Research Article

Analysis of Fintech Adoption and Its Influence on Msme Sustainability Outcomes: A Case Study From Bangalore

Ho Soonmin[1*], Mutyala Subramanyam[2*], Debolina Gupta[3], Arcot Purna Prasad[4], Lakshmipathi K N[5]

[1]Faculty of Health and Life Sciences, INTI International University, Putra Nilai, 71800, Negeri Sembilan, Malaysia.
[2-4]School of Management, CMR University, Bangalore, Karnataka, India.
[5]Amity School of BusinessAmity University, Bangalore, India.
*Correspondence: e-mail: Subramanyam.m@cmr.edu.in (Mutyala); soonmin.ho@newinti.edu.my (Ho)

Abstract

The swift expansion of fintech (FNTC) has radically altered the way business is conducted, and money moves in all parts of the world, especially in emerging economies where people still have low access to more traditional financial services. The increased relevance of FNTC adoption among MSMEs has been enhanced by the growing significance of sustainability. This research is mainly aimed at investigating how Fintech usage affects the sustainability of Micro, Small, and Medium Enterprises (MSMEs). The research design is quantitative; it is found on the primary data where 535 respondents are MSMEs in Karnataka. FNTC utilization was measured through a structured questionnaire in six dimensions, including credit, payments, investment, personal finance management, banktech, insurtech. To test construct validity and correlations between the use of FNTC and the sustainability of businesses. The findings suggest that the use of FNTC has a large and positive effect on MSME sustainability. Digital payments, investment tools and banking technologies are the most impactful FNTC dimensions. The results indicate that the use of FNTC enhances financial access, operational efficiency, and better decision-making, hence sustainability of business performance. The paper emphasizes the value of adopting FNTC by MSMEs to stay competitive and sustainable in a dynamic business world. It recommends the need to encourage digital financial infrastructure and financial and digital literacy of MSMEs by policymakers. Company owners are advised to incorporate FNTC offerings as a way of enhancing financial efficiency and performance

Keywords: Fintech Adoption, economic growth, Sustainability Outcomes, Digital payments, small enterprise, Investment tools and Banking technologies.

INTRODUCTION

The swift expansion of fintech (FNTC) has radically altered the way business is conducted, and money moves in all parts of the world, especially in emerging economies where people still have low access to more traditional financial services. FNTC has a diverse collection of digital financial technologies including mobile payment, digital lending, blockchain, online banking, and automated financial management systems. Such technologies enhance the accessibility of finances, the efficiency of operations, transparency, and the speed of transactions, which contributes to the growth of business based on innovations (Taneja et al., 2024). FNTC in such countries as India has gained greater significance in support of Micro, Small, and Medium Enterprises (MSMEs), which play a significant role in the creation of jobs and the development of the economy but are frequently challenged by the lack of access to credit, inefficient financial management systems, and technological barriers. The increased relevance of FNTC adoption among MSMEs has been enhanced by the growing significance of sustainability. Business sustainability is now not just about financial profitability but also about social responsibility, environmental awareness, operational viability and long run development. FNTC facilitates sustainability in terms of financial inclusion, lowering transaction costs, advancing digital and paperless transactions, and business efficiency (Sreenu, 2024). Using digital financial solutions, MSMEs will be able to enhance their cash flow, seek alternative financing sources, and enhance business survival in the competitive market landscape.

Although the connection between FNTC adoption and MSME sustainability is becoming increasingly important, the existing literature lacks the investigation of this issue. Most of the past research has targeted banking institutions or large organizations whereas little empirical research has been conducted on MSMEs especially in the Indian context (Sharma et al., 2024). Furthermore, previous studies frequently consider FNTC as one-dimensional and assesses sustainability primarily through financial performance and ignores the other economic, social, and environmental aspects of sustainability (Almasria et al., 2024). There is also a lack of sufficient investigation of factors like digital literacy, organizational preparedness and technological infrastructure, which leave gaps in the theoretical and empirical knowledge on the sustainability implications of the FNTC adoption. The research is enhanced by the incorporation of the proven theoretical models like Technology Acceptance Model (TAM), Diffusion of Innovation (DOI) theory, and Resource-Based View (RBV) theory. TAM states that MSMEs tend to embrace FNTC more when they believe that it is useful and convenient to use. DOI theory emphasizes the use of relative advantage, compatibility, and organizational readiness in innovations adoption.

The RBV theory also indicates that digital capabilities and technological competencies are strategic resources that can increase the long-term competitive advantage and sustainability. The combination of these theories will offer a solid conceptual basis to explore the connection between FNTC adoption and the sustainability of MSMEs. It is on this backdrop that the current study seeks to research how FNTC adoption affects the sustainability of MSMEs by establishing the key dimensions of FNTC and determining ways in which they affect sustainable business performance (Alsmadi et al., 2024). The research aims at providing empirical evidence on how FNTC enhances long-term growth, resilience, and sustainability among MSMEs and informing policymakers and financial institutions as well as business practitioners. The paper will be structured in the following way. The initial part examines the literature available on FNTC adoption and business sustainability. The second section describes the research methodology, data collection process, measurement scales and tools of analysis applied in the study. The third part will show the results of factor analysis and structural equation modelling as well as results discussion. Lastly, the conclusion section will recap the findings, implications, limitations and future research directions.

Though the role of FNTC in the enhancement of financial performance and operational efficiency has been previously studied, there is a lack of research that addresses the impact of FNTC on the multidimensional sustainability of MSMEs, especially in emerging economies like India. The current literature primarily focuses on banking institutions and large companies but does not consider the combined impacts of digital financial services on economic, social, and environmental sustainability among MSMEs (Meitriana et al., 2023). Also, issues like digital capabilities, organizational preparedness, and technology issues have not been adequately addressed in a holistic context (Sadiq et al., 2023). Thus, a cohesive framework to analyze the effects of FNTC services on the sustainability of MSMEs is needed. In this work, research objectives include determining the key dimensions of FNTC adoption in MSMEs, investigating effectiveness of FNTC services on the sustainability of businesses in MSMEs and assessing the place of FNTC in promoting the economic, social, and environmental sustainability of MSMEs.

METHOD

Research design

The current research employs a cross-sectional, quantitative research design to investigate how the use of FNTC affects MSMEs sustainability.

Sample design

The study population includes MSMEs in Karnataka, which includes manufacturing, services, trading, and hybrid businesses. The scattered nature of MSMEs and the practical considerations of accessing respondents led to the use of convenience sampling strategy. The sample size was calculated by Cochran formula which is generally used in large population: The lowest sample size required was 384 respondents at a confidence level of 95 with a 5 margin of error. Nevertheless, to enhance the validity and stability of the results, the research garnered 535 valid answers, which surpassed the minimum (Hair et al., 2017).

Data collection instruments

Structured questionnaire was used to gather primary data, with the administration via the online source (like Google Forms) and offline approach to guarantee the inclusion of a wider range of participants. The questionnaire was set in two parts, the first one included demographic information like the type of business, its size, staff number, training, and the FNTC use and business sustainability came in the second part. The FNTC construct was quantified with 23 items, which were divided into six dimensions, such as credit services, payment systems, investment tools, personal finance management, banktech, and insurtech. These questions were based on the existing literature on FNTC and sustainability (Bhat et al., 2024). Previously, the indicators to define business sustainability were based on financial performance, operational efficiency, and long-term viability. All the responses were measured in terms of the five-point Likert scale.

Plan of statistical analysis

The data was analysed with SPSS ver 28 and AMOS ver 28 software through various steps. The data was calculated to ensure that it was suitable to factor analyze. Then, CFA was performed to verify the factor structure and measure the model fit with such indices as Chi-square/df, GFI, and RMSEA (Kline, 2015). Lastly, Structural Equation Modeling (SEM) was used to test the hypothesis.

Ethical considerations

The study was done with strict ethical considerations. The respondents were given the information about the purpose of the research which was voluntary. The data was confidential and anonymous, and the information gathered was utilized just academically.

Literature survey

Literature method

The FNTC adoption and business sustainability literature review in this research was done in a systematic and structured manner to determine the available research on adoption of FNTCs and business sustainability among MSMEs. Peer-reviewed articles on academic databases were included in the study and published in 2021-2026. The following keywords were used: FNTC adoption, MSMEs, business sustainability, financial inclusion, and green finance. The screening of studies was by relevance, credibility, and the contribution to empirical studies. The literature was divided into thematic areas including financial inclusion, innovation, sustainability performance, and risk factors to ensure that all the research available is synthesized.

Literature analysis

The increasing literature emphasizes the major impact that the adoption of FNTC has on business sustainability, especially among SMEs. Research shows that FNTCs enhance operational efficiency, lower transaction costs, and access to finance, which have long-term sustainability outcomes (Bani, 2024). Technological readiness and perceived usefulness as the main factors that drive the FNTC adoption and eventually sustainability of SMEs. Equally, use of FNTC has a positive influence on sustainability due to better financial health of companies. There is also empirical evidence to the effect that implementing FNTC is a strategic method towards attaining sustainable business practices in dynamic environments. Moreover, the use of FNTC directly leads to better financial performance and business continuity.

Financial inclusion and financial literacy have become one of the key mediating variables in the relationship between FNTC and sustainability (Pizzi et al., 2021). FNTC facilitates easier credit access, online payments, and financial services, especially to underserved MSMEs. Adoption of FNTC is largely mediated by financial accessibility, which is a key determinant of sustainable business performance. Increase of sustainability performance in the banking sector by digital financial literacy and inclusion were highlighted (Raza et al., 2024). Financial inclusion, driven by FNTC, not only leads to the sustainability of businesses, but also to the sustainability of the entire society (Hiew et al., 2025). Moreover, Mohapatra and co-workers emphasize that financial literacy is of great importance in motivating MSMEs to use FNTC tools to achieve sustainable growth.

The other significant theme is the concept of FNTC and environmental sustainability via green finance efforts. FNTCs enable sustainable investments, green lending, and sustainable financial practices. It was noted that green finance and innovation are some of the ways in which FNTC adoption can guarantee environmental sustainability (Al Doghan and Chong, 2023). Green innovation and green finance mediate the association between FNTC adoption and sustainable performance. Interest in green banking practices is the force that motivates the use of green FNTC solutions that can result in profitability and sustainability. Hidayat and Hossain support these findings by outlining the role of digital transformation and green finance, as being in the driver's seat of sustainable performance in financial institutions.

At the core of how FNTC helps in sustainable business models is innovation and digital transformation (Buhari et al., 2025). Research indicates that FNTC leads to innovation, and consequently, organizational sustainability. Organizational innovation is the mediator between FNTC and sustainability performance. In the same vein, Rahim and co-workers note that the use of FNTC has led to sustainable competitive advantage via better decision-making and green behavior by employees. It was noticed that FNTC has a great impact on enhancing the performance of SMEs in terms of Sustainable Development Goals (SDGs). Furthermore, Kasim and co-workers also stress that the linkage between entrepreneurial orientation and sustainable entrepreneurship values is reinforced using technology.

Although FNTC has some advantages, there are risks and challenges that it poses and can affect sustainability outcomes. Abdul-Rahim and co-workers investigate the impact of perceived risks and benefits on FNTC adoption with fear of COVID-19 as a mediator. In the same way, researchers develop a risk-benefit assessment and conclude that despite the increased efficiency, FNTC exposes cybersecurity and regulatory risks. Harianto and co-workers discover that the use of FNTC alleviates perceived risk and facilitates sustainability in SMEs. Moreover, Setiawan and co-workers list infrastructural and demographic considerations as key variables that determine FNTC adoption among urban and rural MSMEs.

Business models are also being transformed through FNTC that facilitates the use of the circular economy and sustainable value creation. Pizzi and co-workers articulate the role of FNTC in circular economy models through better efficiency and transparency of the resources. FNTC contributes greatly to increasing sustainability performance via circular practices. In a systematic review, Kanojia and co-workers find that FNTC and regtech, as a combination, are changing the old forms of business to more sustainable and technology-based systems. Arshi and co-workers also mention the current trends and the research directions of the future in FNTC-based sustainability.

Several studies offer industry and regional data on the use and viability of FNTC. Gatauwa and co-workers investigate FNTC services among Kenyan banks and discover that they have a positive correlation with corporate

sustainability. Xu and co-workers proceed with the discussion to resource management industries, demonstrating that FNTC is a contributor to sustainable use of resources. It was observed that environmental regulations can be used to enhance FNTC adoption among banks in Jordan (Bani et al., 2025). Basar and co-workers offer testimonies of Malaysia, where the use of FNTC supports sustainable entrepreneurship by SMEs. All these studies imply that contextual and regulatory environments mediate the FNTC sustainability relationship. Theoretical models like TAM, DOI theory and RBV theory can help in better defining the relationship between the adoption of FNTC and MSME sustainability. TAM elaborates that MSMEs tend to embrace FNTC when they feel that digital financial technologies are convenient and beneficial in enhancing operational efficiency and financial performance. DOI theory emphasizes that relative advantages, compatibility, complexity, and organizational readiness are some of the factors that determine the adoption of innovative technologies that impact the diffusion of FNTC in enterprises. Moreover, RBV theory highlights that organization-level resources such as technological abilities, digital infrastructure, and financial innovation are good organizational resources that increase the competitive advantage and long-term sustainability. Together, these models offer a solid theoretical framework on how the FNTC adoption allows the economic, social, and environmental sustainability of MSMEs.

RESULTS

Profile of the MSMEs

The frequency of respondents according to business type reveals that most of the MSMEs are in the service industry (202 respondents, 37.8%), then a hybrid business (143 respondents, 26.7%), which relates to various activities. The manufacturing units comprise 123 respondents (23.0%), trading and merchandise businesses are the least with 67 respondents (12.5%). It implies that the sample is mostly service-based and there is a rising prevalence of service-based business in urban MSME ecologies. Regarding the size of business, the largest share of the respondents is in the micro-enterprise category with 375 firms (70.1) reporting their annual turnover of less than 10 lakhs. There are also 119 firms (22.2%), which are in the ₹10-30 lakhs category and only 41 firms (7.7%), which are in 30-50 lakhs category. The given distribution shows that most MSMEs included in the research have a rather small financial scope, which can affect how they adopt and use FNTC solutions. Regarding employment, the results show that 452 MSMEs (84.5) have less than 10 employees, and 83 companies (15.5) have 10 to 30 employees. This means that most of the businesses in the sample are micro-enterprises with a small number of workforces, which may affect their efficiency at work and their ability to adopt technology. On the employee training practices, the data indicate that 358 firms (66.9) do not train their employees in any way at all, whereas only 177 firms (33.1) train their employees. The absence of systematic training programs can become a barrier to skill development in the employees, especially in the use of digital and FNTC solutions, which will have an impact on business sustainability. Lastly, there is a relatively equal distribution of the number of MSMEs with a finance manager and without one with 253 and 282 respectively. The lack of special financial skills within over half of the companies can restrict successful financial planning, risk management, and the implementation of the latest FNTC solutions.

Testing of Hypothesis

The identification process of the FNTC services consumed by MSMEs was conducted in a two-step systematic process. The first step involved the wide-ranging literature review of the available sources on the topic of fintech adoption, digital financial services, and MSME sustainability to determine the key dimensions of FNTC usage. According to the literature review, 23 measurement items that characterize various FNTC services that MSMEs have adopted were identified and included into the study instrument. These products encompassed various aspects of fintech services which include digital payments, credit services, investment management, insurtech, and banktech services. The final model was achieved, and the following statistics were obtained for use of FNTC services by MSMEs and explained as follows:

KMO Bartletts Statistics

The second step involved the analysis of the identified 23 items through a factor analysis on Principal Component Analysis (PCA) to identify the underlying factor structure and complexity of data. The appropriateness of the data to work with factor analysis was determined prior to PCA with the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartletts Test of Sphericity. The value of KMO was 0.907 which means that there was an excellent level of sampling adequacy and hence the data was very suitable in terms of factor analysis. The Test of Sphericity by Bartlett also gave a statistically significant result of chi-square = 9587.063, 253 degrees of freedom and p = 0.000, which rejects the null hypothesis that the correlation matrix is an identity matrix. This proves that there are indeed important interrelationships between the variables, and factor analysis can be applied to the current study.

Communalities

The shared components or communalities (Table 1) were between 0.503 and 0.856, which means that all the variables had a reasonable common share with the extracted components.

Table 1. Communalities for use of FNTC by MSMEs

Communalities		
	Initial	Extraction
Credit_1 Peer to peer lending	1.000	0.840
Credit_2 Crowd Funding	1.000	0.578
Credit_3 Loans for business	1.000	0.852
Credit_4 NBFC's Loans	1.000	0.781
Credit_5 Credit scoring Platforms	1.000	0.503
Payments_1 M- wallets	1.000	0.713
Payments_2 Prepaid Payment Instruments (PPI)	1.000	0.670
Payments_3 International remittance	1.000	0.720
Payments_4 Use Crypto Currencies	1.000	0.782
Payments_5 Person to person transactions	1.000	0.558
Payments_6 Person to merchant transactions	1.000	0.731
Payments_7 Government to person transactions	1.000	0.695
Invst_2 Use of Discount bankers	1.000	0.731
Invst_3 Online financial advisors	1.000	0.797
PFM_1 Tax filing and Processing	1.000	0.788
PFM_2 Spend management and Financial planning	1.000	0.849
PFM_3 Savings and Investments	1.000	0.834
Banktech_1 Big data to analyse finances	1.000	0.729
Banktech_2 Customer on boarding platforms	1.000	0.506
Insuretech_1 Business insurance	1.000	0.787
Insuretech_2 Usage Based insurance	1.000	0.759
Insuretech_3 Insurance claims management	1.000	0.682
Invst_1 Use of Robo advisors	1.000	0.645

Total variance explained

The analysis also demonstrated that the first principal component was able to explain 47.094% of the total variance, which was obtained by dividing the eigenvalue 10.832 by the total number of variables (23). On the whole, the total variance was well explained by the six extracted components (71.874%), that is, there was a strong and satisfactory factor solution. Though the explanation of variance is usually 50-60 percent in the general social science studies, the current study surpassed this standard, showing that the factor structure is robust.

Scree plot

The scree plot (figure 1) indicated that the 23 items measuring the utilisation of FNTC services by MSMEs were loaded under 6 Factors namely – Credit, payments, insure tech, Bank tech , Personal finance management and investment facilities.

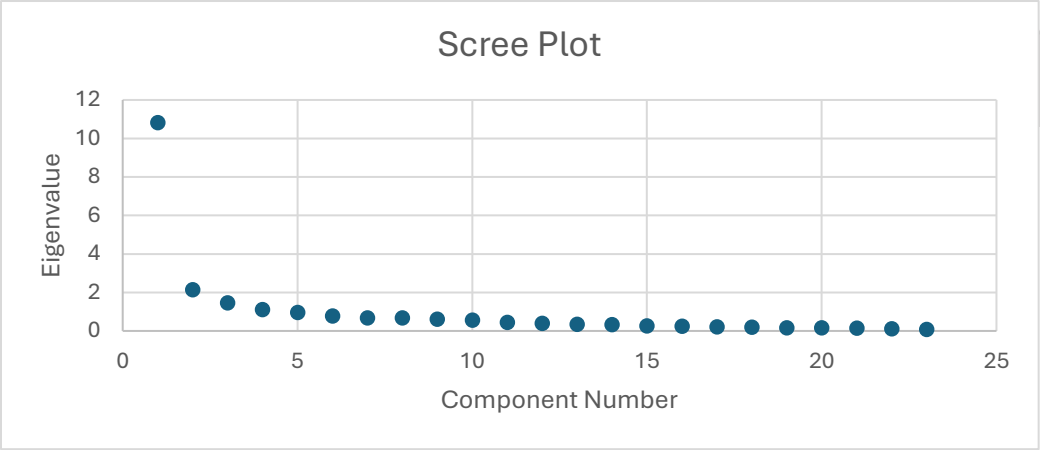


Fig 1. Scree Plot for use of FNTC by MSMEs

Figure 1: Screen plot

Rotated component matrix

The matrix of rotated components was subsequently analyzed to give the interpretation of the loading of the factor and to identify the group of items under the applicable dimensions. Factor loadings depict the level of correlation between each item and the components extracted. According to the results of the rotated components, no 23 items were dropped because all of them had reasonable loading factors and conceptual significance. Lastly, the 23 items were effectively clustered into six overarching factors that indicated the most important dimensions of FNTC services that MSMEs have embraced (Table 2).

Table 2. Results of Rotated component matrix for use of FNTC by MSMEs

No of Factors	Factor Names	No of Items Loaded
1	Credit	5
2	Payment	7
3	Investment facilities	3
4	Personal finance management	3
5	Bank Tech	3
6	Insure Tech	2
		23

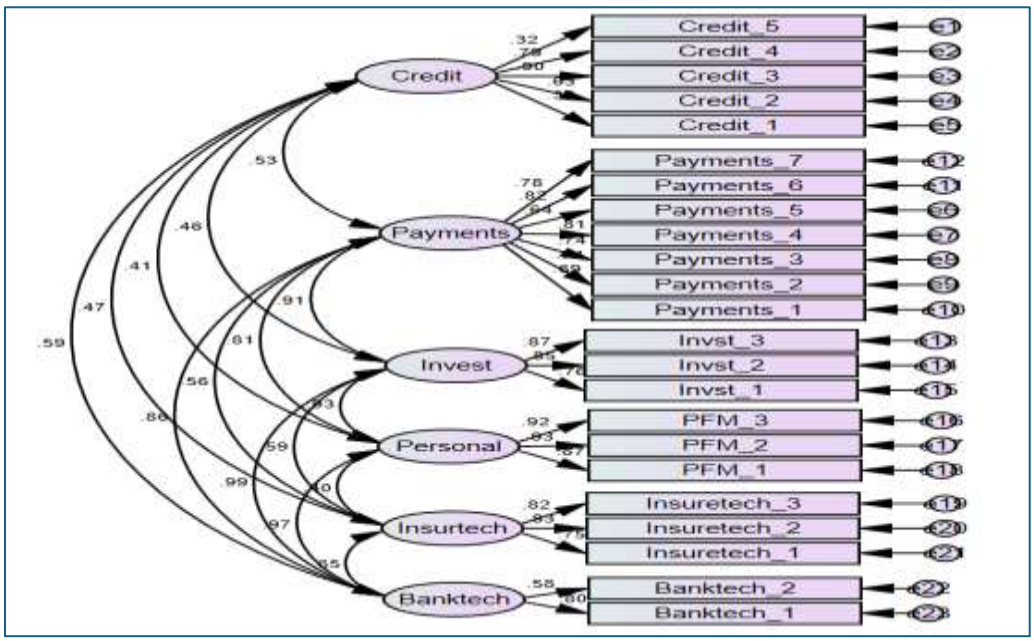


Fig 2. Inter item correlations for use of FNTC by MSMEs

The results of the inter-item correlations that were calculated using confirmatory factor analysis are displayed in figure 2. The items' inter-item correlations are below cutoff of 0.20-0.60, showing a sufficient degree of linkage. Furthermore, the characteristics that impact use of FNTC are considered appropriate for further investigation.

Table 3. Master validity for use of FNTC by MSMEs

Constructs	CR	AVE	MSV	MaxR(H)	Insurtech	Credit	Payments	Invest	Personal	Banktech
Insurtech	0.841	0.638	0.420	0.846	0.799					
Credit	0.753	0.511	0.349	0.871	0.474	0.641				
Payments	0.897	0.555	0.230	0.904	0.562	0.525	0.745			
Invest	0.865	0.683	0.284	0.875	0.588	0.465	0.911	0.826		
Personal	0.932	0.820	0.233	0.936	0.400	0.410	0.810	0.932	0.905	
Banktech	0.754	0.692	0.384	0.700	0.648	0.591	0.855	0.992	0.966	0.701

All aspects of the existing framework were thoroughly analyzed, and it was found that every construct met the established criteria for validity (Table 3). As a result, it was concluded that the utilization of FNTC model demonstrates dependability and validity.

Statistical information related to the models is shown in the table above. The predefined significance threshold of 0.05 is exceeded by the measured significance value. With 200 degrees of freedom, the study's chi-square value is 1290.098. Ideally, the CMIN/DF ratio should be close to 3.000. The value of 2.698 for the new model, however, is a bit higher but still substantial. There is strong agreement between the observed data and the proposed model, as evidenced by the observed goodness of fit score of 0.913. Furthermore, the RMSEA (root mean square error of approximation) is 0.031, which is within a reasonable range. The model shows a respectable degree of congruence and a noteworthy degree of recognition within the academic field.

When several variables are present and it is desired to understand how observed factors affect unseen variables, the SEM is utilized. In this study, the nine features linked to the use of FNTC services comprise the unseen or latent variables, whereas the 23 items that make up the visible variables are examined.

Table 4. Estimates for use of FNTC by MSMEs and its impact on sustainability

			Unstd Estimate	Std Estimate	P
Bus__sustainability	<---	FNTC_Service	0.544	0.218	***
Credit	<---	FNTC_Service	0.138	0.477	***
Payments	<---	FNTC_Service	0.508	0.897	***
Invest	<---	FNTC_Service	0.221	0.996	***
Personal	<---	FNTC_Service	0.778	0.922	***
Insurtech	<---	FNTC_Service	0.572	0.565	***
Banktech	<---	FNTC_Service	0.523	0.997	***

The unstandardized regression estimates, which show the variance in the participants' average values, are shown in the first column (Table 4). The second column's standardized regression estimates show how the individuals' standard deviation values varied from one another. This equation's result indicates how much the autonomous variable affects the dependent variable's variance. The results specify that A 1 unit increase in mean scores of uses of FNTC services has 54.4% impact on Business sustainability of the MSMEs in Karnataka. Based on the findings, there is a positive and strong association between the means scores of FNTCs services and business sustainability of the MSMEs.

Small units in Karnataka can successfully use FNTCs services to survive in long terms. This is more beneficial to the small units in Karnataka to incorporate the trends and good practices of FNTCs services to improve the business sustainability of the region. With such advancements, it can be easy for the MSMEs to meet their most goals and objectives in the areas. The benefits of them including better management of money and efficiency as

well as supporting the small units in the region to access new market and expand their businesses to other cities in India.

Using the means scores of FNTCs services the small units will improve chances of maintaining new technology advancements and proper planning on the means of operation and ways to manage their property and customers. It will be also easy for the small units to benefit from financial tools FNTCs services including mobile platform, online loan and matters that can improve means of competing in the markets. FNTC doesn't sound familiar to many businesspeople, but it is playing a critical part to them as there is still the potential of financial technologies to work closely with the firms to benefit in the long run. Businesses in Karnataka should be in a better position to understand this and use the means scores of FNTC services to help them prosper in long run in the following years or so.

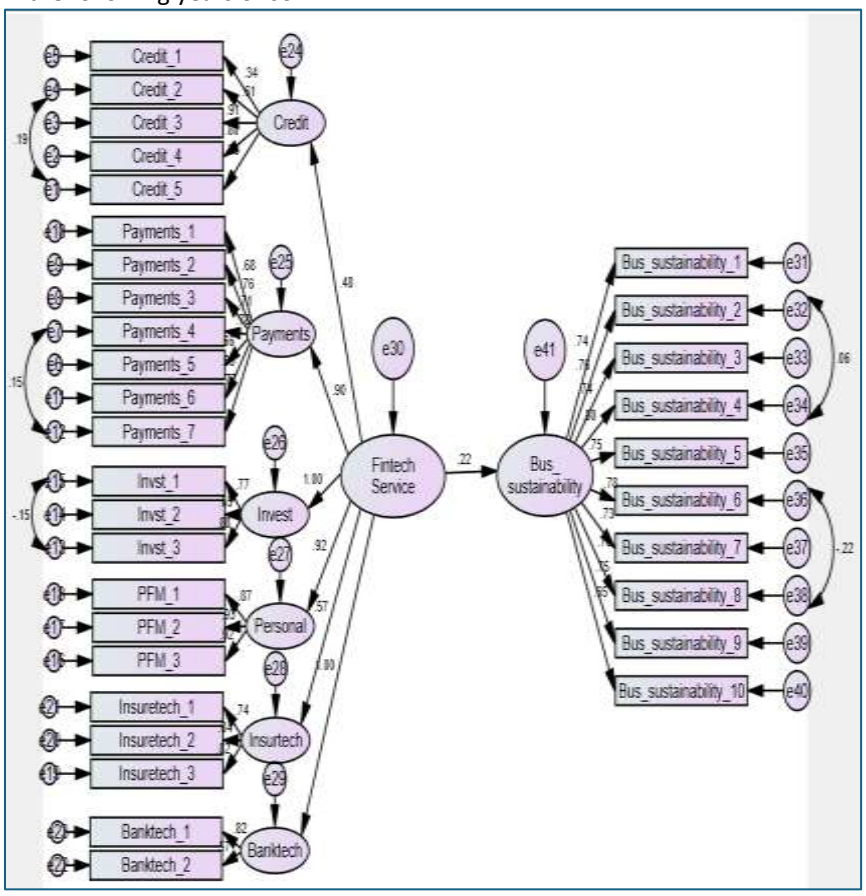


Fig 3. Structural model - use of FNTC by MSMEs and its impact on business sustainability

Standardized estimates are primarily used to rank predictors, often referred to as independent or explanatory variables, because they efficiently eliminate the measurement units connected to both the independent and dependent variables (figure 3). The absolute values of the independent variables' standardized coefficients can be used to rank them. The most important variable is the one with the highest absolute value of the standardized coefficient. FNTC services will impact enterprise economic sustainability through streamlined processes and reduced costs in relation to conventional banking services. As a result, businesses will optimize expenditure, with close to if not all excess funds invested back into the industry or spent on business growth and innovation. Business owners should expect data and analytics as part of FNTC services, informing the ultimate business decisions and keeping the business ahead of competition despite rapid economic changes. Consequently, FNTC services will mean adaptability to the market and long-term success.

Discussions

Results of the structural equation modelling show that there is a strong positive correlation between FNTC usage and business sustainability (0.544, $p < 0.001$), which implies that the higher the MSMEs adopt FNTC, the better their sustainability results will be. This finding is consistent with other studies that found FNTC to be a significant contributor to sustainable business performance, financial inclusion, and operational resilience (Campanella et al., 2026). Based on the findings, FNTC can increase efficiency, lower transaction costs and increase access to financial services, which, in turn, will reinforce the sustainability of MSMEs in the long term. FNTC payments, investment, and bank tech were the most standardized loaded dimensions, indicating that they contribute

strongly to sustainability. Digital payment systems enhance the speed and transparency of transactions, and cash flows, and investment and financial management tools assist in allocating resources better and making decisions (Siddik et al., 2023). In the same manner, credit and insurtech services can promote financial security and risk management in favor of the sustainable business operations (Alsadoun and Alrobai, 2024).

The research also states that FNTC leads to economic, social, and environmental sustainability. FNTC enhances productivity, profitability and business continuity economically. At a social level, increased financial inclusion and a more accessible digital financial service provide a chance to become an entrepreneur and generate employment. In terms of the environment, digital financial systems eliminate reliance on paper-based operations and physical records, thus contributing to the environmentally friendly nature of business operations and green finance (Sharma et al., 2025). In general, the results affirm that FNTC is a strategic facilitator of sustainable business development among MSMEs. The success of FNTC adoption, however, can be subject to the quality of digital literacy, the technological infrastructure, and regulatory support. In line with past research, insufficient infrastructure and cybersecurity issues can curtail the sustainability gains of fintech implementation. Thus, to reach the full potential of FNTC among MSMEs, it is important to strengthen digital ecosystems and enhance financial literacy.

Policy implications

The research study has significant managerial and policy implications on MSMEs, financial institutions, and policymakers. FNTC solutions that MSME managers should embrace to enhance operational efficiency, financial planning, and long-term sustainability include digital payments, online banking, investment management tools, and insurtech services (Mohapatra et al., 2025). Banks are to develop low cost, convenient, and safe digital financial solutions that meet the unique needs of MSMEs, especially those in rural and semi-urban locations. Policy makers need to enhance digital infrastructure, encourage financial and digital literacy initiatives and offer enabling regulatory frameworks that facilitate adoption of fintech by small businesses. Moreover, the government effort aimed at cybersecurity awareness, digital inclusion, and sustainable finance can empower MSMEs to maximize the economic, social, and environmental gains of FNTC adoption.

CONCLUSIONS

The current paper has analyzed the role of FNTC use in business sustainability of MSMEs with a particular emphasis on defining essential FNTC dimensions and their role in ensuring sustainable results. The results are clear that FNTC adoption is important and beneficial to the sustainability of small business units. The factor analysis findings revealed that FNTC is a multidimensional construct with credit, payments, investment, personal finance management, banktech, and insurtech services. Digital payments, investment tools, and banking technologies were the major contributors among them, which can be seen as a sign that they are essential in enhancing operational efficiency and financial decision making. The structural model also showed that there is a positive strong relationship between the use of FNTC and business sustainability, implying that the greater the use of FNTC services, the greater the financial performance, resource management, and resilience of MSMEs. Another point that the study highlights is that FNTC is not only an economic sustainability contributor but has an indirect positive impact on social and environmental factors through facilitation of financial inclusion, lowering the transaction costs, and facilitating digital transactions. These insights underscore the strategic role of FNTC in enhancing long-term development and competitiveness among MSMEs, especially in the emerging economies such as India.

Funding:
This research was funded by INTI International University for supporting article processing fees.

Institutional Review Board Statement:
Not applicable for studies not involving humans or animals.

Informed Consent Statement:
Not applicable

Data Availability Statement:
Data is available upon request

Acknowledgments:
This research work was financially supported by INTI International University, Malaysia (Ho SM).

Conflicts of Interest:
The authors declare no conflicts of interest.

REFERENCES

1. Abdul-Rahim, R., Bohari, S.A., Aman, A., & Awang, Z. (2022). Benefit–risk perceptions of FinTech adoption for sustainability from bank consumers' perspective: The moderating role of fear of COVID-19. Sustainability, 14, https://doi.org/10.3390/su14148357.
2. Al Doghan, M.A., & Chong, K. (2023). Fintech adoption and environmental sustainability: Mediating role of green finance, investment and innovation. International Journal of Operations and Quantitative Management, 29, 296–315.
3. Almasria, N.A., Alhatabat, Z., Ershaid, D., Ibrahim, A., & Ahmed, S. (2024) The mediating impact of organizational innovation on the relationship between fintech innovations and sustainability performance. Sustainability, 16, https://doi.org/10.3390/su162210044.
4. Alsadoun, M., & Alrobai, F. (2024). Influence of fintech adoption on sustainable performance via mediation role of green finance and green innovation. American Journal of Business Science Philosophy, 1, https://doi.org/10.70122/ajbsp.v1i1.13.
5. Alsmadi, A.A., Abu-AlSondos, I.A., Al-Daoud, K.I., & Aldulaimi, S. (2024). Sustainable decision-making in fintech: Impact on sustainable development. 2024 International Conference on Decision Aid Sciences and Applications (DASA), Manama, Bahrain, 2024, doi: 10.1109/DASA63652.2024.10836533.
6. Arshi, A.S., Tamanna, A.Y., Sultana, S., & Ikram, S. (2024). Fintech for sustainability in business and economics research: Trends and future agendas. Business Perspective Review, 6, 34–53.
7. Bani, A. (2024). Adoption of fintech products through environmental regulations in Jordanian commercial banks. Journal of Financial Reporting and Accounting, 23, 536–549.
8. Basar, A., Ibrahim, A., Tamsir, F., Zain, M., & Poniran, H. (2024). Adoption of i-FinTech in promoting sustainable entrepreneurship: Evidence from SMEs in Selangor, Malaysia. Quantum Journal of Social Sciences and Humanities, 5, 138–154.
9. Bhat, M.A., Khan, S.T., Alkhwaldi, A.F., & Abdulmuhsin, A. (2024). Investigating the critical drivers of fintech adoption to promote business sustainability of SMEs. Global Knowledge, Memory and Communication, https://doi.org/10.1108/GKMC-02-2024-0096.
10. Buhari, D., Sami, B., Kumar, T., & Joel, A. (2025). Asymmetry in returns and volatility between green financial assets, sustainable investments, clean energy, and international stock markets. Research in International Business and Finance, 73, 10.1016/j.ribaf.2024.102626.
11. Campanella, F., Ferri, L., Serino, L., & Zampella, A. (2026). Driving sustainability: How FinTech transforms SDG performance in SMEs. Journal of Global Responsibility, 17, 322–342.
12. Gatauwa, J.M., Aluoch, M.O., & Adhing'a, D. (2024). Fintech services and corporate sustainability in commercial banks in Kenya. In: The Adoption of Fintech, Productivity Press, 114-126.
13. Hair, J.F., Black, W.C., Babin, B.J., & Anderson, R. (2017). Multivariate data analysis. 7th edn. Pearson Education.
14. Harianto, A., Febrina, D., Amelia, R., & Fathoni, M. (2025). Exploring the mediating role of fintech adoption in reducing perceived risks and promoting SME sustainability. International Journal of Economics and Management Research, 4, 241–253.
15. Hidayat, I., & Hossain, M. (2025). The impacts of fintech adoption, green finance and competitiveness on banks' sustainable performance: Digital transformation as moderator. Asia-Pacific Journal of Business Administration, 17, 987–1020.
16. Hiew, L.C., Lam, M.T., & Ho, S. (2025). Unveiling the nexus: unravelling the dynamics of financial inclusion, FinTech adoption and societal sustainability in Malaysia. Journal of Financial Reporting and Accounting, 23, 575–593.
17. Kanojia, S., Kaur, S., & Bhavya, B. (2024). Business sustainability in the era of fintech and regtech: A systematic literature review. Discover Sustainability, 5, https://doi.org/10.1007/s43621-024-00767-5.
18. Kasim, R., Zulazli, A., Azman, C., & Merican, B. (2024). The mediating effect of technology adoption in the relationship between entrepreneurial orientation and sustainable entrepreneurship values among fintech organizations in Malaysia. International Journal of Religion, 5, 476–483.
19. Kline, R. (2015). Principles and practice of structural equation modeling. 4th edn. New York: Guilford Press.
20. Meitriana, A., Suwena, R., & Santi, A. (2023). FinTech: Its effect on business sustainability. Jurnal Pendidikan Ekonomi Undiksha, 15, 226–231.

21. Mohapatra, N., Das, M., Shekhar, S., Singh, R., & Khan, S. (2025). Assessing the role of financial literacy in FinTech adoption by MSEs: Ensuring sustainability through a fuzzy AHP approach. Sustainability, 17, https://doi.org/10.3390/su17104340.
22. Pizzi, S., Corbo, L., & Caputo, A. (2021). Fintech and SMEs sustainable business models: Reflections for a circular economy. Journal of Cleaner Production, 281, 10.1016/j.jclepro.2020.125217.
23. Rahim, A., Rosid, O., & Islam, F. (2025). Conceptualizing the drivers of sustainable competitive advantage: a qualitative exploration on fintech adoption, sustainability performance and employee green behavior. Qualitative Research in Financial Markets, 10.1108/qrfm-09-2024-0261.
24. Raza, M., Bilal, M.A., & Khan, A. (2024). FinTech adoption and sustainability performance: Role of digital financial literacy and inclusion in Pakistan's banking sector. Journal of Innovative Research in Management Sciences, 5, 74–98.
25. Sadiq, N., Baneen, U., & Abbas, S. (2023). Fintech adoption and its impact on sustainability: Risk-benefit analysis of an emerging economy. Audit and Accounting Review, 3, 95–126.
26. Setiawan, B., Rani, S., Emilda, E., Arifin, F., & Utami, D. (2026). Understanding FinTech adoption drivers for digital financial sustainability in urban and rural MSMEs. Risks, 14, https://doi.org/10.3390/risks14040077.
27. Sharma, R., Vasishta, P., & Singla, A. (2025). Impact of green banking awareness on green FinTech adoption: A way towards profitable and sustainable practices. Managerial Finance, 51, 377–394.
28. Sharma, V., Gupta, M., & Taneja, S. (2024). Does FinTech adoption impact sustainability of small businesses: Mediating role of financial well-being. Global Knowledge, Memory and Communication, https://doi.org/10.1108/GKMC-04-2024-0225.
29. Siddik, A.B., Yong, L., & Rahman, M. (2023). The Role of fintech in circular economy practices to improve sustainability performance: a two-staged SEM-ANN approach. Environmental Science and Pollution Research, 30, 107465–107486.
30. Sreenu, N. (2024). The Influence of fintech and financial knowledge on sustainable business success: exploring the mediating effect of financial accessibility in Indian. Benchmarking An International Journal, 32, https://doi.org/10.1108/BIJ-12-2023-0875.
31. Taneja, S., Siraj, A., Ali, L., Kumar, A., Luthra, S., & Zhu, Y. (2024). Is fintech implementation a strategic step for sustainability? IEEE Transactions on Engineering Management, 71, 7553–7565.
32. Xu, Y., Nassani, A., Abro, Q., Naseem, I., & Zaman, K. (2024). FinTech revolution in mineral management: Exploring the nexus between technology adoption and sustainable Resource utilization in an industry 4.0 context. Heliyon, 10, https://doi.org/10.1016/j.heliyon.2024.e24641.