



Evaluating AI-Enhanced Digital Payment Platform Adoption through an Extended UTAUT2 Model

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ABSTRACT

AI enabled digital payment is one of the more advanced forms of technology, with the unified theory of acceptance and use of technology (UTAUT) model adopted to perform cashless transactions instantly. The study focuses on how digitized banking might increase behavioral intention in adopting digital payment systems through an altered UTAUT2 model with factors such as performance expectancy, effort expectancy, social influence, facilitating conditions, trust & security, and regulatory support. Hence, a conceptual model and its structure equation modeling are proposed, which validates the model to demonstrate the adoption of the AI based digital payment platform and its effect on the behavioral intention of end users. A Purposive sampling method has been used for the study as the target respondents are the banking users. A sample size of 313 online banking customers of public and private sector banks is targeted in India. The study's findings show that Cronbach's alpha scores range from 0.72 to 0.78, while the scores of composite reliability range from 0.73 to 0.77, indicating favourable construct reliability and significant internal consistency for scale advancement, while SRMR and NFI are 0.058 and 0.89, indicating the achievement of a Good Model Fit. This suggests a promising potential for market share growth in the digital banking sector. Thus, the AI based digital payment system adopted by banking customers provides personalized and customized high-quality satisfaction and loyalty with effective and efficient services. Policymakers and stakeholders can capitalize on the measured model proposed by the current study to explore strategies to boost user engagement.

Keywords: AI Based Digital Payment, Modified UTAUT2 Model, Performance Expectancy, Effort Expectancy, Social Influence, Trust and Security, Behavioural Intention

JEL Classifications: G21, M00, O32

1. INTRODUCTION

Mobile wallets inclusive of internet banking and contactless transactions are the key elements of digital payment systems currently vital to manage money related to everyday life. Users are provided speedy processing, security benefits and easy usage due to reliable access to smartphones, cheap internet services and legal guidelines for cashless payment options. As a matter of fact, the rate of digital payment adoption has increased significantly in all economies, from the developing to the developed country. China with Alipay and Wechat Pay and India through Unified Payments Interface, contributes to the leadership in the usage

of digital finance system. A framework for the digital payment adoption decision which is ultimately utilized in the digitization studies is the Unified Theory of Acceptance and Use of Technology (UTAUT) and its subsequent version UTAUT2 (Chawla and Joshi, 2019; Shin and Lee, 2021; To et al., 2021; Christian et al., 2024). With respect to performance expectancy, effort expectancy, social influence and facilitating conditions, as well as perceived risk and trust, the models concentrate on.

There are multiple elements that encourage people to take up digital payment platforms as the primary mode of payment. The primary drivers for the adoption of the digital payment platform are

simple operation protocols coupled with the speed and efficiency in transaction. Digital payments are selected by the consumers in lieu of cash transactions since money back programs are frequent and discounts together with reward points accompany it. Smartphones along with reliable internet access also means that electronic payment systems are accessible to more people.

The adoption process faces various obstacles which prevent its widespread use. The major impediments to adoption are security threats to data privacy and financial scams. The rate of digital adoption remains low because citizens in underdeveloped areas lack digital education skills. Consumer reluctance to transition results from their refusal to change traditional payment approaches together with their doubts about digital payment simplicity and their resistance to modernization practices. Additionally, inconsistent internet connectivity and inadequate technological infrastructure present challenges in certain areas.

This research assesses digital payment platform adoption by analysing key factors from UTAUT2 perspective to provide policymakers along with financial service providers and technology developers applied recommendations that will boost digital payment adoption and develop inclusive financial systems.

1.1. Objective of the Study

- a) To determine the adoption of AI based digital payment systems in India by using modified UTAUT2 model.
- b) To measure the modified UTAUT2 model Goodness of fit in the present study.

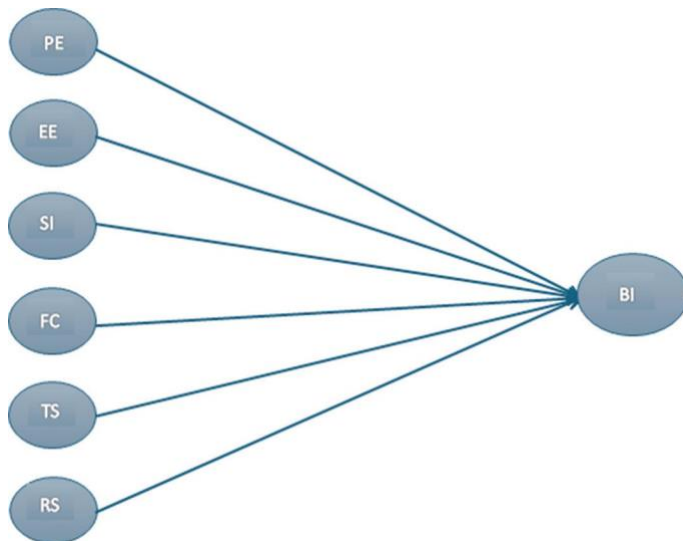
2. LITERATURE REVIEW

Literature review presents different factors affecting the acceptance and use of digital wallets and FinTech services in multiple geographic areas. Research in Indonesia confirms that habit plays the greatest role in digital wallet adoption yet performance expectancy and trust and facilitation conditions also influence adoption but effort expectancy social influence and hedonic motivation together with perceived risk do not affect adoption (Widodo et al., 2019). Perceived usefulness together with ease of use and social influence along with lifestyle compatibility and trust play essential roles in determining Indonesian individuals' intentions to use e-wallets and their eventual adoption of these services (Yang et al., 2021). Research has shown that performance expectancy along with effort expectancy and facilitating conditions together with privacy enablers have a positive effect on behavioral intention towards FinTech services in Saudi Arabia (Bajunaied et al., 2023). The bibliometric study highlights India and the US and China as top research countries for digital wallets and shows data security together with user-friendly functionality and system integration as main adoption enablers but points out absent research on blockchain and AI application (Pizzan-Tomanguillo et al., 2024). Academic research shows that Malaysian millennials adopt Islamic Fintech through performance expectancy and social influence and facilitating conditions although effort expectancy plays no significant part (Fanuel and Fajar, 2021). The primary draw for Malaysian e-wallet users is cashback and reward schemes

because bank and third-party e-wallet competition and low merchant adoption rates create challenges according to research (Teng and Khong, 2021).

The use of digital wallets among rural residents of South India depends on variables like trust and incentive offers and technology satisfaction together with other factors which lead to higher habitual usage patterns (Lakshmanan and Shanmugavel, 2025). All components of perceived ease of use coupled with trust and security with intention influence how people adopt digital wallet technologies in Indonesia (Husainah et al., 2023). Jordanians view digital wallets as more useful when they receive promotional offerings and perceive higher value however neither government support nor social influence matters in their perception (Khasawneh et al., 2024). Malaysian usages of e-wallets are influenced by Technology Acceptance Model constructs together with Theory of Planned Behavior constructs but perceived value fails to strengthen the relationship between user satisfaction and continued usage (Ariffin et al., 2021). Islamic FinTech usage gets its strongest motivational factor in Indonesia through the acceptance model (Darmansyah et al., 2021). There are three fundamental elements for adopting internet wealth management platforms in China: perceived value, risk, and social influence and performance and effort expectancy impact perceived value (Xie et al., 2021). In Jordan, uncertainty avoidance moderates the relationship between facilitating conditions and adoption intentions, with personal innovativeness impacting performance and effort expectancy (Alkhwaldi et al., 2022). In another study, Odei-Appiah et al. (2022) supports that FinTech use enhances financial inclusion adoption and validates performance expectancy and facilitating conditions for behavioral intentions. The adoption of digital payment services through customer satisfaction and performance expectancy and effort expectancy depends on age related factors in Indian payment markets (Srivastava et al., 2024).

The user adoption rate for M-payment systems depends largely on perceived risk and trust and cost structures as well as self-efficacy factors but performance expectancy emerges as the most influential indicator (Al-Saedi et al., 2020), while Threat perceptions are substantially influential on e-wallet adoption because they originate from uncertainties about trust and service quality and therefore require remediation to increase consumer trust (Upadhyay and Pandey, 2024). Additionally, Wei et al. (2021) indicates that observed that social influence, particularly from peers and role models, significantly impacts young generations' adoption of mobile payments, with promotional activities and incentives like cash bonuses being effective strategies. For mobile wallets, perceived ease of use, usefulness, trust, and security are crucial, suggesting the need for a secure infrastructure and user-friendly applications (Chawla and Joshi, 2019). Habit functions as a major influence on NFC mobile wallet adoption according to research data while credibility and service smartness contribute differently to adoption patterns depending on country (Shin and Lee, 2021). Studied evidence demonstrates why businesses need to solve concerns about security while improving trust levels and developing specific approaches appropriate for various cultural environments to boost user acceptance.

Figure 1: Conceptual model

Source(s): Author's self work

The Unified Theory of Acceptance and Use of Technology (UTAUT) model together with its version UTAUT2 serves as primary instruments researchers use to explain why people adopt cashless payment systems and mobile wallets. Performance expectancy together with effort expectancy and social influence and facilitating conditions and trust and perceived risk represent the main determinants that influence adoption in this field (Namahoot and Jantastri, 2023; Hoang et al., 2021; Arora et al., 2023). Across the studies trust stands out as the main predictor showing that perceived risk acts negatively toward adoption intentions (Widyanto et al., 2022). Combination of mobile self-efficacy and perceived enjoyment as well as satisfaction and price value alongside hedonic motivation plays important roles (Ewase, A.T., 2022; Mater et al., 2021). The research indicates that upgrading systems for user-friendliness and security and trust management and resolving privacy issues respectively will dramatically increase adoption numbers (Hammouri et al., 2023). Developing nation stakeholders can benefit from this knowledge as their adoption rates for such technologies continue to grow.

2.1. Conceptual Framework

The framework illustrates the influence of six independent variables — Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Facilitating Conditions (FC), Technology Security (TS), and Risk & Security (RS) — on Behavioral Intention (BI). Based on the UTAUT2 model, it proposes that each factor directly impacts Behavioral Intention (BI) toward using the technology as shown in figure 1.

2.2. Hypotheses of the Study

- H₁: Performance expectancy (PE) has a significant impact on Behavioural intention (BI).
 H₂: Effort expectancy (EE) has a significant impact on Behavioural intention (BI).
 H₃: Social influence (SI) has a significant impact on Behavioural intention (BI).

- H₄: Facilitating conditions (FC) has a significant impact on Behavioural intention (BI).
 H₅: Trust & security (TS) has a significant impact on Behavioural intention (BI).
 H₆: Regulatory support (RS) has a significant impact on Behavioural intention (BI).

3. RESEARCH METHODOLOGY

In this study online survey method from the cross-section of the society with a structured questionnaire would administer to AI based digital payment adoption by banking users in India through modified UTAUT2 model.

3.1. Research Design

A Purposive sampling method has been used for the study as the target respondents are the banking users. A sample size of 313 online banking customers of public & private sector banks is targeted in India. The study uses both primary and secondary sources of data. Primary data has been collected from banking customers through a structured questionnaire using an online survey method. Secondary data has been collected from academic journals. The research model of this study has been tested by structural equation modeling (SEM) using the SMARTPLS tool.

4. RESULTS

4.1. Measurement Model Assessment for AI based Digital Payment Systems through Modified UTAUT2 Model

4.1.1. Step-1: Sample adequacy test

The sample data should reflect sample adequacy for factor analysis to obtain the standardized factor loadings. The Kaiser-Meyer-Olkin (KMO) value and Bartlett's Test of Sphericity help inspect whether the sample data is adequate for factor analysis. For assurance of the suitability of the sample data for factor analysis, the minimum acceptable value for KMO is 0.70, which is a significant Bartlett's Test of Sphericity (Kaiser, 1974). Table 1 reports the overall KMO and Bartlett's test of the study. As evident, the KMO value is above 0.70 (0.81 > 0.70) with a significant Bartlett's test of Sphericity ($P < 0.05$). The individual KMO for all the five constructs of the study was also seen above 0.70 with significant Bartlett's tests of Sphericity. This indicates that the data sample of the study is adequate for factor analysis.

4.1.2. Step-2: Reliability and validity

Reliability refers to the internal consistency of the measures used to measure a construct. Validity assesses whether a scale measures the concept of what it is intended to measure (DeVellis Robert, 2003). The reliability of the measures is assured with the help of an inspection of Cronbach's alpha value for the measures measuring the construct. The minimum acceptable Cronbach alpha value, which ensures the reliability of measures, is 0.70. Table 2 reports the respective Cronbach alpha values of the

measures used for measuring the primary constructs of the study. As inferred from the Table below, all Cronbach alpha values are well above the acceptable Cronbach alpha value of 0.70; hence, the reliability of the measures used for this study is assured. The validity of the constructs is assured through the presence of convergent and discriminant validity (Bagozzi et al., 1991). The presence or absence of convergent validity is determined through the inspection of average variance extracted (AVE) and composite reliability (CR) values (Fornell and Larcker, 1981). The minimum threshold values for AVE and CR should be above 0.50 and 0.60 to ensure convergent validity. However, standardized factor loadings are necessary to obtain the AVE and CR values.

The standardized factor loadings of items above 0.70 indicate they load nicely onto their respective constructs (Dimitrov, 2008). Table 2 reports the standardized factor loadings for all measures of the study above 0.70, which suggests that the measures of the survey nicely weigh upon the constructs of the study. The Table 2 shows that the AVE and CR values for all constructs of the study are well above the acceptable values of 0.50 and

0.60. Thus, figure 2 indicates a clear presence of reliability and convergent validity.

4.1.3. Step-3: Discriminant validity

For complete assurance of construct validity, the presence of discriminant validity alongside convergent validity is also essential (John and Benet-Martínez, 2014). To establish discriminant validity, researchers are required to verify all the constructs in a model are distinct from each other (Kock, 2014; Kock, 2015; Kock and Lynn, 2012).

The presence of discriminant validity is ensured when the individual correlations of the constructs appear less than the square root of the average variance extracted (AVE) values. Table 3 presents the individual correlations of the constructs of the study with the square root of AVE values presented diagonally in bold letters. As evident from the table below, all the individual correlation values of the constructs are seen as less than the square root of AVE values across rows and columns. Thus, assuring the presence of discriminant validity. Therefore, the study's constructs are said to be reliable and valid.

Table 1: KMO and Bartlett's test

Kaiser-Meyer-Olkin measure of sampling adequacy	0.815
Bartlett's test of sphericity	
Approx. Chi-Square	22007.455
Df	631
Sig.	0.000

Table 2: All constructs and their obtained FL, CA, CR, AVE, scores

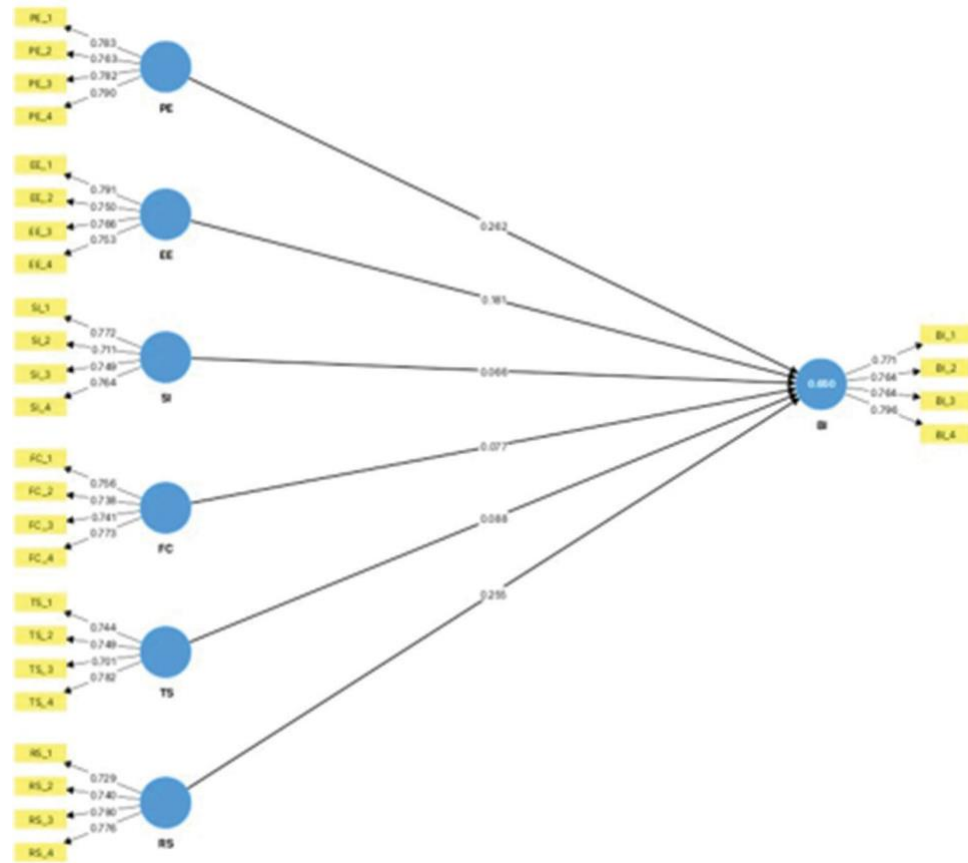
Constructs	Factor loading (FL)	Cronbach's alpha (CA)	Composite reliability (CR)	Average variance extracted (AVE)
BI_1	0.771	0.777	0.777	0.599
BI_2	0.764			
BI_3	0.764			
BI_4	0.796			
EE_1	0.791	0.764	0.765	0.586
EE_2	0.750			
EE_3	0.766			
EE_4	0.753			
FC_1	0.756	0.744	0.746	0.565
FC_2	0.738			
FC_3	0.741			
FC_4	0.773			
PE_1	0.783	0.785	0.785	0.608
PE_2	0.763			
PE_3	0.782			
PE_4	0.790			
RS_1	0.729	0.754	0.755	0.576
RS_2	0.740			
RS_3	0.790			
RS_4	0.776			
SI_1	0.772	0.74	0.743	0.562
SI_2	0.711			
SI_3	0.749			
SI_4	0.764			
TS_1	0.744	0.732	0.734	0.555
TS_2	0.749			
TS_3	0.701			
TS_4	0.782			

Table 3: Discriminant validity-fornell-larcker criterion

Constructs	BI	EE	FC	PE	RS	SI	TS
BI	0.774						
EE	0.692	0.765					
FC	0.659	0.690	0.752				
PE	0.732	0.711	0.691	0.780			
RS	0.715	0.656	0.679	0.723	0.759		
SI	0.656	0.691	0.697	0.695	0.658	0.749	
TS	0.639	0.664	0.644	0.660	0.637	0.695	0.745

Table 4: Collinearity statistics

Constructs	VIF
BI_1	1.493
BI_2	1.504
BI_3	1.474
BI_4	1.596
EE_1	1.546
EE_2	1.421
EE_3	1.460
EE_4	1.453
FC_1	1.452
FC_2	1.339
FC_3	1.450
FC_4	1.448
PE_1	1.535
PE_2	1.479
PE_3	1.573
PE_4	1.579
RS_1	1.385
RS_2	1.401
RS_3	1.550
RS_4	1.515
SI_1	1.503
SI_2	1.383
SI_3	1.420
SI_4	1.420
TS_1	1.404
TS_2	1.429
TS_3	1.313
TS_4	1.470

Figure 2: Structural equation model path coefficients for AI based digital payments adoption platform through UTAUT2 model

4.2. Structural Model Assessment for AI based Digital Payment Systems through Modified UTAUT2 Model

4.2.1. Step-1: Multicollinearity-statistics

To assess the level of collinearity in PLS-SEM, variance inflation factor (VIF) is looked at. A variance inflation factor (VIF) measures the amount of multicollinearity in regression analysis. According to Hair et al. (2011), a VIF value of 3 or higher in the PLS-SEM context indicates a possible collinearity issue. The present model has no collinearity issue, as shown by all of the VIF values in Table 4 that are <3.

4.2.2. Step-2: Path coefficients

Path coefficients signify the strength and direction of the relationships between constructs in the model. The path coefficients have standardized values (Coefficients) between -1 and +1 for every relationship in the structural model and the measurement models (Hair et al., 2019). In Table 5, PLS-structural equation model, a path coefficient of 0.181 indicates that when the EE increases by one standard deviation unit, the digital payments on BI will increase by 0.181 standard deviation units. Likewise, a path coefficient of 0.077 indicates that when the FC increases by one standard deviation unit, the BI will increase by 0.077 standard deviation units. A path coefficient of 0.262 indicates that when the PE increases by one standard deviation unit, the digital payments on BI will increase by 0.262 standard deviation units. A path coefficient of 0.255 indicates that when the RS increases by one standard deviation unit, the digital payments on BI will

Table 5: Path coefficients and hypotheses testing

Constructs Relationship	Path coefficients	P-values	Comments
EE ->BI	0.181	0.000	Supported
FC ->BI	0.077	0.000	Supported
PE ->BI	0.262	0.000	Supported
RS ->BI	0.255	0.000	Supported
SI ->BI	0.066	0.000	Supported
TS ->BI	0.088	0.000	Supported

increase by 0.255 standard deviation units. A path coefficient of 0.066 indicates that when the SI increases by one standard deviation unit, the digital payments on BI will increase by 0.066 standard deviation units. Similarly, a path coefficient of 0.088 indicates that when the TS increases by one standard deviation unit, the digital payments on BI will increase by 0.088 standard deviation units.

4.2.3. Step-3: Coefficient of determination (R^2)

R^2 is the proportion of variation in the dependent variable that the statistical model predicts. Hair et al. (2013) suggested in scholarly research focusing on marketing issues, R^2 values of 0.75, 0.50, or 0.25 for endogenous latent variables can be described as substantial, moderate, or weak as a rough rule of thumb. In Table 6, the R^2 value of BI 0.650 is more significant than 0.25, which shows a moderate variation.

Table 6: Coefficient of determination (R^2)

Construct	R-square	R-square adjusted
BI	0.650	0.643

Table 7: Effect size (f^2)

Constructs Relationship	f-square
EE -> BI	0.034
FC -> BI	0.006
PE -> BI	0.066
RS -> BI	0.071
SI -> BI	0.004
TS -> BI	0.009

Table 8: Goodness of model fit indices

Indices	Saturated model	Estimated model
SRMR	0.058 (≤ 0.08)	0.058
d_ ULS	1.368	1.368
d_ G	0.517	0.517
Chi-square	952.607	952.607
NFI	0.89 (≥ 0.90)	0.89

4.2.4. Step-4: Effect size (f^2)

F-Square is the change in R-Square when an exogenous variable is removed from the model. f^2 is effect size (≥ 0.02 is small; ≥ 0.15 is medium; ≥ 0.35 is large) (Cohen, 1988). In Table 7, all the variables except FC, SI, and TS have f^2 values > 0.02 , which results in a small effect size.

4.2.5. Step-5: Goodness of fit indices

The affirmation of good model fit is necessary to test the study's hypotheses using structural equation modeling (SEM). An SRMR value > 0.10 or 0.08 (Bentler et al., 1980) is considered a good fit. In the table below, the SRMR is 0.05 , less than the mentioned limit—consequently, the NFI results in values between 0 and 1 . The closer the NFI is to $+1$, the better the fit. NFI values above 0.90 usually represent an acceptable fit. In Table 8, the NFI is 0.87 . Hence, the saturated SRMR and NFI values resemble the goodness of model fit in the present study.

5. FINDINGS AND DISCUSSION

The conventional way of payment and transfer of money among people has become an out dated mode of transaction in this technology-driven society. Digital payment is one of the alternative and more advanced payment systems used to execute tasks from any place to anyone within a short time, which generally needs internet services, electronic gadgets, and application software. The objective of the present study is to determine the adoption of AI based digital payment platforms with the increased use of internet services and technological advancement on end-user behavioral intention and user convenience through an altered UTAUT2 model with factors viz., performance expectancy, effort expectancy, social influence, facilitating conditions, trust & security, and regulatory support. The study's findings indicate that strong construct reliability and high internal consistency are validated by the scores of composite reliability, which range between 0.73

and 0.77 . Cronbach's alpha, which varies between 0.72 and 0.78 , certifies good construct reliability and higher internal consistency for scale development and advancement.

In contrast, the hypotheses framed in the study are tested. Hence, all the modified UTAUT2 factors PE, EE, SI, FC, TS, and RS supported BI with $P = 0.000$, and also the SRMR and NFI are 0.058 and 0.89 , which are within the threshold limit that results in the development of Good Model Fit. Accordingly, the results reflect positive behavioral intention in adopting AI based digital payment through a modified UTAUT2 model with factors such as performance expectancy, effort expectancy, social influence, facilitating conditions, trust and security, and regulatory support significantly impacting user satisfaction and engagement.

6. CONCLUSION

Banking has always played a significant role in the modern economic world. Traditional banking customer services were time-consuming processes. The current banking sector is witnessing ground breaking changes, the foremost being the rise in customer-centricity. Today, top Indian banks are exploring advanced technology, which is making their service more user-friendly, reliable, and scalable. Using online payment systems, banks are approaching convenience banking, making it even easier for a customer to do transactions from any place and at any time without waiting in lengthy queues. Hence, AI based digital payment aims to provide personalized, high-quality customer fulfilment and practical and time-saving services. Banks must offer awareness programs for their customers to equip them with the application of online payments in banking services. Thus, the proven model could help the banks frame their strategies and future course of action.

6.1. Managerial Implications

With regard to digital payments in India, the current study advances existing knowledge by creating a reliable and valid model to assess customer behavioral intentions. According to the findings, adopting AI based digital payment through the extension of the UTAUT2 model with factors such as performance expectancy, effort expectancy, social influence, facilitating conditions, trust and security, and regulatory support can collectively affect a customer's behavioral intention toward digital payments. Providing the best services is something that policymakers, stakeholders, and marketers ought never to overlook, as providing inadequate services will make it challenging to keep customers. Even for developing countries like India, the study has demonstrated the importance of having an effective digital presence. Consequently, to facilitate their customers' existence, banks ought to have every digital interface known to individuals.

6.2. Limitations and Scope for Future Research

It is necessary to address specific issues with this study. Since only data from India was gathered, the findings cannot be widely applied. The differences in the behavioral intention of AI based digital payment users between developed and developing nations can be further investigated through a comparative analysis.

Second, the model is exclusive to the digital payments. Other sectors can be the subject of additional research to determine any differences. This model may be helpful and impressive for testing customers' behavioral intentions to AI based digital payment service offerings. Cyber security, transaction safety, and fraud are always areas of concern for users and banks, and these needs to be addressed with every adoption of new technology.

AUTHOR CONTRIBUTIONS

MAH: Wrote the original draft, Data Collection, Data analysis, Visualization & Mapping. SV: Conceptualisation, and Methodology. SK: Proofreading and revisions. All the authors read and approved the final manuscript.

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