Tang, 2011).

Students' perception functions as a central mediating construct, translating instructional characteristics into affective and behavioral outcomes. This mediation logic aligns with prior conceptualizations in educational psychology and technology acceptance research, where perception-based evaluations precede satisfaction and acceptance (Davis, 1989; Sun et al., 2008).

Student satisfaction is conceptualized as an affective outcome resulting from positive perception, reflecting learners' emotional response to hybrid learning experiences. Satisfaction, in turn, influences acceptance of hybrid learning by reinforcing favorable attitudes and behavioral intentions. This sequential linkage ensures conceptual coherence and allows future researchers to empirically test both direct and indirect effects within the framework.

Diagram of the Conceptual Framework

Figure 1: The proposed conceptual framework



This framework visually represents the progression from instructional design features to perceptual evaluation and, ultimately, to affective and behavioral outcomes. The directional flow reflects theoretical assumptions derived from constructivist and experiential learning

perspectives and provides a clear roadmap for future empirical validation using structural modeling or regression-based approaches.

RESEARCH PROPOSITIONS

Conceptual papers are expected to move beyond descriptive synthesis by articulating clear, theoretically grounded propositions that logically emerge from the proposed conceptual framework (MacInnis, 2011). Research propositions serve as formal statements that explain anticipated relationships among constructs based on theory and prior empirical evidence, without subjecting them to immediate statistical testing. In the present study, the propositions are derived from constructivist learning theory, experiential learning theory, and established models of technology acceptance and learner satisfaction.

The proposed framework positions hybrid learning dimensions as antecedent constructs, students' perception as a central mediating construct, and student satisfaction and acceptance of hybrid learning as outcome constructs. The following propositions (P1–P5) articulate these relationships in a sequential and theoretically coherent manner.

Proposition P1

Perceived usefulness of hybrid learning positively influences students' perception of hybrid learning in management education.

Perceived usefulness refers to learners' belief that a particular instructional approach enhances their learning effectiveness and performance. Originating from the Technology Acceptance Model, perceived usefulness has consistently been identified as a primary determinant of individuals' cognitive evaluations of technology-enabled systems (Davis, 1989; Venkatesh et al., 2003). In educational contexts, students are more likely to form positive perceptions of learning environments when they believe that these environments contribute meaningfully to academic achievement and skill development.

From a constructivist perspective, learners actively evaluate instructional environments based on their perceived relevance and value to learning goals (Biggs & Tang, 2011). In management education, where students are strongly outcome-oriented and professionally focused, perceived usefulness is particularly salient. Hybrid learning environments that integrate real-world cases, simulations, and digital resources are likely to be perceived as useful due to their alignment with managerial competencies and industry expectations. Consequently, perceived usefulness is conceptually positioned as a key antecedent shaping students' overall perception of hybrid learning.

Proposition P2

Ease of learning in hybrid learning environments positively influences students' perception of hybrid learning.

Ease of learning reflects students' perception of the effort required to engage with learning systems and instructional content. Cognitive load theory suggests that learning effectiveness is influenced by the extent to which instructional designs minimize unnecessary cognitive effort, allowing learners to focus on meaningful learning activities (Sweller, 1988). When hybrid learning environments are perceived as intuitive, well-organized, and user-friendly, students are more likely to develop favorable perceptions of the learning experience.

Empirical research in e-learning and blended learning contexts consistently demonstrates that ease of use or ease of learning significantly influences learners' attitudes and perceptions (Sun et al., 2008; Al-Fraihat et al., 2020). From a theoretical standpoint, ease of learning functions as an enabling condition that facilitates engagement and reduces resistance to instructional innovation. In management education, where students often engage with multiple digital platforms simultaneously, the perceived simplicity and clarity of hybrid learning environments play a crucial role in shaping overall perception.

Proposition P3

Flexibility of hybrid learning positively influences students' perception of hybrid learning in management education.

Flexibility is widely recognized as a defining characteristic of hybrid learning and a key driver of learner autonomy. Adult learning theory emphasizes that adult learners value control over their learning processes, including decisions related to time, pace, and learning modalities (Knowles et al., 2015). Hybrid learning environments offer flexibility by combining structured face-to-face instruction with self-paced online learning components.

From an experiential learning perspective, flexibility enables learners to engage in reflective observation and active experimentation across different contexts (Kolb, 1984). Prior research indicates that flexibility enhances learner satisfaction and perceived effectiveness, particularly for students balancing academic and professional responsibilities (Graham, 2013; Means et al., 2014). In management education, where students often experience time constraints and diverse learning needs, flexibility is likely to positively shape perceptions of hybrid learning as supportive and learner-centered.

Proposition P4

Interaction and engagement in hybrid learning environments positively influence students' perception of hybrid learning.

Interaction and engagement are central constructs in both constructivist and social learning theories, which emphasize that knowledge is constructed through social interaction and collaborative processes (Vygotsky, 1978). Moore's (1989) interaction framework further highlights the importance of learner–instructor, learner–learner, and learner–content interaction in distance and hybrid learning environments.

Hybrid learning environments extend opportunities for interaction by integrating face-to-face discussions with online forums, collaborative tools, and synchronous virtual sessions. Research consistently demonstrates that meaningful interaction enhances learner engagement, deep learning, and positive perceptions of instructional quality (Bernard et al., 2014; Hrastinski, 2019). In management education, where discussion, debate, and teamwork are integral to pedagogical practice, students' perception of interaction quality is likely to be a strong determinant of their overall evaluation of hybrid learning environments.

Proposition P5

Students' perception of hybrid learning positively influences student satisfaction and acceptance of hybrid learning in management education.

Students' perception functions as a higher-order evaluative construct that integrates cognitive judgments and affective responses to learning environments. Expectation–confirmation theory posits that satisfaction arises when perceived performance meets or exceeds prior expectations (Oliver, 1997). In educational settings, positive perceptions of instructional quality, relevance, and usability are strongly associated with learner satisfaction and continued engagement (Sun et al., 2008).

Furthermore, models of technology acceptance suggest that perception-based evaluations precede behavioral intentions such as acceptance and continued use (Venkatesh et al., 2003). In a conceptual framework, student satisfaction serves as an affective outcome that reinforces acceptance of hybrid learning as a legitimate and preferred instructional mode. This proposition is particularly important in management education, where long-term acceptance of hybrid learning is essential for institutional sustainability and curriculum innovation.

Conceptual of Propositions

Collectively, Propositions P1–P4 position hybrid learning dimensions as antecedents influencing students' perception, while Proposition P5 establishes perception as a central mechanism linking instructional characteristics with affective and behavioral outcomes. This structure reflects a logically ordered causal chain that can be empirically examined using multivariate techniques such as regression analysis or structural equation modeling in future research.

IMPLICATIONS OF THE CONCEPTUAL MODEL

Conceptual research is expected to offer meaningful implications that extend beyond theoretical synthesis by demonstrating how proposed frameworks advance knowledge and inform practice (Whetten, 1989; MacInnis, 2011). The conceptual model developed in this study provides important theoretical and practical insights into students' perception of hybrid learning in management education. By integrating learning theories with perception-based constructs, the model contributes to the refinement of hybrid learning scholarship

and offers guidance for stakeholders involved in curriculum design, pedagogy, and institutional governance.

Theoretical Implications: Contribution to Hybrid Learning Literature

The proposed conceptual model makes a significant theoretical contribution by systematically integrating hybrid learning dimensions, students' perception, satisfaction, and acceptance into a coherent explanatory framework. Existing studies on hybrid learning often examine isolated variables such as learning effectiveness, technology adoption, or student satisfaction without explicitly articulating the underlying perceptual mechanisms that link instructional design to learner outcomes (Bernard et al., 2014; Hrastinski, 2019). By positioning students' perception as a central mediating construct, the model advances theoretical understanding of how hybrid learning environments are interpreted and evaluated by learners.

From a learning theory perspective, the model extends constructivist and experiential learning frameworks by explicitly operationalizing how instructional features are cognitively and affectively processed by students. While constructivist theory emphasizes active knowledge construction, the present model clarifies the specific hybrid learning dimensions—perceived usefulness, ease of learning, flexibility, and interaction—that shape learners' interpretive processes in management education contexts (Biggs & Tang, 2011; Kolb, 1984). This integration strengthens the explanatory power of learning theories in technology-mediated environments.

Additionally, the model contributes to the hybrid learning literature by offering a parsimonious yet comprehensive structure that is conceptually robust and empirically testable. By articulating clear propositions and logical linkages among constructs, the framework provides a foundation for future quantitative research using multivariate techniques such as regression analysis or structural equation modeling. This theoretical clarity addresses a common limitation in hybrid learning research, where conceptual ambiguity often undermines cumulative knowledge development (Jabareen, 2009).

Practical Implications: Implications for Curriculum Design

The conceptual model offers valuable guidance for curriculum designers by emphasizing the importance of aligning hybrid learning components with students' perceptual evaluations. Curriculum design in management education should move beyond content digitization and focus on structuring learning experiences that enhance perceived usefulness, flexibility, and interaction. Integrating real-world case studies, simulations, and industry-oriented projects within hybrid formats can strengthen students' perception of relevance and applicability (Boud & Kolb, 2017).

Furthermore, the model underscores the need for balanced integration of online and face-to-face components. Curriculum designers should ensure that online activities complement rather than replicate classroom instruction, thereby enhancing learning efficiency and cognitive engagement. Modular curriculum structures that allow flexible sequencing and

spacing can further support learner autonomy and self-directed learning, which are critical for management students.

Implications for Faculty Pedagogy

From a pedagogical standpoint, the conceptual model highlights the central role of faculty in shaping students' perception of hybrid learning. Faculty members are not merely content deliverers but facilitators of learning experiences that influence students' cognitive and affective evaluations. Teaching strategies that promote interaction, collaborative learning, and reflective engagement are essential for fostering positive perceptions of hybrid learning environments (Moore, 1989; Hrastinski, 2019).

Faculty pedagogy should therefore emphasize active learning techniques such as problem-based learning, group discussions, and experiential assignments, supported by digital tools that enable continuous interaction. Additionally, instructors should be mindful of cognitive load and instructional clarity when designing hybrid learning activities, as ease of learning significantly influences students' perception and satisfaction (Sweller, 1988). Professional development initiatives focused on digital pedagogy and instructional design can equip faculty with the skills needed to effectively implement hybrid learning models.

Implications for Institutional Policy

At the institutional level, the conceptual model provides insights for policy formulation and strategic planning related to hybrid learning implementation. Institutions should recognize that successful adoption of hybrid learning depends not only on technological infrastructure but also on students' perception and acceptance. Policies should therefore support learner-centered design principles, faculty capacity building, and continuous evaluation of hybrid learning effectiveness.

Institutional policies can promote the sustainability of hybrid learning by encouraging standardized guidelines for hybrid course design, assessment practices, and quality assurance mechanisms. Investments in learning management systems, digital collaboration tools, and instructional support services should be guided by an understanding of how these resources influence students' perception and satisfaction (Means et al., 2014). Moreover, institutions should foster a culture of innovation and flexibility that supports the evolving needs of management education in a digitally mediated environment.

LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

Conceptual papers, while valuable for theory development and synthesis, inherently involve certain limitations that must be transparently acknowledged to strengthen scholarly rigor and credibility (Whetten, 1989; MacInnis, 2011). Recognizing these limitations is essential not only for setting appropriate boundaries for interpretation but also for guiding future research agendas. The present study, which develops a conceptual framework to explain students' perception of hybrid learning in management education, is subject to

limitations related primarily to the absence of empirical testing and the scope for future validation.

Absence of Empirical Testing

The primary limitation of the present study lies in its conceptual nature and the absence of empirical data to test the proposed relationships among constructs. While the conceptual framework and research propositions are grounded in established learning theories and supported by prior empirical literature, they remain theoretically inferred rather than statistically validated. As a result, causal inferences cannot be drawn, and the strength, direction, and significance of the proposed relationships cannot be empirically confirmed at this stage.

From a methodological standpoint, the lack of empirical testing limits the ability to assess measurement reliability, construct validity, and model fit—key considerations in quantitative research using techniques such as regression analysis or structural equation modeling (Hair et al., 2019). Although the framework is designed to be empirically testable, its current contribution is confined to theory building rather than theory testing. This limitation is consistent with the purpose of conceptual research, which prioritizes explanation and integration over statistical generalization (Jabareen, 2009).

Furthermore, without empirical evidence, it is not possible to examine potential moderating or mediating effects that may influence students' perception of hybrid learning, such as demographic characteristics, prior digital learning experience, or institutional context. Acknowledging this limitation underscores the need for caution when applying the proposed framework directly to specific educational settings without empirical substantiation.

Scope for Validation Studies and Future Research Directions

Despite these limitations, the conceptual model offers substantial opportunities for future research and empirical validation. One important direction for future studies is the quantitative testing of the proposed framework using survey-based research designs. Researchers may operationalize the constructs using validated measurement scales and test the propositions through multivariate statistical techniques such as multiple regression analysis, confirmatory factor analysis, or structural equation modeling. Such studies would enable the assessment of direct, indirect, and mediating relationships among hybrid learning dimensions, students' perception, satisfaction, and acceptance (Hair et al., 2019).

Future research may also extend the conceptual framework by incorporating additional variables that could influence students' perception of hybrid learning. For instance, learner characteristics such as self-regulated learning ability, digital literacy, or learning motivation may act as moderating variables. Similarly, contextual factors such as institutional support, technological infrastructure, and faculty readiness could be examined as antecedents or boundary conditions affecting the proposed relationships.

Another promising avenue for future research involves comparative and longitudinal studies. Comparative research could examine differences in students' perception of hybrid learning across disciplines, institutions, or geographical contexts, thereby enhancing the generalizability of the framework. Longitudinal studies could investigate how students' perceptions evolve over time as they gain greater exposure to hybrid learning environments, offering insights into post-adoption behavior and sustained acceptance (Venkatesh et al., 2003).

Finally, qualitative and mixed-methods research designs may complement quantitative validation efforts by providing deeper insights into students' lived experiences within hybrid learning environments. In-depth interviews, focus group discussions, or case studies could help refine construct definitions and uncover context-specific nuances that may not be captured through survey instruments alone. Such methodological pluralism would further strengthen the theoretical robustness and practical relevance of the proposed conceptual model.

CONCLUSION

9.1 Summary of Conceptual Contribution

This conceptual paper set out to advance understanding of students' perception of hybrid learning in management education by developing an integrative theoretical framework grounded in established learning theories and prior scholarly work. Through a systematic synthesis of literature, the study identified key hybrid learning dimensions—perceived usefulness, ease of learning, flexibility, and interaction and engagement—as critical antecedents shaping students' perceptual evaluations of hybrid learning environments. By positioning students' perception as a central mediating construct linking instructional characteristics to satisfaction and acceptance, the paper offers a structured explanation of how hybrid learning is cognitively and affectively processed by learners.

The proposed conceptual framework contributes to the hybrid learning literature in several important ways. First, it addresses conceptual fragmentation by clarifying the relationships among instructional design features, learner perception, and outcome variables, thereby strengthening theoretical coherence. Second, it extends constructivist and experiential learning theories into hybrid learning contexts by explicating how learner-centered and experience-based pedagogical principles operate within technology-mediated environments. Third, by articulating clearly defined research propositions, the study provides a foundation for future empirical validation and cumulative theory building in management education research.

Final Remarks

Hybrid learning has evolved from an emergent instructional alternative into a strategically important pedagogical model within higher education, particularly in management education where flexibility, experiential learning, and professional relevance are paramount. As institutions continue to institutionalize hybrid learning models,

understanding students' perceptions becomes critical for ensuring instructional effectiveness, learner engagement, and long-term sustainability. This conceptual paper underscores that the success of hybrid learning is not determined solely by technological infrastructure or curriculum design, but by how learners perceive and experience the learning environment.

By offering a theoretically grounded and analytically coherent framework, the study contributes to scholarly discourse while providing practical insights for educators, curriculum designers, and institutional leaders. The conceptual model encourages a learner-centric approach to hybrid learning implementation, emphasizing the importance of perceptual and experiential dimensions in shaping educational outcomes. Ultimately, the framework serves as a roadmap for future research and practice aimed at enhancing the quality and effectiveness of hybrid learning in management education.

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