

FinTech Adoption as a Bridge: Linking Digital Financial Literacy to Financial Inclusion among Rural Gig Workers

Agusta Kanagaraj, Nalini Rengaswamy*

School of Management, SASTRA Deemed University, Thanjavur, Tamil Nadu 613401, India

*Corresponding Author's E-Mail: nalini@mba.sastra.edu

Abstract

India's gig economy is growing rapidly, especially in rural areas such as Thanjavur and Trichy, which illustrates the need for gig workers to be absorbed into the formal digital finance ecosystem. Despite being embedded within digital platforms, many gig workers face obstacles rooted in inadequate digital finance literacy, as well as lack of engagement with formal financial services. This current study aims to expand the understanding of the mediating role of FinTech Adoption (FA) between Digital Financial Literacy (DFL) and Digital Financial Inclusion (DFI) for rural gig workers. Data was collected from 334 respondents, and a Structural Equation Modeling (SEM) approach was used for data analysis, in which Digital Financial Literacy was examined by the parameters of awareness, knowledge, skill, behavior, and attitude; FinTech Adoption was examined through perceived usefulness, ease of use, trust and security and DFI was examined by access, usage, and affordability. The results showed that FinTech Adoption partial mediated the relationship between DFL and DFI, indicating that literacy alone cannot create inclusion without a demonstrated FinTech engagement. Findings show the need for inclusive, secure, and accessible digital finance as a policy that continues to increase openness to adoption and provides sustainable economic empowerment for rural gig workers, which aligns with the national objectives for financial inclusion.

Keywords: *Digital Financial Inclusion; Digital Financial Literacy; FinTech Adoption; Gig Economy; Sustainable Development*

Introduction

India's financial sector is being impacted by the evolution of Digital Technology which has contributed to the increase of FinTech companies that enable non-banking customers access to their services. The earning potential for gig workers is a key contributor to the growth of the gig economy. According to NITI Aayog's report, there are currently (2022) an estimated 7.7 million gig workers in India; it is anticipated that this number will increase to almost 23.5 million by 2030 (NITI Aayog, 2022). There remain many rural gig workers who do not have access to the many financial services that have benefited their urban counterparts. They are excluded from the financial system primarily because they do not have access to traditional banking systems and do not know how to use the existing special accounts that provide these services, such as mobile money (Ministry of Finance, 2024; MeitY, 2025). Many digital financial services (UPI, Paytm, Google Pay, PhonePe, etc.) have been successfully introduced in rural markets. However, because of the lack of Digital Financial Literacy (DFL) for these digital financial services, many users will not be able to effectively utilize them. Therefore, FinTech Adoption (FA) is the bridge that turns digital awareness into DFI.

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The adoption of FinTech innovations is revolutionizing the way financial services are delivered, providing access to financial services through digital means and creating a bridge between urban and rural segments. The success of FinTech innovations depends upon the user's ability to understand, utilize, and operate all digital tools in relation to the particular FinTech service. However, research has shown that, despite the expansion of such platforms in the rural area, hindering factors such as the unavailability of internet connectivity and lack of trust in the system and the platform remain unaddressed in PhonePe, Google Pay, and similar platforms (Sam-Abugu *et al.*, 2025; Priyadarshi, 2025). Also, the important note given by the Reserve Bank of India in the Financial Inclusion Report of 2025 states that the adoption of FinTech platforms has been rising rapidly, but in order for the goal of financial inclusion to be achieved, the users need to have the required digital financial literacy to take their own financial decisions in a more confident and independent manner. This specifies that the road from financial literacy to financial inclusion is not direct, and the adoption of FinTech acts as the intervening factor in this process.

There is empirical evidence that establishes this interconnectedness. Digital financial literacy enables people to participate in online platforms, which in turn helps them make informed decisions on savings, payments, and investments (Wu & Peng, 2024). Rural gig workers, when financially literate, can easily recognize the value, trust, and convenience of FinTech as major influencers of adoption. However, despite the high penetration of smartphones in rural areas, many rural gig workers remain as reactive consumers of online financial services. According to the RBI (2025) report, although 78% of gig workers own smartphones, only 40% of them actually make use of online financial services. This clearly establishes that mere availability of technology can no longer suffice; in fact, increased financial literacy of the digital kind can allow this technology gap to turn into an opportunity.

This study will, therefore, fill an important void in understanding how digital financial literacy affects financial inclusion for rural gig workers through the adoption of FinTech. Although prior studies have addressed these variables as standalones, few have been set on this integrated pathway that links literacy to adoption to inclusion, especially across rural gig economies characterized by support structures that are informal in nature. The novelty in this study is that it positions FinTech adoption as a mediating mechanism that explains how digital knowledge turns into inclusive financial behavior and sustainable participation in the digital economy.

The present study attempts to (1) investigate the direct effect of digital financial literacy on digital financial inclusion among rural gig workers, (2) evaluate the impact of digital financial literacy on FinTech adoption, and (3) analyze how FinTech adoption mediates the relationship between digital financial literacy and digital financial inclusion. Based on the above objectives, the study is founded on two presumptive questions:

- (1) To what extent does digital financial literacy influence digital financial inclusions among rural gig workers?
- (2) Does FinTech adoption mediate the relationship between digital financial literacy and financial inclusions in the rural gig economy?

From these observations, and building on these questions, the study hypothesizes the following to empirically validate the conceptual relationships:

H1: Digital Financial Literacy (DFL) has a significant positive effect on Digital Financial Inclusion (DFI).

H2: Digital Financial Literacy (DFL) has a significant positive effect on FinTech Adoption (FA).

H3: FinTech Adoption (FA) has a significant positive effect on Digital Financial Inclusion (DFI).

H4: FinTech Adoption (FA) mediates the relationship between Digital Financial Literacy (DFL) and Digital Financial Inclusion (DFI).

In essence, the research articulates the concept of FinTech adoption as the connecting link between literacy and inclusion within the digital financial space in rural India. Based on the understanding of the

influence of the digital financial literacy paradigm on the aforementioned FinTech process, the research shall make a valuable addition within the understanding of policymakers, financial institutions, and service providers. Enhancement of literacy-focused FinTech initiatives can empower rural gig economies, enable equitable internet use, and promote the larger agenda of sustainable economic development.

Review of Literature

Digital Financial Literacy as a Basis for Digital Financial Inclusion

Digital Financial Literacy (DFL), on the other hand, has been widely recognized as an essential driver of Digital Financial Inclusion (DFI), particularly among rural gig economy workers who are connected through digital platforms for earning their livelihoods. Although FinTech innovations have grown at an unprecedented rate, empirical research highlights that simply possessing access is insufficient for achieving true inclusion unless there is an equal level of financial and digital literacy on the part of the users. Evidence emerging out of developing nations has emphasized that people with higher levels of literacy are better positioned to understand and operate through digital channels effectively, absorb financial knowledge, and mitigate risks associated with digital technologies (Sam-Abugu *et al.*, 2025). At the same time, low levels of literacy hinder effective engagement with digital financial opportunities, perpetuating the cycle of exclusion despite technology penetration (Velez, 2025).

H1: Digital Financial Literacy is strongly and positively related to Digital Financial Inclusion.

Digital Financial Literacy as a FinTech Adoption Driver

Digital Financial Literacy is a crucial determining factor for influencing FinTech adoption behavior, in that it facilitates reduced uncertainty and a more confident approach to using these services. It has been seen that various literacy variables, such as awareness, perceived usefulness, and perceived ease of use, are significant determinants of individuals' intentions towards using digital financial services (Wu & Peng, 2024). It is a fact that in some rural gig economies, a lack of financial literacy leads to suboptimal usage of readily available payment and banking services, even in areas where smartphone penetration is very high (Priyadarshi, 2025). The more users enhance their digital skills, the more efficient they can be in using FinTech services, which eventually leads to optimal adoption and economic performance (Kowsick, 2025).

H2: Digital Financial Literacy exerts a strong positive effect on FinTech Adoption.

Adoption of FinTech as an Enabler of Digital Financial Inclusion

The adoption of FinTech has direct effects on Digital Financial Inclusion in terms of improving financial accessibility, affordability, and usage for underbanked segments. The adoption of mobile money, digital wallets, and banking apps brings individuals within the fold of mainstream financial systems, which they could not access otherwise (Adelaja *et al.*, 2024). There are empirical studies showing that increased adoption of FinTech leads to improvement in efficiency, financial participation, and continuity of financial services (Rehman, 2023). Nonetheless, for inclusive outcomes, it is essential that FinTech adoption happens actively, since inculcating financial literacy could have its limitations in rural areas, especially in developing countries (Heng & Tok, 2022).

H3: FinTech Adoption exerts a strong positive influence on Digital Financial Inclusion.

Adoption of FinTech as a Mediator between Digital Financial Literacy and Financial Inclusion

Recent findings indicate that while Digital Financial Literacy will improve one's chances of becoming included in the Financial Technology (FinTech) industry, without Digital Financial Literacy resulting in FinTech adoption, it does not automatically equate to financial inclusion. Digital Financial Literacy will improve the chances of an individual becoming a FinTech user; once they are using FinTech, they will also be able to use that technology to enhance their Financial Inclusion (Siddiqui & Prakash, 2025). Research shows that Digital Financial Literacy has a positive impact on Digital Financial Inclusion by increasing the ability of users to adopt Digital Financial Technologies (DFT). Furthermore, digitized

Financial Literacy was shown in several quantitative studies conducted in developing nations to play a role in increasing Digital Financial Adoption (Kowsick, 2025; Sam-Abugu *et al.*, 2025). This Digital Financial Literacy to Digital Financial Adoption to Digital Financial Inclusion continuum of behaviors underlines the importance of improving the opportunity for financial inclusion for rural gig workers who face barriers based on both informational and structural limitations.

H4: FinTech adoption acts as the mediator between Digital Financial Literacy and Digital Financial Inclusion.

Methodology

This study adopts a quantitative, explanatory design to examine how FinTech Adoption (FA) mediates the relationship between Digital Financial Literacy (DFL) and Digital Financial Inclusion (DFI) among rural gig workers in Tamil Nadu, India. It explores how financial literacy translates into inclusion through technology-driven behavior, aligning with the growing emphasis on digital empowerment (Sam-Abugu *et al.*, 2025; Wu & Peng, 2024).

- **Study Area:**
A cross-sectional survey was conducted among gig workers in Thanjavur and Trichy, two districts representing emerging rural gig economies with rising digital financial activity.
- **Sampling Technique:**
Using a purposive sampling technique, only active gig workers engaged in income-generating digital or platform-based work such as delivery, freelancing, or domestic services were included (Etikan *et al.*, 2016).
- **Data Collection:**
A total of 334 valid responses was collected through structured questionnaires (both online and offline) to ensure inclusivity across varying digital access levels. Ethical standards, including informed consent and confidentiality, were strictly followed (Creswell & Creswell, 2018).

Measurement Scale:

The constructs were measured on a five-point Likert scale (1 = strongly disagree to 5 = strongly agree). DFL was assessed through awareness, knowledge, skill, behavior, and attitude (OECD, 2022; Sam-Abugu *et al.*, 2025). FA included perceived usefulness, ease of use, and trust and security, drawn from the Technology Acceptance Model (Davis, 1989; Wu & Peng, 2024). DFI was measured using access, usage, and affordability, in line with World Bank (2022) and RBI (2025) indicators.

Data Analysis:

Data was analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) via SmartPLS 4.0, suitable for models with mediating variables and moderate samples (Hair *et al.*, 2019; Henseler *et al.*, 2015). This approach offered robust validation of both measurement and structural models, revealing how FinTech adoption amplifies the effect of financial literacy on inclusion.

Results and Discussion

Data Analysis

Data collected was analyzed using descriptive statistics as well as inferential statistics to develop accuracy as well as reliability. Descriptive statistics (Table 1) explored the rural gig workforce demographics, where Partial Least Squares Structural Equation Model analysis tested the hypotheses (Hair *et al.*, 2021). Data analysis further checked construct validity, where the measurement model tested the measurement properties using Cronbach's alpha and composite reliability, as well as AVE, hence constructing construct accuracy. In the model, the results tested path coefficients and R-squared, as well as significance, where validity checked hypotheses (Henseler *et al.*, 2015). Hypotheses were checked, where this data proved construct validity on the enabling role played by FinTech Adoption in

promoting Digital Financial Literacy, impacting positively on Digital Financial Inclusion as required in national inclusion (RBI, 2025; NITI Aayog, 2022).

The demographic characteristics of the 334 rural gig workers represented in Table 1 are fairly balanced for both genders at 43.7% for female participants, marking the increasing involvement of women in the digital workforce, as suggested by NITI Aayog (2022). The largest number of participants are aged between 26 and 35 years, representing the youth-driven gig economy in the country, as stated by the Ministry of Labor and Employment (2023). The educational background of the participants shows that most of them possess Higher Secondary/UG qualifications, symbolizing the willingness for digital participation and limited involvement in finance, as indicated by the RBI (2025) observations on the income gaps in rural areas. More than 72% of the participants' incomes are less than ₹25,000, which symbolizes their economic fragility, similar to the observations made by RBI (2025).

Table1: Demographic Profile

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	188	56.3
	Female	146	43.7
Age Group	18–25 years	105	31.4
	26–35 years	149	44.6
	36–45 years	57	17.1
	Above 45 years	23	6.9
Educational Qualification	School Level	37	11.1
	Higher Secondary	120	35.9
	Undergraduate	139	41.6
	Postgraduate	38	11.4
	Freelance Digital Services	93	27.8
Occupational Category	Delivery and Logistics	111	33.2
	Domestic and Care Work	75	22.4
	Agri-linked/Repair Services	55	16.5
Monthly Income (₹)	Below 15,000	85	25.5
	15,001–25,000	157	47.0
	25,001–40,000	78	23.4
	Above 40,000	14	4.1

Source: (Primary data)

Assessment of Measurement model

The proposed measurements of the modeling scale were determined to be reliable as well as valid via the use of Cronbach's alpha and composite reliability coefficients, as well as AVEs. This was based on the work of Hair *et al.* (2021) as well as Fornell and Larcker (1981).

Table 2: Reliability and Validity Score

Variables	Cronbach's alpha	CR	AVE
Digital Financial Literacy	0.828	0.835	0.598
FinTech Adoption	0.708	0.721	0.630
Digital Financial Inclusion	0.782	0.786	0.697

Source: (Primary data)

Note: CR: Composite Reliability; AVE: Average Variance Extracted

Table 2 shows that all three constructs (Digital Financial Literacy, Fintech Adoption, and Digital Financial Inclusion) are valid and reliable as indicated by their respective Cronbach's alpha (between 0.708 and 0.828) and Composite Reliability (between 0.721 and 0.835) measures, as all were above the acceptable value of 0.70 indicating very high internal consistency among the measures. Also, the average variance extracted from the three constructs (DFL, FA, and DFI) are all greater than or equal to 0.50, which indicates that the constructs are all valid measures, meaning that they all measure what they were developed to measure.

Table 3: Outer Loadings for Constructs

Digital Financial Awareness	→ DFL	0.864
Digital Financial Knowledge	→ DFL	0.864
Digital Financial skills	→ DFL	0.692
Digital Financial Behavior	→ DFL	0.705
Digital Financial Attitude	→ DFL	0.722
Perceived Ease of Use	→ FA	0.759
Perceived Usefulness	→ FA	0.829
Trust & Security	→ FA	0.791
Access	→ DFI	0.865
Usage	→ DFI	0.844
Affordability	→ DFI	0.794

Source: (Primary data)

The outcomes revealed in Table 3 above demonstrate that all the indicator loading values are higher than the recommended threshold level of 0.70. Consequently, all indicators are reliable, and their quality of measurement is satisfactory (Hair *et al.*, 2019). All the observed variables significantly loaded on each corresponding construct. This verifies that all observed variables are valid representations of Digital Financial Literacy (DFL), FinTech Adoption (FA), and Digital Financial Inclusion (DFI). All constructs are thus properly defined and reliable for sound measurement outcomes.

Table 4: Fornell Lacker

	DFL	FA	DFI
DFI	0.868	0.881	0.835
DFL	0.773	0.872	
FA		0.794	

Source: (Primary data)

The Fornell–Larcker results confirm positive discriminant validity, as the square roots of AVE for DFL (0.872), FA (0.794), and DFI (0.868) exceed their inter-construct correlations. This indicates that each construct is distinct yet positively related, supporting the model’s validity (Fornell & Larcker, 1981; Hair *et al.*, 2021).

Assessment of Structural Model

The structural model evaluation tested the hypothesized paths between DFL, FA, and DFI, revealing all relationships to be positive and statistically significant ($p < 0.001$). This confirms that FinTech Adoption effectively mediates the impact of Digital Financial Literacy on Financial Inclusion, supporting the study’s conceptual model and predictive relevance (Hair *et al.*, 2021).

Table 5: R square Value

	R- Square	Adjusted- R-Square
FinTech Adoption	0.760	0.759
Digital Financial Inclusion	0.817	0.816

Source: (Primary data)

The R² statistics in Table 5 above indicate the proportion of variance in the endogenous constructs that the predictor variables explain. FinTech Adoption (FA) has an R² of 0.760 (adjusted R² = 0.759), which implies that DFL explains 76% of the variance in FA. Similarly, the measure for the model capturing the relationship between the endogenous constructs, that is, Digital Financial Inclusion (DFI), indicates an R² of 0.817 (adjusted R² = 0.816), which implies that the combined effects of DFL and FA explain 82% of the variance in DFI.

Table 6: f- Square Value

	f- Square
Digital Financial Literacy → Digital Financial Inclusion	0.230
Digital Financial Literacy → FinTech Adoption	3.164
FinTech Adoption → Digital Financial Inclusion	0.350

Source: Primary data

The f^2 values indicate that Digital Financial Literacy (DFL) exerts a very large effect on FinTech Adoption (FA = 3.164), while FA also exerts a very large effect on Digital Financial Inclusion (DFI = 0.350). The direct effect of DFL on DFI (0.230) is smaller in this regard, thus illustrating that FinTech Adoption exerts a strong mediating effect on the association between DFL and DFI, thus positively affecting financial literacy on inclusion (Cohen, 1988).

Table 7: Outer Loadings and Indicator Significance of Constructs

Relationship	Outer Loadings	T statistic	P-Values
DFAW – DFL	0.864	56.541	0.000
DFK – DFL	0.864	56.541	0.000
DFS – DFL	0.692	19.611	0.000
DFB – DFL	0.705	21.805	0.000
DFA – DFL	0.722	22.961	0.000
PEU – FA	0.759	23.659	0.000
PUF – FA	0.829	52.430	0.000
T&S – FA	0.791	31.146	0.000
AC – DFI	0.865	58.460	0.000
US – DFI	0.844	44.295	0.000
AF – DFI	0.794	34.647	0.000

Source: Primary data

The values of all the indicator loadings are greater than the minimum threshold level of 0.70, along with high t-values and significant p-values ($p < 0.001$). This indicates the model has high degrees of Convergent Validity. It ensures that each indicator measures the respective constructs properly: Digital Financial Literacy (DFL), FinTech Adoption (FA), and Digital Financial Inclusion (DFI), thus ensuring the overall reliability of the measurement model (Hair *et al.*, 2021; Henseler *et al.*, 2015).

Table 8: Hypotheses Testing Results and Mediation Analysis

Hypotheses	Paths	Path coefficient	T statistic	P- value
H1	DFL → DFI	0.418	7.835	0.000
H2	DFL → FA	0.872	58.815	0.000
H3	FA → DFI	0.516	10.066	0.000
H4	DFL → FA → DFI	0.450	10.249	0.000

Source: Primary data

As shown in Table 8, all hypothesized paths are positive and significant at the level of $p < 0.001$, thus proving the strong links between the constructs. The Digital Financial Literacy (DFL) has positively impacted the FinTech Adoption (FA) and the Digital Financial Inclusion (DFI), and the FA further increases the DFI. The indirect effect proves the partial mediation, suggesting that the adoption of FinTech increases the effect of the financial literacy component on the inclusion component, thereby proving the H4.

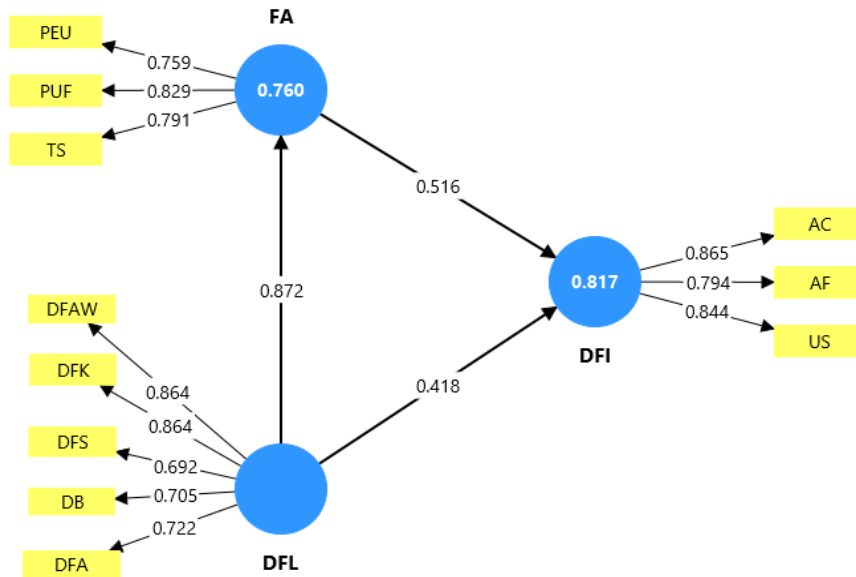


Figure1: Resultant Model

The results show that Digital Financial Literacy (DFL) exerts a significant direct and indirect effect on Digital Financial Inclusion (DFI) via FinTech Adoption (FA). The models indicate a strong level of reliability and validity (Cronbach’s $\alpha = 0.708\text{--}0.828$; AVE = $0.598\text{--}0.697$) that aligns with the guidelines recommended by Hair *et al.* (2021). The proposed path coefficients were significantly ($p < 0.001$) different from zero, thus verifying that improved financial literacy positively contributes to FinTech adoption and vice versa to promote greater inclusion of rural gig economy workers (Sam-Abugu *et al.*, 2025; Wu & Peng, 2024). The structural models display a strong explanatory capability with R-squared of 0.760 for FA and 0.817 for DFI, thereby indicating the substantial contribution of DFL and FA to inclusion (Henseler *et al.*, 2015). The mediations ($\beta = 0.450$) indicate that FinTech indeed plays a critical role in facilitating the “literacy to inclusion” process (Venkatesh *et al.*, 2003). These observations validate the RBI’s Financial Inclusion Index (2025) and World Bank (2022) reports regarding the significance of awareness and trust in sustainable participation in finances. The observations thus collectively validate that improved digital literacy and ease of access can empower gig economy workers to drive India’s Digital Economy Vision and leverage UN SDGs.

Limitation

This research, while providing useful insights and understanding, has some limitations as well. The sample in this study is restricted to rural gig workers, so findings cannot be generalized in urban areas and platform economies as well. There may be limitations to self-reported survey studies due to response bias.

Conclusion

This research distills the conclusion that the adoption of FinTech functions as an essential connectivity platform between digital financial literacy and the subsequent financial inclusion of rural gig economy workers, thus underpinning the transformative power of technology in driving inclusive growth. It was found that higher digital financial literacy made significant positive contributions to FinTech adoption and digital financial inclusion, thereby reiterating the significance of "awareness, knowledge, and confidence in digital capabilities in being the primary enablers of empowerment" for the transformative agenda of technology. FinTech platforms function as a catalytic agent enabling simple access, minimizing transaction costs, and encouraging overall participation in finance, particularly for low-income earners in the rural sector. This outcome complements the goal of India’s agenda for inclusive finance, thus pledging support for the government’s endeavor of building a conducive digital environment for the economic empowerment of gig economy workers.

More diverse samples with behavioral aspects could be included in future studies to improve accuracy as well. Additionally, variables such as gender, internet accessibility, and government initiatives could also be explored to gain more insights into digital inclusion outcomes as well. Longitudinal studies and studies involving multiple nations could also be useful in understanding the adoption of recent FinTech and AI developments in maintaining digital financial inclusion as well.

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Conflict of Interest

The authors declare that they have no competing interests.

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