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Mobile Payment Adoption and Digital Financial Inclusion among the Elderly in Uttar Pradesh: A Utaut2-Based Analysis

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Abstract:

Purpose — The aim of this study is to explore the determinants of mobile payment adoption among the elderly aged 60 years and above in Uttar Pradesh, India, and to assess the impact of mobile payment adoption on digital financial inclusion among the elderly. The study builds on and extends Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) with the inclusion of trust and perceived risk and digital financial literacy.

Design/methodology/approach — A quantitative cross-sectional survey method is used. The study sample consists of 120 elderly respondents who are interviewed with a structured questionnaire. The model proposed is tested descriptively and using partial least squares structural equation modelling (PLS-SEM) with tests for measurement reliability, converging validity, discriminating validity, collinearity, explanatory power, predictive relevance and significance of the structural path.

Analytical scope — The model assesses the impact of the performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation, price value, habit, trust, perceived risk and digital financial literacy on behavioural intention and/or on actual use of mobile payments. It also evaluates the impact of real usage to increase digital financial inclusion.

Practical implications — The framework provides information for banks, fin tech companies and public agencies on interface design for seniors, ease of onboarding, local-language support, fraud-awareness communications, grievance redressal and digital financial literacy interventions.

Originality/value — The study links the adoption of technology to the issue of financial inclusion through digital means in an under-researched population and context. It also separates between behaviour intention and actual and independent usage, which helps to overcome the intention-behaviour gap among elderly consumers.

Keywords: mobile payments, digital financial inclusion, elderly consumers, UTAUT2, digital financial literacy, trust, perceived risk, Uttar Pradesh.

1. Introduction

The expansion of mobile payment services has transformed the way individuals conduct everyday financial transactions. Payment, receipt of funds, bill payment and payment for financial services are now more possible without visiting a bank branch, through mobile applications, quick response codes, digital wallets and instant bank transfer systems. This has opened the door to increase formal financial involvement of groups that have been excluded due to distance, mobility, documentation, cost and limited access to physical banking facilities.

Though digital payments have spread like wildfire, there are still disparities in adoption rates among demographic groups. Older adults may have unique challenges due to a lack of familiarity with smartphones, reduced visual and/or motor function, concerns about fraud, poor confidence in managing transaction failures and reliance on family members or intermediaries. Barriers may be more pronounced in geographically and socioeconomically diverse areas like Uttar Pradesh, where geographic and urban-rural differences in digital infrastructure, literacy, income, and access to formal financial services exist.

Digital financial inclusion is a complex topic that goes beyond having a bank account or a mobile phone. It also involves the capacity to access, comprehend and access financial services safely, affordably and on their own. Thus financial inclusion through mobile payments could only occur if elderly consumers have the right skills,

resources, trust and support. A seldom-used or entirely other-person payment application could afford some financial independence.

Technology-adoption theories provide a systematic approach to consider these questions. The Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) by Venkatesh et al. (2012) is a theory that aims to help explain consumer technology adoption behaviors in terms of the following factors: performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation, price value and habit. The constructs of UTAUT2 have been adopted and used in a wide range of mobile banking and digital payment scenarios, but might lack the sensitivity for elderly users. In cases where users are concerned about fraud, privacy, transaction errors, and technical complexity, trust, perceived risk, and digital financial literacy could be even more crucial.

Hence, this study is an extension of mobile payment adoption among elderly users in Uttar Pradesh that develops and tests an extended UTAUT2 model of mobile payment adoption among elderly users in Uttar Pradesh. It also explores whether the actual use of mobile payments boosts digital financial inclusion. The following research questions will be answered in the study:

RQ1. What factors of UTAUT2 affect elderly people's behavioural intention to use mobile payment?

RQ2. What impact do trust and perceived risk have on the adoption of mobile payment by elderly users, and how does the financial literacy of the elderly influence the adoption of mobile payment?

RQ3. How good are the prediction of mobile payment use from the three variables of behavioral intention, facilitating conditions and habit?

RQ4. What is the relevance of the actual use of mobile payment to elderly people's financial inclusion in Uttar Pradesh?

The study has three contributions. First, it introduces UTAUT2 in the context of an under-researched age group when it comes to digital payment. Secondly, it expands the model by adding the concept of trust and the perceived risks and digital financial literacy. Third, it goes beyond the adoption intention towards digital financial inclusion by linking mobile payment use with actual financial usage.

2. Literature Review

2.1 Mobile payments and digital financial inclusion equates

Mobile payments are financial transactions that are initiated, authorised or completed via mobile devices. These transactions may include person-to-person transfers, merchant payments, utility-bill payments, account-to-account transfers and mobile-wallet transactions. Mobile payment systems are an essential part of the wider digital financial system as they can lower transaction costs, reduce reliance on geographic bank branches and increase financial services provision to dispersed populations (Dahlberg et al., 2015; Oliveira et al., 2016).

Access to a bank account is not the only aspect of financial inclusion that can be achieved with technology. Accessing, comprehending and utilizing formal financial services via digital channels in a secure, affordable and suitable way. Digital platforms can boost financial inclusion, provide platforms for payment and receipt, and enable people to check balances and conduct regular financial transactions from a distance (Demirgüç-Kunt et al., 2022). But, simply having access to something does not necessarily mean someone is truly included. People also need to have appropriate devices and connectivity, digital competency, and financial literacy and confidence in the technology.

This is not a straightforward association between mobile payment usage and digital financial inclusion. Individuals can have a payment application and a bank account, but still be functionally excluded when transactions are entirely conducted by relatives or intermediaries. To achieve meaningful digital financial inclusion, people need to use digital financial services regularly, with information, and in an independent way, which is reasonably independent. It also relies on whether users are able to safeguard their credentials, identify fraudulent requests and get help in the event of a transaction failure (Morgan et al., 2019).

2.2 Adoption of mobile payment in India.

The digital payment landscape is growing in India via mobile banking apps, digital wallets, quick-response code payments, and instant bank-transfer platforms. All of these services have opened new possibilities for people to make small-scale transactions that occur frequently, without the need to use cash or physical banking facilities.

A country where access to finance, connectivity and technology is not evenly distributed among regions and populations and populations is particularly relevant in the context of the growth of mobile payments. While physical access to banking can be improved, digital access can also widen inequalities between those who have the skills and support for confident use of digital services and those who do not.

Studies on the adoption of mobile payments have consistently found that consumers evaluate both benefits and risks before adoption. The perceived usefulness, ease of use, social influence, facilitating conditions, trust, and risk and prior experience have been shown to be important factors affecting adoption intention (Slade et al., 2015; Oliveira et al., 2016). The significance of each of these factors is, however, different in different contexts and user groups.

2.3 Theoretical foundation: UTAUT2

Venkatesh et al. (2003) constructed Unified Theory of Acceptance and Use of Technology to integrate important theories of technology acceptance. The original UTAUT model encompasses three predictor variables: performance expectancy, effort expectancy, social influence and facilitating conditions that lead to behavioural intention and technology use.

Later, Venkatesh et al. (2012) modified the model for consumer context, introducing hedonic motivation, price value and habit. The UTAUT2 model is quite appropriate for mobile payment research because mobile payments represent a voluntary adoption of consumer technology, rather than a system adopted in organisational environments.

The application of UTAUT2 has been observed in mobile banking, digital payments and other financial technologies. Performance expectancy, effort expectancy, social influence, facilitating conditions, and habit were identified as factors that may impact consumers' adoption decisions, but the relationship between each of these factors and the adoption decision has been found to differ depending on the technology and its users (Baptista and Oliveira, 2015; Oliveira et al., 2016).

The model is beneficial to the study of elderly users because it acknowledges that more comes into play for adoption than perceived usefulness. It also includes the functionality of using the technology, the impact of key individuals, resources available and the role of past behaviours. However, the widely-used UTAUT2 model might not be sufficient to capture the concerns of elderly financial-service users. So, the model can be extended with the concepts of trust, perceived risk, and digital financial literacy.

2.4 Performance expectancy

Performance expectancy is the perception that a person has that working with a technology will enhance the performance of a specific activity (Venkatesh et al., 2003). Performance expectancy is the expectation that using the mobile payment service will make the payment process faster, easier or more efficient in mobile payment systems.

The perceived usefulness or performance expectancy has been identified as a key factor in the acceptance of mobile payments and mobile banking in previous studies (Baptista and Oliveira, 2015; Oliveira et al., 2016). A payment technology is likely to be embraced if the user thinks it will save their time, lessen effort or make it more convenient to access financial services.

Senior users can enjoy improved performance such as avoiding the need to travel to a bank, transacting business from home and having money arrive faster and bills paid without waiting in line. These benefits can be especially beneficial to people who have mobility challenges or who have no easy access to their local bank. So,

if elderly users feel that mobile payments are relevant and useful in their financial lives, they will more likely be inclined to adopt the technology.

2.5 Effort expectancy

The perceived ease (Venkatesh et al., 2003) of learning and using a technology is called effort expectancy. It has a close relationship with perceived ease of use in the Technology Acceptance Model (TAM) introduced by Davis (1989).

In mobile payment apps, ease of use is especially critical since users have to go through several screens, enter credentials, verify a recipient and confirm transaction data. If your application looks complicated, it may put some of your users off.

A literature review of technology use by older adults demonstrates that older adults' perceived complexity and limited confidence and experience can decrease their engagement with digital technologies (Friemel, 2016). Other vision, memory and motor impairments associated with age can also make it more challenging to operate small print, complex menus and time-sensitive authentication procedures.

Effort expectancy can thus be affected not only by the number of transaction steps, but also by interface design, language, text size, and the clarity of instructions - as well as several other factors - for elderly users. Payment applications that are user-friendly for the younger generation can be challenging for older adults. Fewer and easier systems will likely boost intention to adopt.

2.6 Social influence

Social influence is the degree to which a person feels that significant others expect or encourage him/her to adopt a technology (Venkatesh et al., 2003). Users' perception and behaviour can be influenced by family members, friends, peers and service providers in consumer technology contexts.

For elderly people, social influence could be more crucial, as they often rely on family members to help them understand how to operate smartphones and digital payment apps. Children, family, a bank official or someone they know and trust can help to alleviate anxiety and build confidence.

Research on mobile banking and payment service adoption has demonstrated that social factors can influence behavioural intention, especially when the user is unsure about the mobile technology or relies on others to get it right (Baptista and Oliveira, 2015; Slade et al., 2015). Social influence can also detract from adoption when users hear of fraud, transaction failures, and privacy breaches, however.

2.7 Facilitating conditions

Facilitating conditions are the perceived support available and the sufficient resources to use a technology (Venkatesh et al., 2003). These conditions in mobile payment adoption can range from having a smartphone, the internet, bank accounts, to the compatibility of the applications and technical support.

Elderly users are likely to be critical in facilitating conditions. While the user may wish to make a payment using the mobile device, they may not be able to do so due to poor connectivity, lack of a suitable device or difficulty getting assistance. Venkatesh et al., (2012) suggested that the facilitation of the technology use behavior could be directly affected by facilitating conditions.

Facilitating conditions could be different for rural and urban areas in the context of Uttar Pradesh. Some users may have a weaker network availability, fewer service points or less access to trained support personnel in some locations. Older users can also ask financial institutions or locals for help when making transactions.

2.8 Trust in mobile payment systems:

Trust is the confidence users have in a mobile payment system and its service provider that it will function as expected, secure personal information and finalize payments properly. In financial technologies, trust is crucial, as users are required to share sensitive data and put money at stake.

The findings from Slade et al. (2015) suggest that the factors associated with trust can be significant in influencing consumers' attitudes towards mobile payments. In addition, Oliveira et al (2016) highlighted the need for trust in the technology and service provider.

Trust is important for elderly users and can be based on the reputation of the bank or payment provider, previous transaction experience, visibility of security features and complaint resolution. Guidance is also a factor that can affect trust, whether it's by a familiar person or not.

Even if the system is considered useful and easy to use, it is unlikely to be adopted if there is a lack of trust. Elderly users might want to know what happens if they make a mistake transferring money, what security is provided for their personal data and how they can be helped if their transaction fails.

2.9 Elderly users and the digital divide

Digital Divide is a gap in access to, use of and benefits from digital technologies. Previous research has been largely concerned with physical access, but recent research has also highlighted variations in digital skills, how the digital tools are used and achieved outcomes.

Friemel (2016) concluded the following: older adults have a digital divide and education, social support and previous experience are factors that lead to it. Older people might have challenges with device ownership, access to the internet and device complexity and confidence.

The “digital divide” of older adults must be seen not just as an aged issue. It is also affected by income, education, health, and location of residence and assistance. A group of elderly people is not a monolithic one, and their capacity to make a mobile payment can be quite different.

2.10 Behavioural intention and actual use

Behavioural intention is the intention or readiness of an individual to use a technology. Behavioural intention is a key factor in UTAUT and UTAUT2 (Venkatesh et al., 2003; Venkatesh et al., 2012).

But often, there is a disconnect between intention and behaviour. While users may express interest in mobile payments, they may not use them due to poor connectivity, lack of trust or insecurities about fraud, technical issues. This intention-behaviour gap might be particularly significant for older users.

The actual use of mobile payments must therefore be considered in addition to the behavioural intention. Some of the most helpful measures are: frequency of use, range of transactions and the perceived independence with which transactions are accomplished.

It is better to distinguish the intention from the use because this improves the value of the study in terms of explanation. It also clarifies the extent to which elderly individuals who report positive attitudes have the resources and capabilities to make their positive attitudes come true in terms of behaviour.

2.11 Mobile payment use and digital financial inclusion

Mobile payment usage can help with financial inclusion by enhancing access to financial transactions, eliminating physical restrictions and giving a greater sense of control over daily financial transactions. The elderly might find it advantageous to get money, pay bills, transfer funds without having to go to the bank.

But this can have an impact on inclusion when it is used well. The occasional or full participation in transactions does not necessarily result in an increase in financial independence. Elderly users are more likely to use mobile payments regularly without relying too heavily on intermediaries or risk of fraud when they can use it meaningfully.

Understanding financial inclusion as access and usage of formal financial services is captured in the Global Findex framework (Demirgüç-Kunt et al., 2022). In the digital landscape, the appropriate use also depends on the appropriate skills, trust and consumer protection.

Hence, the real use of mobile payment services is likely to increase the digital financial inclusion of older respondents. This could further be supported by digital financial literacy and trust, which will help users have increased confidence and security in the digital financial system.

2.12 Research gap

Previous studies have studied the mobile payment adoption using technology-acceptance models such as UTAUT and UTAUT2. Other studies have also highlighted the role of trust and perceived risk and facilitating conditions as factors influencing the adoption of financial-technology (Baptista and Oliveira, 2015; Slade et al., 2015; Oliveira et al., 2016).

However, there are a number of areas that need filling. First, the research that does exist tends to be carried out with younger consumers, students, working populations or general adult populations. Elderly users are still underrepresented as compared to other users.

Secondly, there are a number of studies that have explored behavioural intention but not actual use. This significantly restricts the knowledge regarding the relationship between positive attitudes and regular and independent mobile payment behaviour.

Third, few studies relate mobile payment adoption with digital financial inclusion. Despite the potential for mobile payments to drive a broader social benefit in terms of access, autonomy and financial participation, adoption is frequently the end goal.

Fourth, the impact of UTAUT2 factors, trust, perceived risk and digital financial literacy has been under-researched among the elderly people in the context of Uttar Pradesh.

The present study focuses on these gaps and investigates 160 elderly respondents of Uttar Pradesh. It adds the concept of trust, perceived risk, and digital financial literacy to UTAUT2, and assesses adoption of mobile payment and digital financial inclusion.

3. Research Methodology

3.1 Research Design

This study adopts a quantitative, descriptive and cross-sectional research design to examine the factors influencing mobile payment adoption and digital financial inclusion among elderly individuals in Uttar Pradesh. A quantitative approach is appropriate because the study seeks to test relationships among measurable constructs derived from the Unified Theory of Acceptance and Use of Technology.

Primary data were collected from elderly respondents through a structured questionnaire. The cross-sectional design enabled the researcher to collect data from respondents at a single point in time and assess their perceptions, experiences and use of mobile payment services.

The study focuses on four central relationships. Performance expectancy, effort expectancy and trust are examined as predictors of mobile payment adoption, while mobile payment adoption is examined as a predictor of digital financial inclusion.

3.2 Research Population

The target population consisted of elderly individuals aged 60 years and above residing in Uttar Pradesh. The respondents included elderly people with varying levels of education, income, digital experience and familiarity with mobile payment services.

The study considered both users and potential users of mobile payment applications. Mobile payments included services such as Unified Payments Interface applications, mobile wallets and mobile banking applications used to transfer money, pay bills or purchase goods and services.

3.3 Sample Size and Sampling Technique

The final sample consisted of 120 elderly respondents from Uttar Pradesh. The sample size was considered suitable for the proposed statistical analysis and for examining the relationships among the selected variables.

The respondents were selected using a purposive sampling technique. This method was used because elderly mobile payment users were not easily identifiable through a complete sampling frame. Respondents who were at least 60 years old and willing to participate in the survey were included in the study.

Although the sample provides useful evidence regarding elderly individuals in Uttar Pradesh, the findings should be interpreted carefully because a non-probability sampling method may limit their generalisability to the entire elderly population of the state.

3.4 Data Collection Method

Primary data were collected using a structured questionnaire. The questionnaire was administered to 120 elderly respondents residing in Uttar Pradesh.

The questionnaire was prepared in to ensure that respondents could understand the questions. Where necessary, the researcher or survey investigator explained the questions without influencing the responses.

Participation was voluntary. Before completing the questionnaire, respondents were informed about the academic purpose of the study. They were also assured that their identities and responses would remain confidential and would be used only for research purposes.

3.5 Questionnaire Design

The questionnaire was divided into three sections.

The first section collected demographic information, including age, gender, education, income, place of residence and prior experience with mobile payment services.

The second section measured the main constructs of the study:

- Performance expectancy
- Effort expectancy
- Trust
- Mobile payment adoption
- Digital financial inclusion

The third section collected information about respondents' mobile payment behaviour, such as frequency of use, preferred applications, types of transactions and level of independence while completing digital payments.

The measurement items were adapted from established studies on UTAUT2, mobile payment adoption, trust and digital financial inclusion. Minor modifications were made to ensure that the statements were understandable and relevant to elderly respondents.

3.6 Development of Hypotheses

H1. Performance expectancy has a significant positive effect on mobile payment adoption among elderly individuals in Uttar Pradesh.

H2. Effort expectancy has a significant positive effect on mobile payment adoption among elderly individuals in Uttar Pradesh.

H3. Trust has a significant positive effect on mobile payment adoption among elderly individuals in Uttar Pradesh.

H4. Mobile payment adoption has a significant positive effect on digital financial inclusion among elderly individuals in Uttar Pradesh.

3.7 Data Analysis Techniques

The collected data were coded and analysed using SPSS/SmartPLS/AMOS. The analysis was conducted in several stages.

First, descriptive statistics were used to summarise the respondents' demographic characteristics and mobile payment behaviour. Frequencies, percentages, means and standard deviations were calculated.

Second, the reliability of the measurement scales was assessed using Cronbach's alpha. A value of 0.70 or above was considered acceptable for internal consistency.

Third, validity was examined through factor loadings, composite reliability and average variance extracted, depending on the statistical technique used.

4. Data Analysis and Interpretation

4.1 Demographic Profile of Respondents

The demographic characteristics of the respondents were analysed using frequencies and percentages. The characteristics included age, gender, education, place of residence and experience with mobile payment services.

Table 4.1 Demographic Profile of Respondents

Variable	Category	Frequency	Percent
Age	60–65 years	48	40.0
	66–70 years	34	28.3
	71–75 years	23	19.2
	Above 75 years	15	12.5
Gender	Male	68	56.7
	Female	52	43.3
Education	No formal education	18	15.0
	Primary education	29	24.2
	Secondary education	38	31.7
	Graduate and above	35	29.2
Residence	Rural	55	45.8
	Urban	65	54.2
Mobile payment experience	Existing user	87	72.5
	Potential or occasional user	33	27.5
Total		**120**	**100.0**

Interpretation

Demographic analysis revealed that the highest number of respondents were within the age group of 60-65 years with 40.0% of the total respondents. Respondents aged 66–70 years accounted for 28.3%, while 19.2% were aged 71–75 years. The other 12.5% were elderly (over 75).

The male respondents made up 56.7% of the sample while the female respondents constituted 43.3% of the sample. Regarding education, 31.7% had reached secondary level and 29.2% had a higher educational level or were graduates. Another 24.2% had primary education and 15.0% had no formal education.

Respondents were from both rural and urban areas. 54.2% of the respondents were from urban areas and 45.8% were from rural areas. The majority of respondents, 72.5%, have previous experience with mobile payment services. This means that most respondents had access to the opportunity to assess the mobile payment applications from real usage.

4.2 Mobile Payment Behaviour

The respondents were asked about their frequency of mobile payment use, preferred payment service, major transaction purpose and level of independence while conducting digital payments.

Table 4.2 Mobile Payment Behaviour of Respondents

Behavioural characteristic	Category	Frequency	Percent
Frequency of use	Daily	26	21.7
	Weekly	39	32.5
	Monthly	28	23.3
	Rarely	27	22.5
Preferred service	UPI application	69	57.5
	Mobile banking application	31	25.8
	Mobile wallet	20	16.7
Main transaction purpose	Money transfer	42	35.0
	Bill payment	35	29.2
	Purchase of goods and services	29	24.2
	Other transactions	14	11.7
Level of independence	Completely independent	49	40.8
	Requires occasional assistance	45	37.5
	Requires regular assistance	26	21.7
Total		**120**	**100.0**

Interpretation

The results show that 32.5% of the respondents used mobile payments on a weekly basis, while 21.7% used them daily. 23.3% of the respondents used mobile payments monthly and 22.5% rarely.

Most preferred payment service was UPI application with the 57.5% of the respondents preferring it. 25.8% preferred to use mobile banking applications and 16.7% used mobile wallets.

The most common purpose for the money transfer was for the payment of bills, with 35.0% saying that it was for this purpose. Bill payments made up 29.2% of the payments made and 24.2% made mobile payments primarily to buy goods and services.

Only 40.8% of the respondents reported that they could complete mobile payments independently. Another 37.5 per cent needed some help at times and 21.7 per cent needed regular assistance. The finding suggests that the availability of mobile payment technology does not mean that all elderly consumers are digital independent.

4.3 Descriptive Statistics of the Study Constructs

The means and standard deviations of the five main constructs were calculated. The constructs were measured using a five-point Likert scale ranging from 1, strongly disagree, to 5, strongly agree.

Table 4.3 Descriptive Statistics

Construct	N	Minimum	Maximum	Mean	Std. Deviation
Performance expectancy	120	1.75	5.00	3.91	0.68
Effort expectancy	120	1.50	5.00	3.63	0.74
Trust	120	1.25	5.00	3.48	0.79
Mobile payment adoption	120	1.50	5.00	3.70	0.72
Digital financial inclusion	120	1.40	5.00	3.76	0.69
Valid N, listwise	120				

Interpretation

The mean score for performance expectancy was the highest with the score of 3.91. This suggests that the participants felt overall that mobile payment had a positive impact on the financial activities' speed, convenience and efficiency.

The mean score for digital financial inclusion was 3.76 and that for mobile payment adoption was 3.70. These values indicate a "moderate" adoption and financial inclusion score.

The mean score of effort expectancy was 3.63, which suggested that respondents perceived mobile payment services to be relatively easy to use. But this score was less than performance expectancy, which indicated that respondents believed mobile payments could be beneficial but were not always easy to use.

The mean score for Trust was the lowest at 3.48. This was above the scale mid-point but indicated that security, privacy, fraud and transaction reliability continued to be significant issues with elderly respondents.

4.4 Reliability Analysis

Cronbach’s alpha and composite reliability were used to evaluate the internal consistency of the measurement scales. Values of 0.70 or above were considered acceptable.

Table 4.4 Reliability Statistics

Construct	Number of Items	Cronbach’s Alpha	Composite Reliability	Result
Performance expectancy	4	0.842	0.894	Reliable
Effort expectancy	4	0.817	0.879	Reliable
Trust	4	0.866	0.909	Reliable
Mobile payment adoption	4	0.851	0.900	Reliable

Digital financial inclusion	4	0.838	0.891	Reliable

Interpretation

The Cronbach's alpha values were 0.817 to 0.866. The internal consistency for all items was acceptable above 0.70.

The composite reliability rate was between 0.879 to 0.909. These findings again support the consistency of the measure items to their constructs.

The Cronbach's alpha value and composite reliability value for trust were the highest at 0.866 and 0.909, respectively. The Cronbach's alpha value for effort expectancy was the least, 0.817, but was still above the acceptable level. Hence, all of the five constructs were found reliable and suitable for further analysis.

4.5 Indicator Loadings and Convergent Validity

Convergent validity was assessed using indicator loadings and average variance extracted. Factor loadings above 0.70 and average variance extracted values above 0.50 were considered acceptable.

Table 4.5 Outer Loadings

Construct	**Item**	**Outer Loading**
Performance expectancy	PE1	0.812
	PE2	0.846
	PE3	0.784
	PE4	0.829
Effort expectancy	EE1	0.773
	EE2	0.821
	EE3	0.798
	EE4	0.806
Trust	TR1	0.842
	TR2	0.871
	TR3	0.816
	TR4	0.854
Mobile payment adoption	MPA1	0.833
	MPA2	0.857
	MPA3	0.808
	MPA4	0.836
Digital financial inclusion	DFI1	0.801
	DFI2	0.829
	DFI3	0.844
	DFI4	0.815

Interpretation

All indicator loadings were above 0.70. The lowest loading was 0.773, while the highest loading was 0.871. Therefore, no measurement item was removed.

Table 4.6 Construct Reliability and Validity

Construct	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted
Performance expectancy	0.842	0.848	0.894	0.679
Effort expectancy	0.817	0.823	0.879	0.645
Trust	0.866	0.870	0.909	0.715
Mobile payment adoption	0.851	0.855	0.900	0.693
Digital financial inclusion	0.838	0.842	0.891	0.676

Interpretation

The mean variance extracted scores were between 0.645 and 0.715. All scores were above 0.50, resulting in convergent validity.

The highest average variance extracted was found for the construct of trust (AVE = 0.715) which explained 71.5% of the variance in the measurement items.

The lowest average variance extracted value was for effort expectancy (0.645). However, this was still above the recommended limit.

The results thus indicate that the measurement items were representative of the constructs they measured.

4.6 Discriminant Validity

Discriminant validity was examined using the heterotrait-monotrait ratio.

Table 4.7 Heterotrait-Monotrait Ratio

Construct	PE	EE	TR	MPA	DFI
Performance expectancy	—				
Effort expectancy	0.714	—			
Trust	0.621	0.659	—		
Mobile payment adoption	0.781	0.742	0.804	—	
Digital financial inclusion	0.636	0.612	0.701	0.823	—

Interpretation

The HTMT values for all were below 0.85. The highest value was 0.823 in the relationship between mobile payment adoption and digital financial inclusion. The value of 0.612 was the minimum value among the variables between effort expectancy and digital financial inclusion.

The findings were congruent with the constructs being empirically different from each other. Thus, discriminant validity was achieved.

4.7 Multicollinearity Assessment

Variance inflation factor values were examined to identify possible multicollinearity among the predictors.

Table 4.8 Collinearity Statistics

Dependent Construct	Predictor	Tolerance	VIF
Mobile payment adoption	Performance expectancy	0.584	1.713
	Effort expectancy	0.556	1.799
	Trust	0.632	1.582
Digital financial inclusion	Mobile payment adoption	1.000	1.000

Interpretation

The VIF values for performance expectancy, effort expectancy and trust were 1.713, 1.799 and 1.582, respectively. All values were below the conservative threshold of 3.3 and well below the general threshold of 5.0.

Therefore, multicollinearity was not considered a problem in the structural model.

4.8 Coefficient of Determination

The coefficient of determination was used to assess the explanatory power of the model.

Table 4.9 R Square

Endogenous Construct	R Square	R Square Adjusted
Mobile payment adoption	0.618	0.608
Digital financial inclusion	0.527	0.523

Interpretation of Mobile Payment Adoption

The R^2 value of mobile payment adoption was 0.618. This indicates that the variance in mobile payment adoption could be accounted for by 61.8% through the performance expectancy, effort expectancy, and trust together.

After standardizing for the number of predictors, the adjusted R^2 value was 0.608, which was a strong result.

Other factors that are not measured in the model account for another 38.2% of the variance in mobile payment adoption. Some of these factors can be social influence, facilitating conditions, digital literacy, perceived risk, support of family and habit and access to smartphone or Internet connectivity.

In the field of behavioural research, a value of $R^2 = 0.618$ would be considered moderate to substantial. Hence, the model was able to explain the adoption of mobile payment among elderly respondents.

Interpretation of Digital Financial Inclusion

Digital financial inclusion had a coefficient of determination of $R^2 = 0.527$. This means mobile payment adoption accounted for 52.7% of the variation in digital financial inclusion.

The adjusted R^2 value was 0.523. Thus, the model had medium explanatory power in the context of digital financial inclusion.

The other 47.3% of the variance could be related to banking services, income level, financial knowledge, education, internet access, government support or family support.

4.9 Effect Size

The effect size was assessed using f^2 values.

Table 4.10 Effect Size

Relationship	f^2	Interpretation
Performance expectancy → Mobile payment adoption	0.186	Medium
Effort expectancy → Mobile payment adoption	0.098	Small
Trust → Mobile payment adoption	0.237	Medium
Mobile payment adoption → Digital financial inclusion	1.114	Large

Interpretation

Trust had the highest value of f^2 (0.237), indicating that trust had the greatest impact on mobile payment adoption. This represents a medium effect.

The medium effect of performance expectancy was shown by the f^2 value of 0.186. The effect of effort expectancy was smaller with an f^2 value of 0.098.

Mobile payment adoption had a significant impact on digital financial inclusion, having an f^2 value of 1.114. This suggests that the role of adoption was significant in explaining issues of digital financial inclusion.

4.10 Predictive Relevance

Predictive relevance was assessed using Stone-Geisser's Q^2 values. A Q^2 value greater than zero indicates that the model has predictive relevance.

Table 4.11 Construct Cross-Validated Redundancy

Endogenous Construct	SSO	SSE	Q^2
Mobile payment adoption	480.000	298.080	0.379
Digital financial inclusion	480.000	320.640	0.332

Interpretation

The value of Q2 for mobile payment adoption was 0.379 and the value of Q2 for digital financial inclusion was 0.332.

Both of these values were positive, which indicated the model had good predictive relevance. The results show that the model proposed could predict the adoption of mobile payment and the inclusion of digital financial services.

4.11 Model Fit

The model fit was assessed using the Standardised Root Mean Square Residual and Normed Fit Index.

Table 4.12 Model Fit Summary

Fit Measure	Saturated Model	Estimated Model	Recommended Value	Result
SRMR	0.061	0.067	Less than 0.08	Acceptable
d_ULS	0.592	0.681	Lower values preferred	Acceptable
d_G	0.314	0.352	Lower values preferred	Acceptable

Chi-square	348.216	371.504	—	—
NFI	0.918	0.907	Above 0.90	Acceptable

Interpretation

The model resulted in an SRMR of 0.067. This value was seen to be below 0.08, indicating acceptable fit for the model.

The NFI value was 0.907, which is higher than the recommended value of 0.90. This further supports the adequacy of the structural model.

When compared to the saturated model, the d_ULS and d_G values were also acceptable values. In summary, the results of model-fit showed that the relationships between the study variables were well represented by the proposed model.

5. Hypothesis Testing

The evaluation of the significance of the structural relationships was achieved through bootstrapping with 5,000 resamples. The path coefficient was taken as positive and the t-statistic was more than 1.96 with a p-value less than 0.05 to accept it as a hypothesis.

Table 4.13 Path Coefficients

Hypothesis	Structural Relationship	Original Sample	Sample Mean	Std. Deviation	t-Statistic	p-Value
H1	Performance expectancy → Mobile payment adoption	0.327	0.331	0.081	4.037	<0.001
H2	Effort expectancy → Mobile payment adoption	0.214	0.218	0.087	2.460	0.014
H3	Trust → Mobile payment adoption	0.401	0.397	0.079	5.076	<0.001
H4	Mobile payment adoption → Digital financial inclusion	0.726	0.729	0.052	13.962	<0.001

Table 4.14 Bootstrapping Confidence Intervals

Relationship	Path Coefficient	2.5%	97.5%	Result
Performance expectancy → Mobile payment adoption	0.327	0.171	0.485	Significant
Effort expectancy → Mobile payment adoption	0.214	0.047	0.386	Significant
Trust → Mobile payment adoption	0.401	0.249	0.554	Significant

Mobile payment adoption → Digital financial inclusion	0.726	0.617	0.819	Significant

All bootstrapping confidence intervals excluded zero. Therefore, all four structural relationships were statistically significant.

5.1 Interpretation of Hypotheses

5.1.1 Performance Expectancy and Mobile Payment Adoption

H1. Performance expectancy has a significant positive effect on mobile payment adoption among elderly individuals in Uttar Pradesh.

Path coefficient of performance expectancy to adoptions of mobile payment was positive and statistically significant:

$\beta = 0.327$, $t = 4.037$, $p < 0.001$

The confidence interval was from 0.171 to 0.485, and not containing the value of zero. Thus, the hypothesis was accepted.

The result suggests that older people are less willing to use mobile payments when they do not feel that the mobile payments enhance the speed, convenience and efficiency of financial transactions.

The findings imply that aged respondents are interested in the functional aspect of their welfare like transferring funds from home, paying utility bills at home, and minimizing reliance on cash.

Performance expectancy was the second strongest predictor of mobile payment adoption. Thus, the benefits of mobile payments need to be emphasized to persuade the elderly to adopt this technology.

5.1.2 Effort Expectancy and Mobile Payment Adoption

H2. Effort expectancy has a significant positive effect on mobile payment adoption among elderly individuals in Uttar Pradesh.

Relationship between the two was positive and significant:

$\beta = 0.214$, $t = 2.460$, $p = 0.014$

A confidence interval for the value was (0.047, 0.386) with no overlap with zero. Hence, H2 was advocated.

The findings suggest that when the mobile applications are seen as simple to use and understand, elderly respondents are more likely to be using mobile payments.

The path coefficient was the smallest for the effort expectancy of the three predictors, however. Ease of use was also an important factor, but with a lesser impact than trust and performance expectancy.

This may be because some elderly people are supported in making transactions by family members, and are not as affected as others. Therefore, their use may be less dependent upon being able to use it on their own.

5.1.3 Trust and Mobile Payment Adoption

H3. Trust has a significant positive effect on mobile payment adoption among elderly individuals in Uttar Pradesh.

The path coefficient was statistically significant and positive:

$\beta = 0.401$, $t = 5.076$, $p < 0.001$

The confidence interval was (0.249, 0.554), which does not include 0. Hence, the support of H3.

The three predictors were found to have the largest impact on mobile payment adoption, with trust having the strongest impact. This indicates that older individuals were more likely to use mobile payment services if they felt the systems were secure, always reliable and could keep their financial information safe.

The outcome emphasizes issues of fraud and error in transfers, transaction failure, privacy and unauthorised access.

The discovery indicates that enhancing security awareness, transaction transparency, and the complaints-resolution process could have a significant impact on the adoption of elderly users.

5.1.4 Mobile Payment Adoption and Digital Financial Inclusion

H4. Mobile payment adoption has a significant positive effect on digital financial inclusion among elderly individuals in Uttar Pradesh.

There was a positive and very significant relationship between the two:

$\beta = 0.726$, $t = 13.962$, $p < 0.001$

The confidence interval was (0.617, 0.819) with no zero in it. Thus, the support was given to H4.

This means that there is a strong positive association between the adoption of mobile payments and digital financial inclusion, with a coefficient of 0.726.

The discovery implies that older people who use mobile payments more actively have a higher level of access to digital financial services, greater convenience of transaction and higher participation in formal financial activities.

Mobile payment use could also help to lessen reliance on physical financial institutions and promote financial autonomy. The results with regards to assistance, however, indicate that access does not ensure full autonomy.

A meaningful form of digital financial inclusion must allow elderly customers to transact without undue reliance on others, in a confident, secure environment.

6. Summary of Hypothesis Testing

Table 4.15 Summary of Hypotheses

Hypothesis	Proposed Relationship	Path Coefficient	p-Value	Decision
H1	Performance expectancy positively affects mobile payment adoption	0.327	<0.001	Supported
H2	Effort expectancy positively affects mobile payment adoption	0.214	0.014	Supported
H3	Trust positively affects mobile payment adoption	0.401	<0.001	Supported
H4	Mobile payment adoption positively affects digital financial inclusion	0.726	<0.001	Supported

It was found that all four hypotheses were supported. Performance expectancy and effort expectancy were the second and third strongest predictors of mobile payment adoption, respectively, with trust as the strongest predictor. The adoption of mobile payment showed a very positive impact on digital financial inclusion.

7. Discussion of Findings

The findings revealed that performance expectancy, effort expectancy and trust were significant factors influencing the adoption of mobile payment among the elderly people in Uttar Pradesh.

The most powerful predictor was trust. This result suggests that elderly users are very concerned with transaction security, privacy protection and service reliability. Regardless of the usefulness of the mobile payment system, fear of fraud and financial loss might deter elderly customers.

Performance expectancy was the second strongest predictor. This validates the insights that elderly people are ready to embrace mobile payments where they see advantages. The self-service of paying bills, transferring cash and making purchases without having to travel to a bank or carry cash could enhance adoption.

Effort expectancy was also a significant factor in adoption, but not as strong a factor. This finding reveals that usability is still relevant, however, when having a high level of confidence in the service and realizing its functionality, the elderly can handle some complexity.

The uptake of mobile payment had a significant impact on the digital financial inclusion. This shows that the digital payment services can contribute to the better access of elderly people to formal financial services.

However, around 59.2% of respondents needed to be occasionally or frequently helped. So, the fact that mobile payment services are available does not necessarily mean that financial inclusion is fully realized in digital format.

Independent use, confidence, awareness of security risks and ability to solve problems with transactions are all part of the equation of true inclusion.

8. Practical Implications

There are some practical implications of the results.

Banks and mobile payment service providers must put in place measures to build trust. The visibility of customer-support options and complaint procedures, as well as clear transaction confirmations and fraud alerts, can help boost the trust of elderly users.

Big text and small menus, local language options and fewer steps in transactions, voice-guided instructions.

There is a need for financial-literacy programmes tailored to the elderly. These programmes should educate people on how to recognise the suspicious links, how to safeguard PINs and passwords, how to check the recipient's details and how to report suspicious transactions.

Family assisted adoption can be beneficial in the beginning, and then slowly move towards independent use of the training.

Digital-payment awareness sessions can also be held in rural and urban locations by government agencies, banks and community organisations.

9. Conclusion

The present study explored the factors affecting elderly people's mobile payment adoption and digital financial inclusion in Uttar Pradesh. The study was grounded on the Unified Theory of Acceptance and Use of Technology and on the four main relationships. It was found that performance expectancy, effort expectancy and trust were examined as predictors of mobile payment adoption, and a digital financial inclusion was examined as a predictor of mobile payment adoption.

The results show that the adoption of mobile payments among elderly depends on the perceived usefulness and ease of use plus trust. The results showed that performance expectancy was a significant positive influence on the adoption of mobile payments, suggesting that elderly users are more likely to adopt mobile payment services if they think these services would make financial transactions quicker, easier and more efficient. Mobile payments can help cut down on trips to the bank, ease home bill payments and improve money transfer operations. As such, mobile payment services provide a key practical advantage to elderly consumers, which is significant in motivating them to engage in mobile payments.

The effort expectancy also positively and significantly influenced adoption of mobile payment. The result indicates that satisfaction with simplicity, understandability and ease of use of mobile payment applications is more highly correlated with the adoption of these services among the elderly than among other groups of respondents. A system that contains multiple steps in the payment process, has a complex menu, a small text and unfamiliar terminology can discourage elderly users. Therefore, the design and the kind of support offered to users are key elements in ensuring adoption among this age group.

The factor that was most predictive of mobile payment adoption was trust. This discovery suggests that the security, reliability and credibility of mobile payment systems is extremely important to elderly consumers. They could be less inclined to use digital payment services due to fears of online fraud, incorrect transactions, loss of personal information, and transaction failure and unauthorised access. Trust in the system, clarity of transactional confirmation, awareness of fraud, good customer support and transparent procedures to address complaints are especially crucial.

The research also revealed that the adoption of mobile payment had a strong positive impact on digital financial inclusion. This implies that the active users of mobile payment services are more likely to enjoy enhanced access to financial service, convenience in the completion of financial transaction and involvement in the digital financial system, especially for the elderly. Mobile payments can cut down on cash usage and bank branch reliance, and can help increase the financial independence of older users.

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