

Factors Affecting the Use of Mobile Payments among Educated Urban Population: An Indian Perspective

Felicia Maria Vincent, Angan Sengupta

Abstract: Mobile payments usage is encouraged by the Indian government by creating many schemes to increase the adoption rate. This study is aimed at finding factors that have a significant impact on the frequency of mobile payments usage. This study is empirically validated by collecting data from participants through an online survey. The data were analyzed using chi-square analysis, ANOVA and multinomial logistic regression. The result shows that males and younger population use mobile payments more frequently. Percentage of men who used mobile payments more than 7 times a month was twice higher than the female percentage. There is a significant difference in mean values of perceived usefulness index and ease of use index across age groups. In addition, there is a statistically significant relationship between convenience to use and frequency of mobile payments. These findings can be used by the third party mobile payment companies, managers of those businesses who deal with online payments, banks, and the state level policymakers, in order to create strategies increasing usage of mobile payments and making it safe and convenient.

Index Terms: Mobile Payments; Online payment methods; Digital India; Security risks

I. INTRODUCTION

India is a rapidly developing economy, where penetration of mobile phones, and even smart phones, has been massively increasing even among rural and poorer section of the population during the last decade. Globally, in the history of consumer-based technology, usage of mobile phones has increased at the fastest rate and reached to the deepest level [1]. With the advancement of communication technology, rise in awareness and realization of convenience, people are willing to adopt several modern technology-based payment mechanisms, such as internet or mobile based payment facilities. Mobile payment is a process of paying money for a product, service or family and friends through a portable electronic device like a cell phone and tablet. It is an alternative method of payments instead of using cash, cheque or bank issued cards. However, they are often not convinced about the security of their savings and valuable data.

In India, mobile payment technology has been made available by banks as well as third-party companies like BHIM, Google Pay, PayTm, FreeCharge and PhonePe to name a few. Despite the number of payment portals available, the penetration rate and adoption are relatively low compared to other forms of cashless and credit card payments [2].

Mobile payments in India started during November 2010 with the launch of Immediate Payment Services (IMPS) from National Payments Corporation of India (NPCI). IMPS is an interbank service, offering an instant round the clock fund

transfer service through mobile phones. This service revolutionized the way in which money transfer happened in India. The adoption rate of IMPS is rapidly increasing with the penetration of mobile phones in India. Unified Payments Interface (UPI) is the new payment system launched by NPCI which is a combination of IMPS and open interfaces. The transactions using UPI touched a peak by crossing 300 million transactions amounting to Rs 54,212,26 crore in August 2018 [3]. Currently, most of the payment apps from banks to third-party applications run of UPI.

On 8th of November 2016, Mr. Narendra Modi, Prime Minister of India, announced the demonetization of 500 and 1000 rupee notes. One agenda was to encourage cashless transactions among the general population through structured banking system. This demonetization provided a huge opportunity for digital payment practices to expand in India. As India is cash driven society, there was a collapse in the regular living and lack of cash for the transactions. The country had to adopt digital payment applications in order to tackle the cash insufficiency issues during that time. However, the beneficiaries of such technologies were limited and were exclusively part of urban, educated and well-off class. Over the time demonetization proved to have increased the adoption of digital payments [3]. Both public (Aadhaar Payment app, UPI app) and private platforms have marketed heavily. The National Payments Corporation of India (NPCI) developed the Bharat Interface for Money (BHIM) app. Digital transfers using apps has brought behavioral change and helped in the adoption of digital payment. This technology has even spread to rural markets which predominantly used to depend upon cash transaction.

II. LITERATURE REVIEW

Through the theory of diffusion of innovation E.M. Rogers (1995) suggests that the process of diffusion consists of four stages: invention, diffusion (or communication) through the social system, time and consequences [4]. The information flows through networks and finally the adoption depends upon several factors related to the characteristics of those networks. The unified theory of acceptance and use of technology (UTAUT) proposes that there are four constructs, namely (i) performance expectancy, (ii) effort expectancy, (iii) social influence and (iv) facilitating conditions, which determine behavioral intentions and use behavior among the consumers [5]. One of the important factor is security concerns. According to the



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theory of perceived technology security potential feelings of uncertainty about monetary information makes a buyer skeptical [6]. Dennehy and Sammon in their research discussed on the contingency theory of technology adoption to emphasize on the importance of external influences like cultural, social and economic factors on the rate of adopting mobile payments among consumers. They draw on how contingency theory is helpful to understand why different types of mobile payments services are offered in different countries. To point an example, mobile payments in Kenya happen through SMS technology while other countries use QR code or NFC technology. This difference is due to the difference in the countries' payment technology infrastructure, regulation, laws or social customs. The underlying assumption of this theory is that there is no single best method or way for being equally effective in all conditions [7].

Jaradat and Mashaqba in their paper "Understanding the adoption and usage of mobile payment services by using TAM3" has investigated the key factors that contribute to customers' motive to learn and shift to mobile payments. To find the willingness to adopt, the researchers collected data from 475 undergraduate students in Jordan. Results denote that adoption rate of individuals depended on factors like 1) Perceived Usefulness, 2) Perceived Use of Ease, 3) Subjective Norms, 4) Image, 5) Output Quality, 6) Self-Efficacy, 7) Perception of External Control and 8) Playfulness [8].

While analyzing consumer trust in mobile payments, researchers observed that mobile service provider characteristics and mobile technology environment characteristics as two facilitators for trust in mobile payment. The results show that consumer trust in mobile payments is more important than the other technology adoption factors [9]. A study based on "trust-theoretic model for consumer adoption of m-payment systems" showed that Singapore based population showed that there is an overarching importance of "consumer trust in m-payment systems" as compared to other technology adoption factors [10]. A research conducted on 457 participants by Park et al. (2018) examines the effect of perceived risk, perceived benefits, and trust on customers' willingness to use mobile payments. In addition to above mentioned factors, the researchers also examined the effects of different demographic factors like age, income, and education. This study showed that trust mediated consumers' intention to use mobile payments. In addition, the result also showed education influenced the relationship between perceived risk and intention as well as trust and intention to use mobile payments [11]. However, Shen and Yazdanifard observed that the factors that hinder the development of mobile payments are cost, network externalities, complexity and security [12]. A qualitative study exploring the consumer adoption of mobile payments showed that adoption of mobile payments was dynamic, depending on certain situational factors such as a lack of other payment methods or urgency, while other barriers include premium pricing, complexity, a lack of critical mass, and perceived risks [13].

Consumer perception about mobile payment and its adoption in India is being studied in recent past. During the

past decade, studies have attempted examining the factors which may have potential effect on mobile payments adoption intention among Indians. Nevertheless, more studies are required to be conducted in Indian context in order to generalize on the findings.

III. OBJECTIVES AND HYPOTHESIS

This study attempts to contribute in understanding of factors which have any impact on mobile payment use among urban and educated Indian population.

H₁ Demographic variables (age, gender and education level) would have an impact on the Perceived Usefulness (PU) index

H₂ Demographic variables (age, gender and education level) would have an impact on the Perceived Security (PS) index

H₃ Demographic variables (age, gender and education level) would have an impact on the Ease of Use (EU) index

H₄ Demographic variables (age, gender and education level) would have an impact on the Societal Norms (SN) index

H₅ Demographic variables (age, gender and education level) would have an impact on the Self-Efficacy (SE) index

H₆ Perceived Usefulness (PU) would have a significant impact on frequency of mobile payment usage

H₇ Perceived Security (PS) would have a significant impact on frequency of mobile payment usage

H₈ Ease of Use (EU) would have a significant impact on frequency of mobile payment usage

H₉ Societal Norms(SN) would have a significant impact on frequency of mobile payment usage

H₁₀ Self-Efficacy (SE) would have a significant impact on frequency of mobile payment usage

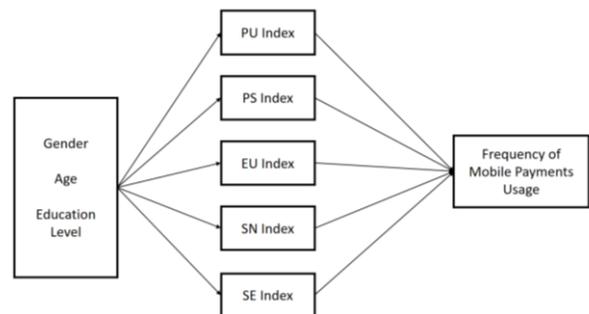


Fig.1: Theoretical Framework

IV. METHODOLOGY

Primary data was collected from urban respondents through convenience sampling, a non-probability sampling technique where data is collected from respondents because of their accessibility to the researcher. We specifically targeted the population who have at least graduation level of education. In order to collect data, a questionnaire was designed. The questionnaire was formed based on factors identified as having an effect on mobile payments during literature review.



The questionnaire captured variables of perceived usefulness, security, ease of use, self-efficacy and societal norms. In addition to capturing differences in variables, the questionnaire also collected data on frequency of mobile payment use and demographic data points. Cronbach's alpha test was carried about with 15 items of the questionnaire. The result of .865 indicates good internal consistency. The questionnaire was pilot tested on nine respondents to ensure its reliability and usefulness. In addition, variability inflation factor was carried out to check for collinearity between variables. The resulted indicated goodness of the variables.

The respondents were given an introduction on mobile payments at the beginning of the survey and given examples of famous mobile payments apps in the market. This is done to guide participants to answer accurately for mobile payments instead of confusing with other payment services. The questionnaire was circulated through Google forms. The number of respondents for the survey was 203.

We have considered fifteen factors which determine the frequency of mobile payments. These variables had been grouped into five indices labelled as perceived usefulness (PU), perceived security (PS), ease of use (EU), societal norms (SN) and self-efficacy (SE). These indices are created by summing up individual factors under common identities; such as, factors considered for PU index - convenience to use, promotional offers and time saving; PS index- governmental governance, trust in service provider and security; EU index- user friendly, easy process and learned behavior; SN index- network externality, societal influence and societal expectation; SE index- capability perception, ability and intention to adopt to new technology. ANOVA is conducted mainly to understand that whether there is any significant difference in the mean values of the five indices, across age, gender and education categories. We also conducted Chi-square analysis in order to understand difference between demographic variables for mobile payments usage. There is a significant difference between genders and across age groups in terms of frequency of mobile payment usage.

V. RESULT AND DISCUSSION

Percentage of men who were using MP for more than 7 times a month is twice higher than the female percentage. Seventy percent of the female respondents used MP less than 7 times a month. Individuals between the age group of 25-34 years (55%) use MP most frequently, closely followed by those aged 18-24 years (48%). More than half of the individuals belonging to age group of 35-44 used mobile payments less than 4 times a month. However, there is no significant difference between the respondents who have completed bachelors and those who are postgraduates in terms of frequency distribution of use of MP.

Table 1: Percentage Distribution of Frequency of MP Usage Across Selected Demographic Factors

Demographic Factors		Percentage of MP use		
		1-3 times a month	4-6 times a month	More than 7 times a month
Gender*	Female	43.3	26.7	30.0

	Male	22.1	16.8	61.1
Age*	15 - 24	24.7	26.9	48.4
	25 - 34	30.0	15.0	55.0
	35 - 44	56.7	20.0	23.3
Education	Bachelors	31.8	20.5	47.7
	Postgraduate and higher	31.0	22.5	46.5

*Chi-square is significant at 95% confidence interval

The ANOVA results suggest that there is a significant difference in mean values of PU index and EU index across age groups. The mean values of the PU and EU indices show inverse patterns with age of the respondents. Mean PU and EU index values were found to be 12.94 and 13.06 for the youngest respondent group, while it declined to 10.81 and 10.84 respectively for the 35-44 years old respondents. However, we did not find any statistically significant impact of gender and two educational categories upon the indices. The results (Not shown in table) also show that there is a significant difference in mean values of the factors such as 'convenience to use', 'time saving', 'promotional offers', 'ease of use', 'easy process' and 'learned behavior' across age groups and the respective mean values declined with increase in age.

Table 2: Mean Difference in the Index Values Across Demographic Groups

		PU	PS	EU	SN	SE
Gender	Female	12.1 7	10.2 6	12.0 0	9.0 7	10.7 0
	Male	12.1 2	10.0 8	12.3 7	9.6 5	11.3 5
Age	18-24	12.9 4	9.95	13.0 6	9.6 3	11.1 1
	25-34	12.6 9	10.7 5	12.6 5	9.7 0	11.0 9
	35-45	10.8 2	9.80	10.8 4	8.7 6	10.8 7
Education	Bachelors	12.2 1	10.1 5	12.5 5	9.1 4	11.0 8
	Postgraduate and Higher	12.0 8	10.1 8	11.8 1	9.5 8	10.9 7

Note: Bold values portray that the mean differences (F-statistics) are statistically significant at 95% confidence interval

In Multinomial logistic regression, there is statistically significant relationship between convenience to use and frequency of mobile payments. Increase in convenience to use by a unit results in increase of probability of using mobile payments by 2.3 times for respondents for 4-6 times a month and by 4.8 times for respondents to use more than 7 times a month as compared to those who are using mobile payments for not more than 3 times a month. Increase in unit values of 'easy process',



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'network externality' and 'ability to use' results in rise of likelihood of using mobile payments by 3.6 times, 1.7 times and 1.6 times respectively for more than 7 times a month as compared to those using less than 4 times a month.

There is a statistically significant positive relationship between PU index and frequency of mobile payments. Increase in the PU index by a unit results in chance of using mobile payments by 1.5 times for more than 7 times a month as compared to those who are using 1-3 times in a month. The EU index, security index, SN index and SE index does not have significant effect on the frequency of mobile payment usage. Compared to males, females have 69.5% lesser likelihood of using mobile payments for more than 7 times in a month.

Table 3: Multinomial Logistic Regression

Variables	Sig.	Exp (B)	95% Confidence Interval for Exp(B)	
			Lower Bound	Upper Bound
4-6 times a month				
PU Index	0.10	1.24	0.96	1.61
PS Index	0.43	0.93	0.77	1.12
EU Index	0.51	1.09	0.85	1.39
SN Index	0.72	0.97	0.80	1.17
SE Index	0.76	1.03	0.85	1.26
Male	1.00	1.00	1.00	1.00
Female	0.74	0.87	0.38	2.00
18-24				
25-34	0.29	0.51	0.15	1.75
35-44	0.16	0.51	0.20	1.31
Bachelors				
Masters and higher	0.96	0.98	0.41	2.35
More than equals 7 times a month				
PU Index	0.00	1.53	1.19	1.97
PS Index	0.12	0.88	0.74	1.03
EU Index	0.34	1.12	0.89	1.42
SN Index	0.34	0.92	0.78	1.09
SE Index	0.22	1.12	0.93	1.34
Male	1.00	1.00	1.00	1.00
Female	0.00	0.31	0.14	0.65
18-24				

25-34	0.40	0.60	0.18	2.00
35-44	0.85	1.09	0.47	2.49
Bachelors				
Masters and higher	0.78	0.89	0.40	1.98

VI. DISCUSSION

Mobile payments usage is actively increasing in India. This is the result of combined action from government, mobile payment companies, personal attitudes towards technology adoption. In India, relative advantage, compatibility, complexity, trialability, voluntariness, result demonstrability, social approval, cost and communicability significantly predicted users' intention of using IMPS; cost and behavioral intention significantly predicted the adoption of IMPS; yet observability, image, visibility and riskiness were found to be the insignificant adoption attributes for IMPS [14]. Even though previous studies conducted in 2008 and 2015, found that perception of security and risks is a major issue for electronic payments system and showed negative relationship between perceived risk and intention to use mobile payments [15], [16], our study results do not show any such association between perceived security and frequency of mobile payment usage. On the contrary to our findings, the results of a study conducted in India, also indicate perceived credibility risk defined by security risk and privacy risk is significantly and negatively associated with behavioral intention, which indicates that security and privacy concerns are important in deterring customers from using mobile commerce [17]. However, the cause of our contradictory results may be due to the improvement in cyber security measures across the globe [18].

The study by Muñoz (2015) concludes intention to use mobile payments is determined by usefulness of the mobile payments system [19]. These findings align with our findings and prove that it is beneficial to increase the usefulness of mobile payments. A recent study (2017) confirmed that ease of use significantly influences mobile payment usage [20]. A research study by Schierz et al., shows that there is a positive relationship between perceived ease of use and consumer adoption of mobile payments. The study also demonstrated that there is a significant relationship between societal norms and attitude to use mobile payments [21]. An earlier study conducted in 2013 on Indian population found that perceived usefulness, perceived ease of use and social influence are significantly associated with technology adoption readiness to use mobile commerce while facilitating conditions did not demonstrate any significant relationship [17]. However, our findings refute that societal norms determine perception towards mobile payments; and the possible reason can be attributed to a massively increased popularity of mobile payment and the awareness among highly educated urban population refuse to be moderated by societal norms.



An empirical study of the effects of behavioral beliefs, social influences, and personal traits on mobile payments adoption across time showed that behavioral beliefs in combination with social influences and personal traits play crucial roles in determining mobile payment services adoption and use, but their impacts on behavioral intention vary across in different stages [22]. A study was conducted by Shankar and Datta, to identify the factors which had an effect on mobile payments adoption intention in Indians by using a conceptual framework inspired by Technology Adoption Model. The results based on total of 381 participants show that perceived ease of use, perceived usefulness, trust, and self-efficacy had a positive effect on the adoption intention rate. However, in contrast to other research. This study shows that subjective norms and personal innovativeness does not have any significant effect on adoption innovation [23]

Supporting our finding that age plays an important role in the frequency of mobile payment usage, a survey conducted by [24] "The Pew Charitable Trusts" highlighted that 72% of mobile payments users are millennials (18-24) and generation Xers (35-50). This study results also suggest that educational background do not have effect on mobile payments usage, which is backed by a study conducted by Rana (2017) on opinion on mobile wallets [25].

Even if an earlier study could not find any significant gender differences in terms of usage of mobile payments [26], we found males are significantly more active in mobile payment when frequency rises. Supporting our results on gender dynamics of mobile payment adoption Thakur and Srivastava suggested that mobile service providers need to engender users' innovativeness in order to facilitate usage of mobile payments [27]. A report by Ernst and Young (2017) also contradicts our research findings by showing that American women (59%) used mobile for banking activities slightly more than men (50%), while there was a minor difference between men (28%) and women (27%) regarding mobile payment usage [28]. However, the differences in cultural norms between USA and India could be the contributing factor for difference in the results.

VII. CONCLUSION

Mobile payments usage is actively increasing in India. This is the result of combined action from government, mobile payment companies, personal attitudes towards technology adoption. In India, relative advantage, compatibility, complexity, trialability, voluntariness, result demonstrability, social approval, cost and communicability significantly predicted users' intention of using IMPS; cost and behavioral intention significantly predicted the adoption of IMPS; yet observability, image, visibility and riskiness were found to be the insignificant adoption attributes for IMPS [14]. Even though previous studies conducted in 2008 and 2015, found that perception of security and risks is a major issue for electronic payments system and showed negative relationship between perceived risk and intention to use mobile payments [15], [16], our study results do not show any such association between perceived security and frequency of mobile payment usage. On the contrary to our findings, the results of a study conducted in India, also

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