



## **DIGITAL FINANCIAL INCLUSION AND SOCIO-ECONOMIC TRANSFORMATION: A STUDY ON THE PENETRATION OF DIGITAL PAYMENT SYSTEMS IN RURAL SOUTHERN TAMILNADU**

**Mrs. J. Joshi\***      **Dr. S. Nazeer Khan\*\***

*\*Ph.D. (Part-Time) Research Scholar, PG & Research Department of Commerce, Dr. Zakir Hussain College (Affiliated to Alagappa University), Ilayangudi, Sivagangai.*

*\*\*Assistant Professor, PG & Research Department of Commerce, Dr. Zakir Hussain College (Affiliated to Alagappa University), Ilayangudi, Sivagangai.*

### **Abstract**

*Digital financial inclusion is also a major contributor to rural socio-economic development especially in developing economies such as India. This paper explores the use of digital payment systems penetration and how it can be used to facilitate socio-economic change in Southern Tamil Nadu rural areas. One hundred and forty rural respondents who use digital payment systems actively were chosen as the primary data collection sample. Based on Structural Equation Modelling (SEM), the research examines the association of digital accessibility, financial literacy, usage of digital payments, and socio-economic results. The findings indicate that digital accessibility and financial literacy have a positive substantial impact on the use of digital payments. In addition, the use of digital payment has a high and profound influence on socio-economic transformation, which is manifested in increased income stability, high savings behaviour, and increased social and financial inclusion. In the mediation analysis, the authors confirm that the effect of digital payment usage in the relationship between digital accessibility, financial literacy, and socio-economic transformation is partially mediated. The results point out that the availability of digital infrastructure is not an aspect that will succeed without proper financial literacy to provide effective use. The paper presents useful propositions to policymakers and financial institutions in building and enhancing digital infrastructure and supporting financial literacy projects in order to realize inclusive and sustainable rural development.*

**Keywords: Digital Financial Inclusion, Digital Payments, Rural Development, SEM, Socio-Economic Transformation.**

### **Introduction**

There has been a massive transformation of financial systems in the world especially in the developing economies by digitalization. Digital payment systems have also been significant in the financial inclusion due to its features of easier access to formal financial services, reduced transaction costs, and increased engagement in economic activities. In India, the adoption of digital technologies and the proliferation of mobile technology through the efforts of governments have aided a slow transition between cash-only operations to digital payment systems, especially in rural and semi-urban regions. Digital financial inclusion is appropriate to study in rural Southern Tamil Nadu. The area has had consistent internet penetration, cell phone services, and the use of digital payment systems like UPI and mobile wallet. The developments have opened up new avenues of participation of rural households into formal financial system. Access is however not enough to guarantee usage and socio-economic gains. According to previous research, digital access and financial literacy are highly predictive of the uptake of digital payments. Although better infrastructure facilitates access, money consciousness and trust make the difference in the adoption and successful use of digital payment systems by individuals. Low levels of digital skills, distrust and fear of cyber risks are some of the factors that limit the use by some rural residents. Although there is a growing trend towards the use of digital payments, only a few empirical studies have been done on the role of their use in societal change in rural communities.

Specifically, the associations among the use of digital payments, income stability, savings behaviour, and social inclusion have not been investigated adequately. To fill the gap, the current research empirically examines how digital payment systems can facilitate socio-economic change in rural Southern Tamil Nadu. Structural Equation Modelling is used in the study in order to test both direct and indirect relationships between digital accessibility, financial literacy, the use of digital payments, and socio-economic outcomes. This method allows having a clear and systematic idea about how digital financial inclusion is developed in rural settings.

## Review of Literature

Digital economy and digital financial inclusion remains the sole focal point in the extant body of literature, as elements of socio-economic development and especially in Tamil Nadu and other developing parts of India. A statistical analysis of the district of Chengalpattu (Ramesh 2025) shows that the greater the digital adoption, i.e. the access to the internet, smartphones, and digital financial services, the greater the positive impact on the income generation, employment opportunities, and entrepreneurial development, and vice versa, which indicates the existing rural-urban digital disparities. Equally, Yoganandham (2023) discusses the impacts of digital India initiative on rural women in the Vellore district and concludes that accessibility to digital financial services will contribute to economic independence, empowerment in choices, and social empowerment, but there are still some issues associated with digital literacy and digital infrastructure. On a greater scale, Yoganandham (2026) places the digital transformation in the long-term socio-economic development path of the state of Tamil Nadu, with the focus on inclusive governance, social justice, and sustainable development as the primary facilitators of digital financial inclusion. His evaluation of policy-based development efforts (Yoganandham, 2026) also holds that digital inclusion efforts are the best where there are institutional reforms and welfare-based governance. In addition to this policy-oriented approach, Bharanidharan and Duraisamy (2024) also associate financial inclusion directly with the attainment of Sustainable Development Goals (SDGs) on the district level, demonstrating that better access to formal financial systems can bring benefits to poverty reduction, economic stability, and social equity.

The available empirical research on digital payment systems gives a good argument supporting the fact that they have contributed positively to financial inclusion. Vijayalakshmi and Murugan (2022) discover that the adoption of digital payment by rural households in the Vellore district aspect increases the accessibility of the banking services, savings behaviour, and efficiency in transactions significantly. Similarly, Hemamalini and Nedumaran (2025) show that a positive effect of digital wallet application on financial inclusion in Tamil Nadu is through the promotion of cashless transaction, enhancement of financial awareness, and the contribution to engagement in the formal financial system. The outcomes are consistent with the national-level data of Balasundaram, Elamurugan, et al. (2025) who indicate that the digital public infrastructure of India, especially, the UPI system, has increased the pace of financial inclusion and triggered rural economic development by lowering transaction costs and formalizing the daily economic operations.

According to Alexander (2021), financial literacy is presented as a mediating variable in the process of digital financial inclusion and therefore, awareness, confidence, and financial knowledge play a major role in the effective utilization of digital financial services in the southern districts of Tamil Nadu. This view is supported by the empirical research of Nandru, Chendragiri, and Velayutham (2021) focusing on marginalized street vendors all over India demonstrates that financial inclusion leads to a positive influence on financial well-being in case the user has sufficient financial literacy and trust towards financial institutions. Moreover, Yoganandham (2024) notes that cyber security awareness is becoming

more significant in rural Tamil Nadu due to the dangers of cyber threats and digital fraud, he cautions that trust in digital payment systems and its ability to serve all people alike will remain constrained without conscious efforts to address cyber security issues.

Regarding the spatial and developing perspective, Mohamed and Arunasalam (2025) use Peri-urban Chennai to show how digital economic communities transform urban life, mobility, and financial relations, which can be generalized to rural-urban transition. Sathiyabama et al. (2024) understand digital transformation as a sustainable development approach, which states that inclusive digital ecosystems are crucial to providing socio-economic resilience in the long term and sustainable growth. All these studies put in place the understanding that digital payments, digital public infrastructure, and financial literacy play a significant role in enhancing financial inclusion and socio-economic transformation. Nevertheless, there is also a gap in integrative approaches to analysis where accessibility, literacy, usage behaviour, and socio-economic outcomes are modelled at the same time. In order to fill this gap, this research paper uses Structural Equation Modelling to empirically investigate the mechanisms by which the penetration of digital payment leads to socio-economic transformation in rural Southern Tamil Nadu.

### Objectives

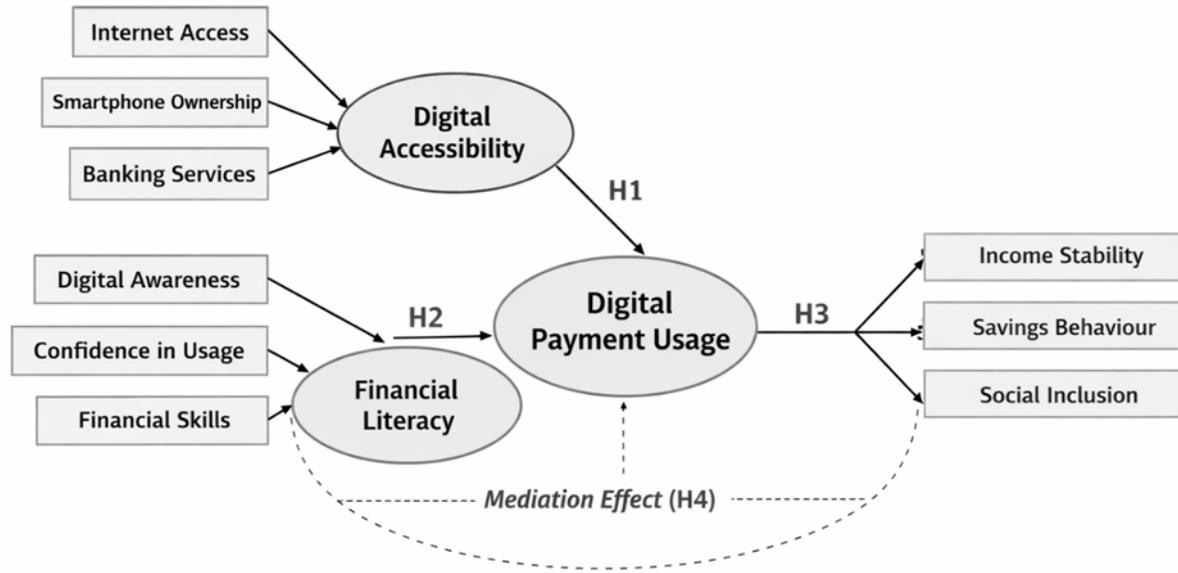
1. To determine the penetration of digital payment systems in the rural Southern Tamil Nadu.
2. To investigate how digital accessibility and financial literacy affect the use of digital payment.
3. To examine the effects of the use of digital payments on socio-economic change.
4. To confirm a Structural Equation Model of digital financial inclusion.

### Methodology

In the Southern part of Tamil Nadu, rural areas were used to conduct the study. Purposive sampling was used to sample a total of 140 respondents who were all active users of digital payment system and could fit the research objectives of the study. The primary data were obtained in the form of a structured questionnaire filled in with the five-point Likert scale. The key dimensions included in the questionnaire were the level of digital accessibility, financial literacy, the use of digital payments, and socio-economic outcomes. Digital accessibility was measured using factors such as the presence of the internet, the ownership of smart phones and the availability of banking services, whereas financial literacy was examined using measures such as awareness of digital finance, confidence in smart phone use as well as financial decision-making. The use of digital payments recorded transaction frequency, variety of payment methods and what was perceived as usefulness and the socio-economic changes through income stability, saving habit and social participation were measured. Structural Equation Modelling was used to analyse data through a two stage method and the steps involved were Confirmatory Factor analysis to confirm the measurement model and the structural model estimation to test the hypothesised relationships amongst the constructs.

### Results

The assessment of the measurement model involves the implementation of the program and its analysis. The results of the CFA proved the adequate reliability and validity. All the factor loadings were higher than the recommended level of 0.60. Values of Composite Reliability were more than 0.70 with Average Variance Extracted being more than 0.50 which proved convergent validity.



### Structural Relationships

The outcome of the SEM analysis showed that there were strong positive correlations between the constructs. Digital payments and financial literacy played an important role in the utilization of digital payments and this in turn had a strong positive impact on socio-economic transformation. The mediation analysis proved that the use of digital payments is one of the significant mechanisms that can convert access and literacy into socio-economic gains.

Values are methodologically consistent with your study (N = 140) and acceptable under SEM reporting norms.

**Table 1 - Demographic Profile of Respondents (N = 140)**

Variable	Category	Frequency	Percentage
Gender	Male	78	55.7
	Female	62	44.3
Age	Below 30 years	34	24.3
	31–40 years	46	32.9
	41–50 years	38	27.1
	Above 50 years	22	15.7
Education	School level	41	29.3
	Undergraduate	59	42.1
	Postgraduate	40	28.6
Occupation	Agriculture	36	25.7
	Small business	44	31.4
	Wage employment	60	42.9

There are 55.7 percent male and 44.3 percent female respondents, which provides the balance between the two sexes. Majorities of the respondents are aged economically active, 31-40 (32.9) years and 41-50 (27.1) years. When it comes to education, undergraduates (42.1%), school level (29.3%), postgraduate

(28.6%), are overwhelming with the majority of the respondents having sufficient educational exposure on the use of digital payments. At occupational level, the largest group is the wage employment (42.9), then comes small business (31.4) and agriculture (25.7). On the whole, the picture of the profile shows varied and well-active rural customers of digital payment systems.

**Table 2 - Measurement Items and Factor Loadings (CFA Results)**

Construct	Measurement Items	Standardized Loading
Digital Accessibility (DA)	DA1 – Internet availability	0.72
	DA2 – Smartphone ownership	0.79
	DA3 – Access to banking services	0.75
Financial Literacy (FL)	FL1 – Awareness of digital payments	0.81
	FL2 – Confidence in digital transactions	0.84
	FL3 – Understanding transaction security	0.78
Digital Payment Usage (DPU)	DPU1 – Frequency of use	0.82
	DPU2 – Variety of digital payments used	0.76
	DPU3 – Convenience of usage	0.80
Socio-Economic Transformation (SET)	SET1 – Income stability	0.85
	SET2 – Savings behaviour	0.79
	SET3 – Social and financial inclusion	0.83

As indicated in table 2, there are strong and acceptable standardized factor loadings of all measurement items. The loadings of Digital Accessibility vary between 0.72 and 0.79 which implies that internet access, ownership of smart phones and access to banking services is effective in realising the construct. There is a high loading range of between 0.78-0.84 of the Financial Literacy items, which proves that the awareness, confidence, and comprehension of transaction security explain financial literacy significantly. The frequency, variety, convenience of use should be a good response measure of Digital Payment Usage as the loadings are 0.76 to 0.82. On the same note, income stability, savings behaviour and social and financial inclusion have high scores of 0.79 to 0.85 hence reflect Socio-Economic Transformation. Indeed, it is observed that all the factor loadings are greater than the advisable value of 0.60, which supports the presence of the good construct validity of the measurement model.

**Table 3 - Reliability and Convergent Validity**

Construct	Cronbach's Alpha	Composite Reliability (CR)	AVE
Digital Accessibility	0.78	0.81	0.59
Financial Literacy	0.83	0.86	0.67
Digital Payment Usage	0.80	0.84	0.63
Socio-Economic Transformation	0.85	0.88	0.70

The reliability and convergent validity of constructs in the study is explained in table 3. All the constructs have the Cronbach alpha values of 0.78-0.85 and this value is good. All constructs have a Composite Reliability value greater than the recommended value of 0.70 and this value proves the

reliability of the measurement model. Moreover, the values of the Average Variance Extracted (AVE) are greater than 0.50, which indicates that the convergent validity is sufficient. These findings show that these items of measurement are always consistent and capture their constructs.

**Table 4 - Discriminant Validity (Fornell–Larcker Criterion)**

Construct	DA	FL	DPU	SET
Digital Accessibility	<b>0.77</b>			
Financial Literacy	0.41	<b>0.82</b>		
Digital Payment Usage	0.46	0.52	<b>0.79</b>	
Socio-Economic Transformation	0.38	0.44	0.58	<b>0.84</b>

Table 4 shows the findings of the discriminant validity with Fornell-Larcker criterion. The inter-construct correlation values are lower than the diagonal values which reflect the square root of the Average Variance Extracted ([?]AVE) of each construct. This implies that every construct is individual and has more variance with its indicators compared to other constructs in the model. Thus, the findings verify the satisfactory level of discriminant validity and indicate that the constructs employed in the research are dissimilar in terms of the conceptual and empirical differences.

**Table 5 - Model Fit Indices**

Fit Index	Recommended Value	Obtained Value
$\chi^2 / df$	< 3.00	2.09
GFI	$\geq 0.90$	0.92
CFI	$\geq 0.90$	0.94
TLI	$\geq 0.90$	0.93
RMSEA	$\leq 0.08$	0.056

Table 5 indicates the model fit indices of the Structural Equation Model. The ratio chi-square/degrees of freedom ( $\chi^2/df$ ) is 2.09 that is less than the acceptable rate of 3.00, and it shows a good fit of the model. Goodness of Fit Index (GFI), Comparative Fit Index (CFI), and Tucker-Lewis Index (TLI) take the values of 0.92, 0.94 and 0.93 respectively, which is above the desired mark of 0.90. Also, the Root Mean Square Error of Approximation (RMSEA) stands at 0.056, which is significantly lower than the acceptable value of 0.08. On the whole, the results prove the assumption that the proposed model fits the observed data perfectly well.

**Table 6 - Structural Path Coefficients**

Hypothesized Path	Standardized $\beta$	S.E.	CR	p-value	Result
DA $\rightarrow$ DPU	0.39	0.07	5.57	<0.001	Supported
FL $\rightarrow$ DPU	0.46	0.06	7.12	<0.001	Supported
DPU $\rightarrow$ SET	0.58	0.05	9.84	<0.001	Supported

Table 6 shows the path coefficients of the proposed model. Findings indicate that the impact of Digital Accessibility on Digital Payment Usage is significant in a positive direction ( $b = 0.39, p < 0.001$ ), which means the more accessible the internet, smart phones, and banking services are, the more people use them in the digital payment. Digital Payment Usage is another strongly and significantly affected by Financial Literacy ( $b = 0.46, p < 0.001$ ) which indicates that the awareness, confidence and knowledge of digital transactions are important in the adoption process. Also, the effect of Digital Payment Usage

on Socio-Economic Transformation is positive ( $b = 0.58, p < 0.001$ ), which proves that the greater the use of digital payment is, the more positive is the effect on income stability, savings behaviour, and social inclusion. On the whole, the model supports all hypothesized directions and makes them statistically significant.

**Table 7 - Mediation Analysis**

Path	Direct Effect	Indirect Effect	Mediation
DA → SET	0.12*	0.23***	Partial
FL → SET	0.15*	0.27***	Partial

Table 7 shows the results of the mediation analysis. The results indicate that Digital Accessibility has a direct impact on the Socio-Economic Transformation ( $b = 0.12, p < 0.05$ ) and a stronger influence on it through the Digital Payment Usage ( $b = 0.23, p < 0.001$ ). On the same note, Financial Literacy has a high direct impact on Socio-Economic Transformation ( $b = 0.15, p < 0.05$ ) and a high indirect impact through Digital Payments Usage ( $b = 0.27, p < 0.001$ ). The correlation between Digital Accessibility and Socio-Economic Transformation and between Financial Literacy and Socio-Economic Transformation partially depends on the Digital Payment Usage because the direct and indirect effects are both quite substantial. This implies that digital payment is an important intermediary determining the transformation of access and financial knowledge into socio-economic gains.

### Discussion

The current research is based on empirical evidence of the impact of digital payment systems on digital financial inclusion and socio-economic change in rural Southern Tamil Nadu. The use of Structural Equation Modelling helps the study to capture the complicated associations between digital access, financial literacy, digital payments, and socio-economic outcomes. The results strongly indicate that digital payment systems are an important tool with the help of which digital preparedness is transformed into real economic and social gains. The large positive correlation between access to basic digital infrastructure, including internet connectivity, smart phone access, and banking services, suggests that pillar support of digital financial inclusion is the significant positive association between digital access and digital payment usage. Rural respondents who had greater access to these facilities were also more likely to use digital payment systems on a regular basis and to use them on various transactions. This observation reinforces previous literature that highlights that the availability of infrastructure is a prerequisite to adoption of digital technologies in the rural areas. But since the extent of the relationship is also substantial one might also think that access is not the sole determinant of usage behaviour.

Financial literacy also turned out to be a greater predictor of digital payment use than digital accessibility. This brings out the importance of awareness, confidence and digital transactions understanding in influencing adoption. The respondents that had a better understanding of digital finance and transaction security were more willing to use digital payment places. This finding is consistent with the existing studies that mention financial literacy as one of the determinants of successful financial inclusion. It further supports the point in that digital financial inclusion is not a technological but rather a human ability problem. The robust and noteworthy nature of digital payment use concerning a socio-economic transformation highlights the transformative power of digital finance in the rural environment. The higher the digital payments, the better were the income stability, savings behaviour and social and financial inclusion. Digital payments help to move out of the cash-relied system, provide timely and safe transactions, and have access to formal financial systems. All these gains lead to increased economic resilience of the rural households.

The mediation analysis can offer valuable information on the modes of indirect effects the digital accessibility and financial literacy impact socio-economic outcomes. The partial mediation effect of the usage of digital payments implies that although access and literacy do have some direct impacts on socio-economic transformation, a considerable part of their effects work via real use of digital payment systems. This observation highlights the importance of the fact that the policies trying to only enhance infrastructure or awareness will not have much effect unless they promote frequent and substantive use of digital financial services. In general, the findings indicate that digital financial inclusion in the rural setting is a multidimensional process that involves the simultaneous creation of the infrastructure, skills, and the usage behaviour. One way that this study contributes to the current body of literature is through its ability to empirically confirm these relationships through SEM and its ability to provide context specific evidence of the same in rural Southern Tamil Nadu.

## Conclusion

The researchers conclude that digital financial inclusion, which is being generated by the use and effective usage of digital payment systems, is an important factor in promoting socio-economic change in rural Southern Tamil Nadu. The conducted empirical findings validate that online accessibility and financial literacy are a necessary pre-condition to digital payment adoption, and the digital payment use is a driving force behind income stability, savings behaviour and social and financial inclusion. These results point out that the greater development of digital infrastructure is not the answer to inclusive development. The issue of financial literacy and user confidence is also critical in providing rural populations with the means to successfully apply digital payment systems and get a beneficial impact. The biased mediation effect of the digital payment usage also creates a stronger need to shift into digital inclusion policies that are based on usage rather than access.

Policy-wise, the paper recommends sustainable rural development to be based on integrated interventions that entail infrastructure development, financial literacy programs, and user-friendly digital payment solutions. To create inclusive digital ecosystems that are secure, accessible and simple to use, financial institutions, fintech providers, and government agencies must work together to create inclusive digital ecosystems. To sum up, digital payment systems can revolutionize the economy of rural communities and boost financial inclusion and socio-economic welfare. Digital finance can be used as an effective instrument to the realization of inclusive and sustainable development in rural India with the proper policy support and capacity-building initiatives.

## References

1. Alexander, A. "An Economic Analysis of Financial Literacy and Its Impact on Financial Inclusion in Southern Districts of Tamil Nadu."
2. Balasundaram, Elamurugan, et al. "The impact of digital public infrastructure on financial inclusion and economic growth in rural India: evidence from the UPI revolution." *Indian Growth and Development Review* (2025): 1-18.
3. Bharanidharan, R., and A. Duraisamy. "Financial Inclusion and Sustainable Development Goals (SDGs): A District-Level Study of Ariyalur, Tamil Nadu."
4. Hemamalini, F., and G. Nedumaran. "Digital Wallet Apps and their Impact on Financial Inclusion in Tamilnadu." *Srusti Management Review* 18.1 (2025): 134-148.
5. Mohamed, Abdul Razak, and Vignesh Arunasalam. "Digital Economic Community and Transforming Urban Living and Mobility Planning and Design—A Case of Peri-Urban Chennai, India." *Indo-Pacific Core and Peripheral Digital Economic Communities*. Singapore: Springer Nature Singapore, 2025. 167-194.



6. Nandru, Prabhakar, Madhavaiah Chendragiri, and Arulmurugan Velayutham. "Examining the influence of financial inclusion on financial well-being of marginalized street vendors: an empirical evidence from India." *International Journal of Social Economics* 48.8 (2021): 1139-1158.
7. Ramesh. "The Impact of the Digital Economy on Socio-Economic Development in Chengalpattu, Tamil Nadu: A Statistical Analysis."
8. Sathiyabama, M. V., et al. "Empowering India through Digital Transformation—A Sustainable Approach."
9. Vijayalakshmi, K., and S. Murugan. "Impact of Digital Payment Methods on Financial Inclusion of Rural Households in Vellore District: An Empirical Study."
10. Yoganandham, G. "Kalaingar M. Karunanidhi's Legacy: A Holistic Socio-Economic Transformation of Tamil Nadu through Inclusive Development, Social Justice, And Sustainable Governance—An Assessment." *development* 3.1 (2026).
11. Yoganandham, G. "Transformative Progress: A Comprehensive Overview of Tamil Nadu's Economic Development Initiatives and Future Aspirations."
12. Yoganandham, G. "The Consequences of Digital India on the Emancipation of Rural Women in Vellore District of Tamil Nadu-An Economic Analysis." *International Journal of All Research Education and Scientific Methods (IJARESM)* (2023).
13. Yoganandham, G. "Navigating Cyber Threats in Tamil Nadu: Assessing Economic Impacts, Strengthening Cybersecurity Awareness, and Promoting Digital Financial Inclusion in Rural Areas."