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Impact of demographic profile variables on rural households' digital finance adoptions: A study

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Abstract
Digital finance adoption is utilizing digital technologies to provide better financial services to users. It raises client satisfaction levels and boosts the general effectiveness of financial services and goods. To encourage consumers to use electronic banking services, India launched the Digital India initiative in 2015 and demonetized the country in 2016. Hundreds of thousands of people in underserved and rural areas now have access to banking services because of the advent of digital wallets, mobile banking, and the Unified Payments Interface (UPI). With more than 1.5 billion daily transactions, UPI has surpassed established payment methods like debit and credit cards to maintain its dominance in the payments market in 2024. The rate of digital adoption in rural India is lower than in urban areas. A variety of factors influence rural households' digital adoption behaviour. Demographic factors have been used in this study to examine how rural households adopt digital finance. A multistage stratified random sampling method was adopted to collect a target sample from 660 respondents. The findings of this study revealed that rural households' demographic and investment variables have shown a significant influence on their digital adoption behaviour.

Keywords: Digital finance, digital adoptions, financial decisions, rural households, adoption behaviours

Introduction
Digital finance in the financial sector fills the access gap, allowing for social and economic advantages, particularly among economically disadvantaged rural areas in developing countries. Mobile banking makes making deposits, transferring funds, and purchasing goods and services easy and convenient. It provides an inexpensive and quick alternative for close companions and relatives to exchange money through the means of remittances, particularly in rural places with less or less access to conventional banking (Mbiti and Weil, 2015) [30]. Perceptions among people depend very much on their age. Age should be prioritised in future research to investigate the numerous attributes. Matured and very young people have different perceptions (Srinuan *et al*., 2012) [52]. Unreached people should be targeted to avail themselves of all kinds of financial services rendered by financial institutions and the concerned government. Research should be conducted to find out the challenges and difficulties faced by people aged 50 and the visually impaired (Kim *et al*., 2019) [22]. Digital finance adoptions and their impact on environmental variables should be studied to make banking services green banking. Such things as digital devices (Boateng *et al*., 2016) [7], the place and the day on which transactions were conducted (Runnemark *et al*., 2015) [40], and the socialisation of the people (Takieddine and Sun, 2015) [54]. In developing countries, digital payments are greatly supported by financial inclusion (Ligon *et al*. 2019) [26]. It enables people to access all kinds of financial services through banking platforms (Naumenkova, Mishchenko, and Dorofeiev, 2019; Lutfi *et al*., 2021) [32, 27]. In India, most of the farmers have bank accounts with ATM cards. However, their digital accessibility is still low due to digital illiteracy and infrastructural problems (S Kumar *et al*. 2018) [24]. Digital payments change consumer behaviour from many perspectives (Jiaxin Zhang, Luximon, and Song 2019) [65]. Customers' age, gender, education, occupation, marital status, and income have significantly influenced their satisfaction (Khurana, Kaur, and Singh 2019) [47]. Digital finance literacy helps people use more digital platforms for their transactions (Hossain *et al*. 2020) [18]. The role of demographic factors is inevitable for the success of digital finance adoptions (Khan *et al*., 2021) [21]. Factors like privacy and access barriers can influence digital payment adoption (Dimitrova, Öhman, and Yazdanfar 2022) [12]. These two factors influence people's intention to use digital platforms for their financial activities.

Financial inclusion is defined as "the mechanism for guaranteeing those who are disadvantaged, including the poor and communities with low incomes, timely get credit at a reasonable cost". Farmers are excluded from the traditional banking sector because of Insufficient security, inconsistent data, and elevated costs associated with transactions (Wang X & He G., 2020) [58]. The use of digital finance by farmers will be more likely a "supplementary benefit mechanism" that uses labour market results to produce profitable economic expansion and spending refinement. Direct and indirect charges related to digital transactions, more private businesses are increasingly executing electronic payments, and Cash, which is still widely used, inexpensive for customers, and does not require KYC, is continuing to be vital in the payments industry (RBI, 2019). Factors like security, network connectivity, merchant issues, high transactional costs, and a lack of literacy influence people's digital adoption systems. (Tabitha Durai & Stella, 2019) [13]. The highest priority is safety, and changes in financial services can influence customers' attitudes toward digital banking in either a beneficial or detrimental way (Solomon, Shamsuddin, and Wahab, 2013) [51]. Roy R & Gupta N (2018) [39] opined that security in performing digital transactions should be acknowledged. The usefulness of digital finance played an important role in determining the attitude of those who accept and adopt digital finance tools and techniques. E-payment solutions make the users easy to use and user-friendly (Anouze and Alamro, 2019) [5]. More trust and security must be created to encourage people to accept digital payment services. Nowadays, people still prefer physical people in banks to avail themselves of the bank's financial services. Offline banking is still preferred by users because it allows people to have personal interactions, which makes them feel secure (KW Lee *et al*., 2011) [25]. In addition to improving security, the financial institution could employ independent endorsements to inform end users about its safety protocols. Johnson *et al*. (2018) [2]0 suggested that the security of digital payment services can encourage people to accept and use more digital payments in their financial activities.

Review of Literature

The technology acceptance model (TAM) was developed by Fred Davis in 1989 and is used to analyse the adoption and acceptance of digital finance. It served as the foundation for a large body of research on adoption models for electronic payments. In addition to the TAM model, another noteworthy model that was applied was the "Unified Technology of Acceptance and Use of Technology" (UTAUT). These two models were often used by researchers to find out the digital adoptions of the users. According to research, two components explain the intrinsic characteristics of digital adoption. They are motivators and inhibitors. Most of the digital adoption studies were conducted in emerging countries such as India, China, South Korea, and Taiwan. Cruz-Jesus *et al*. (2018) classified digitally developed countries as the most digitally developed and the least digitally developed. South Korea, Norway, the USA, and all the European countries are the most digitally developed countries, while India, China, Malaysia, Brazil, Turkey, and Chile are regarded as the least digitally developed countries. The term "digital financial transactions" refers to all financial transactions that use electronic mediums such as wallets, cryptocurrency, online payments, mobile payments, debit card payments, etc. (Agarwal and Zhang, 2020; Alkhowaiter, 2020) [66, 3]. There are many digital platforms through which the user can access the digital payment services of financial institutions. It can be varied from e-banking, cards, Online banking, ATMs, QR code scans, electronic wallets, real-time gross settlement (RTGS), near-field communication (NFC), purchase orders (POs), and application-based payment systems, etc. (Simatele and Mbedzi 2021; Das and Mahapatra 2019) [48, 28]. According to Vlasov (2017) [56], users expect novelty in digital payment services. Electronic payments should cater to the needs of the people and encourage them to adopt and use the electronic payment system. Except for age, risk considerations, quick and easy access, social influence, and interoperability all have an impact on financial institutions' services. Individuals' satisfaction with using a digital payment system enhances positive experiences, which can motivate service providers to provide niche products and services to end users. In most developing countries, the adoption of digital finance is low due to many barriers, though the government has taken many initiatives to promote digital finance (Chaveesuk, Khalid, and Chaiyasoonthorn, 2021a) [9]. The role of the government plays an important factor in the penetration of digital payment adoption. E-governance initiatives support digital adoptions (Saxena and Joshi 2019) [45], but still, the policies of the government hinder the success of digital payment adoptions. Some of the barriers are high transaction costs, infrastructural problems, accessibility issues, etc. (Seethamraju and Diatha 2018; Simatele and Mbedzi 2021) [46, 48]. Digital payment systems help both service providers and people in many ways. It is more flexible, accessible, affordable, convenient, efficient, transparent, portable, etc. (Sahi *et al*., 2021; Chaveesuk, Khalid, and Chaiyasoonthorn, 2021a) [42, 9]. Despite all the positive factors that encourage people to accept digital payment systems, people still give high priority to the security of payment systems. It has a strong influence on people's use of digital payments (Jiaxin Zhang, Luximon, and Song 2019) [65]. The risk of the payment systems and the cost of availing digital payment services are the two elements that determine digital payments' acceptance (Ligon *et al*., 2019; Lutfi *et al*., 2021; Seethamraju and Diatha, 2018) [26, 27, 46]. Perceived usefulness and perceived financial cost have a major impact on behavioural intentions to utilise the m-payment system. These factors directly influence digital adoption behaviour and intentions to use digital payment systems (Lutfi *et al*., 2021) [27]. The digital payment facility should provide satisfaction to the end users to encourage them to adopt the technology for their daily financial activities. Ghazali *et al*. (2018) [14] proposed that financial institutions solicit customer feedback to understand client demands and incorporate their recommendations into product development and service delivery. Creating digital financial awareness is the primary role of the government in establishing an ecosystem to increase internet access and digital penetration. The primary reason why individuals embrace digital wallets is convenience, claims Rathore HS (2016) [36]. The physical presence of those buying the products will be avoided. More POs solutions are being adopted by banks and the financial system to ease and improve the payment system. Further, she added that incentives allotted during fuel purchases

using digital payment systems are a promising approach to encourage more card-based digital transactions. At the same time, the hurdles of merchandise digital transactions made by rural consumers should be sorted out (Singh R., 2016) [50].

Wamuyu PK (2014) [57] stated that digital wallets offered many benefits while transferring money, such as convenience, security, and affordability. Perceived ease of use, expressiveness, and trust affect wallet payment methods. These factors are crucial for adopting digital payments. (Padashetty S, Kishore KS, 2013) [34]. The satisfaction of customers is directly related to the benefits offered by mobile banking (Sampaio CH, *et al*., 2017) [44]. Attitude, trust, and intention are the major factors in the adoption of digital wallet services. Digital finance eliminates indirect costs, reduces leakages, and provides affordable, secure banking systems. It includes different stakeholder participation like banks, financial institutions, mobile networks, operators, regulators, retailers, clients, etc. (Haider, *et al*., 2018) [16]. The lack of dispute resolution procedures affects people's digital payment systems (Salunke, 2022) [8]. The findings of Sait *et al*. (2024) [43] studied digital users and behaviour concerning digital exclusions. They found that users are excluded from digital wallet usage because of many dissatisfaction factors. Srivastava *et al*. (2024) [53] explored that socio-demographic variables have significantly affected people's digital adoption behaviour. Digital payments transform the current cash-centric society into a cashless society by giving importance to digital security, usage and adaptability. Though many factors are promisingly influencing the success of digital adoptions, many people still prefer cash for their financial needs. Age and education are the factors that influence their digital adoptions (Agarwal and Khatri, 2024) [1]. The findings of Ilieva *et al*. (2024) [19] explored that people's age, education, income and e-gov initiatives influence digital adoptions of payments. An individual's digital payment behaviour is significantly influenced by their age, education level, usage and income. The findings of Muksalmina *et al*. (2024) [31] revealed that utility, convenience, and demographic factors influence digital and mobile payment adoption. These findings conclude that demographic factors, security, convenience and users' preferences influence digital payment adoption behaviour. Rice (1997) have examined the factors that influence the attractiveness of digital usage. They are navigation, content and interactive. Suggested that satisfied services positively motivate people to use more digital platforms for their needs and wants. Found that trust, perceived usefulness, and ease of use are the major factors driving people to adopt and use digital services. Njite and Parsa (2005) [33] have different points that an individual's perceived risk, trust, and convenience significantly influence their digital adoption behaviour. Overall, ease of use, trust, and customer experience are pivotal for enhancing digital payment strategies and customer satisfaction.

Objective of the study

1. The primary objective of this study is to find out the rural households' digital finance adoption behaviour.
2. The secondary objective of this study is to find out the influence of rural households' demographic and financial awareness variables.

Research Methodology

The study is being conducted using a descriptive-exploratory research approach. To facilitate data collection, a multistage stratified sampling approach is utilized to gather target data from 660 samples collected from the district of Villupuram, Tamil Nadu.

Factorisation of digital finance adoption

Factor analysis is used to reduce the digital finance adoption variables into smaller factors. In this study, the major factors of adoption are taken as Access (AA), Cost (AC), Security (AS), Products and channels (APC), and Productivity (AP). These five factors constitute sixteen variables, which help to find out about rural households' digital finance adoption behaviour.

Table 1: KMO and Bartlett's Test

Kaiser-Meyer-Olkin measure of sampling adequacy		**0.878**
Bartlett's Test of Sphericity	Sig.	.000

Kaiser-Meyer-Olkin Measure of Sampling Adequacy of digital finance adoption variables is 0.878, which is higher than the threshold limit of above 60 percent. The significance value of Bartlett's test of sphericity is 0.000, which is less than the acceptable limit of 0.05. The overall findings of KMO and Bartlett's test of sphericity are helpful for further analysis.

Determination of factors

Factor analysis is a tool for reducing many variables into a smaller number of components, i.e., factors. To reduce the variables, the principal component matrix with Varimax rotation methods has been adopted. Components with eigenvalues larger than one are extracted and presented in Table 2.

Table 2: Digital finance adoption variances

S. No	Factors	Eigen Value	% of Variance Explained	Cumulative %
1	Component 1	8.165	51.030	51.030
2	Component 2	3.621	22.634	73.664
3	Component 3	2.771	17.318	90.982

Three components were extracted, and the percentages of variances explained by the three components are 51 percent, 23 percent, and 17 percent. The overall percentage of variance explained by digital finance adoption components is 91 percent.

Digital Finance Adoption Model (DFA)

In this study, factors that influence rural households' digital finance adoption, such as access, costs, security, products and channels, and productivity, are considered to determine their influence on their digital finance adoption. With the help of factorization, digital adoption factors concerning their variables are reduced to three factors: perceived operational efficiency, perceived ease of use, and perceived usefulness.

Factors loadings of digital finance adoptions

Table 3: Factor loadings of digital finance adoptions

	Factors	Description of the Statement	Factor
Perceived Operational Efficiency	AP1	Convenient-Digital finance mode of transactions is very convenient	0.84
	AA1	Range of services: Services offered by financial institutions meet my expectations	0.84
	AS1	Cash-I feel secure with all my cash transactions through the digital mode	0.83
	AA2	Location access-The Location of financial institutions is easily accessible	0.82
	AS2	Safety-I feel safe doing financial transactions in digital mode	0.82
	APC1	New products-Frequent new products from financial institutions motivate me to use more transactions through digital platforms	0.81
	AP2	Intuitive-Queries are spontaneously resolved by the service provider	0.81
	APC2	Delivery methods-Intermediaries of banks and financial institutions are offering good channels of distribution of products and services	0.8
	AC1	Efficient-The cost incurred for getting financial services from financial institutions is efficient and reasonable	0.79
	AC2	Affordable-The costs are affordable to meet my expectations	0.76
Perceived	APC3	Easy to use, Digital platforms are user-friendly for all my transactions	0.71
	AS3	Transparent-My digital transactions are transparent	0.69
	AC3	Participation-The cost of services rendered by the financial institutions is participatory	0.66
	AA3	Convenience-Based on my convenience, I approach financial institutions for my financial needs and transactions	0.64
Perceive	AP4	Client benefits-I have often been motivated by banks or financial institutions to receive benefits in terms of bonus points, reductions in interest rates, etc	0.92
	AP3	Needs of the consumers-My financial needs are often taken care of by banks/financial institutions	0.89

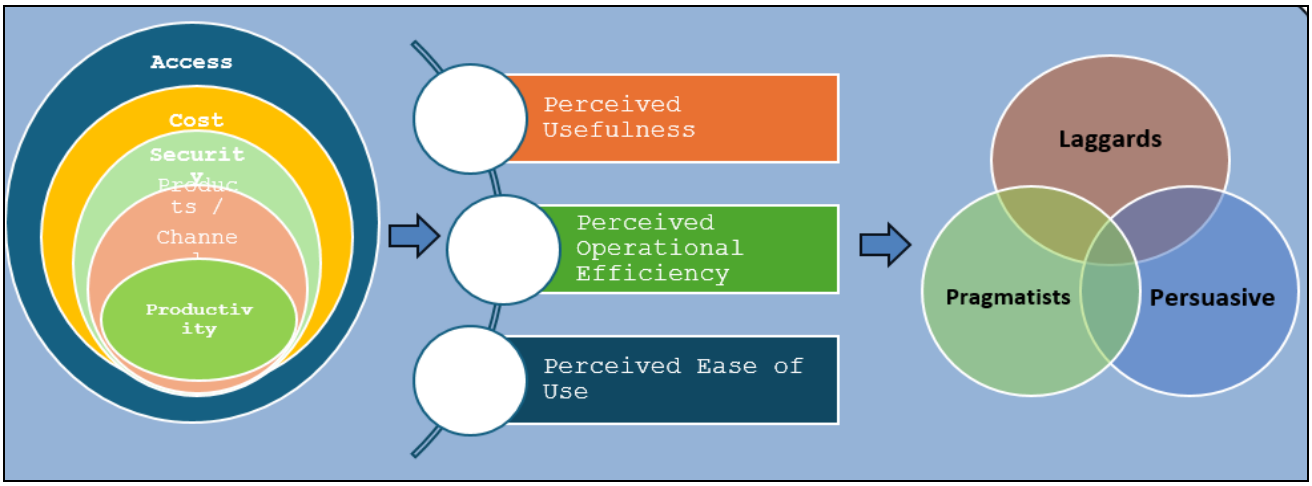

Fig 1: Digital finance adoption model

Perceived operational efficiency: The digital finance adoption model starts with the operational efficiency of financial institutions and banks. Operational efficiency is defined as 'the maximum utilization of resources to provide better products and services to end users. In this study, the operational efficiency of service providers is measured with the help of variables such as safety, location, delivery, services, cash, intuitive products, efficient attributes, and affordable attributes. People's perceptions of the operational efficiency variables help them make two decisions. They are perceived as ease of use and perceived usefulness.

Perceived ease of use: It is defined as "the degree to which a person believes that using a particular system would be free from effort." It includes the variables of ease of use of technology, participation, and transparency. The final output of the ease of use of digital finance technology gives satisfaction or dissatisfaction to the end users.

Perceived usefulness: It is defined as 'the extent to which technology is expected to improve a potential user's performance. It includes the variables of satisfaction and benefit expectations. Positive opinions on its use lead people to accept and use digital finance technology for their daily financial operations. A negative outcome of its usefulness leads to dissatisfied people, which provokes them to be digitally excluded.

Adoptions Behaviour

Using cluster analysis, perceived operational efficiency, perceived ease of use, and perceived usefulness factors are segmented into three homogenous groups. They are laggards, pragmatists, and persuasive

- **Laggards:** Slow to adopt technology, more stubborn, skeptical, and wary of technology.
- **Pragmatists:** Moderate to adopt technology, less stubborn, moderately convinced, mature and trust technology.
- **Persuasive:** Fast to adopt technology, intuitive, satisfied, young and more trusting of the technology, risk-seeking, persuasive, willing to use new technology, and concerned about their reputations.

Associations between digital finance adoption clusters and demographic/Financial awareness profile variables

The chi-square test is used to find the association between demographic and financial awareness variables and their digital finance adoption behaviours. The chi-square and significance values are shown in Table 4.

Table 4: Associations between demographic and financial awareness variables and digital finance adoption clusters

S. No	Demographic profile and financial awareness		Chi-square value	Sig
1	Demographic Profile	Age	86.530	0.000*
2		Gender	3.868	0.648
3		Marital status	5.236	0.514
4		Education	46.386	0.000*
5		Household size	29.609	0.062
6		Occupation	17.385	0.076
7		Religion	2.123	0.713
8		Caste	25.767	0.063
9		Holdings of land	49.101	0.282
1	Financial Awareness	Monthly income	55.875	0.000*
2		Expenditure	27.538	0.056
3		Investments	42.145	0.000*
4		Savings	47.285	0.000*
6		Device platforms	22.900	0.001*
7		Network availability	8.341	0.401
8		Distance of reaching financial institutions	4.279	0.831

*indicates the variables are statistically significant at less than 0.05

From Table 4**,** it is inferred that rural households' age, education, monthly income, investments, savings, and device platforms have shown significant associations with the digital finance adoption clusters.

Associations between age and digital finance adoption

The chi-square test helps to find out the significant association between rural households' age and their digital finance adoption clusters. The chi-square and significance values of this association are 86.530 and 0.000, respectively.

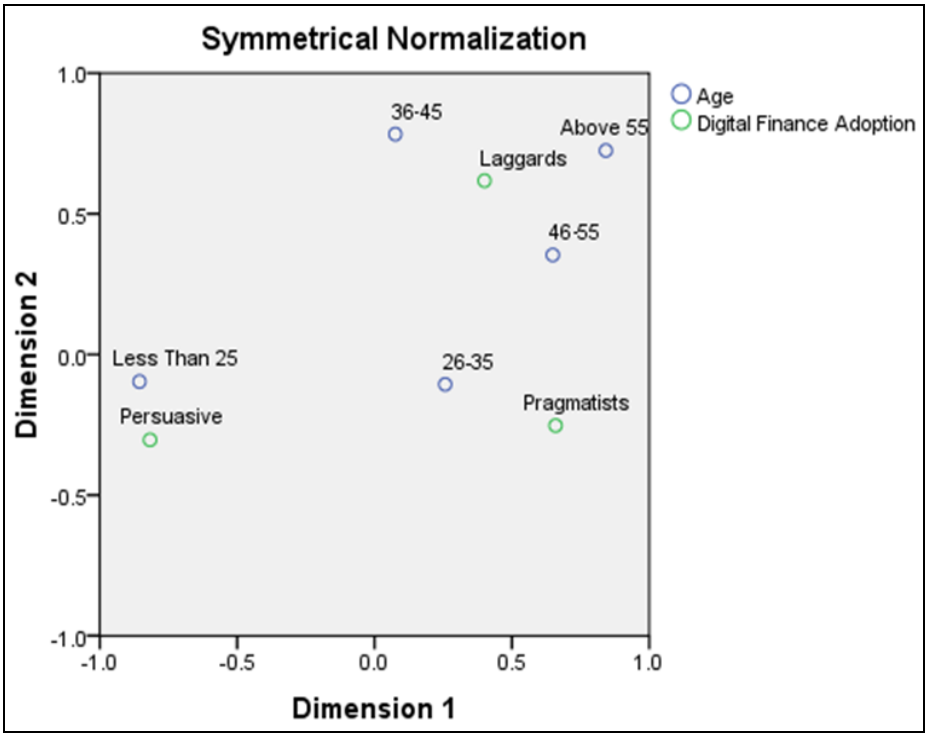

Fig 2: Age and digital finance adoption

The correspondence analysis Figure 2 explores that rural households belonging to the age groups of 26 and 35 are pragmatists, those above 36 years of age are laggards, and those less than 25 years of age are persuasive adopters. It clearly shows that households less than 25 years of age are early adopters with highly intuitive behaviour. According to Rogers (1965) [38], early adopters are typically younger, equipped with a good education, and have more financial lucidity. They are enthusiastic, risk-seeking, and not concerned about the idea of the future. They are the motivators to make others adopt digital technologies. Middle-aged groups (pragmatists) are normally neither risk-averse nor risk-seekers. They are combinations of both. They are cautious, logical, and hesitant. Digital finance adoptions will be based on the satisfaction with digital technologies. Elderly people adopt technology at a slower rate than younger age groups, compromising their potential to enjoy the advantages of technology (Anderson and Perrin, 2017) [4]. People between the laggards and the persuasive are pragmatists. They are mature, persuasive people.

Education and digital finance adoption

The technique of acquiring knowledge and adjusting to new technologies is referred to as technology adoption.

Education helps individuals learn, accept, and adopt digital technologies. The chi-square and significant values of the education and digital finance adoptions are 46.386 and 0.000, respectively.

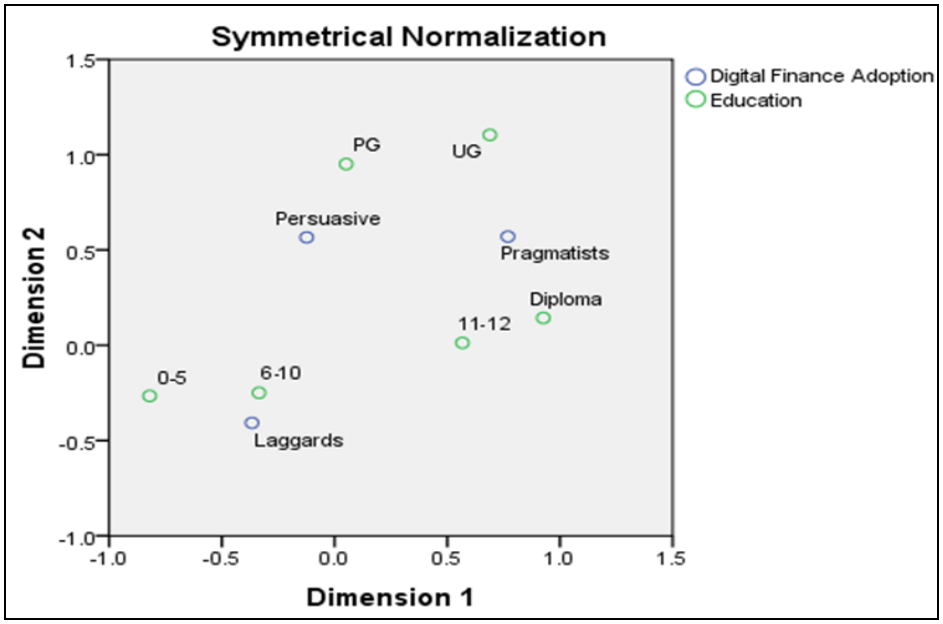

Fig 3: Education and digital finance adoption

Rural people who have studied up to the 10th standard are laggards; people who studied diplomas, 11th, and 12th standards are pragmatists and studied UG and PG degrees associated with persuasiveness. The findings of this study indicate that those who are less educated are laggards, while those who are moderate to highly educated are pragmatists and persuasive. It can be concluded that education makes people digitally literate, which reinforces their acceptance, adoption, and use of digital technologies in their financial activities. Highly educated individuals adopt new technology faster than individuals with less knowledge (Krueger, 1993) [23].

Income and Digital Finance Adoption

The findings of the chi-square test revealed that there is an association between rural households' income and digital finance adoption clusters. It's chi-square and significance values are 55.875 and 0.000, respectively.

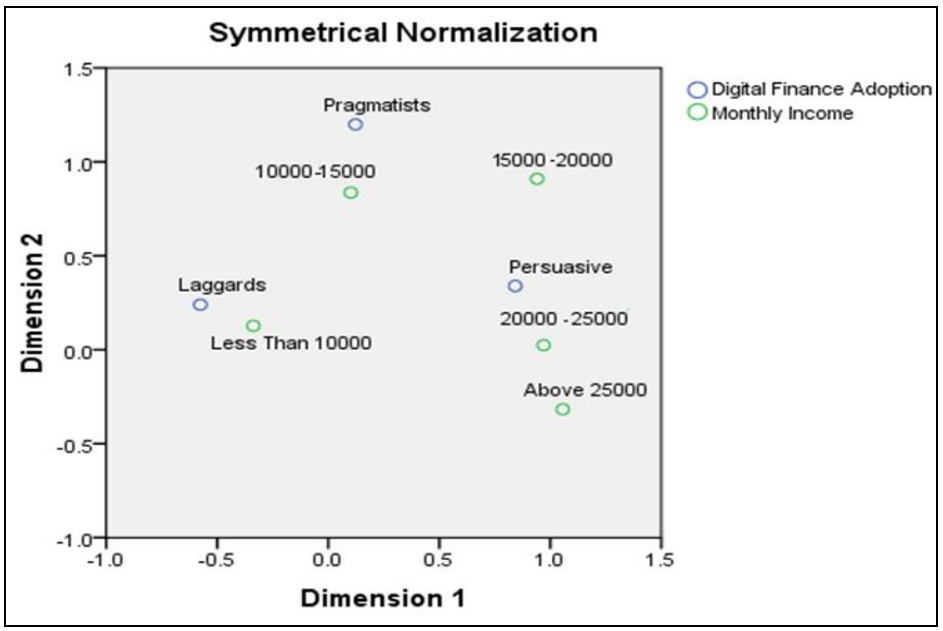

Fig 4: Income and digital finance adoption

Rural households earning less than 10000 are mostly laggards; those earning between 10,000 and 20000 are pragmatists; and those earning more than 20,000 are persuasive. It shows that low-income people are conservative about accepting and using digital finance tools. They still prefer cash for their daily financial activities. Middle and high-income people are using digital finance for their regular course of financing activities. Income has the potential to impact technology adoption. Lesser-income people adopt technology at a lesser rate than those with greater incomes.

Investments and Digital Finance Adoption

The chi-square test suggests that there is a strong association between rural households' investments and their digital finance adoptions. The chi-square and significant values of this association are 42.145 and 0.000. Figure 5 shows that rural households with a yearly investment of less than 25000 are laggard, investments between 25000 and 75000 are pragmatists and investments above 75000 are persuasive. It coincides with the income of rural households that low-income groups lead to fewer investments, middle-income groups are moderate investors, and high-income groups are high investors. It shows that rural households' income directly influences their investments and digital finance adoptions.

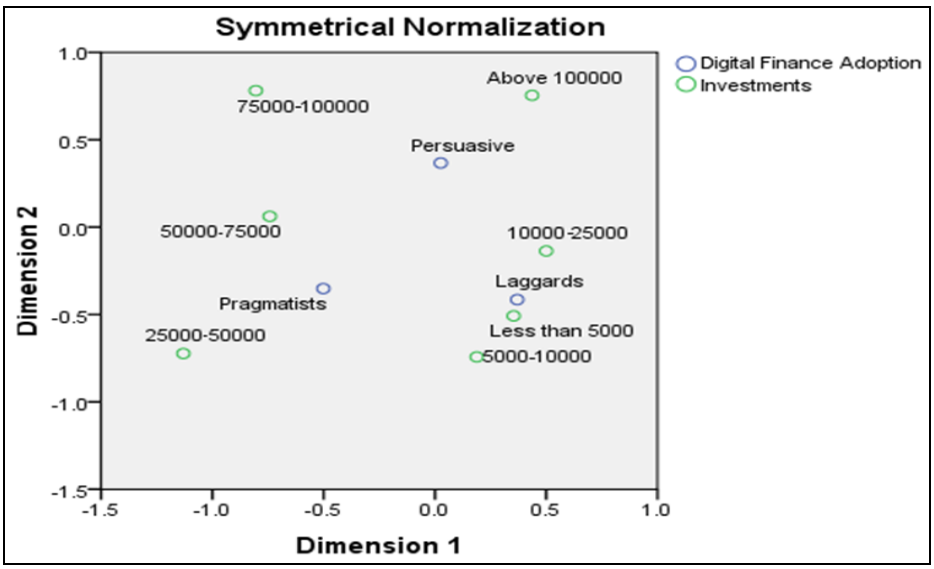

Fig 5: Investments and digital finance adoption

Savings and digital finance adoption

Automation has the potential to eliminate manual mistakes, labour expenses, and inefficiencies. It can result in better financial success. The chi-square and significance values of the associations between savings and digital finance adoption clusters are 47.285 and 0.000. People who have saved less than 25000 per year are laggards; those between 25000 and 75000 are pragmatists; and those above 75000 are persuasive. It shows that less-savvy people are slow adopters of technology, and vice versa. Individuals' savings are directly correlated with their income. Lower income leads to fewer savings, and higher incomes have a higher savings rate. Technology offers several advantages, including increased accuracy, cost savings, flexibility, and confidentiality (Mansour *et al*, 2022).

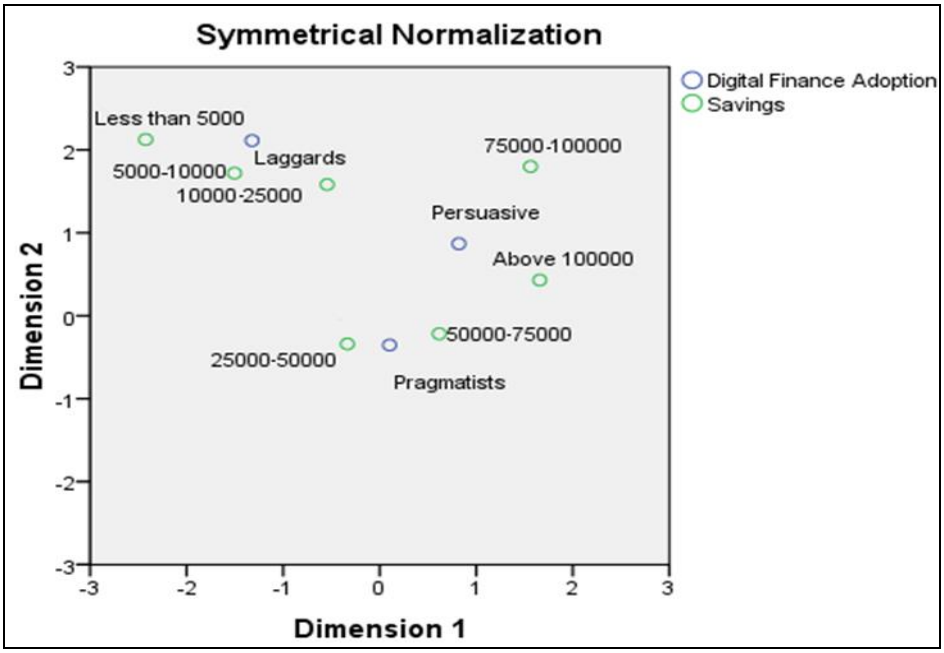

Fig 6: Savings and digital finance adoption

Device Platform Access and Digital Finance Adoptions

The chi-square and significance values of the association between rural households' digital finance adoptions and their device platform variables are 22.90 and 0.000.

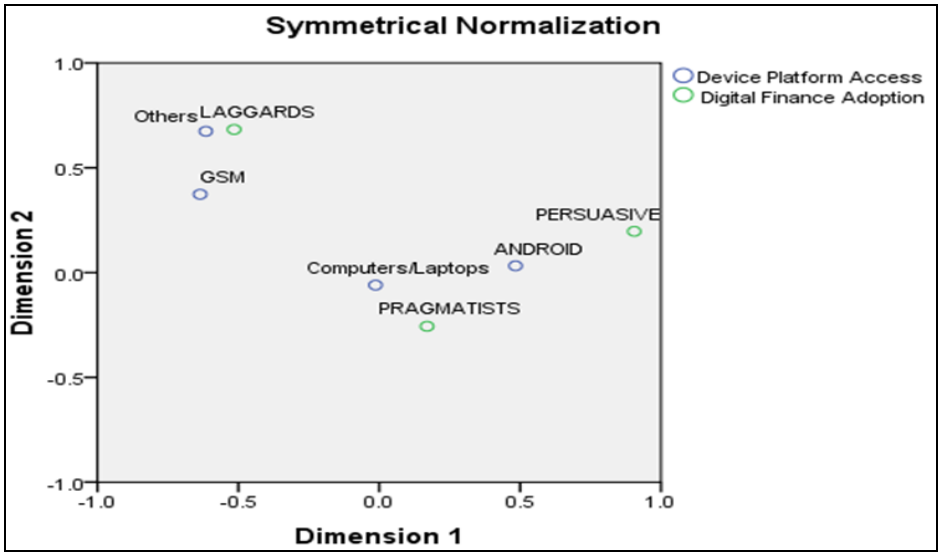

Fig 7: Digital finance adoption and device platform access

Rural households with GSM and other category devices are associated with laggard, Android mobiles, computers and laptops are associated with persuasive and pragmatic adoption behaviour. It indicates that people who are holding smartphones, computers, and laptops are rapidly adopting and using digital technologies for their financial tasks. Mobile phone adoptions positively influence people's online shopping (Yang *et al*., 2023) [60]. Mobile payments through digital platforms encourage people to adopt and use them. It reduces physical cash holdings and increases spending (Zhang *et al*., 2020) [66].

Conclusions

Electronic money is an emerging concept in India, aided by more effective information and communication technologies and widespread adoption of smartphones. By 2026, India's smartphone user base will have reached 1 billion. Rural India will account for around 56% of all new internet users by 2025. Rural residents now make up 36% of digital payment users. About 52% of Indians under 40 who have adopted and used digital platforms for their financial transactions make up 52% of the nation's population, which is marginally higher than the 46% global average (Trans Union CIBIL report, 2023). The nation's household digital literacy percentage is just 38%. Furthermore, although 67 percent of people in cities have access to the Internet, just 31 percent of those in rural areas do so (India Inequality Report, 2022). Even though digital banking has a bright future, rural families have less access to and use of digital technology than those living in cities. Therefore, this study has identified the variables that influence rural households' digital finance adoption behaviour. Findings of this study revealed that rural households' digital finance adoption behaviour can be classified as laggards, pragmatists and persuasive. Findings of associations between Rural households' demographic and financial awareness variables have shown that age, education, monthly income, investments, savings, and device platforms of rural families have shown significant associations with the clusters of digital finance adoption.

Directions for future research

The current study identifies various topics for future investigation. First, the present study has taken only digital finance factors to determine rural households' access and adoption behaviour. Many factors that can influence rural households' digital finance adoption behaviour. It needs to be studied. Second, the influence of demographic and financial awareness variables is restricted to a few variables to carry out this study. Future research can also include more variables to broaden the current research area. Finally, this study has concentrated only on rural households' digital finance adoption behaviour. The digital divide between rural and urban areas needs to be studied, which is also a promising area of future research related to this topic.

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