

Technology acceptance model for mobile payment adoption in urban India

R Pradheep Balaji, T Vijayakumar

Abstract: Digital economy is driven by 02 key factors – First is the mobile payment ecosystem driven by banks, commercial institutions, NBFCs. Second one is the ability of the user to adopt and use the mobile payment systems offered by the above. This paper examines the mobile payment technology adoption levels amongst urban users in India with specific focus on Chennai. The authors focuses on user-centric factors and evaluated the adoption based on UTAUT model to understand the user acceptance of mobile payment systems in urban India. UTAUT provides a useful tool for mobile payment companies to assess the likelihood of success of innovations, feature additions in their applications and helps them understand the drivers of acceptance to proactively design their marketing and design interventions. Our study will support managers is improving the adoption rate of mobile payments amongst late adopters amongst urban users.

Index Terms: Mobile payments, user acceptance,

I. OBJECTIVES OF THE STUDY

Mobile payment is defined as any payment in which a mobile device is utilized to initiate, authorize and confirm a commercial transaction(Au and Kauffman,2008).This study aimed at investigating the components impacting the expectation to utilize mobile payment methods in urban parts of India. This intention is accomplished by exploring the literature and summing the major factors that are theoretically expected to impact behavioral aims (BI). Following are the four core determinants of the intention and usage.

1. To comprehend basic mental mechanism for selection of mobile payments
2. To examine the customer journey and key impacts of selection of mobile payments
3. To examination the key variables affecting selection of mobile payments in India
4. To assess nomological system of brought together theory of acknowledgment and client innovation (UTAUT) for selection of mobile payments

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II. USER ANALYSIS IN MOBILE PAYMENTS

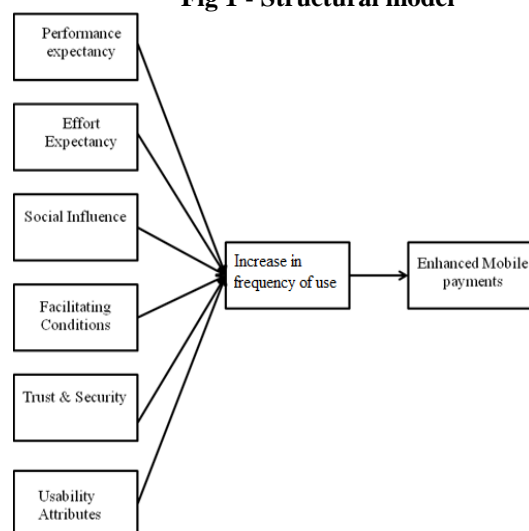
The behavioral intention of clients is influenced by their motivation as indicated by the conviction attitude-intention-behavior relationship portrayed in Davi's Technology Acceptance Model (TAM), which depends on the Theory of Reasoned Action (TRA). TAM theory discloses factors identifying with the apparent handiness and saw convenience determining the acknowledgment of innovation. What's more, the determinants of relative preferred standpoint and compatibility have been demonstrated by Roger's Innovation Diffusion Theory (IDT) and Moore's expansion in data innovation development (Moore, 1993).Strikingly, IDT's factor of compatibility was essentially confirmed in numerous studies on mobile payment acceptance.

III. UNIFIED THEORY OF ACCEPTANCE AND USE OF TECHNOLOGY (UTAUT)

The hypothetical model utilized in this examination work is the Unified Theory of Acceptance and Use of Technology (UTAUT) of Venkatesh, Morris, Davis and Davis (2003). UTAUT incorporates eight unmistakable models with respect to singular acknowledgment of recently presented data technologies.

UTAUT was formulated containing the most important constructs. The variables of the intention to use mobile payments are performance expectancy, effort expectancy, social influence, Facilitating Condition, Trust & Security and Usability Attributes.

Fig 1 - Structural model



IV. ENHANCED MOBILE PAYMENTS

Enhanced mobile payment is directly linked with the variable increased user. The ultimate achievement of this research is to enhance the mobile payments which can be achieved when there are increased users towards mobile payments.

V. RESEARCH QUESTIONS AND HYPOTHESIS

5.1 Research Question 1 (RQ1): Does the dimensions viz. Performance expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, Trust & Security and Usability Attributes have an impact on Increase in frequency of use?

5.2 Research Question 2 (RQ2): Does the dimension Increase in frequency of use has an impact on Enhanced Mobile payments?

VI. NULL HYPOTHESES

H_{01.1}: There is no significant difference between age groups with regards to the Performance expectancy, Effort Expectancy, Facilitating conditions, Social influence, Trust and Security, Usability Attributes, Increase in frequency of use and Enhanced Mobile payments.

H_{01.2}: There is no significant difference between Educational Qualification groups with regards to the Performance expectancy, Effort Expectancy, Facilitating conditions, Social influence, Trust and Security, Usability Attributes, Increase in frequency of use and Enhanced Mobile payments.

CHI-SQUARE

H_{02.1}: There is no significance difference between Age and Use of Mobile Payment.

H_{02.2}: There is no significance difference between Mobile Payment and Monthly Income

SEM Hypothesis

H_{03.1} Performance expectancy has no impact on Increase in frequency of use.

H_{03.2} Effort Expectancy has no impact on Increase in frequency of use.

H_{03.3} Facilitating Conditions has no impact on Increase in frequency of use.

H_{03.4} Social Influence has no impact on Increase in frequency of use.

H_{03.5} Trust & Security has no impact on Increase in frequency of use.

H_{03.6} Usability Attributes has no impact on Increase in frequency of use.

H_{03.7} Increase in frequency of use has no impact on Enhanced and Mobile payments.

VII. RELIABILITY AND VALIDITY

The reliability coefficients for each question and complete research instrument are presented in Table 1 Cronbach values above 0.7 are acceptable and denote very good reliability (Nunally, 1978). In this research work we start from exploratory factor analysis and confirm the relationship through Confirmatory factor analysis.

**Table 1
Reliability Coefficient**

Description	Number of Items	Cronbach's Alpha
Performance expectancy	6	0.833
Effort Expectancy	5	0.779
Facilitating Conditions	3	0.815
Social Influence	4	0.793
Trust & Security	7	0.812
Usability Attributes	12	0.876
Increase in frequency of use	5	0.751
Enhanced and Mobile payments	5	0.787
Overall	43	0.944

Source: Primary Data

**Table 2
Cronbach Values from Pilot Study**

Description	Number of Items	Cronbach's Alpha
Performance expectancy	6	0.817
Effort Expectancy	5	0.714
Social Influence	4	0.766
Facilitating Conditions	3	0.829
Trust & Security	7	0.746
Usability Attributes	12	0.808
Increase in frequency of use	3	0.829
Enhanced and Mobile payments	3	0.784
Overall	43	0.923

VIII. POPULATION

The population comprises of users of mobile Payment System in urban areas in India.

IX. SAMPLING METHOD

Deliberate (Purposive or Judgment) Sampling (Malhotra and Birks, 2006) was employed. The survey was based on mobile payment system.



X. SAMPLE SIZE ESTIMATION

The standard deviation value from the pilot study, considering question on 'Enhanced mobile payments' was found to be 0.784. Sample size, when population is unknown, is estimated (Malhotra and Birks, 2006) using the formula.

$$n = \sigma^2 \cdot z^2 / D^2$$

σ = standard deviation = 0.784
 D = level of acceptable error = 0.05 (Level of significance)
 z = standard variant = 1.535
 n = estimated sample size (579.30) = 579

XI. DATA ANALYSIS AND INTERPRETATION

This chapter presents analysis of data gained from 579 respondents. The data analyzed was interpreted using the primary data collection method with the help of questionnaire containing questions relevant to the topic of the research. The information collected from the respondents is analyzed using SPSS package. Interpretation of data and study variables were constructed using path analysis. Evaluation of path coefficient was carried out using AMOS (Analysis of Moment Structure).

XII. DIFFUSION OF MOBILE PAYMENTS IN INDIA.

Table 3 have been prepared to show the percentage-wise distribution of the respondents according to the usage of mobile phones for payments in India. The tables include both; section-wise mean scores and the composite mean scores of the usage of mobile phones for payments in India. The range of summated scores in different sections has been grouped into three different class-intervals of scores to indicate their corresponding usage of mobile phones for payments in India. There are total 43 items covering all eight sections.

XIII. CHI-SQUARE METHOD

Association between Age and Use of Mobile Payment

$H_{02.1}$: There is no significance difference between
***Significant at 5% level**

Analysis:

It can be seen from Table - 4.57 the P value is lesser than our chosen Significance at = 0.05 levels, the null hypothesis is rejected.

Discussion

It is therefore concluded that there is an association between Age and Use of Mobile Payment.

XIV. TESTING OF HYPOTHESIS USING STRUCTURED EQUATION MODELLING

Structural Equation Modeling (SEM) was applied by using Amos 5.0 software package to test the hypothesis (SEM) of the proposed research model. The SEM is useful to find evaluation of the casual relationship between variables as well as the compatibility of the research model.

Observed, endogenous variables

Increase in frequency of use
 Enhanced Mobile Payment

Observed, exogenous variables

Performance Expectancy
 Effort Expectancy
 Facilitating Conditions
 Social Influence
 Trust and Security
 Usability Attributes

Unobserved, exogenous variables

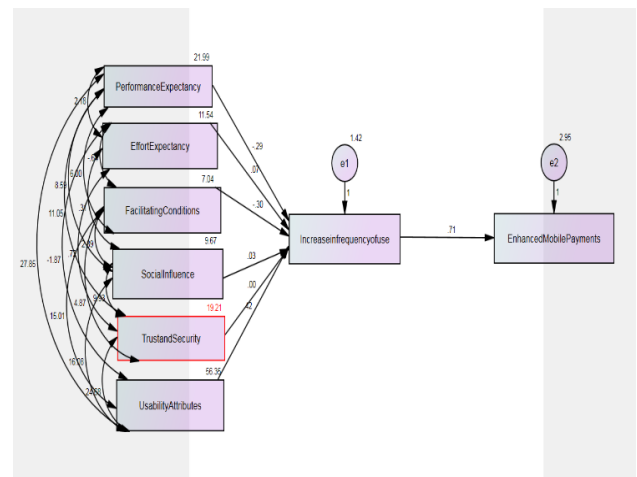
e1 (error term for Increase in frequency of use)
 e2 (error term for Enhanced Mobile Payment)

Variable counts (Group number 1)

Number of variables in the model	: 10
Number of observed variables	: 8
Number of unobserved variables	: 2
Number of exogenous variables	: 8
Number of endogenous variables	: 2

SEM Path Analysis

FIGURE : 4.53



XV. SEM PATH ANALYSIS

Research Question 1 (RQ1) : Does the dimensions viz. Performance Expectancy, Effort Expectancy, Facilitating Conditions, Social Influence, Trust and Security and Usability Attributes have an impact on Increase in frequency of use

Research Question 2 (RQ2) : Does the dimensions viz Increase in frequency of use has an impact on Enhanced Mobile Payments?

$H_{03.1}$ Performance Expectancy has no impact on Increase in frequency of use.

Analysis: It can be seen from Table 4.59, the p value is less than the significance level, hence the null hypothesis is rejected.

Result: Performance Expectancy has positive impact on Increase in frequency of use.



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H_{03.2}Effort Expectancy has no impact on Increase in frequency of use.

Analysis: It can be seen from Table 4.59, the p value is less than the significance level, hence the null hypothesis is rejected.

Result:Effort Expectancy has positive impact on Increase in frequency of use.

H_{03.3}Facilitating Conditions has no impact on Increase in frequency of use.

Analysis: It can be seen from Table 4.59, the p value is less than the significance level, hence the null hypothesis is rejected.

Result:Facilitating Conditions has positive impact on Increase in frequency of use.

H_{03.4}Social Influence has no impact on Increase in frequency of use.

Analysis: It can be seen from Table 4.59, the p value is greater than the significance level, hence the null hypothesis is accepted.

Result:Social Influence has negative impact on Increase in frequency of use.

H_{03.5}Trust and Security has no impact on Increase in frequency of use.

Analysis: It can be seen from Table 4.59, the p value is greater than the significance level, hence the null hypothesis is accepted.

Result:Trust and Security has negative impact on Increase in frequency of use.

H_{03.6}Usability Attributes has no impact on Increase in frequency of use.

Analysis: It can be seen from Table 4.59, the p value is less than the significance level, hence the null hypothesis is rejected.

Result:Usability Attributes has positive impact on Increase in frequency of use.

H_{03.7}Increase in frequency of use has no impact on Enhanced Mobile Payments.

Analysis: It can be seen from Table 4.59, the p value is less than the significance level, hence the null hypothesis is rejected.

Result:Increase in frequency of use has positive impact on Enhanced Mobile Payments.

XVI. MAJOR MODEL FIT INDICES SUMMARY

The important fit indices are presented in the Table below.

Table 3

Parameters	Acceptable values for Good Fit	Research Model Values
GFI	>0.9	0.931
AGFI	>0.9	0.928
CFI	>0.9	0.944
RMSEA	<0.06	0.012
RMR	<0.02	0.011

Source: Primary Data, SPSS AMOS output, Haier et al. (2009); Hooper et al. (2008); Steiger (2007); Hu and Bentler (1999).

Interpretation:

It can be seen from Table 4.60 the Goodness of Fit Index (GFI) value was 0.931, Adjusted Goodness of Fit Index (AGFI) value was 0.928 and Comparative Fit Index (CFI) value was 0.944. All these values are (greater than 0.9) indicating a very good fit. It was found that Root Mean Square Error of Approximation (RMSEA) value was 0.012 (lesser than 0.06) and Root Mean Square Residual (RMR) value was 0.011 (lesser than 0.02).

XVII. FINDINGS, CONCLUSION AND FUTURE RESEARCH

The distribution of respondents according to the Diffusion of mobile payments in India. It shows both section – wise distribution and their composite scores. Also, the table shows the respective mean scores and standard deviation. It may be inferred that, 66.55% percent of the respondents have stated that, Diffusion of mobile payments in India is High, 28.55% of the respondents have stated that, Diffusion of mobile payments in India is Moderate and 4.91% of the respondents have stated that, Diffusion of mobile payments in India is Low. However, the composite mean score (2.62), standard deviation (0.559) depicts that the respondents have stated that, Diffusion of mobile payments in India is High.

- “Gender of the respondents” Obtained the following ratings: 69.1% respondents are Male; 30.9% of the respondents are Female.
- “Age of the respondents” Obtained the following ratings: 37.8% respondents are between 25 - 30 Years; 27.6% respondents are between 30 - 40 Years; 20.7% respondents are between 40 - 50 Years and 13.8% of the respondents are between 50 - 60 Years.
- “Marital Status” Obtained the following ratings: 36.36% respondents rated for Unmarried; 26.39% respondents rated for Married; 23.95% respondents rated for Separated and 13.30% respondents rated for Widow.
- “Educational Qualification” Obtained the following ratings: 10.2% respondents rated School Level; 41.5% respondents rated Graduate; 31.1% respondents rated Post Graduate and 17.3% respondents rated Diploma.
- “Occupation” Obtained the following ratings: 20.7% respondents rated Employed; 34.5% respondents rated Business, 27.6% respondents rated Professional, 11.9% respondents rated Student and 5.2% respondents rated House Wife.
- “Monthly Income” Obtained the following ratings: 5.2% respondents rated Below Rs. 20000, 15.5% respondents rated Rs. 20001 - 40000, 48.2% respondents rated Rs.40001 – 60000 and 31.1% respondents rated Above Rs.60000.
- “Do you have mobile payment application (Mobile Wallet) installed in your smart phone?” Obtained the following ratings: 62.0% respondents rated Yes and 38.0% respondents rated No.
- “Which of the following mobile app you are using for making payment online?” Obtained the following ratings: 31.1% respondents rated Paytm, 7.3% respondents rated Payzapp, 20.7% respondents rated



Googlepay, 15.0% respondents rated Amazon and 25.9% respondents rated BHIM.

- “In the past Month, how many times approximately have you used the Mobile Payment Application?” Obtained the following ratings: 28.3% respondents rated 5 or less; 47.5% respondents rated 5 - 10 times; 17.3% respondents rated 10 - 15 times and 6.9% respondents rated More than 15 times.

XVIII. ANOVA

- There is significant difference between age groups with regards to Performance expectancy, Facilitating conditions, Social influence, Trust and Security, Usability Attributes, Increased Users and Enhanced Mobile payments.

There is no significant difference between age groups with regards to Effort Expectancy.

- There is significant difference between Educational Qualification with regards to Performance expectancy, Facilitating conditions, Trust and Security, Usability Attributes, Increased Users and Enhanced Mobile payments.

There is no significant difference between Educational Qualification with regards to Effort Expectancy and Social influence.

XIX. CHI – SQUARE

- It is therefore concluded that there is an association between Age and Use of Mobile Payment.
- It is therefore concluded that there is an association between Mobile Payment and Monthly Income.

XX. SEM

- Performance Expectancy, Effort Expectancy, Facilitating Conditions and Usability Attributes have positive impact on Increase in frequency of use except Social Influence and Trust and Security.
- Increased Users has positive impact on Enhanced Mobile Payments.
- The Goodness of Fit Index (GFI) value was 0.931, Adjusted Goodness of Fit Index (AGFI) value was 0.928 and Comparative Fit Index (CFI) value was 0.944. All these values are (greater than 0.9) indicating a very good fit. It was found that Root Mean Square Error of Approximation (RMSEA) value was 0.012 (lesser than 0.06) and Root Mean Square Residual (RMR) value was 0.011 (lesser than 0.02).

XXI. CONCLUSION

This investigation accepted that five major indicators will impact the aims to utilize mobile payment innovation and they are: performance expectancy, effort expectancy; social influence, trust, and Facilitating Conditions. Based on accurate statistical foundation, the commonalities between indicators would not allow every declared indicator to be significant when joint together in the proposed research model. Results showed that every single accepted variables are significant in predicting Increased users except Effort expectancy. From the above findings, it can be concluded that Male use mobile payments than female. The user under the age group of 25 to 30 years properly utilizes the mobile payments facilities. Unmarried and graduate people use

mobile payment options more to fulfill their requirements. Business people need to transaction more in order to develop their business. So it is very easy to have payment app in mobile itself for instant transactions. It is very useful for time and cost consuming. Nowadays, maximum number of people are having payment app in their mobile. Most users use Paytm app for mobile payment. There is significance between age groups with performance expectancy, social influence, trust & security, Facilitating Conditions, Usability Attributes, Increased users and enhanced mobile payments except Effort expectancy. There is significance between educational qualification groups with performance expectancy, trust & security, Facilitating Conditions, Usability Attributes, Increase in frequency of use and enhanced mobile payments except Effort expectancy and social influence. Performance expectancy, Effort expectancy, Facilitating Conditions and Increase in frequency of use have a positive impact on Enhanced mobile payments.

The users are having trust on transactions through mobile payment than other payment modes because it is very safe and secure. By analyzing all the above factors like expectancy of performance and effort, awareness about the social influence and facilitating conditions, users preferred transactions through mobile payment than any other payment method. This will result in increased mobile payment users and finally the transactions through mobile also will be enhanced.

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