

Impact of Digital Finance on Rural Households' Financial Behaviour

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Abstract

Villages are the backbone of India. Rural households constitute 70% of India's population. Financial inclusions help rural households to open a bank account and encourage them to do more financial activities. Innovations in communications technology and mobile phone penetration in rural villages change rural households' digital finance behaviour. The government has taken many initiatives to make rural households be digitally literate. Despite all the initiatives of the government, the rural house still lags behind. This study has taken rural households as the target audience to find out their digital financial behaviour with respect to savings, remittances, payments, credit and investments. A multi-stage stratified random sampling method is adopted to carry out the study. Rural households' opinions are collected using structured questionnaires. The collected data is quantitatively analysed with the help of SPSS tools. The findings of this study revealed that financial behaviour traits are identified as a motivator, moderator and excluded. Security traits of digital finance transactions play a vital role in significant discrimination of different digital finance behaviours. Findings of Structural Equation Modelling reveal that the accessibility of various digital finance platforms can influence their digital financial behaviours in a broad way.

Keywords: Digital India, Digital Finance, Financial Behaviour, Financial Behaviour Traits, Financial Behaviour Classifications etc.

Introduction

Household Finance is an important sector in emerging countries which integrates the disciplines of economics, finance, development and behavioural studies. The word 'Household Finance Research' was coined by Tufano (2009). According to him, household finance is 'the study of how institutions provide goods and services to satisfy the financial functions of the household, how consumers make financial decisions and how government action affects the provision of financial services'. Emerging countries like India, Rural households play a significant role in the economic development of the country. Financial inclusions play a significant role in making rural households to be financially active. Advancement in communications technology and technological penetrations in rural villages reduce the digital divide between rural and urban. digital financial services makes the unbanked individuals gain access to digital financial services. Digital finance services are more convenient, high accessibility, speed, affordability and security. It reduces the direct and indirect cost of financial transactions. Further, it makes the government to directly credit the social security scheme benefits to the targeted people. Mobile phone penetrations can further boost the financial institutions and government to provide niche services to the end users. The digital India program helps the people to be a digitally literate and active participant. Some of the government initiatives of the digital India program are internet, mobile banking,

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e-governance and e-education. Rural households access digital platforms through smart phones, Automated Teller Machines (ATM), mobile applications, POs machines, Biometric devices, computers, tablets, etc. The primary objective of this study is to find out the digital financial behaviour of rural households with respect to their savings, credit, remittances, payments and investments. Financial behaviour traits are taken as factors to find out the rural households' different behaviours. The findings of this study will be useful to policy makers, financial institutions to produce niche products and services to satisfy the needs of rural households.

Review of Literature

Rural households' financial behaviour plays an important role in determining the poverty alleviation and economic development. Financial literacy helps the rural households to be more equipped with banking and financial activities. Revolutions in information and communication technology further fuelled the people to access and adopt more digital platforms for their daily course of financing activities. Internet and mobile phone penetrations in rural villages help the government and financial institutions to provide the best services to the targeted people. Mas (2012) found that financial inclusion is the process of bridging three clouds: 1) a physical cash cloud which is the legacy financial system where most poor people operate today; 2) a digital cloud where money is stored in a virtual account and 3) a psychological cloud (i.e., the brain) through which people interpret and plan their financial lives. Connecting the physical and digital clouds unlocks 'access' while connecting the digital and psychological clouds unlocks 'usage'. Digital banking platforms help the laymen to access all kinds of banking services at finger points. Digital illiteracy can lead to irrational financial behaviour of people, (Gigerenzer & Gaissmaier, 2011). Capuano and Ramsay (2011) found that an individual's community, psychological and cognitive factors determine the suboptimal and irrational consumer behaviour. A survey data of Beck and Brown (2011) revealed that digital platforms used by urban households have greater income and wealth. Though the fees are high for their financial transactions, they neglect it. However, such fees may be substantial to poor individuals in rural areas, thereby, reducing their incentive to use digital finance platforms. Use of digital finance by

farmers will be more likely to achieve sustainable income growth and consumption improvement through labour market outcomes, a 'secondary impact channel.' (Beck, Lu & Yang, 2015). Safety is the utmost priority and updating in financial services leads to positive or negative behaviour towards digital banking (Solomon, Shamsuddin & Wahab, 2013). India is the home of the largest internal migrant populations in the world. Domestic remittances played a significant role in the socio economic conditions of the households receiving remittances. Reserve Bank of India survey (2017), revealed that remittances to India also make up for 11.4% of the total global remittance inflow. It was also found in the survey that 59.2% of the remittance amount received in India was used for family maintenance- for the consumption of the family. 20 percent was used as deposits in banks while 8.3% was used to invest in equity shares, land, property, etc. About 74.2% of the transactions took place through private sector banks in India. The percentage of transactions that took place through public sector banks and foreign banks are 17.3% and 8.5%, respectively. According to the World Bank report (2019), India leads 82.2 billion \$ of remittances received among the other countries in the world. Remittances grew by more than 14% in India year on year. Lack of access to basic financial services restricts the ability of the rural poor to make savings and investments and engage in both formal and informal insurance mechanisms aimed at smoothing consumption and curbing poverty (Dupas & Robinson, 2008). Consumer attitude towards the digital adaptation mainly depends on their digital literacy, (Bhatt, Shaikh & Patel, 2022). Financial services to the remote rural people is very less, when compared to urban population, (Asli & Klapper, 2012; Kumar, 2006; Collins et al., 2009; Susan & Zarazua, 2011). Digital finance in the financial sector fills the access gap, which allows for socioeconomic improvements, especially among the financially excluded rural communities in many developing countries. Mobile banking helps the people to make deposits, transfer funds, purchase of goods and services very easily and conveniently. It provides a cheap and convenient way for family members and friends to exchange financial assistance in the form of remittances especially in remote areas with limited or no access to formal financial institutions like banks, (Mbiti & Weil, 2011). Jack and Suri (2011) suggested that access to mobile money services facilitates risk sharing, thereby considerably

reducing the transaction costs of remittances. Findings of Gupta (2021) suggested that 80 percent of Indian women are financially illiterate. There are many factors that contribute to making them illiterate. Some of the factors that contributed to making them digitally illiterate are the dominant patriarchal mindset, lack of quality service, lack of access to smartphones, absence of a regular income and lack of trust towards the financial system. Keeping savings 'At home' and/or in a 'Bank Savings Account' seemed to be the two most popular ways for them. While about 48% of migrants preferred to save 'At home', about 43% of migrants preferred to save in a 'Bank Savings Account'. About 22% of migrants were saved in both ways. About 61% recipients who had a bank account did not use an ATM to withdraw money. Not knowing how to operate an ATM was the biggest reason for not using it, followed by non-receipt of an ATM card. These findings revealed that accessibility to financial institutions and digital literacy should be addressed to tap the major chunk of migrant remittances. Findings of Amaka Precious Nnaji and Noble Nweze (2016) suggested that remittance was found to improve investment in agricultural production and increase farm income. There should be a transparent policy to improve remittance flows and to reduce problems encountered, for example, delay in receiving remittance, high bank charges, etc. Transparent remittances are not only facilitating local, regional and national economic development but also reducing poverty mainly in poor and marginalised families. Luo (2011) found that remittances not only increase rural income, but also reduces income inequality. 'Digital Wallet' has become a part of consumers which are nothing but smart phones which can function as leather wallets, Doan (2014). Wamuyu (2014) stated that Digital wallet offered many benefits while transferring money, such as convenience, security and affordability. Perceived ease of use, expressiveness and trust affect the wallet payment method. These factors are termed as crucial factors for adopting digital payments, Padashetty and Kishore (2013). According to Rathore HS (2016), convenience is the major factor for adopting digital wallet by the people. Physical presence of buying the products will be avoided. Findings of Taheem, Sharma and Goswami (2016) revealed that premium pricing, complexity, a lack of critical mass, and perceived risks are the barriers to adoption of digital payment systems. Rory Macmillan,

Partner, Macmillan Keck Attorneys and Solicitors (2016) findings suggested that the mobile banking services towards financial inclusiveness by using mobile cash transactions and payments to motivate many sectors in the formal economic system. Mymoon (2017) explored that digital India is possible only in the hands of citizens and youths. Roy (2018) suggests that digital payments in rural India are possible only if the security concerns are solved. Sagayarani (2018), digital payment is a type of payment method through which a payee and payer both utilise advanced modes to receive as well as send money. Quality and affordable access to digital connectivity is required to ensure that poor and low-income individuals can have access to digital financial services from any location and at all time (Ketterer, 2017). According to Vivek Joshi (2022), technological innovations will make the banking industry provide niche products and services to the end users in the near future. In his findings, he explained the role of fintech companies in the future financial industry is inevitable. Jayachandran C. (2004) in his studies revealed that factors determining the rural household savings are the personal income, family size, family income and life cycle of the household. Further, the findings explored that the most common form of investments made by the rural households are investments in physical assets like gold and financial assets like bank deposits. Lack of awareness is the major factor contributing to their least investment in financial assets. Findings from Sethupathi, M. (2011) suggested that rural households preferred only the traditional form of savings and investments. The role of education plays a significant role of increasing the financial inclusions among the rural households in India, Goel (2020),

Research Methodology

Descriptive research method was used to find out the digital finance behaviour of the rural households in the selected district of Tamil Nadu. Based on financial inclusion index data and Reserve Bank of India initiatives of digital financial literacy programme, Villupuram district is selected. A multi-stage stratified random sampling method is adopted to collect the primary data from the target audiences of rural households. Around 660 samples are collected and analysed with the help of SPSS and AMOS software tools.

Objective of the Study

- To find out the digital financial behaviour of rural households'.
- To find out the influence of rural households' digital access to their financial behaviour.

Factorisation of Digital Financial Behaviour Variables

Digital finance behaviour variables like Access, Affordability, Availability, Safety, Convenience, Fast and Transparency are taken for factorisations. Rural households' opinions about digital finance behaviour are collected by using the Likert scale. Variables are reduced into smaller components using a factor analysis method. Kaiser-Meyer-Olkin and Bartlett's Test help to find out the suitability of the data. KMO measure is used to find out the sampling adequacy of the variables.

Table 2: Digital Financial Literacy Variances

<i>Sr. No.</i>	<i>Factors</i>	<i>Eigen Value</i>	<i>% of Variance Explained</i>	<i>Cumulative %</i>
1	Component 1	9.888	28.251	28.251
2	Component 2	9.333	26.667	54.918
3	Component 3	6.229	17.797	72.715
4	Component 4	5.601	16.004	88.718

Four components are extracted with the condition of Eigen value greater than one. The total variances explained by these four components are 89%. Hence, it suggested that around 89 percent of variances are explained by the study variables with the help of these 4 components.

Accessibility

The first component contained the variables of financial behaviour of rural households' convenience,

Table 1: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.786
Bartlett's Test of Sphericity	Approx. Chi-Square	8858.64
	Df	10
	Sig.	.000

The sampling adequacy of the KMO value is 0.786. It is greater than the expected limit of 50%. Further, the significance value of Bartlett's test of Sphericity is less than 5%. Findings of KMO and Bartlett's test of sphericity supported the further analysis of factor reductions.

Determination of Factors

Factor analysis is used to reduce a large number of variables from a lesser number of factors. By using the principal component matrix with Varimax rotations, the digital finance behaviour variables are deducted with the conditions of Eigen value greater than one.

affordability and accessibility on savings, investments, credit, remittances and payments. There are 15 variables contained in this component which explain the rural households' financial behaviour of convenient, access and affordability of using digital finance services. Since accessibility leads to convenient and affordability, this component is named as Accessibility behaviour. The total variance explained by the Accessibility behaviour is around 28 percent. The factor loadings of accessibility factor are shown in Table 3.

Table 3: Accessibility

<i>Sr. No.</i>	<i>Factors</i>	<i>Description of the Factor Statement</i>	<i>Factor Loadings</i>
1	CR	Remittance Conveniency	0.83
2	CC	Credit Conveniency	0.83
3	CP	Payment Conveniency	0.82
4	CS	Savings Conveniency	0.82
5	CI	Investment Conveniency	0.82
6	AFI	Investment Affordability	0.79
7	AFS	Savings Affordability	0.78

<i>Sr. No</i>	<i>Factors</i>	<i>Description of the Factor Statement</i>	<i>Factor Loadings</i>
8	AFR	Remittances Affordability	0.78
9	AFC	Credit Affordability	0.76
10	AFP	Payments Affordability	0.75
11	AP	Payments Accessibility	0.54
12	AR	Remittances Accessibility	0.52
13	AS	Savings Accessibility	0.51
14	AI	Investments Accessibility	0.50
15	AC	Credit Accessibility	0.49

The above factors explore the knowledge of access, convenience and affordability. These attributes are basic primary attributes expected by the rural households. Accessing finance information, using digital platforms can make the people use banking activities easier than the traditional way of approaching the banking services. The customer needs to be met out to fulfil minimum digital accessibility requirements. The frequency table of Accessibility factor explores that around 40% have shown strong accessibility, 16% are neutral and 44% are low accessibility. An overall conclusion can be made that

only 40% of rural households have shown strong access and use of digital finance in their financial activities.

Transparency

The Second component contains the variables of transparency trait which explains the digital financial behaviour of savings, credit, payments, remittances and investments. Transparent is the secondary factor expected by the people in their digital finance activities. Hence, these variables are collectively named as secondary factors.

Table 4: Transparency

<i>Sr. No.</i>	<i>Factors</i>	<i>Description of the Factor Statement</i>	<i>Factor Loadings</i>
1	TS	Savings Transparency	0.88
2	TC	Credit Transparency	0.87
3	TP	Payments Transparency	0.87
4	TR	Remittances Transparency	0.87
5	TI	Investments Transparency	0.86

Digital finance services delivered through digital technology having a transformative effect on the financial sector. Transparency motivates the people to use more digital platforms for their daily course of financial activities. The frequency table of transparency behaviour suggests, 30% have shown digital finance is more transparent in nature. About 35% are neutral and the

remaining 35% have perceived that digital finance is less transparent.

Secure

The third component contains the variables which explain the rural households' financial behaviour of safety, secure and faster transactions of digital money.

Table 5: Secure

<i>Sr. No.</i>	<i>Factors</i>	<i>Description of the Factor Statement</i>	<i>Factor Loadings</i>
1	SSS	Savings, Safety/Secure	0.74
2	FQS	Savings Fast/Quick	0.73
3	FQP	Payments Fast/Quick	0.73
4	SSR	Remittances Safety/Secure	0.72
5	SSI	Investments Safety/Secure	0.72
6	FQR	Remittances Fast/Quick	0.71

Sr. No.	Factors	Description of the Factor Statement	Factor Loadings
7	SSC	Credit Safety/Secure	0.71
8	FQI	Investments Fast/Quick	0.71
9	SSP	Payments Safety/Secure	0.70
10	FQC	Credit Fast/Quick	0.52

The variables contained in the safety and secure traits explain the tertiary behaviour of digital finance. Due to changing banking services, financial institutions are providing more digital platforms for their customers to fulfil their expectations and make them satisfied customer. Above variables are collectively named as secure financial services. Security of financial information, data and transactions motivate the people to use more and more digital platforms. Dissatisfaction on this factor makes the people to be digitally excluded. According to

the frequency analysis of secure behaviour, 31% have felt digital finance is secure, 31% are neutral and 38% are unsecured.

Availability

The fourth component contains the variables which explain digital finance availability. Availability of different digital platforms makes people use different digital tools for their financial transactions.

Table 6: Availability

Sr. No.	Factors	Description of the Factor Statement	Factor Loadings
1	AVI	Investments availability	0.89
2	AVS	Safety availability	0.88
3	AVR	Remittances availability	0.88
4	AVP	Payments availability	0.87
5	AVC	Credit availability	0.80

Availability of digital tools helps the rural households to choose based on their need and satisfactions. Access is primarily captured by indicators related to availability of means to access digital financial services. A positive accessibility will lead to positive availability attributes. About 31% of rural households have shown that they are using the available digital financial tools in a maximum way, 50% are neutral and 19% are not less using available digital financial tools.

Segmentations of Digital Finance Behaviour

Segmentations of rural households' financial behaviour can be classified by using K-means clustering technique. The mean values of three homogenous groups are taken and ranked and named as clusters. F statistics and significant values of different factors with respect to three clusters are tabulated in the ANOVA table.

Table 7: Final Cluster and ANOVA Table

Factors	Cluster			F	Sig
	1	2	3		
Access	1	3	4	14.222	.000
Transparency	2	2	5	21.517	.000
Secure	2	1	5	54.904	.000
Availability	2	3	4	18.338	.000
No of cases in each cluster	224	216	90		
Total percentage	42	40	18		

The significant values of the three clusters are 0.000 which is an acceptable limit of less than 5 percent. Further, the F statistics of security factors are high. A higher F value of the security factor determines the segmentations of three

clusters. Frequency table of different clusters reveals that 42% of households belong to Cluster 1, 40% to Cluster 2 and 18% to Cluster 3.

Informed

The first cluster contains the factors of access, transparency, secure and available with a high degree of acceptable behaviour. These households are positively accepted and adopt the use of digital technology in their daily course of financial activities. They are more informed people about the various digital finance tools and platforms than the other two clusters. Hence, they are called informed households. Around 42% of people belong to this cluster category. They are well versed in all digital platforms and use it appropriately for their financial needs.

Moderator

The second cluster contains the variables of moderate influence of accessibility and availability and high influence of transparency and security. Though this category people know digital finance and its prospects, moderate accessibility and availability of digital tools and platforms can make them a moderator. The moderator can be an informed person, if the access and availability of digital technology is increased. Hence, they are called as moderators. Around 40% of the people belong to the moderator category.

Excluder

Financial behaviour traits like accessibility, affordability, security and transparency are low influenced by this category. They are less informed and somewhat excluded

people. Hence they are called as excluder. Around 18% of rural households belong to the excluded category. F statistics of security factors are high. It shows that the security factor is the dominating factor for determining the financial behaviour cluster classifications. Security behaviour is the main reason for the person who is being excluded.

Reliability of Classification

Discriminant analysis is a technique used to find out the reliability of classifications of different financial behaviours. Factors like access, transparency, security and availability are taken as predictors and clusters taken as grouping variables to find out the reliability of cluster classifications.

Table 8: Tests of Equality of Group Means

Factors	Wilks' Lambda	F	Sig.
Access	.768	14.222	.000
Transparency	.686	21.517	.000
Secure	.474	54.904	.000
Availability	.719	18.338	.000

Security factor has low Wilks' Lambda value and higher F statistics. Other findings of the above values suggest that there exists strong statistical evidence of significant differences between the mean values of three clusters. The significance values of the four factors are 0.000. It can be concluded that the cluster classifications are statistically significant.

Table 9: Eigen Values

Function	Eigen Value	% of Variance	Cumulative %	Canonical Correlation
1	2.433a	67.1	67.1	.842
2	1.195a	32.9	100.0	.738

Functions 1 and 2 have higher Eigen values of greater than 1 and the canonical correlations of function one is 0.842 and function two is 0.738 which are higher than the threshold limit of greater than 60%, that is, the coefficient of canonical correlations is higher for functions 1 and 2. Higher Eigen value and canonical correlations convey that there exists a strong relationship between the functions and factors.

Table 10: Structure Matrix

	Function	
	1	2
Access	0.47*	0.42
Transparency	0.42*	0.13
Secure	0.01	0.50*
Availability	0.24	0.45*

The structure matrix table has shown that there exists a strong correlation between dependent factors with the canonical function. Function 1 has shown the strongest correlation existed with access and transparency, and function 2 is secure and available. The two functions with respect to its correlation factors are:

$$Z1 = (0.47) * \text{Access} + (0.42) * \text{Transparency} \quad \text{and} \quad Z2 = (0.50) * \text{Secure} + (0.45) * \text{Availability}.$$

Structural Equation Modeling

Structural Equation Modelling is used to identify the interactions between different study variables. The study variables taken for this study are accessible, affordable, available, convenience, safety, fast and transparency. In this study, Access is taken as an independent variable and all other remaining variables taken as the dependent variables to find out the interactions between different studies variables. Goodness of fit indexes is calculated and presented in Table 11.

Table 11: Goodness of Fit

Statistics Categories	Indexes	Recommended Value	Study Value	Interpretations
Absolute Fit	Normed chi square	Less than 5	4.4	Good fit
	P value	Less than 0.05	0.75	Good fit
	CMIN/DF	Within 1 to 5	4.6	Good fit
	GFI	More than 0.90	0.95	Good fit
	AGFI	More than 0.90	0.91	Good fit
	RMSEA	Less than 1	0.08	Good fit
Incremental Fit	NFI	Less than 0.90	0.92	Good fit
	TLI	More than 0.90	0.90	Good fit
	CFI	More than 0.90	0.91	Good fit
Parsimony Fit	AGFI	More than 0.90	0.92	Good fit

The table shows the value of absolute fit, incremental fit and parsimony fit. All the above indices have shown that the variables chosen for the study are perfectly fit.

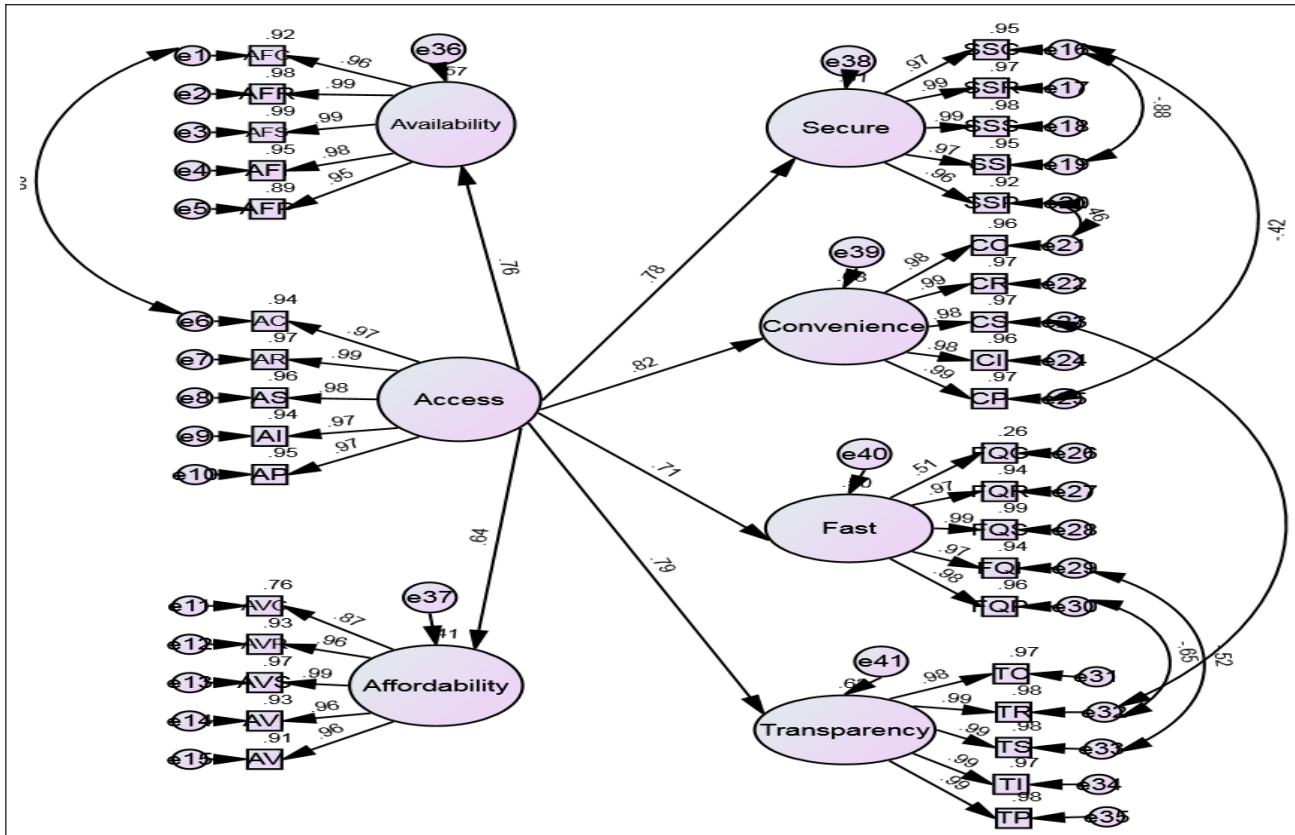
Structural Equation Modeling of Financial Behaviour Variables

Table 12: Impact of Accessibility on Financial Behaviour Attributes

Independent Variable	Dependent Variable	Path Coefficient	Standard Error	T-Value	P-Value
Access	Secure	0.780	0.041	13.569	0.000
	Convenience	0.824	0.050	15.565	0.000
	Fast	0.708	0.079	5.971	0.000
	Transparency	0.789	0.047	14.102	0.000
	Affordability	0.639	0.045	9.229	0.000
	Availability	0.758	0.053	12.268	0.000

The Table 12 explores the path coefficient values, standard errors, t and p values. Here, independent variables are taken as access and dependent variables as secure, convenient, fast, transparency, affordability, availability, etc. The path coefficient of access with respect to convenience is higher than other interactions. It shows that digital finance accessibility provides an opportunity for the rural households to do various financial activities

based on their convenience. Simultaneously, the path coefficient of impact of accessibility on affordability is lower value compared to other financial behaviour attributes. It indicates that accessibility has shown less influence on affordability attributes of rural households. An overall conclusion arrives that accessibility of various digital finance platforms can influence their digital financial behaviours in a broad manner.



Conclusions

Digital finance is a niche area in finance which allows the people to access all banking activities through digital platforms and tools. It is both beneficial to service providers and the service receiver in all aspects. It reduces costs, increases transparency; convenience and safety. Though the mobile phone penetrations are high in villages, still the rural households' accessibility and adoptions are lagging behind the urban people. In this study, the rural household's digital finance behaviour is studied using their savings, investments, credit, remittance and payments. The findings of this study explored that rural household digital finance behaviour can be classified as informed, moderator and excluded. Security variable contributes the segmentations of different homogenous clusters into heterogeneous cluster groups. Findings of structural equation modelling suggested that rural households' digital access has shown the strong influence of their conveniences and less influence of their affordability variables. The findings of this study will be useful to the financial institutions, banks, Governments and other regulatory bodies for framing policies and producing

products and services to meet the rural households' expectations.

Future Research Works

In this study, digital financial behaviour of rural households with respect to their savings, investments, remittances, credit and payments are taken only to carry out the study. Demographic and psychological factors can also hinder their financial behaviour. It should be studied to broaden the current research area in future research works.

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