

# Adoption of Mobile Payment Services in Bangalore Urban - A Structural Equation Modelling based Approach

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## ABSTRACT

The mobile payment adoption in India has not grown at the rate of growth of the mobile phone industry. There is a need to examine the underlying factors among consumers, which influence behavioral intention towards adoption of mobile payments. Six constructs, Perceived ease of use, perceived usefulness, trust, risk, social influence, facilitating conditions are studied to understand attitude and behavioral intention of consumers towards mobile payments adoption. Exploratory factor analysis is conducted on primary responses. The associations between constructs and dependent variables are explored through structural equation modelling. Trust, social influence and perceived usefulness are seen to influence attitude towards adoption. Attitude, trust and perceived risk are seen to have significant associations with behavioral intention towards adoption of mobile payments.

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## Introducton

The indian mobile phone market comprises of a whopping 1 billion users, majority of whom are users of smartphones. The penetration of adoption of mobile payments is only by a meagre 3.6% of the Indian population. The market has many old players and new players competing to understand the magic factor which will boost consumer adoption behavior. Some players in this space are Paytm, Vodafone Mpesa, Airtel money, Ultracash, PayU, Mobikwik, Oxigen, Freecharge, Chillr, Citruspay, Novopay and Momoe. There are certain hurdles in the consumer adoption space which is not effectively addressed by service providers till date. The successful identification of the factors boosting consumer adoption has the potential for disruptive innovation in the mobile payments market.

Mobile payments have the potential to redefine payments methodology and optimize customer shopping experience. Mobile shopping is seen as “a green field opportunity “and “game changing innovation”. Consumers and retail outlets is seen to have a consensus on the fact that in time of one or two years, the mobile based payment space will have dominated the market (Taylor 2016).(Goeke and Pousttchi, 2010) defines mobile payments as “a type of payment transaction processing in which the payer uses mobile communication techniques in conjunction with mobile devices for

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initiation, authorization, or completion of payment". Mobile transactions in the developing world enable users, to store value in account accessible using mobile handset. In the presence of bank account, the account is linked to bank account. In absence of bank account, a pseudo bank account is created by the mobile phone service provider, the value can have cash in and cash out via bank account or mobile phone retail store- retailer works as agent for the transaction system, transfer of stored value between accounts linked to mobile phones using SMS or PIN's (Donner and Tellez 2008).

This study aims to validate relationships between the proposed structural model to understand the underlying factors and constructs leading to behavioural intention towards adoption of mobile payments. Six constructs, Perceived ease of use, perceived usefulness, trust, risk, social influence, facilitating conditions are studied to understand attitude and behavioral intention of consumers towards mobile payments adoption.

The section wise layout is as follows. The paper commences with the broad introduction objectives and premise of the study followed by section 2 literature review. This is followed by the section three –hypothesis formulation. Section 4 and 5 comprises of analysis and discussions. The paper concludes with section 6.

## **Literature review**

The models Technology adoption model (TAM) (Davis 1989), and Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et.al. 2003), among others are prominent theories in technology adoption studies. In TAM , the constructs perceived ease of use, perceived usefulness and external variables were identified as contributing towards attitude, behavioral intention and use behavior of adoption of technology. Perceived usefulness was identified as a major determinant and perceived ease of use as a secondary determinant of people's intention to adopt technology. The UTAUT (Venkatesh et.al. 2003) model was developed through review of eight technology adoption theories theory of reasoned action, the technology acceptance model, the motivational model, the theory of planned behavior, a model combining the technology acceptance model and the theory of planned behavior, the model of PC utilization, the innovation diffusion theory, and the social cognitive theory. UTAUT model analysed influence of predictor variables performance expectancy, effort expectancy, social influence and facilitating conditions on behavioral intention and use behavior in technology adoption. The moderation effects of gender, age, experience and voluntariness of use were also explored in the article by Venkatesh et.al. 200 and Performance expectancy, effort expectancy, and social influence are seen to have a direct effect on intention to use.

Further to analyzing the adoption models, literature review of recent studies were done to understand the associations between factors influencing attitude and behavioral intention to adopt technology. Zhou (2011) validated significant relationships variables trust and perceived usefulness on usage intention. Chauhan (2015) identified significant relationship between trust and perceived usefulness on consumer attitude, and high association between attitude and behavioral intention. Gu et.al.

(2009) revealed significant associations of trust, perceived ease of use, perceived usefulness on behavioural intention towards adoption of technology. Wei (2009) validated significant relation between perceived usefulness, social influence and trust on consumer usage intention. Puschel and Mazzon (2010) identified significant associations between relative advantage (termed in this study as perceived usefulness), attitude and behavioural intention. This finding was supported by Akturan and rescan (2012) where the path on perceived usefulness to attitude and attitude to behavioral intention was seen as significant. Koenig – lewis (2010) and Wessels and drennen (2010) found significant associations between perceived usefulness and behavioural intention. Liebana- cabanillas et.al. (2015) in their study found significant relation between attitude of consumers and behavioral intention. Further perceived usefulness was found to be significant predictor of attitude towards technology adoption.

Risk and trust factors were originally missing from Technology adoption model (Davis 1989) and UTAUT model (Venkatesh 2003). Further, adoption literature has evidence of quantitative studies from countries United Kingdom, Spain, Brazil, China, Australia, Turkey and Malaysia. Literature on benefits of mobile payment usage on financial inclusion was found in association with organizations as World economic forum, Consulting Group to assist poor (CGAP), International telecommunication Union (ITU) and others. The current study integrated risk and trust into mobile payments adoption model, originally missing from TAM. Further, this study contributes to mobile payment adoption research in India where the current studies are few and fragmented.

From extensive literature review associations between attitude, behavior intention towards adoption of mobile payments, perceived ease of use, facilitating conditions, social influence, trust, perceived usefulness and perceived risk were identified as relevant and statistically significant on a global level. This study aimed to identify significant factors, and structural associations between the identified variables in the Indian context.

Intent to use mobile money services was termed as Behavioural intention to use technology, ( Venkatesh et.al., 2012;2003). Behavioural intention is defined as a person's intention to perform various behaviours (Fishbein and Ajzen 1975). Consumer attitude towards mobile payments was measured in this study. Attitude is "an individual's positive or negative feelings about performing the target behaviour" (Fishbein and Ajzen 1975).

Perceived usefulness is the degree to which an individual perceives that the technology will help to attain objectives satisfactorily. (Aktruzan & Tezcan, 2012; Chauhan, 2015; Davis, 1989; Koenig- Lewis et.al., 2010; Liebana-Cabanillas et.al., 2015; Thakur & Srivastava, 2013; Wessels & Drennen, 2010).

Trust is termed as future positive outcomes through use of mobile money services and includes trust propensity and initial trust (Zhou 2011). The three dimensions of trust as identified by Benamati et.al. (2010) are – Ability ( knowledge and skills to fulfill tasks) , Integrity ( fulfilling terms and conditions without deceiving customers ) and Benevolence ( focus on customers interests). In addition two dimensions, trust propensity (tendency to trust other people) and initial trust ( Ability, integrity and benevolence) are identified (Zhou 2011).

The degree to which an individual's behavior is influenced by reference group and degree to which reference group perceives appropriateness of usage of mobile money services is termed as social influence. Evidence from previous literature consists of four terms pertaining to social influence – Social norm (Dahlberg & Oorni, 2007; Slade et al., 2014; Venkatesh et al., 2012; 2003; Wei et al., 2008; Zhou et al., 2010), Subjective Norm (Fishbein & Ajzen, 1975; Liebana-Cabanillas et al., 2015; Puschel et al., 2010), Reference group influence (Thakur & Srivastava, 2013) Perceived compatibility (coherence of an innovation with the values, behaviour patterns and experiences of an individual) (Liebana-Cabanillas et al., 2015). Facilitating conditions refer to consumers' perceptions of the resources and support available to perform a behavior (Venkatesh et al., 2012; 2003). Facilitating conditions include technology support and government support (Brown et al., 2003)

Perceived ease of use is the degree of ease associated with consumers' use of technology (Venkatesh 2012; 2003). Perceived ease of use or effort expectancy, is identified as a significant predictor variable in TAM (Davis et al., 1989) and UTAUT (Venkatesh et al., 2012; 2003). Perceived ease of use, is widely analyzed as a predictor of technology adoption by Davis (1989), and is also termed as Effort Expectancy (Slade et al., 2014; Venkatesh 2012; 2003; Zhou et al., 2010) and Complexity (Mallat, 2007; Moore and Benbasat, 1991; Thompson et al. 1991).

Perceived risk is identified and analysed in studies by Liebana-Cabanillas et al. (2015), Mallat (2007), Slade et al. (2014), Thakur & Srivastava (2013). Perceived risk factor needs to overcome for consumer adoption process (Arvidsson, 2013; Mallat, 2007; Puschel et al., 2010; Thakur & Srivastava 2013)

Based on the identified constructs from the technology adoption literature, a conceptual model was formulated as described in the subsequent section.

## **Hypothesis formulation**

The constructs and the hypothesis in the study are as detailed below. The conceptual model is developed based on the hypothesis.

Attitude and behavioural intention towards adoption were seen to be highly correlated. (Akturan & Tezcan, 2012; Chauhan, 2015; Liebana-Cabanillas et al., 2015; Wessels & Drennen, 2010). The high significance of relationship between attitude and behavioural intention in the Indian context is hypothesized in this study.

*H<sub>1</sub>: Attitude of users towards mobile payment services have a significant influence on behavioral intention to use mobile payment services.*

Evidence of significant relationship between perceived usefulness towards attitude of adoption of mobile money services was validated in previous literature (Chauhan, 2015; Gu et al., 2009; Koenig-lewis, 2010; Liebana-Cabanillas et al., 2015; Venkatesh et al., 2003; Wei, 2009; Wessels and Drennen, 2010; Zhou, 2011). The following hypothesis was proposed.

*H<sub>2</sub>: Perceived usefulness of mobile payment services significantly influences attitude towards adoption of mobile money services*

*H<sub>3</sub>: Perceived usefulness of mobile payment services significantly influences behavioral intention towards adoption of mobile money services*

Technology adoption studies (Arvidsson, 2013; Chauhan, 2015; Dahlberg & Oorni, 2007; Koenig-Lewis et.al., 2010; Mallat, 2007; Slade et . al., 2014; Wei et. al., 2008;Zhou, 2011) contains significant literature on importance of trust in adoption of mobile money services. Trust comprises of familiarity with bank, situational normality, structural assurances, calculative based trust.( Gu, 2009). Services offered need to be Confidential and secure ( Laforet & Li, 2005) . The relationship between Trust and attitude and intended behavior towards use of mobile money was validated in studies by Chauhan (2015), Koenig-lewis (2010), Dahlberg and Oorni (2007), Gu et.al.(2009), Wei (2009) . The following hypothesis is proposed.

*H<sub>4</sub>: Trust in mobile payment services significantly influences attitude towards adoption of mobile money services*

*H<sub>5</sub>: Trust in mobile payment services significantly influences behavioral intention towards adoption of mobile money services*

There exists positive relationship between Social influence and attitude towards mobile money services adoption (Liébana-Cabanillas et.al. 2015; Puschel et.al. 2010; Venkateshet.al. 2003; Wei,2009;Zhou et.al., 2010). The following hypothesis was proposed to test the association.

*H<sub>6</sub>: Social influence significantly influence attitude towards mobile money adoption*

*H<sub>7</sub>: Social influence significantly influence behavioral intention towards mobile money adoption*

Existence of favorable Facilitating conditions was seen to increases adoption of mobile money services (Thakur & Srivastava, 2013;Slade et.al., 2014;Venkatesh et.al., 2012;2003; Zhou et .al., 2010).The following hypothesis was proposed to test the association between facilitating conditions, behavioral intention and attitude.

*H<sub>8</sub>: Existence of, and change in facilitating conditionssignificantly influences attitude towards mobile money services*

*H<sub>9</sub>: Existence of, and change in facilitating conditions significantly influences behavioral intention towards mobile money services*

Perceived ease of use was identified as a significant predictor of technology adoption (Davis, 1989; Moore and Benbasat,1991;Thompson et. al., 1991; Venkatesh 2012: 2003), mobile payments adoption (Arvidsson, 2013; Dahlberg & OOrni, 2007; Liebana-Cabanillas et.al.,2015; Mallat, 2007;Slade et .

al., 2014;Thakur, 2013). However , perceived ease of use was seen to have negligible effect on attitude towards adoption of mobile money services (Akturan & Rescan, 2012; Chauhan,2015 ;Liébana-Cabanillas et.al.,2015 ; Zhou et.al.,2010; Wessels & Drennen,2010) and behavioral intention to use mobile money services (Wei 2009 ). In spite of insignificant results from previous literature, the latent possibility of effect of perceived ease of use on towards attitude and behavioral intention towards adoption of mobile money services in the Indian context is hypothesized as  $H_{10}$  and  $H_{11}$ .

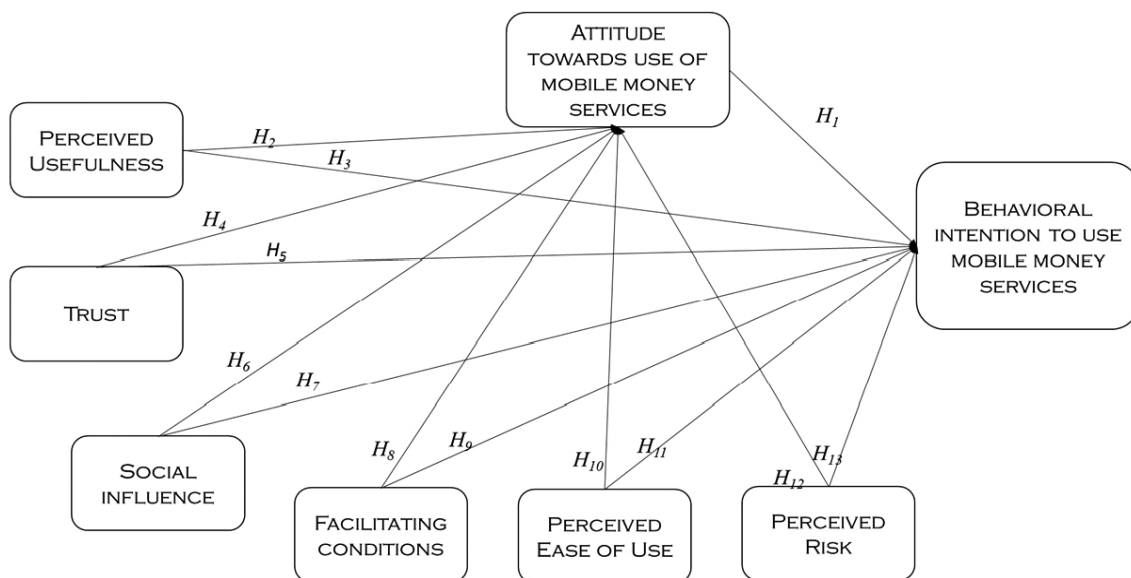
$H_{10}$ : Perceived Ease of use significantly influences attitude towards mobile money services

$H_{11}$ : Perceived Ease of use significantly influences behavioral intention towards mobile money services

Perceived risk in conduct of mobile transaction was seen to be a significant predictor of attitude towards mobile money and behavioural intention towards adoption of mobile money services ( Akturan & Rescan,2012; Koenig-lewis et.al., 2010; Wessels & Drennen, 2010). Security risk was defined as Potential loss of control over transactions and financial information (Aktruzan & Tezcan, 2012). Monetary Risk was the potential monetary outlay associated with the initial purchase price as well as the subsequent maintenance cost of the product (Aktruzan & Tezcan,2012). Monetary risk was seen to deter adoption of mobile money services (Thakur& Srivastava, 2013). Privacy risk was defined as potential loss of control over personal information ( Aktruzan & Tezcan, 2012). Possibility of compromise of personal data while using mobile money services was termed as Privacy risk ( Gerrard, 2003; Pikkarainen, 2004; Thakur & Srivastava,2013).The following hypothesis was proposed to test the association.

$H_{12}$ : Perceived risk significantly influences attitude towards mobile money services

$H_{13}$ : Perceived risk significantly influences behavioral intention towards mobile money services



**Figure 1 : Conceptual model of adoption of mobile money services**

The constructs and items identified from extensive literature review of adoption literature is given in Table 1

**Table 1 : Items and Constructs**

<b>Questionnaire</b>		
<b>Constructs</b>	<b>Items</b>	<b>Evidence in Literature Review</b>
Attitude (ATU)	A1	Liebana - Cabanillas 2015, Akturan & Tezcan 2012, Venkatesh et. al 2003
	A2	Akturan & Tezcan 2012
	A3	Liebana - Cabanillas 2015
	A4	Liebana - Cabanillas 2015, Chauhan 2015
	A5	Venkatesh et. al 2003, Liebana - Cabanillas 2015
Behavioral intention (BI)	BI1	Chauhan 2015, Gu 2009, Zhou 2011, Slade et.al.2015, Akturan & Tezcan 2012, Venkatesh et. al 2012;2003
	BI2	Chauhan 2015, Gu 2009, Venkatesh et al 2012
	BI3	Chauhan 2015, Gu 2009,
	BI4	Zhou et al 2010
	BI5	Akturan & Tezcan 2012
Perceived usefulness (PU)	PU1	Chauhan 2015, Liebana - Cabanillas 2015, Zhou et al 2010, Zhou 2011, Slade et.al.2015, Koenig - Lewis 2010, Venkatesh et. al 2003
	PU2	Brown et.al. 2003, Venkatesh et. al 2003, Venkatesh et al 2012, Slade et.al.2015, Wei 2009, Zhou et al 2010, Gu 2009, Chauhan 2015, Liebana - Cabanillas 2015
	PU3	Akturan & Tezcan 2012, Chauhan 2015, Zhou et al 2010, Wei 2009
	PU4	Gu 2009, Liebana - Cabanillas 2015, Zhou et al 2010, Zhou 2011, Slade et.al.2015, Venkatesh et. al 2003;2012
	PU5	Koenig - Lewis 2010
Trust (TR)	T1	Chauhan 2015, Gu 2009, Wei 2009, Zhou 2011, Slade et.al.2015,
	T2	Slade et.al.2015, Zhou 2011, Chauhan 2015
	T3	Chauhan 2015, Wei 2009, Slade et.al.2015, Koenig - Lewis 2010
	T4	Slade et.al.2015, Zhou 2011, Gu 2009
	T5	Wei 2009,

Social Influence (SI)	SI1	Venkatesh et al 2012, Venkatesh et. al 2003, Slade et.al.2015, Zhou et al 2010, Liebana - Cabanillas 2015,Gu 2009
	SI2	Venkatesh et al 2012, Venkatesh et. al 2003, Slade et.al.2015, Zhou et al 2010
	SI3	Gu 2009, Wei 2009
	SI4	Gu 2009, Wei 2009
	SI5	Wei 2009,Gu 2009
Facilitating conditions (FC)	FC1	Gu 2009, Zhou et al 2010,Slade et.al.2015, Venkatesh et. al 2003
	FC2	Venkatesh et al 2012, Venkatesh et. al 2003,Slade et.al.2015, Zhou et al 2010
	FC3	Stoica & miller 2005,Zhou 2011, Yan & Yang 2015
	FC4	Slade et.al.2015, Koenig - Lewis 2010, Venkatesh et al 2012
	FC5	Zhou et al 2010, Slade et.al.2015, Venkatesh et. al 2003;2012
Perceived ease of use (PE)	PE1	Akturan & Tezcan 2012; Chauhan 2015;Gu 2009;Koenig - Lewis 2010;Wei 2009; Moore and Benbasat 1991;Slade et al 2015; Thakur 2013;Venkatesh et. al 2003;Zhou 2011
	PE2	Chauhan 2015;Liebana - Cabanillas 2015;Moore and Benbasat 1991;Slade et al 2015;Thakur 2013; Venkatesh et. al 2003; Wei 2009
	PE3	Akturan & Tezcan 2012;Davis 1989 ;Moore and Benbasat 1991
	PE4	Koenig - Lewis 2010;Liebana - Cabanillas 2015; Slade et al 2015; Thakur 2013;Venkatesh et. al 2003;Zhou 2011
	PE5	Arvidsson 2013;Gu 2009;Thakur 2013;Venkatesh et. al 2003; Wei 2009
Perceived Risk (PR)	Perceived Security Risk (PSR)	Akturan & Tezcan 2012,Slade et.al.2015, Liebana - Cabanillas 2015
	Perceived Monetary Risk (PMR)	Wei 2009, Koenig - Lewis 2010,
	Perceived Privacy Risk (PPR)	Akturan & Tezcan 2012, Liebana - Cabanillas 2015, Slade et.al.2015



## Analysis

The data was collected through web based surveys and personal interviews in Bangalore during the time period January to July 2017. 232 responses were used for the analysis. The respondent profile is as follows

**Table 2 : Respondent Profile**

<b>Variables</b>		<b>Frequency</b>	<b>Percentage</b>
Age	20-29	132	56.90
	30-39	50	21.55
	40-49	35	15.09
	above 50	15	6.47
Gender	Female	86	37.07
	Male	146	62.93
Education	Pre University	3	1.29
	Bachelors	85	36.64
	Masters	140	60.34
	Doctorate	4	1.72
Occupation	Student	66	28.45
	Professional	125	53.88
	Entrepreneur	16	6.90
	Homemaker	25	10.78
Mobile Data Connection	No Data	7	3.02
	2G	14	6.03
	3G	145	62.50
	4G	66	28.45
Marital Status	Single	120	51.72
	Married	109	46.98
	Other	3	1.29

Face validity of the questionnaire and constructs was ascertained through personal interview of professionals, entrepreneurs, and student community and home makers. Content validity was ensured by identifying constructs and items from previous literature (Luarn and Lin 2005). In this study the constructs and items have been identified from extensive literature review of adoption literature. The questionnaire has been formulated from review of structured questionnaires in adoption literature as seen in Table 1.

The results of the validity and reliability of the data is listed as follows. Multicollinearity, discriminant validity, convergent validity, reliability (Cronbach alpha) and exploratory factor analysis is conducted to ascertain reliability and validity of the data.

**Table 3 : Multicollinearity**

<b>Collinearity Statistics</b>		
<b>Constructs</b>	<b>Tolerance</b>	<b>VIF</b>
Attitude	.581	1.721
Per_Use	.569	1.756
Trust	.675	1.481
Soc_inf	.643	1.554
Fac_Con	.675	1.482
Per_Ease	.780	1.283
Per_Risk	.953	1.049

Multicollinearity exists between predictor variables when two or more predictor variables are found to have high correlation. Variance inflation factor (VIF) is used to assess multicollinearity between predictor variables. Typically VIF values fall below 10 for large samples. For small samples (Sample size < 250), a VIF of 3.16 is accepted (Hair et.al. 2009). In the current study, the predictor variables of behavioral intention were assessed for multicollinearity. Table 3 reveals that VIF statistics in the current study ranges from 1.049 to 1.756 and is well within the acceptable range. It was concluded that this study does not suffer from multicollinearity.

**Table 4: Discriminant validity**

**Correlations**

		Behav_Int	Attitude	Per_Use	Trust	Soc_inf	Fac_Con	Per_Ease	Per_Risk
Pearson Correlation	Behav_Int	1.000							
	Attitude	.747	1.000						
	Per_Use	.564	.563	1.000					
	Trust	.534	.483	.360	1.000				
	Soc_inf	.413	.392	.403	.410	1.000			
	Fac_Con	.388	.370	.492	.294	.440	1.000		
	Per_Ease	.275	.258	.322	.355	.384	.291	1.000	
	Per_Risk	.228	.049	.067	.116	.176	-.001	.022	1.000

Assessing discriminant validity assures that the predictor variables are not interrelated. A low discriminant validity measure indicates that the constructs do not overlap.

A correlation matrix showing correlations less than 0.90 indicates presence of discriminant validity (Hair et.al. 2009). The correlation coefficients as seen in table 4 falls well below the specified number with highest correlation value at 0.747. This indicated that discriminant validity is confirmed in the current study.

Convergent validity was ascertained in this study as there existed high correlation between behavioural intention and attitude (0.747) whereas all other correlations between constructs are medium to low at a range of -0.001 to 0.564.

Reliability of constructs were measured by using construct measure of cronbach alpha (Hair et.al 2009, Chin 1998). Minimum reliability of 0.7 is recommended for all constructs in the study ( Wessels 2010,Slade 2015). In this study the itemwise reliability measure was assessed as seen in table 6. Itemwise Cronbach alpha ranged from 0.76 to 0.911 and indicated a high level of reliability of constructs in this study.

Exploratory factor analysis (EFA) was conducted on the statements that measure the constructs to assess if the items are loaded on to the constructs measured( Akturan and tezcان 2012). Kaiser-Meyer-Olkin Measure of Sampling Adequacy and Bartlett's Test of Sphericity was conducted on the sample of 232 respondents. The results can be seen in table 5

**Table 5 : KMO and Bartlett's Test**

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.877
Bartlett's Test of Sphericity	Approx. Chi-Square	4906.890
	df	703
	Sig.	.000

**Table 6 : Factor scores and Reliability Scores**

	Factor loadings			Cronbach Alpha
	1	2	3	
A1	.531			0.838
A2	.678			
A3	.722			
A4	.791			
A5	.711			
BI1	.751			0.883
BI2	.800			
BI3	.806			
BI4	.667			
BI5	.722			
PU1	.382			0.787
PU2	.455			
PU3	.445			
PU4	.576			
PU5	.545			
T1	.601			0.911
T2	.573			

T3	.458			
T4	.456			
T5	.415			
SI1		.529		0.76
SI2		.534		
SI3		.420		
SI4		.505		
SI5		.446		
FC1		.285		0.782
FC2		.378		
FC3		.527		
FC4		.472		
FC5		.492		
PE1		.514		0.793
PE2		.511		
PE3		.655		
PE4		.697		
PE5		.658		
PSR			.809	0.87
PMR			.700	
PPR			.807	

Measure of sampling adequacy must exceed 0.5 for the over all test. In this study, the Kaiser-Meyer-Olkin Measure of Sampling Adequacy was measured. The KMO score was at 0.877 indicating high sampling adequacy. Bartlett's test of Sphercity was seen as significant if p value is less than 0.05 (Hair et.al. 2009). Since the significance of Bartlett score in the study was at  $p < 0.000$ , we can conclude that statistically significant relationships exist between variables and conduct of factor analysis was found valid.

It is recommended that the factor loadings have a score of 0.5 or above to be accepted as statistically significant. (Hair et. al. 2009). On application of this thumb rule in table 6, the constructs Attitude(A), Behavioural intention(BI), Perceived ease of use (PE) and Perceived Risk (PR) and underlying items were seen as significant. Items measuring Perceived usefulness – PU1(0.382), PU2 (0.455), PU3(0.445), Trust – T3(0.458), T4 (0.456), T5(0.415), Social Influence- SI3(0.420), SI5(0.446), Facilitating conditions – FC1(0.285), FC2(0.378), FC4(0.472) were seen as falling below the threshold specified, 0.5 in the EFA. These items measuring constructs was included in the study as the values of factor scores falls above minimally accepted measure of 0.3 and as the items score high on reliability (Cronbach alpha) and validity (Discriminant and Convergent) measures.

The overall conceptual model was able to account for 64 % (adjusted  $r^2 = 0.639$ ) of the variance in behavioural intention. It was concluded that the analysis results if leveraged appropriately can be used to bring changes in adoption intention.

## Results of structural equation modelling

The results of structural equation modelling and the goodness of fit statistics is as follows

Summary of Model fit statistics for conceptual model

Chi Square ( $X^2$ )= 1527.332\*\*\*

Chisquare ( $X^2$ )/ degrees of freedom (df) = 1527.332/652 = 2.342

Root mean square error of approximation (RMSEA) = 0.076

Goodness of fit Index (GFI) = 0.728

Normed Fit Index (NFI) = 0.707

Comparative fit index (CFI) = 0.806

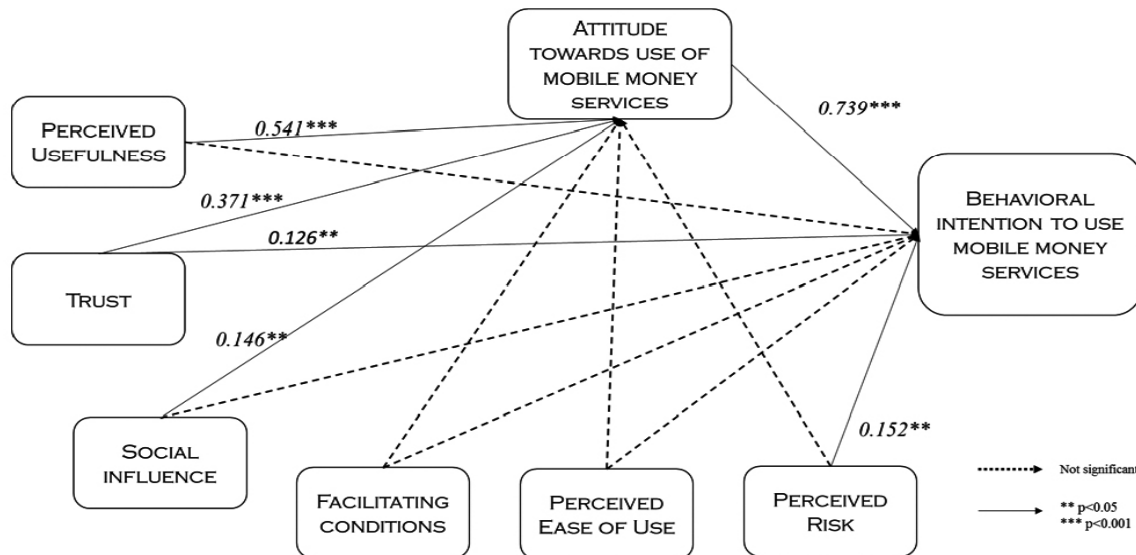
The  $X^2$  was significant (1527.332\*\*\*) for df= 652.  $X^2/df$  is 2.342 falling below 5, the threshold good fit indicator as per Bentler (1990). The GFI for the current study was 0.728 and falls below the threshold of 0.9 which indicates a good fit (Hair et.al.2009). The RMSEA for indicating an acceptable model typically falls below 0.10 (Hair et.al.2009). The RMSEA was 0.076 for the model specified. NFI ranges between 0 and 1 with 1 indicating a perfect fit. The current model NFI score was 0.707. CFI ranges from 0 to 1 and 1 indicate a perfect fit. CFI greater than 0.9 is generally termed as acceptable. In the current model fit score, the CFI falls below 0.9 at 0.806.

Results of structural equation modelling and the Hypothesized structural paths and estimates are given in Table 7

**Table 7: Hypothesized structural paths and estimates**

Hypothesis			Standardised Regression Weights	Estimate	S.E.	C.R.	P	Hypothesis Supported
H1: Behavint	←	Attitude	0.739	1.351	0.224	6.032	***	Yes
H2:Attitude	←	PU	0.541	0.333	0.062	5.344	***	Yes
H3:Behavint	←	PU	0.1	0.112	0.081	1.38	0.168	No
H4:Attitude	←	Trust	0.371	0.2	0.041	4.835	***	Yes
H5:Behavint	←	Trust	0.126	0.124	0.057	2.166	**	Yes
H6:Attitude	←	SI	0.146	0.081	0.039	2.049	**	Yes
H7:Behavint	←	SI	0.037	0.038	0.055	0.685	0.493	No
H8:Attitude	←	FC	0.054	0.03	0.037	0.81	0.418	No
H9:Behavint	←	FC	0.058	0.059	0.054	1.102	0.271	No
H10:Attitude	←	PE	-0.056	-0.036	0.042	-0.847	0.397	No
H11:Behavint	←	PE	-0.002	-0.002	0.06	-0.037	0.97	No
H12:Attitude	←	Risk	-0.05	-0.015	0.019	-0.802	0.422	No
H13:Behavint	←	Risk	0.152	0.086	0.028	3.066	**	Yes

The figure indicates the validation of conceptual model using structural equation modelling.



**Figure 2: Measurement model validation based on standardized regression weights**

## Discussion

Six structural paths on thirteen were validated as having significant relationships. The most significant association revealed in the structural analysis was between attitude and behavioral intention. Consumer attitude explains up to 74% variation in behavioral intention. Further, perceived usefulness, trust and social influence was found to have significant associations with attitude towards use of mobile payments. This finding was supported with evidence from previous literature in studies by Zhou (2011), Chauhan (2015), Gu et.al. (2009), Puschel (2010), Akturan (2012), which revealed significant association between attitude and perceived usefulness. Chauhan (2015) has validated this association in the Indian context and the current study supports the finding. Trust and attitude are also found to be significantly related. This association was identified in previous adoption literature by Zhou (2011), Chauhan (2015), Gu et.al. (2009).

Attitude, trust and perceived risk was identified as significant direct predictors of behavioral intention. Perceived usefulness and social influence was seen as having indirect association with behavioral intention with attitude as a mediating variable. Perceived usefulness does not have a direct effect on behavioral intention, but the effect was mediated through attitude. Similar finding can be seen in Akturan (2012) and Puschel (2010). Trust was seen to have a significant and direct effect on attitude and behavioral intention towards adoption of mobile payments. Perceived risk was seen as a significant predictor of behavioral intention and not attitude. Further studies can be conducted in isolation on the effects of Privacy risk, monetary risk and security risk on behavioral intention to understand the individual effect of the factors on behavioral intention.

An interesting finding in this is that facilitating conditions and perceived ease of use do not have significant associations with either attitude or behavioral intention. This could be attributed to the fact that majority of the respondents have educational qualification of graduates or higher qualifications. The level of education and awareness of existing facilitating conditions could be a significant factor in ease of use of usage of mobile payments and the conviction that facilitating conditions exist for usage of mobile payments.

The consumer risk perception on behavioral intention was significant and risk perception on attitude was not significant. This finding reflects that risk does have a significant influence on consumer behavioral intention and not on consumer attitude.

## Conclusion

Mobile payments adoption is less than 5% of mobile phone adoption in India. This study explores structural associations between six predictors of attitude and behavioral intention of consumers towards mobile payments usage. The factors trust and risk, previously missing from adoption literature were used in this study. Perceived usefulness, trust, social influence and perceived risk were seen to have significant associations with mobile payments usage. One of the major limitations of the study was that the factor reduction has not been complete from the exploratory factor analysis. This



was intentionally done as the items and constructs loaded high on validity and reliability scores. Similarly, the Goodness of Fit score has scope for improvement.

Trust emerges as a significant predictor. Mobile based payment systems are vulnerable to theft and awareness in this area is minimal. The mobile payment technologies like mobile scanning and Mobile point of sale are seen to be highly vulnerable to crime and offender behavior in the retail sector (Taylor 2016). The trust issues need to be effectively dealt with to increase consumer adoption of mobile payments.

Further, the current research in the mobile payment space is fragmented and does not cover areas like stakeholder expectations. The current benefits of Mobile payments – secure and fast service, absence of cash transaction and lower transaction fee in comparison to credit cards are seen to appeal to the stake holders. But the fact remains that mobile payment service providers in their present state fail to provide all the benefits to the stakeholders. Further the stakeholder has an unfulfilled need of enhanced purchase process where point of sale can be minimized by use of mobile payment technology. For example customers can use a device to scan prices and update automatically in the system for easy checkout (Apanasevic 2016). These and other similar innovations to enhance the process of easy usage of mobile payments and greater merchant acceptance of mobile payments will surely redefine the Indian mobile payments market in the near future.

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