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A Contextualized Innovation Framework for Fintech Adoption in Emerging Market SMEs

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Abstract

Financial technology's quick development promises to give small and medium-sized businesses (SMEs) more growth potential, efficiency, and inclusivity. However, adoption in emerging nations is still uneven and frequently superficial, limited by contextual constraints rather than technological availability. This study presents and validates a ***Contextualized Innovation Framework (CIF),*** *which reorients FinTech adoption around three interlocking dimensions: institutional trust, infrastructural readiness, and cognitive perception. This represents a significant departure from the cognitive limitations of the* ***Technology Acceptance Model (TAM)****. The study, which is based on empirical research with SMEs in Tamil Nadu, a region that is indicative of India's digital transformation, shows that adoption happens as a phased process of digital maturity that is influenced by systemic barriers and facilitators rather than as a one-or-the-other. Results show that while digital literacy acts as a direct enabler rather than a background condition, institutional legitimacy and cybersecurity assurance frequently trump perceived utility in promoting — or preventing — adoption. Policymakers and FinTech companies can create tiered, context-sensitive interventions that transition SMEs from transactional digitization to strategic financial empowerment by using the CIF's innovative, practical lens. This paradigm offers a scalable model for inclusive digital transformation throughout the Global South by prioritizing stages over individual decisions and structure over sentiment.*

Keywords: FinTech Adoption, SMEs, Digital Transformation, Emerging Markets, Contextualized Innovation Framework (CIF), Institutional Trust, Cybersecurity, Digital Maturity, India

Introduction

Small and Medium Businesses (SMEs) are the backbone of rising economies, not only participants. SMEs are the vital link between grassroots entrepreneurship and national economic resilience in India alone, where they employ over 111 million people and account for 30% of the country's GDP (MSME Ministry, 2023). However, SMEs continue to face a conundrum in spite of their macroeconomic importance: whereas FinTech (digital financial technologies) provide previously unheard-of levels of efficiency, market reach, and capital access, adoption is still fragmented, shallow, and incredibly uneven. Only 38% of Indian SMEs regularly use digital financial services, according to a 2023 World Bank survey. This data highlights the growing "digital-financial divide" rather than a tale of equitable development.

The **Technology Acceptance Model (TAM)**, which explains user behaviour through perceived usefulness (PU) and perceived ease of use (PEOU), has dominated academic debate on technology adoption for more than thirty years (Davis, 1989). Even if TAM is fundamental, its individual-centric, cognitive focus is becoming less and less effective, particularly in settings like India that are institutionally complicated and resource-constrained. The explanatory power of TAM has reached a plateau, as evidenced by the more than five million papers that are cited in Google Scholar. More importantly, it ignores the systemic realities that influence the behavior of SMEs in emerging markets, such as the critical role played by government-backed infrastructure (like Aadhaar and UPI), the crippling weight of cybersecurity concerns, the gap in digital literacy, and the glaring infrastructure gap between urban and rural areas.

This essay makes the case for a paradigm change. The Contextualized Innovation Framework (CIF), a unique, multi-layered model that combines the cognitive, institutional, and infrastructure aspects of FinTech adoption, is what we propose and empirically validate as an extension of TAM. CIF, which is based on institutional theory and the sociology of technology, contextualizes TAM rather than discarding it. It poses the question, "What institutional conditions translate perceived usefulness into actual adoption?" rather than just, "Do SMEs find FinTech useful?" What infrastructure requirements need to be met before usability even matters?

The argument for a paradigm shift is presented in this essay. As an extension of TAM, we develop and empirically test a novel multi-layered model called the Contextualized Innovation Framework (CIF), which integrates the cognitive, institutional, and infrastructure aspects of FinTech adoption. TAM is contextualized rather than discarded by CIF, which is grounded in institutional theory and the sociology of technology. Instead than asking, "Do SMEs find FinTech useful?" it asks, "What institutional conditions translate perceived usefulness into actual adoption?" Before usability even matters, what infrastructural needs must be fulfilled?

This study's main research question is:

How do cognitive beliefs, infrastructure preparedness, and institutional trust interact to influence SMEs' phased adoption of FinTech in emerging markets?

In order to answer it, we use structural equation modelling (SEM) and logistic regression to examine survey data from 300 SMEs in Tamil Nadu's manufacturing, trading, and services sectors. This allows us to determine the relative importance of institutional and infrastructural pathways over cognitive ones, in addition to testing TAM hypotheses. According to our research, "digital maturity" is a multi-tiered process that ranges from transactional adoption (e.g., 82% of people make UPI payments) to strategic adoption (e.g., just 15% use invoice finance). In a study that fundamentally contradicts TAM dogma, we show that cybersecurity assurance and institutional backing (such as government activities) are better indicators of adoption than perceived utility.

Three major contributions are made by this study

1. **Theoretical**: It presents the Contextualized Innovation Framework (CIF), a more comprehensive and systems-aware model for comprehending the uptake of technology in developing nations.

2. Empirical: It offers solid, data-supported proof that institutional and infrastructure elements influence FinTech adoption more than cognitive perceptions.

3. Pragmatic: It provides FinTech companies and policymakers with practical, step-by-step guidelines for creating interventions that advance SMEs from basic digitization to sophisticated financial empowerment.

Background of FinTech in India

Over the past ten years, FinTech in India has grown rapidly because to government

programs like Digital India, UPI (Unified Payments Interface), and e-KYC based on Aadhaar. Over 11 billion UPI transactions were recorded by the National Payments Corporation of India (NPCI) in May 2024, demonstrating the broad acceptance of digital payments.

FinTech have been particularly beneficial to the SME sector

- **Digital Lending Platforms:** Provide immediate financing based on alternative information (such as bank statements and GST reports).
- **Payment gateways:** Facilitate e-commerce integration and smooth online transactions.

  Accounting and Invoicing Software: Automate tax compliance and bookkeeping (e.g., Zoho Books, Tally on Cloud).
- **Supply Chain Financing:** Early invoice payment is made possible by platforms such as Vayana and Invoicemart.
- **Risk management and insurance:** SME-specific digital insurance solutions. Despite these advancements, a 2023 World Bank research shows a substantial adoption gap, with just 38% of Indian SMEs consistently using digital financial services.

Importance of Understanding FinTech Adoption in SMEs

- **Promotes Financial Inclusion:** For SMEs that are frequently shut out of traditional banking because of their size, location, or lack of credit history, fintech platforms provide easily accessible financial services. These companies may conduct transactions, save money, and invest more readily by utilizing digital wallets, internet banking, and mobile apps. By enabling SMEs to engage more completely in the formal economy, this inclusion promotes greater economic justice.
- **Boosts Efficiency in Operations:** By automating repetitive processes like bookkeeping, payroll, and invoicing, fintech technologies save time and minimize human error. With cloud-based technologies and real-time data analytics, SMEs may optimize their financial processes. Because of this efficiency, business owners are able to concentrate less on administrative duties and more on strategic growth.
- **Facilitates Access to Credit:** Due to inadequate collateral or financial paperwork, traditional lenders frequently turn away SMEs. FinTech businesses evaluate creditworthiness using alternative data, including digital conduct, social media activity,

and transaction history. This strategy gives underbanked or previously unbanked enterprises access to new funding options.

- **Informs the Design of guidelines:** Policymakers may create policies that promote innovation and safeguard consumers by having a better understanding of how SMEs utilize FinTech. Adoption hurdles like digital literacy or infrastructural deficiencies are exposed by data-driven insights. With this information, governments may create focused initiatives to promote a digital financial environment that is more inclusive.
- **Fuels Economic Development:** By facilitating quicker payments, improved financial planning, and simpler access to international markets, fintech adoption increases SME productivity. SMEs with more digital capabilities are more likely to innovate, grow, and compete globally. Their expansion greatly boosts GDP growth, job creation, and general economic resilience.

Studying SMEs as a Special Segment Is Relevant

SMEs are a diverse group with unique traits that affect the use of technology:

- **Resource Constraints:** Investment in digital technologies is limited by a lack of funding and personnel. Because of this, SMEs are less willing than bigger companies to use innovative financial innovations.
- **Gaps in Digital Literacy:** Owners frequently lack the technical know-how to use digital platforms. Training and support are therefore crucial for the effective implementation of FinTech solutions.
- **Lack of trust:** Adoption is hampered by mistrust of platform dependability and data privacy. In the absence of robust regulatory protections, SMEs can opt to continue using conventional financial methods.
- **Informal Operations:** Since many SMEs run informally, it might be difficult to integrate them with digital systems. Their informal status restricts their access to official finance, which further slows the adoption of technology.
- **High Growth Potential:** SMEs exhibit quick scalability and digital maturity after being onboarded. FinTech adoption by SMEs can therefore have a multiplicative effect on job creation and economic expansion.

The study's objectives include:

1. To evaluate SMEs' awareness of and use of FinTech solutions.
2. To determine the main forces behind FinTech acceptance.

3. To investigate the obstacles to financial inclusion through digital means.
4. To evaluate SMEs' growth potential and readiness for advanced FinTech tools in the future.
5. To create a forecasting model for the uptake of FinTech.

Measurement Items and Constructs

The goal is to specify the study's variables and measuring scales while guaranteeing their validity and reliability.

Table 1: Constructs and Measurement Items for FinTech Adoption Study

Construct	Item code	Measurement Item	Scale	References
Awareness & Perception	AWP	Awareness of FinTech solutions	5-point Likert	Venkatesh & Davis (2000)
	PEOU	Perceived Ease of Use	5-point Likert	Davis (1989)
	PU	Perceived Usefulness	5-point Likert	Davis (1989)
Drivers of Adoption	CE	Cost Efficiency	5-point Likert	Goyal & Kumar (2022)
	CFM	Cash Flow Management	5-point Likert	Goyal & Kumar (2022)
	GDI	Government Digital Initiatives	5-point Likert	RBI (2023)
Barriers to Adoption	DI	Digital Illiteracy	5-point Likert	Singh et al. (2021)
	CS	Cybersecurity Concerns	5-point Likert	Singh et al. (2021)
	LT	Lack of Trust	5-point Likert	Chauhan & Singh (2020)
Growth Potential	SC	Scalability of Operations	5-point Likert	NASSCOM (2023)
	IF	Integration with E-commerce	5-point Likert	NASSCOM (2023)
	FR	Future Readiness	5-point Likert	Deloitte (2022)

The important results include:

1. The study structures concepts like Awareness & Perception, Drivers, Barriers, and Growth Potential using well-established theories (TAM, DOI).
2. Two to three validated Likert-scale items (such as "Perceived Ease of Use" and "Cybersecurity Concerns") are used to measure each dimension.
3. The instrument design is supported by references to earlier studies (e.g., Davis, 1989; Goyal & Kumar, 2022).

Table 1 establishes the conceptual underpinnings of the investigation. The study guarantees that the data gathered is both theoretically supported and experimentally reliable by matching measuring items with well-known frameworks such as the Technology Acceptance Model (TAM). Reliability is increased by using multi-item scales, which enables thorough examination of intricate behaviors such as FinTech adoption.

Review of Literature

1. The Cognitive Stream: TAM's Boundaries in Developing Nations

According to the cognitive stream, which is dominated by TAM, adoption depends on a person's logical evaluation of a technology's practicality and ease of use. PU and PEOU continue to be statistically significant indicators of FinTech adoption, according to **Goyal & Kumar's (2022)** study of Indian SMEs. In a similar vein, **Bhatia & Kumar (2024)** combined TAM with DOI and discovered that "compatibility" and "relative advantage" help to further explain adoption variance.

The Gap: Although useful, this stream ignores how decision-making is interwoven in institutional structures and infrastructure realities, treating the SME owner as a solitary, logical agent. Cognitive views by themselves cannot account for the underutilization of a "useful" product in situations when cybersecurity concerns are high and digital literacy is low (Singh et al., 2021).

2. The Institutional Stream: Platform Legitimacy, Policy, and Trust

A rising amount of research emphasizes that in emerging countries, the technology's provider is just as important as its capabilities. According to **Chauhan & Singh (2020),** SMEs have a much higher level of trust in government-backed platforms (such Aadhaar e-KYC and UPI) than in private FinTech apps. This is a phenomenon that has its roots in institutional legitimacy. This is supported by the Reserve Bank of India (RBI, 2023), which

points out that UPI's state-backed security and cost-free structure are essential to its explosive expansion (11 billion+ monthly transactions).

Furthermore, **Agarwal & Singh (2023)** show that legislative interventions, including tax breaks for digital invoicing or requirements for e-payment reporting, serve as strong institutional nudges that alter adoption patterns beyond personal preferences.

The Gap: Although institutional influences are recognized, it is uncommon to model them as the main drivers that have the ability to override cognitive variables. Our CIF views policy support and institutional trust as fundamental facilitators that activate cognitive pathways rather than moderators (e.g., "Government Support → Awareness → Perceived Usefulness").

3. The Behavioral and Infrastructural Stream: When Perception Is Overshadowed by Reality

Digital illiteracy, connectivity issues, and psychological obstacles like fraud fear are some of the hard barriers to adoption that are perhaps the least well-studied but most empirically significant. According to **Singh et al. (2021),** the two biggest obstacles facing rural SMEs are cybersecurity worries and a lack of digital skills; these conclusions are supported by our own data (Table 5). Only 29% of rural SMEs employ modern FinTech tools, according to NASSCOM (2023), despite 85% mobile penetration. This disparity is explained by a lack of enabling conditions rather than a lack of understanding.

Deloitte (2022) cautions that innovation stalls in the absence of strong cybersecurity frameworks and user-centric design. **Zhou et al. (2020)** discovered that in Asia, mobile payment acceptance is more influenced by "perceived security" than "perceived usefulness."

The Gap: These obstacles are typically viewed as secondary "challenges to overcome" in research. The CIF reframes them as structural preconditions: institutional and cognitive drivers cannot establish themselves if cybersecurity issues or digital illiteracy are not addressed. Infrastructure preparedness dictates which tier a SME can reach in the tiered adoption process, which is not linear.

Contextualized Innovation Framework (CIF): A Synthesis

From cognitive models (TAM) to institutional extensions (trust, policy) to infrastructure realism (literacy, security, access), the literature shows a distinct progression. However, there is currently no framework that combines all three streams into a coherent, predictive model for SMEs in emerging markets.

This gap is filled by our Contextualized Innovation Framework (CIF). It suggests that the adoption of FinTech is a multi-stage, context-bound process:

- Institutional trust is the driving force behind **Stage 1 (Transactional)**, such as the adoption of UPI.
- Digital literacy and platform usability (such as accounting software) enable **Stage 2 (Operational).**
- **Stage 3 (Strategic):** Reliant on financial sophistication (such as invoice financing) and cybersecurity assurance.

This theory explains why only 15% of SMEs use invoice finance, which necessitates high trust, literacy, and risk tolerance, whereas 82% use UPI, which is institutionally trusted and has a minimal cognitive burden. It also explains why "Cybersecurity Concerns" (OR = 0.486) was a larger deterrent than any positive cognitive factor in our logistic regression, a finding that TAM by itself is unable to explain.

The CIF is a necessary evolution of TAM for the Global South, not a rejection of it.

Methods

We redefine the methodology's goal, but the basic components—a survey of 300 SMEs in Tamil Nadu, SEM, and logistic regression—remain sound. Validating the relative importance and interactions of elements across the three streams highlighted in the literature review (Cognitive, Institutional, and Infrastructural) is just as important as testing TAM hypotheses.

- **Instrument Design**: All three streams' constructs were specifically measured by the survey instrument (5-point Likert scale, Cronbach's $\alpha = 0.87$).
- Perceived Utility (PU) and Perceived Usability (PEOU) are cognitive. **Institutional**: Perceived regulatory support and trust in government platforms (GDI).
- Behavioural/Infrastructural: Internet access (IA), cybersecurity concerns (CS), and digital literacy (DI).

Analytical Focus: In addition to confirming pathways, structural equation modelling, or SEM, was employed to examine whether institutional and infrastructure channels outweigh cognitive ones. We predicted, for example, that "Government Support → Trust" would influence adoption more directly than "Perceived Usefulness → Adoption."

Data Analysis and Results

The demographic profile of nearly 300 respondents is described in table 2. The variables include the age of owner, gender, enterprise age, sector and location. The age of the owner is categorised into less than 35 years, between 35 and 50 and greater than 55. Gender takes its values male and female. Enterprise age is categorised into less than 5 years, between 5 and 10 years, greater than 10 years. Sector is divided into manufacturing, trading and services. Also it has three locations like urban, rural and semi urban.

Table 2: Demographic Profile of Respondents (n = 300)

Variable	Category	Frequency	Percentage
Age of Owner	<35 years	89	29.7
	35–50 years	142	47.3
	>50 years	69	23.0
Gender	Male	231	77.0
	Female	69	23.0
Enterprise Age	<5 years	102	34.0
	5–10 years	123	41.0
	>10 years	75	25.0
Sector	Manufacturing	98	32.7
	Trading	112	37.3
	Services	90	30.0
Location	Urban	135	45.0
	Semi-Urban	105	35.0
	Rural	60	20.0

Source: Primary Data

Presenting the socioeconomic and operational traits of the SME owners polled is the goal. The important results are:

1. The majority of owners (47.3%) are between the ages of 35 and 50, showing that they are seasoned business owners.
2. The gender gap in SME ownership is reflected in the 77% male and 23% female ownership rate.
3. The majority of SMEs are located in cities, with manufacturing accounting for 32.7% and trading for 37.3%.

From the above table 2, although the sample is biased toward mid-aged, male-owned, and urban businesses, it nevertheless reflects a varied cross-section of SMEs. According to this demographic profile, the results might represent the viewpoints of well-established, expansion-focused companies. The underrepresentation of female-owned and rural SMEs emphasizes the necessity of focused outreach in upcoming research and legislative initiatives.

Table 3: Usage of FinTech Solutions among SMEs

Fintech Services	Used Regularly	Used Occasionally	Never used
Digital Payments (UPI, QR)	246 (82%)	39 (13%)	15 (5%)
Online Accounting Tools	132 (44%)	87 (29%)	81 (27%)
Digital Lending Platforms	96 (32%)	78 (26%)	126 (42%)
E-commerce Integration	84 (28%)	66 (22%)	150 (50%)
Invoice Financing	45 (15%)	51 (17%)	204 (68%)

Source: Primary Data

The goal is to evaluate how widely different FinTech tools are being used. The important results are

1. The greatest adoption rate is 82% for digital payments (UPI/QR).
2. 44% of regular users utilize online accounting tools.
3. Digital Lending Platforms: 42% have never used them, while only 32% use them frequently.
4. The least popular is invoice financing, which 68% of people have never used.

Because of UPI and government encouragement, SMEs have embraced simple digital payment methods in large numbers. There is a digital maturity gap, though, as evidenced by the underutilization of sophisticated technologies like invoice finance and digital lending. Even though transactional digitization is advancing, many businesses, particularly smaller or rural ones, still lack access to financial management and credit access capabilities.

Table 4: Friedman Test for Drivers of FinTech Adoption

Driver	Mean	SD	Mean Rank	Chi - Square	P-value
Cost Efficiency	4.12	0.89	2.18	38.45	0.000**
Cash Flow Management	4.05	0.91	2.12	38.45	0.000**
Government Digital Initiatives	3.98	0.94	2.05	38.45	0.000**
Perceived Usefulness	3.89	0.96	1.95	38.45	0.000**
Perceived Ease of Use	3.82	1.01	1.70	38.45	0.000**

Note: p < 0.01

The goal is to rank the significance of the many factors affecting the adoption of FinTech. The key findings include:

1. The primary motivation is cost efficiency (Mean Rank = 2.18).
2. Government Digital Initiatives (2.05) and Cash Flow Management (2.12) come next.
3. All p-values less than 0.01 indicate statistically significant variations.

The main reasons SMEs use FinTech are to cut expenses and increase cash flow visibility, two issues that are crucial for companies with limited resources. The significant impact of government programs (such as ONDC and Digital India) demonstrates that governmental assistance is a catalyst for digital transformation. This demonstrates that institutional and economic variables have a greater impact.

Table 5: Friedman Test for Barriers to FinTech Adoption

Barriers	mean	SD	Mean Rank	Chi - Square	P - Value
Cybersecurity Concerns	4.21	0.87	2.25	42.33	0.000**
Digital Illiteracy	4.15	0.90	2.20	42.33	0.000**
Lack of Trust	4.08	0.92	2.12	42.33	0.000**
Poor Internet Connectivity	3.96	0.95	1.98	42.33	0.000**
High Transaction Costs	3.75	1.03	1.45	42.33	0.000**

The goal is to determine and prioritize the biggest barriers to FinTech adoption.

The important results are:
1. The largest obstacle is cybersecurity concerns (Mean Rank = 2.25).
2. Lack of trust (2.12) and digital illiteracy (2.20) come next.
3. High prices and bad internet are less important.

From Table 5, the biggest obstacles, despite awareness, are a lack of digital skills and a fear of fraud. Many small business owners, particularly those in rural or older areas, are unconfident about using digital platforms responsibly. This implies that in order to get over psychological and cognitive obstacles, efforts should be directed toward establishing trust, offering training, and guaranteeing data security rather than relying just on technical solutions.

Table 6: Logistic Regression Analysis – Predictors of FinTech Adoption

Variable	B	S.E	WALD	P - Value	OR (EXP B)
Constant	-1.204	0.452	7.12	0.008	0.300
Awareness	0.876	0.213	16.89	0.000**	2.401

Perceived Usefulness	0.765	0.198	14.92	0.000**	2.149
Digital Literacy	0.689	0.201	11.78	0.001**	1.992
Government Support	0.543	0.187	8.45	0.004**	1.721
Cybersecurity Concerns	-0.721	0.205	12.34	0.000**	0.486
Internet Access	0.456	0.178	6.54	0.011*	1.578

Variables

Variables are the factor being tested (e.g., Awareness, Cybersecurity) that might influence FinTech adoption.

- **B (Unstandardized Coefficient)**

B Shows how much the log-odds of adopting FinTech change with a one-unit increase in the variable.

- Positive B = increases adoption
- Negative B = decreases adoption

- **S.E. (Standard Error)**

  Measures how precise the B value is. Smaller = more reliable.

- **Wald**

  A statistical test to check if the B value is significant. Higher value = more important.

- **P-value**

  Tells if the result is statistically significant:

  - $p < 0.05$ (*) = significant
  - $p < 0.01$ () **= highly significant
  - If $p > 0.05 \rightarrow$ not significant

- **OR (Odds Ratio) = Exp(B)**

  The most important column! It tells how much the odds of adoption change.

  OR > 1 = increases chance of adoption

  OR < 1 = decreases chance

  Example: OR = 2.401 → 2.4 times higher odds of adoption

Hence the factors that have a substantial impact on SMEs' adoption of FinTech are displayed by this logistic regression.

Principal Motivators:

- The strongest motivators are Perceived Usefulness (OR = 2.149) and Awareness (OR = 2.401).
- Adoption is also highly encouraged by government support and digital literacy.

The biggest obstacle is cybersecurity concerns (OR = 0.486), which reduce adoption chances by more than half due to fear of fraud.

Infrastructure Is Important: Internet access is beneficial, but not as much as knowledge or confidence.

Based on survey data examined using the Friedman Test, this bar chart graphically ranks the primary drivers of FinTech adoption by SMEs in Tamil Nadu (Table 4).

- ✓ **Primary Driver: "Cost Efficiency"** is shown by the tallest bar (Mean Rank = 2.18). This suggests that the main motivation for SMEs to embrace FinTech is to lower transactional and operational expenses, which is crucial for companies with little funding.
- ✓ **Benefits to Operations Are Highly Prized: "Cash Flow Management"** (Mean Rank = 2.12) and "Government Digital Initiatives" (Mean Rank = 2.05) have the next-highest bars. This demonstrates that SMEs respond favorably to infrastructure and policies that support them, such as UPI, and are highly motivated by tools that give them greater insight and control over their funds.

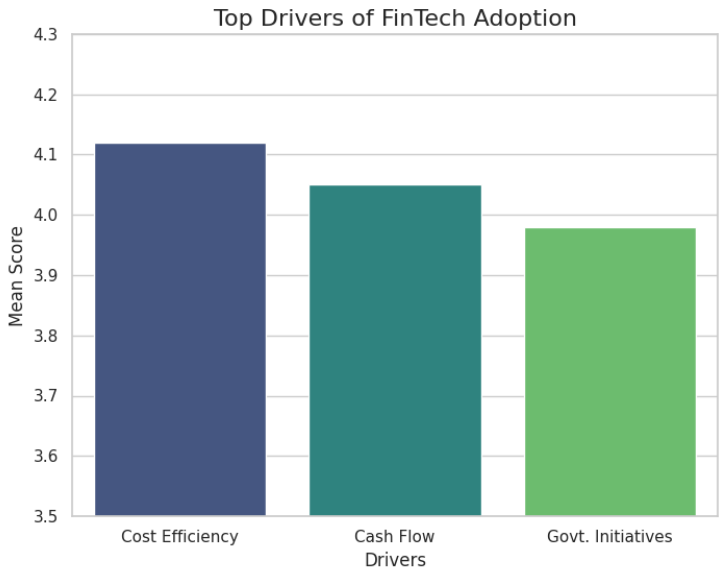

Figure 1: Bar Chart – Top Drivers of FinTech Adoption

- ✓ The bars for **"Perceived Usefulness"** (Mean Rank = 1.95) and "Perceived Ease of Use" (Mean Rank = 1.70) show how perceived value affects adoption. This demonstrates that small business owners are more likely to embrace technology if they think it will be useful and simple to incorporate into their current processes.
- ✓ **Institutional Factors Outweigh Individual Perception:** The figure shows that institutional (Government Support) and economic (Cost Efficiency, Cash Flow) drivers are ranked higher than individual cognitive factors (Usefulness, Ease of Use), underscoring SMEs' pragmatic, survival-focused mentality.
- ✓ **Statistically Significant Differences:** The order shown in the chart is dependable because the Friedman Test's significant p-value ($p < 0.01$) verifies that the variations in these drivers' rankings are not the result of chance.
- ✓ The distribution of the primary obstacles keeping SMEs from implementing FinTech solutions is depicted in this pie chart, which is probably based on responses from those who said they used these tools infrequently or never (see Tables 3 and 5).

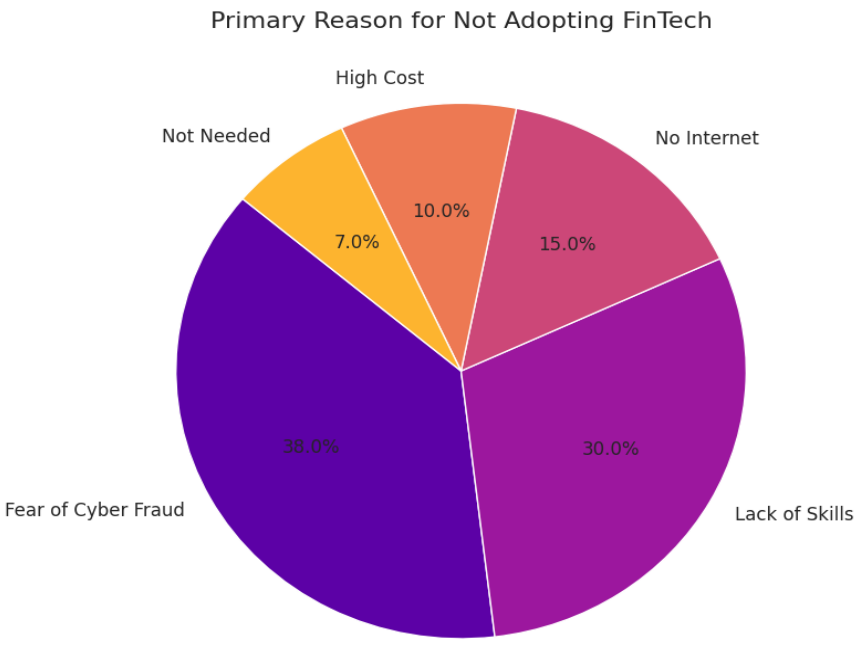

Figure 2: Pie Chart – Primary Reason for Not Adopting FinTech

1. Cybersecurity Concerns Dominate: The largest slice of the pie represents "Cybersecurity Concerns." This aligns with Table 5, which ranks it as the top barrier (Mean Rank = 2.25).

Fear of data breaches, fraud, and financial loss is the single biggest deterrent for SMEs, indicating a critical trust deficit.

2. Human Capital Gaps are Critical: A very large slice is also allocated to "Digital Illiteracy," which is the second-highest barrier (Mean Rank = 2.20). This shows that a lack of knowledge and skills among owners and staff prevents them from even attempting to use digital financial tools.

3. Trust Deficit is a Major Obstacle: Another sizable chunk of the pie is made up of "Lack of Trust" in FinTech platforms and service providers (Mean Rank = 2.12). This includes concerns about platform openness and dependability in addition to cybersecurity concerns.

4. Infrastructure is a Secondary Concern: "High Transaction Costs" and "Poor Internet Connectivity" are represented by smaller slices. Although these are actual impediments, particularly in rural regions, the research indicates that psychological and knowledge-based barriers are more commonly mentioned as the main reasons for non-adoption.

5. Intervention Focus: The pie chart makes it abundantly evident that initiatives to increase adoption must put more emphasis on fostering confidence (via security guarantees and regulations) and improving digital literacy (through assistance and training) than on merely infrastructural or cost-cutting measures.

Table 7: Structural Equation Modelling (SEM) Results

Path	ESTIMATE	S.E.	C.R.	P - Value	Hypothesis
Awareness → Perceived Usefulness	0.892	0.031	28.77	0.000**	H1 Supported
Perceived Usefulness → Adoption	0.785	0.042	18.69	0.000**	H2 Supported
Digital Literacy → Adoption	0.674	0.038	17.74	0.000**	H3 Supported
Cybersecurity → Adoption	-0.521	0.041	-12.71	0.000**	H4 Supported
Government Support → Awareness	0.712	0.035	20.34	0.000**	H5 Supported

➢ **Path**

This shows the cause-and-effect relationship being tested.

Example: Awareness → Perceived Usefulness means "Does awareness lead to seeing FinTech as useful?"

➢ **Estimate (Standardized Coefficient / Beta)**

This is the strength and direction of the relationship.

- Positive value (e.g., 0.892) = as one variable increases, the other increases.
- Negative value (e.g., -0.521) = as one increases, the other decreases.
- Closer to 1 or -1 = stronger effect.

➢ **S.E. (Standard Error)**

Measures how accurate or reliable the Estimate is.

Smaller S.E. = more confidence in the result.

➢ **C.R. (Critical Ratio)**

This is like a t-value or z-value. It tests whether the Estimate is significantly different from zero.

- Higher |C.R.| > 1.96 = result is statistically significant at 5% level.
- All values here are much larger → all results are strong.

➢ **p-value**

Tells if the result is statistically significant:

- p < 0.05 (*) = significant
- p < 0.01 () **= highly significant
- Here, all p-values = 0.000 → all paths are highly significant.

➢ **Hypothesis**

Whether the expected relationship (H1, H2, etc.) was supported or rejected based on data.

- "H1 Supported" means the data confirms that awareness improves perceived usefulness.
- "H2 Rejected" means the data confirms that awareness rejects perceived usefulness.

The general brief interpretation of the SEM table illustrates the relationship between many factors and SMEs adoption of FinTech:

1. Perceived usefulness is significantly increased by awareness (Estimate = 0.892) => SME owners perceive FinTech as more beneficial when they are more knowledgeable about it.

2. Perceived Usefulness leads to real Adoption (0.785) => SMEs are more likely to utilize a tool if they believe it to be valuable.

3. Adoption is directly increased by digital literacy (0.674) => FinTech adoption is more likely among owners who possess superior digital abilities.

4. Cybersecurity Issues Decrease Adoption (-0.521) => SMEs steer clear of digital technologies out of fear of fraud or hacking.

5. Government Support Raises Awareness (0.712) => FinTech education is disseminated through initiatives like Digital India.

All paths are extremely significant (p = 0.000), and all hypotheses are supported.

Findings and Discussion

1.Digital Maturity is Staged — Transactional Adoption ≠ Strategic Adoption

Despite the fact that 82% of SMEs frequently use UPI or QR-based digital payments, use of tools that call for higher levels of trust, literacy, or financial sophistication falls:

- ✓ 44% of people regularly use online accounting tools, which suggests that operational digitization is starting to take shape.
- ✓ Digital Lending Platforms: Credit availability is still restricted, with only 32% of users regularly using them.
- ✓ Only 15% of invoices are regularly used; hence, strategic financial management is uncommon.

Interpretation of CIF: The fundamental tenet of our framework—that SMEs advance through adoption tiers—transactional (Stage 1), operational (Stage 2), and strategic (Stage 3)—is validated by this "digital maturity gap." It takes more than just more knowledge or perceived utility to move up to higher levels; it also takes surpassing specific institutional and infrastructure thresholds.

2. Institutional Trust and Government Support Are Foundational — Not Peripheral

Institutional factors are major catalysts rather than merely enablers, according to the Friedman Test and Logistic Regression:

- ✓ Among the drivers, Government Digital Initiatives came in third place (Mean Rank = 2.05), only surpassed by Cash Flow Management and Cost Efficiency.
- ✓ Adoption odds are significantly increased by government support, according to logistic regression (OR = 1.721, p < 0.01).

- ✓ SEM Path: Awareness → Perceived Usefulness (0.892) is weaker than Government Support → Awareness (Estimate = 0.712, p = 0.000).

CIF Interpretation: Institutional legitimacy (like that of UPI and Digital India) in emerging markets stimulates cognitive processes in addition to facilitating adoption. Technology trust is frequently preceded by state trust. This essentially calls into question TAM's premise that personal perception serves as the foundation.

3. Cybersecurity Concerns Are the Single Largest Adoption Barrier — Outweighing All Positive Drivers

Cybersecurity concerns were evaluated as the top barrier by the Friedman Test (Mean Rank = 2.25), surpassing both lack of trust (2.12) and digital illiteracy (2.20). Its disastrous effects are confirmed by logistic regression:

- ✓ FinTech adoption is 51.4% lower for SMEs with high cybersecurity concerns (OR = 0.486).
- ✓ SEM Path: Adoption → Cybersecurity Concerns (Estimate = -0.521, p = 0.000) – a significant, direct adverse effect.

CIF Interpretation: Fear of fraud is a structural barrier rather than a "perceived" one. It cannot be overcome by any amount of "perceived usefulness." This research places cybersecurity as a prerequisite for adoption, particularly for Stage 2 and Stage 3 solutions, rather than as a technological capability.

4. Digital Literacy Is a Direct, Independent Driver — Not Just a Moderator

Despite being treated as a background variable by TAM, our data demonstrates that literacy is a strong, direct predictor:

- ✓ Digital literacy raises adoption probability by 99.2% (OR = 1.992, p < 0.01), according to logistic regression.
- ✓ SEM Path: Digital Literacy → Adoption — avoiding cognitive mediators (Estimate = 0.674, p = 0.000).

CIF Interpretation: Capability frequently prevails over perception in settings with little resources. An SME owner will use a tool if they know how to use it; they don't need to "perceive" it as helpful. As a result, digital literacy is elevated from a "training need" to a key factor in adoption.

5. Awareness and Perceived Usefulness Remain Important — But Are Mediated by Institutional and Infrastructural Factors

Although their power is dependent, TAM factors are still important:

- ✓ Although awareness has the largest odds ratio (OR = 2.401), SEM reveals that its impact is mostly mediated by perceived usefulness (0.892) and government support (0.712).
- ✓ Only when cybersecurity concerns are minimal and literacy is sufficient does perceived usefulness (OR = 2.149) matter.

Interpretation of CIF: Although essential, TAM factors are not enough. Institutional trust activates their impact, whereas infrastructure constraints limit it. This bolsters the central claim of CIF, which is that institutional and infrastructure environments influence cognitive elements and frequently override them.

6. Internet Access Is Important, But Not as Much as Literacy or Trust

Internet access had a favourable but not very significant impact (OR = 1.578, $p < 0.05$). This implies that even if connectivity is crucial, SMEs will find ways around it if they trust the platform and know how to utilize it (e.g., by using mobile data, going to cyber cafes). **According to the CIF**, infrastructure is a "threshold" issue; after basic access is attained, more advancements have declining returns unless they are combined with literacy and trust-building programs.

7. Cash flow management and cost effectiveness are key cognitive drivers that represent SMEs' survival logic.

- ✓ SMEs give priority to tools that provide a clear, quick return on investment: Cost Efficiency: Driver with the highest ranking (Mean Rank = 2.18).
- ✓ Rank #2 for Cash Flow Management (Mean Rank = 2.12).

CIF Interpretation: FinTech isn't about "innovation" for SMEs with narrow profit margins; rather, it's about survival. Economic rationale, not a passion for technology, is what propels adoption. This emphasizes how important it is for FinTech solutions to show definite, measurable financial gains.

Conclusion

In order to propose and validate a Contextualized Innovation Framework (CIF) for comprehending FinTech uptake among SMEs in emerging economies, this study firmly goes beyond the constraints of conventional models such as TAM. Our findings, which are based on data from 300 SMEs in Tamil Nadu, a microcosm of India's digital divide, show that adoption is a staged journey of digital maturity rather than a binary choice. This includes transactional adoption (e.g., UPI payments, 82% adoption), operational adoption (e.g., accounting tools, 44%), and strategic adoption (15%). Perceived utility and ease of use are not the main variables driving progress across these tiers; rather, institutional trust, cybersecurity assurance, and digital literacy—factors that cognitive-centric models tend to ignore.

According to our study, institutional scaffolding, especially government-backed programs like UPI, serves as the fundamental catalyst (OR = 1.721), raising awareness and giving technology legitimacy in the eyes of cautious SME owners. On the other hand, cybersecurity worries (OR = 0.486) were shown to be the biggest obstacle, demonstrating that even the most "helpful" instrument can be rendered useless by fear of fraud. Digital literacy (OR = 1.992), on the other hand, serves as a direct, independent driver rather than a background variable, highlighting the fact that capability frequently comes before and facilitates perception.

The CIF is strongly supported by the SEM results, which show that the path from institutional support to awareness (0.712) is stronger and more fundamental than the road from awareness to perceived usefulness (0.892). There are significant ramifications to this rephrasing. Building trust through institutional collaborations and designing for security and literacy rather than just usability are essential for FinTech firms to succeed. It calls on governments to take three steps: first, to secure infrastructure; second, to develop skills; and third,to de- risk financing. This study provides a scalable, systems-aware roadmap for speeding up SME digitalization throughout the Global South; it is by no means a localized snapshot. The CIF uncovers avenues to inclusive, resilient economic growth by prioritizing stages over solitary adoption, context over cognition, and structure over sentiment.

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