Adoption of Digital Innovations in Rural Banking of Vellore District: Based on UTAUT Model

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Abstract

The banking sector has encountered unrivalled disruption due to digitalisation and emerging technologies, and this rapid transformation is constantly increasing. Critical decisions are required by banks wherever technological changes appear in customer expectations and the regulatory environment. Digital innovation is the implementation of technological innovations to improve various facets and processes of a business, stimulate development, and increase overall efficiency. Digital innovations in banks include digital wallets, the application of personal financial administration tools, biometric identification, and mobile applications. This article is predicated on the UTAUT (Unified Theory of Acceptance and Use of Technology) model proposed by Venkatesh in 2003 to identify the adoption of digital innovation in the banking industry among the rural public. This paradigm includes four concepts: performance expectancy, effort expectancy, facilitating condition, and social influence. In addition to the four structures, security measures were also included. Using a sample size of 525, digital users in rural areas, the study used Structural Equation Modelling (SEM) to gauge customer opinions. The result reveals that most of the customers are utilising digital innovations to make their work easier and faster and also a positive relationship exists among the constructs.

Keywords: Digital innovations, UTAUT model, Digital wallets, Mobile applications, Biometric identification.

Introduction

The banking industry has rapidly transformed due to digitalisation and emerging technology. Banks are in a crucial situation to implement and adapt the technological changes to provide their customers with a wide range of services. Digital innovation implies deploying technological innovations and applications to enhance corporate operations and workforce productivity, elevate customer service, and introduce novel products or operation models. Mobile currencies, marketplace financing, robo-advice, insurance technology, and digital assets are some recent innovations in financial technology that have evolved around the globe. Fintech has increased access to financial services over the last decade. Commercial users will benefit from the convenience of financial services (1).

The emergence of technological innovations such as the Internet of Things (IoT), Artificial Intelligence (AI), remote surveillance, proactive care, additive manufacturing, big data, cloud computing, and business analytics are perceived as innovative and transformative prospects for businesses (2). Further, banking innovations allow customers to access simple and affordable banking amenities. Banks can benefit from technology-intensive products by improving internal procedures, productivity, cost and profit margins by leveraging the network, dimension, and scale efficiencies, which resulted in effective money laundering and risk management (3). The Innovative banking products include a cheque truncation system, smartwatch banking, contactless payments using Near Field Communication (NFC), and microfinance (4). The government was able to make "Digital India" a reality. This foresight was crucial in securing regulatory measures to facilitate banking's digital transformation. As digital banking has evolved, mobile banking on smartphones has become more popular (5). Financial innovations and technological advancements impacted the banking sector, leading to a fundamental transformation in banking operations, customer interactions, and competitive dynamics. The introduction of innovative financial services and offerings, such as online banking, mobile payment

services, and virtual currencies, has provided banks with the potential to broaden their client base while boosting their profitability (6). By embracing modern technology, financial institutions have reaped multiple benefits. The primary modern banking technologies include power computing, artificial intelligence, machine learning, datafying, augmented reality and robotic process automation. These technological innovations pave the way for digital advancements in the banking business (7). The paper utilises the UTAUT model to ascertain the various factors that affect the level of adoption of digital innovations. While numerous research articles exist on digital banking innovations and the UTAUT paradigm, only a limited number of articles specifically address the aspect of security measures and a research study covering rural areas. This research intends to fill the gap by undertaking the study in rural areas and also focusing on security factors. The main objectives of the study are to identify the variables that influence the adoption of digital rural banking and to find out the existence of a positive relationship among the variables.

Theoretical Background

Numerous studies have been conducted to comprehend the acceptance and utilization of technologies. The Unified Theory of Acceptance and Use of Technologies (UTAUT) is widely used in explaining individuals' acceptance of technologies. The fundamental UTAUT model posits that individuals are more likely to adopt and utilize technology when it possesses four key attributes: performance expectancy, effort expectancy, social influence, and enabling conditions (8). This theory was originally propounded by (9) in the year 2003. This model has been extended further as UTAUT 2 and includes three more variables such as price value, hedonic motivation and habit (10). In 2017, performance innovativeness (PI) was included as one more factor by (11) and UTAUT 3 has been propounded. Personal innovativeness is the measure of an individual's inclination to engage in experimentation and the adoption of new technology. The UTAUT model is a frequently and widely used model in technology adoption articles. This model is gaining popularity due to its extensibility through the incorporation of diverse

factors. Since the current study is to measure the adoption of technology, the study uses the UTAUT model.

Hypothesis Development

In recent years, a multitude of concepts and frameworks have emerged intending to elucidate and delineate the factors that influence the acceptance and use of electronic banking. This study is based on the theoretical framework known as the "Unified Theory of Acceptance and Use of Technology (UTAUT)." The UTAUT framework incorporates four key concepts: performance expectancy, effort expectancy, facilitating conditions, and social impact. Drawing upon the theoretical framework previously examined, this paper added a novel element known as the security feature.

Performance Expectancy

Performance expectancy plays a significant role in shaping individuals' propensity to embrace innovative technology (12). This variable assesses the extent to which the rural population's behavioural intention usage and adoption of digital innovations are influenced by their performance expectancy. As a result, the subsequent hypotheses have been developed.
H1: Performance expectancy posits a favourable association with behavioural intention.
H7: Performance expectancy posits a favourable association with behavioural use.

Effort Expectancy

Effort expectancy pertains to the degree of simplicity and convenience an individual can experience when utilising technology to accomplish their objectives. A further definition of the ease level of tasks is the condition in which individuals expend unnecessary mental effort to carry out their duties through the use of technology (13). This component evaluates the perception of effort required by rural populations while using digital banking products, concerning their intention to use and actual usage behaviour. As a result, the subsequent hypotheses have been developed.
H2: Effort expectancy posits a favourable association with behavioural intention.
H8: Effort expectancy posits a favourable association with behavioural use.

Facilitating Condition

Facilitating conditions refer to the extent to which an individual perceives that the existing organisational and technological framework effectively enables the utilisation of an existing system. (14). This variable analyses the extent to which the availability and accessibility of digital banking services in rural areas influence individuals' intentions and usage patterns. As a result, the subsequent hypotheses have been developed.

H3: Facilitating condition posits a favourable association with behavioural intention.

H9: Facilitating condition posits a favourable association with behavioural use.

Social Influence

Social influence is a term used to describe the impact of external environmental elements on an individual's conduct and perception of specific activities, as well as their perceptions of friends, relatives, family members, or co-workers (15). This variable quantifies the extent of social influence exerted by digital banking products on the rural population. As a result, the subsequent hypotheses have been developed.

H4: Social influence posits a favourable association with behavioural intention.

H10: Social influence posits a favourable association with behavioural use.

Security

Security encompasses the customer's perception of the dependability and credibility of the employed technologies (16). Customers confidence in the safety of their financial transactions is gauged here. As a result, the subsequent hypotheses have been developed.

H5: Security posits a favourable association with behavioural intention.

H11: Security posits a favourable association with behavioural use.

Behavioural intention and use

The concept of behavioural intention refers to an individual's inclination or interest in engaging in a particular behaviour. It is defined as how people truly plan to make use of tools and resources. (17). Hence, the following hypothesis has been developed.

H6: Behavioural Intention posits a favourable association with Behavioural Use.

Methodology

The study uses a sample of 525 customers from rural areas in and around the Vellore District in Tamil Nadu, India. The researcher selected rural areas for the study because 56.76% of the Vellore population consists of rural populations and their literacy rate is 75% as per census records. The study used a cluster sampling technique, with digital users as the sample unit. The district is made up of 5 taluks and 285 individual villages. From among the 285 communities, a representative sample was chosen. The duration of the research spanned nine months, commenced in December 2021 and concluded in August 2022. A five-point Likert scale spinning from strongly disagree-1 to strongly agree-5 has been used in the study. For statistical analysis, we employ both SPSS 3.0 and AMOS 3.0. Exploratory Factor Analysis was used to evaluate the offered model in terms of its measurement model and model fit. Structural equation modelling is employed to verify the hypotheses. Approximately 560 questionnaires were distributed to the rural community residing in the Vellore district. But out of 560 questionnaires 21 are with missing data and 14 with no response. Hence a total of 525 replies were utilised for further study. The research used the UTAUT model by incorporating five exogenous variables viz., performance expectancy, effort expectancy, social influence, facilitating condition and security and two endogenous variables viz., behavioural intention and behavioural use.

Results and Discussion

Table 1 exhibits the elaborated data on the demographical information of the respondents. The demographic profile of the respondents reveals the following information. Regarding gender, (51%) are female population and (49%) are male population. Most of the respondents are in the age category of 26-35 (40%) and 36-45 (28%). Regarding education, over 30% of the participants have completed their undergraduate studies, while (24%) have pursued further study at the post-graduate level. Most of the digital users are in the student community (26%) and 24% of them are private employees. The majority (52%) of the respondents are unmarried and (48%) of them are married.

Table 1: Demographical Data (N= 525)

Variable	Frequency	Valid Percent
Gender		
Male	259	49.3
Female	266	50.7
Age		
18-25	99	18.9
26-35	212	40.4
36-45	147	28.0
46-55	35	6.7
Above 55	32	6.1
Education		
Below 10th	60	11.4
10th to 12th	96	18.3
Diploma	85	16.2
Graduate	158	30.1
Post Graduate	126	24.0
Marital Status		
Married	253	48.2
Unmarried	272	51.8
Dependent family members		
Nil	85	16.2
One	167	31.8
Two	120	22.9
Three	67	12.8
Four	68	13.0
More than four	18	3.4
Occupation		
Government Employee	76	14.5
Private Employee	126	24.0
Student	135	25.7
Retired	96	18.3
Business/Self-employed	92	17.5
Bank Account		
State Bank of India	38	7.2
Indian Bank	64	12.2
City Union Bank	69	13.1
Canara Bank	80	15.2
Axis Bank	99	18.9
Vijaya Bank	106	20.2
Bank of Baroda	69	13.1
Type of Account		
Savings Bank	222	42.3
Fixed Deposit account	168	32.0
Current account	135	25.7
Reason for using digital products		
Payment of bills	120	22.9
Fund transfer	208	39.6
Checking statements of accounts	121	23.0
Making deposits	35	6.7
Withdrawals	41	7.8

Table 2: Validity of the data

	CR	AVE	MSV	MaxR (H)	PE	EE	FC	SI	SEC	BI	BU
PE	0.928	0.765	0.003	0.92	0.832						
EE	0.876	0.639	0.002	0.846	-0.007	0.745					
FC	0.919	0.793	0.115	0.908	-0.003	-0.079	0.867				
SI	0.864	0.681	0.131	0.844	-0.032	0.072	-0.054	0.774			
SEC	0.907	0.765	0.002	0.901	0.011	0.127***	0.200***	-0.001	0.846		
BI	0.904	0.759	0.118	0.897	0.071	0.009	-0.042	0.342***	-0.032	0.838	
BU	0.911	0.773	0.127	0.907	-0.017	-0.032	0.427	-0.067	-0.375***	-0.024	0.848

PE- Performance Expectancy, EE- Effort Expectancy, FC-Facilitating Condition, SI- Social Influence, SEC- security, BI-Behavioural Intention, BU- Behavioural Use

Table 3: Matrix of rotated components

	Rotated Component Matrix							Reliability
	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	
PE1	.803							0.87
PE2	.915							Performance
PE3	.901							Expectancy
PE4	.875							
EE1		.772						0.80
EE2		.808						Effort
EE3		.790						Expectancy
EE4		.828						
FC1			.915					0.89
FC2			.843					Facilitating
FC3			.911					Condition
SI1				.848				0.83
SI2				.857				Social
SI3				.779				Influence
SEC1					.839			0.87
SEC2					.858			Security
SEC3					.907			
BI1						.843		0.88
BI2						.922		Behavioural
BI3						.850		Intention
BU1							.840	0.81
BU2							.772	Behavioural
BU3							.812	Use

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 6 iterations.

Nearly (20%) of the respondents maintain their account in Vijaya Bank and (19 %) of them maintain it in Axis Bank. Most of the customers (42%) are maintaining savings bank accounts. A majority of the respondents are using digital products for transfer of funds (40%) and payment of bills (23%).

The validity of the variables is displayed in Table 2. The computation of the Average Variance Extracted (AVE) is used as a means to assess the degree of convergent validity. Variables are considered to be approved if the Average Variance Extracted (AVE) exceeds a threshold of 0.5. Here, all variables exhibit values greater than 0.5. Composite Reliability is calculated to evaluate the reliability or consistency of an item. Variables are considered to be acceptable if their CR exceeds 0.7.

The researchers employed Exploratory Factor Analysis (EFA) as a statistical technique to ascertain the elements that assess the adoption of digital innovations among the rural population. Before proceeding, it is imperative to assess the suitability of the exploratory factor analysis (EFA) by subjecting it to scrutiny against the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's Test of Sphericity. All items in the study had communalities above 0.40, indicating that none of the items needed to be excluded. A total of seven components were retrieved, accounting for a cumulative variance explained of 76.890. Hence, the selected variable in this study accounts for 77% of the variance in the model.

Table 3 displays the matrix of the rotated component. It shows the reliability value of each variable. Cronbach's alpha is employed as a measure to evaluate the reliability of the variables. It is observed that all the reliability values surpass the threshold of 0.725, hence showing satisfactory levels of reliability.

Model Measurement

Confirmatory Factor Analysis is employed to assess the fit indices of the suggested structural model. This model includes the Goodness of Fit Index (GFI), the Adjusted Goodness of Fit Index (AGFI), the Normal Fit Index (NFI), Tucker-Lewis's Index (TLI), the Comparative Fit Index (CFI), the Relative Fit Index (RFI), the Incremental Fit Index (IFI), Root Mean Square Residual (RMR) and Root Mean Square Error of Approximation (RMSEA). All these indexes are shown in Table 4 with before and after modification of the model results. All the indices show a perfect model fit based on their cut-off values. Cronbach's alpha is employed as a measure to evaluate the reliability of the variables. It is observed that all the reliability values surpass the threshold of 0.725, hence showing satisfactory levels of reliability.

Hypothesis Testing

By employing Structural Equation Modelling (SEM), researchers can uncover the association between the construct and the variable. SEM offers the advantage of doing a comprehensive assessment of numerous variables concurrently. The SEM Model has been displayed in Figure 1.

The external variables such as performance expectancy, effort expectation, facilitating condition, security and social influence have a favourable association with behavioural intention and use.

Table 4: Fit indices

FIT STATISTIC	Cut-Off	Before Modification of the Model	After Modification of Model
x^2	-	642.045	493.190
x^2 significance	$p \leq 0.05$	0.000	0.000
x^2/df	≤2- 5.0	3.072	2.371
GFI	≥ 0.90	0.913	0.930
AGFI	>0.90	0.885	0.907
NFI	≥ 0.90	0.910	0.931
RFI	≥ 0.90	0.891	0.916
IFI	≥ 0.90	0.937	0.959
CFI	≥ 0.95	0.937	0.959

TLI	≥ 0.90	0.924	0.950
RMSEA	≤0.08	0.062	0.050
RMR	≤0.05	0.044	0.037
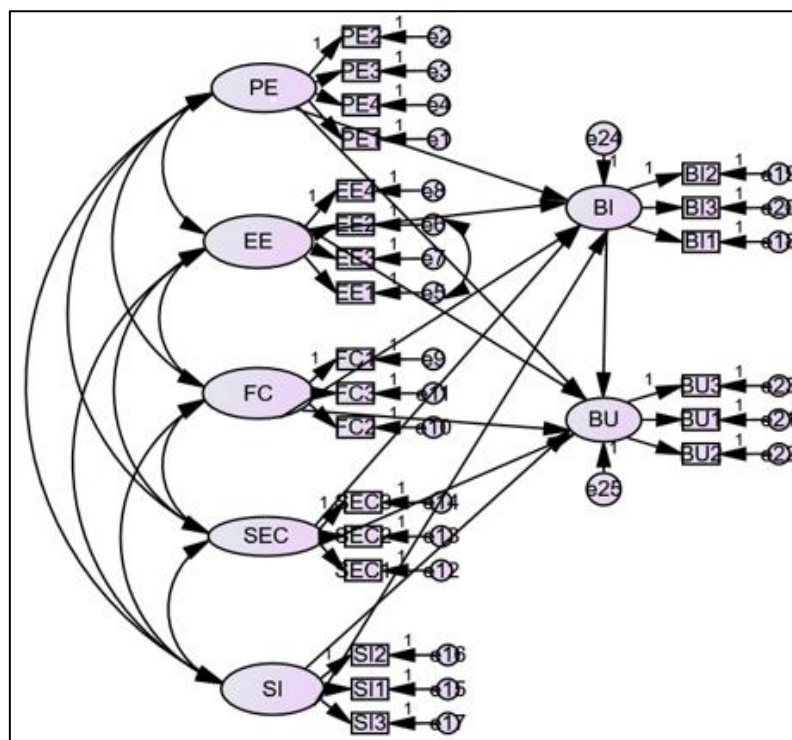
Figure 1: Structural Equation Modelling

Table 5: Output of SEM

Testing of Hypotheses			Estimate	S.E.	C.R.	P	Result
Behavioural Intention	<---	Performance Expectancy	.079	.052	3.528	.027	Supported
Behavioural Intention	<---	Effort Expectancy	.020	.048	4.460	.044	Supported
Behavioural Intention	<---	Facilitating Condition	.039	.053	3.660	.006	Supported
Behavioural Intention	<---	Security	.027	.049	3.593	.011	Supported
Behavioural Intention	<---	Social Influence	.003	.084	4.033	.003	Supported
Behavioural Use	<---	Behavioural Intention	.287	.039	7.360	***	Supported
Behavioural Use	<---	Performance Expectancy	.054	.041	1.309	.192	Not Supported
Behavioural Use	<---	Effort Expectancy	.025	.038	.649	***	Supported
Behavioural Use	<---	Facilitating Condition	.015	.042	.333	.740	Not Supported
Behavioural Use	<---	Security	.027	.036	.712	.475	Not Supported
Behavioural Use	<---	Social Influence	.076	.069	1.120	.259	Not Supported

*** denotes a direct link among the variables

The hypothesis test result is displayed in Table 5 as SEM output. It shows that behavioural intention has a positive and favourable association with behavioural use as per hypothesis 6. The hypotheses from 1-6 and 8 show a favourable association with the variables. From 9 -11 and 7 are not supported which reveals there is an unfavourable association between behavioural use and other variables. This demonstrates that customers are giving more importance to behavioural intention than its use.

The exogenous factors such as performance expectancy, effort expectancy, security, social influence and facilitating condition have a positive effect on the endogenous variable behavioural intention. The behavioural intention in turn has a positive effect on behavioural usage. This shows these factors affect the adoption of digital innovations in banking. If these factors are satisfied, then customers will have a continuous intention of utilising digital products of banking.

Conclusion

The current study reveals that customers are very keen on adopting digital products and innovations, especially in rural areas. This has been evident during the pandemic as well. Customers have demonstrated their appreciation for the importance of utilising digital banking options during the pandemic crisis. The effects of COVID-19 persist across the country, particularly in rural regions, even after the outbreak has ended. Customers who were unfamiliar with digital banking products before and during the epidemic gained familiarity with them as a result of the crisis. This study identifies the adoption pattern of digital innovations in the banking sector of rural customers by using the UTAUT model. It also proved that there is some variable association that persists among the variables. Therefore, it may be inferred that customers place greater emphasis on the behavioural intention of digital innovations in banking than their actual use. The research helps rural financial institutions to analyse the most pertinent factor that affects the adoption level of the customers on digital innovations in the banking sector. Further, the findings of the study reveal that social influence, facilitating conditions and security measures are the strong influencers based on the output derived. Hence, banks can concentrate and prioritize more on these factors in their future adoption strategies.

Abbreviations

PE- Performance Expectancy, EE- Effort Expectancy, FC- Facilitating Condition, SI- Social Influence, SEC- security, BI- Behavioural Intention, BU- Behavioural Use

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Conceptualisation: Lavanya B
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Investigation: Lavanya B
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Conflict of interest

The authors declare no conflict of interest

Ethics approval

The authors have followed the Vellore Institute of Technology's ethical guidelines. The authors swear that everyone who took part in the survey received a written explanation of the research's goals and methods. All responses were recorded in a way that protected the participants' identities and confidentiality. As a result, no IRB approval for moral purposes was necessary.

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