Application of Decomposed Theory of Planned Behavior for M-commerce Adoption in India

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Abstract: Mobile commerce (m-commerce) is the latest version of electronic commerce or e-commerce. M-commerce is in early stages and its associated customer behavior is not well understood. In this paper, we examine the decomposed theory of planned behavior in the context of M-commerce. We examined the roles of *trust, perceived usefulness, perceived ease of use* and *perceived enjoyment* in determining the attitude towards adoption of m-commerce. We also tested the relationship between *normative influence* and *subjective norms* as well as the relationship between *self-efficacy* and *perceived behavioral control*. Based on the theory of planned behavior, we hypothesize that *attitude, subjective norms, personal innovation* and *perceived behavioral control* have positive impact on a person's intentions to adopt m-commerce. We conducted a survey and received 212 responses. We used structural equation modeling for data analysis. Our model was able to explain 60% of the observed variance. Out of 11 hypotheses, 8 were significant at $p < 0.01$ and the remaining 3 are significant at $p < 0.05$. Our results show that trust (m-commerce vendor), perceived usefulness (user), self efficacy (technology) and the normative influence (society) are the most important factors for m-commerce adoption in India.

1 INTRODUCTION

Mobile commerce (m-commerce) is the latest version of electronic commerce or e-commerce. From a seller's perspective, m-commerce facilitates personalization through location information and identification of the user (Zhang et al., 2012). The M-commerce market has great potential due to the rapid advancement of communication technology and the increasing popularity of smart phones, notepads and palmtops. India is the third largest country in the world in terms of Internet users (20% of its population) after China and the United States. India has had low penetration of landline phones, desktop computers and laptops. However, sale of smart phones in India is growing by 200% annually and is expected to reach $19 billion by 2019. Accordingly, major Indian companies in the e-retail space have moved to m-commerce. Every sector including banking, retail, government and healthcare are also moving towards m-commerce. The Indian government has also taken a big step towards digital India. In particular, the m-wallet market is estimated to grow from $7 million to $28 million by 2019 and that includes operations similar to money transfer, banking transactions, ticketing, bill payment.

As m-commerce is still in early stages, its associated customer behavior is not well understood. There are many factors that are important for the growth of m-commerce like security, privacy, usefulness, ease of use, trust, enjoyment, etc. We can address these issues based on observations, experience and intuitions without using or considering a theoretical model. Lately, many theoretical models have been built to understand the factors that lead to the adoption of information technology or systems at the individual level (micro-perspective) and at the level of the society (macro-perspective). M-commerce is largely an information system when viewed from a customer's perspective. Adoption of m-commerce by a customer is a decision at the individual level that is influenced by social norms. We can utilize micro-level theoretical models to study the adoption of m-commerce by individuals. The technology acceptance model (Davis et al., 1989), the theory of interpersonal behavior (Triandis, 1979), the theory of reasoned action (Ajzen and Fishbein, 1977), the theory of planned behavior (Ajzen and Madden, 1986) and the unified theory of acceptance and use of technology (UTAUT) (Venkatesh et al., 2003) are the popu-

lar micro-level theoretical models.

In this paper, we have made an attempt to identify constructs and understand their relationships for m-commerce adoption in India. The behavior of Indian customers may not be very different from that of the customers elsewhere and reports on adoption of m-commerce in the Indian context are few (Vaithianathan, 2010). However, it is important to delineate any factors that may affect customer behavior in India. A study of shopping orientation of Indian shoppers identified that price sensitivity is not the prime reason for on-line shopping (Gehrt et al., 2012). Accurate information about products, warranties, complaint management and certified websites are important factors for on-line shoppers in India (Kiran et al., 2009), whereas privacy seems to be less important (Gupta et al., 2010).

We discuss related work in the next section. In section 3, we discuss our proposed model and our hypotheses. We present our findings in section 4 followed by discussion in section 5.

2 BACKGROUND

Customer characteristics have been viewed as significant predictors in determining behavioral outcomes (Davis et al., 1989), (Karahanna et al., 1999), (Bagozzi and Yi, 1988). *Theory of reasoned action (TRA)* was developed (Ajzen and Madden, 1986) to predict and understand an individual's behavior. According to the theory of reasoned action (TRA), a person's intention to perform a task is determined by his attitude and subjective norm. A person's attitude towards a behavior is determined by his belief that a particular behavior leads to a particular outcome and his evaluation of the outcome. Subjective norms are determined by the person's perception of what others around him believe that he should do. The intention is the immediate antecedent of the behavior. Intentions capture the motivational factors that influence a behavior, showing how hard people are willing to try, and how far they are willing to go in order to perform the behavior (Ajzen, 1991). The stronger a person's intentions, the greater his will to perform the behavior. Consequently, the likelihood of performing the behavior increases. The relationship between intention and behavior will hold if the target, action, context and time (TACT) elements are identical and appropriate measurement procedures have been employed (Ajzen and Fishbein, 1977). The determinants of attitude (represented as A) and subjective norms (represented as SN) are known as behavioral and normative beliefs. A behavioral belief refers to an in-

dividual's subjective probability that a behavior will lead to a certain consequence. Normative beliefs refer to the likelihood that important referent individuals or groups would approve or disapprove of the behavior.

A fair amount of research has been done to predict human behavior assuming that human behavior is rational and motivation-based. The decision for performing or not performing a behavior is based on the information available. Attitude is formed on the basis of three general classes of information: affective information, cognitive information and behavioral information. Affective information refers to how the person feels towards the subject, cognitive information refers to what a person thinks about the subject, and behavioral information comes from the past and future behavioral intentions in relation to the target. The cognitive component or information processing approach is used in attitude formation in both the theories of reasoned action and planned behavior (Ajzen and Madden, 1986). The theory of reasoned action has been applied to many situations to predict and understand human behavior (e.g. unethical behavior, user acceptance of information systems, voting behavior, etc.). The theory of reasoned action has strong predictive power when behavior is under volitional control.

The theory of planned behavior (TPB) (Ajzen, 1991) is an extension of the theory of reasoned action that incorporates a third construct namely perceived behavioral control (PBC) (shown in Figure 1). Perceived behavioral control is defined as a persons perception of the ease of carrying out a specific behavior. TPB accounts for the non-volitional control over behavior. TPB has been the basis for several studies of Internet purchasing behavior (George, 2004). Most behaviors are influenced by internal or external non-motivational factors. Internal factors are *ability, skills* and *knowledge* while *time, money, availability of resources* and *cooperation from other people* are external factors (Ajzen and Madden, 1986). It is possible that non-availability of resources or ability may preclude a person from performing a behavior, despite having strong intentions to do so. These non-motivational factors are also responsible for the actual control over a behavior. In TPB, behavioral intention is an immediate antecedent of behavior and is determined by attitude (A), subjective norms (SN) and perceived behavioral control (PBC). Meta-analysis studies show that TPB has better prediction profiles than the theory of reasoned action (Armitage and Conner, 2001).

The Technology Acceptance Model (TAM) (Davis et al., 1989) tries to explain an individuals behavior towards the use of an Information system (IS)
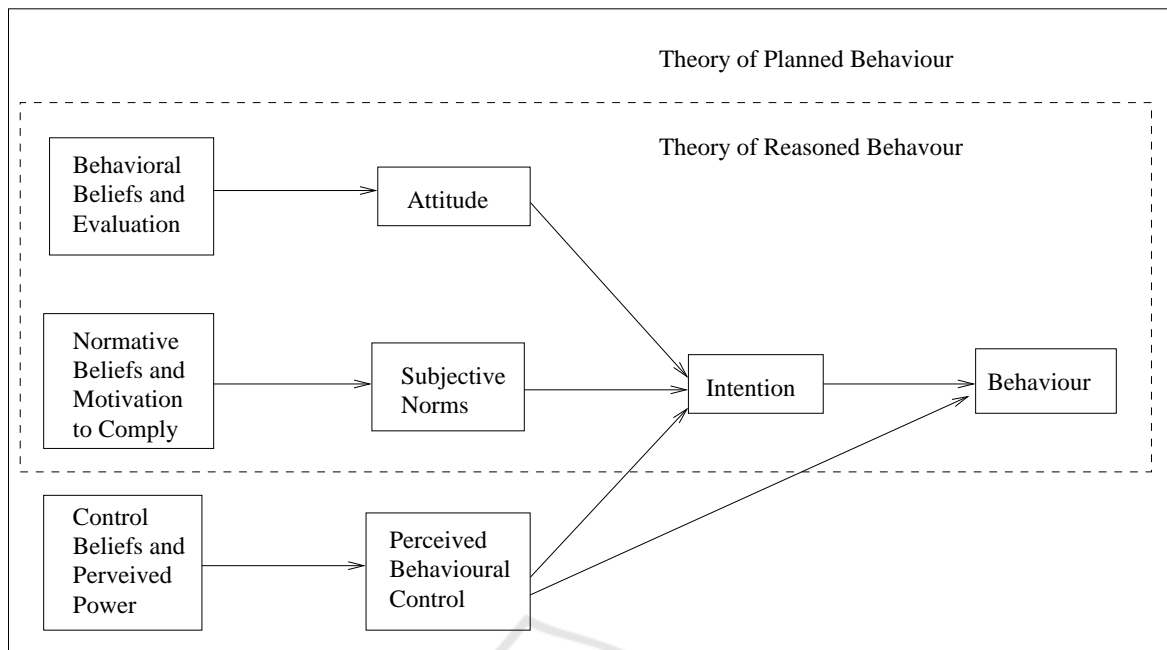
Figure 1: Theory of Reasoned Action (TRA) and Theory of Planned Behavior (TPB).

through two beliefs: *perceived usefulness* and the *perceived ease of use*. Perceived usefulness (PU) is a user's belief that using a particular system will enhance his job performance, and perceived ease of use (PEOU) is the perceived effort required to learn and use the system. TAM has been predominantly used to study user acceptance of various information systems by users. M-commerce involves the use of information systems that run on mobile devices, therefore the constructs used in TAM seem appropriate to understand the adoption of m-commerce. The more a customer feels that using m-commerce will be useful and effortless (PEOU), the more they will use it (Gefen et al., 2003). But these two constructs alone cannot capture the adoption of m-commerce because trust and perceived enjoyment also play important roles.

It has been shown that the decomposed theory of planned behavior has more predictive power than the theory of planned behavior (Taylor and Todd, 1995). We have used the decomposed TPB model for understanding customer behavior driving the adoption of m-commerce in India. A decomposed model provides several advantages over a unidimensional belief structure, because as it has been shown that belief is not a monolithic structure. Decomposition also provides flexibility in finding a stable set of beliefs that can be applied across a variety of settings (Taylor and Todd, 1995). Our proposed decomposed model is presented in Figure 2. Antecedents of intentions are attitude, subjective norm and perceived behavioral control and each of these are further decomposed. Behavioral

beliefs are decomposed into trust, perceived usefulness, the perceived ease of use and perceived enjoyment. Normative belief is decomposed into influence exerted by friends, batch-mates and family. Control belief is decomposed into self-efficacy. We will also test the effect of personal innovativeness on the intentions mediated by the attitude towards m-commerce adoption.

3 PROPOSED MODEL

Our model is primarily based on the theory of reasoned action (TRA), the technology acceptance model (TAM) and the theory of planned behavior (TPB). We also include additional constructs that are not a part of TRA, TAM and TPB but that have been explored in the literature. Our proposed decomposed model is presented in Figure 2. We have used 3 antecedents of intention directly from TPB for our research model viz., attitude, subjective norms and perceived behavioral control (Liao and Shi, 2009) (Pavlou and Fygenson, 2006). Intention is a construct that has been accepted at a micro-level for adopting IT (Venkatesh et al., 2003), (Gefen et al., 2003). Attitude, subjective norm and perceived behavioral control have also been accepted to play a role in IT adoption at an individual level (Ajzen and Madden, 1986), (Davis et al., 1989). Hence we propose the following 3 hypotheses:

H1: Attitude has a positive influence on behav-

ioral intentions for adopting m-commerce. H7: Subjective norm has a positive influence on the behavioral intentions for adopting m-commerce. H9: Perceived behavioral control has a positive influence on the intention to adopt m-commerce.

3.1 Decomposition of Attitude

We decomposed attitude into *trust, perceived usefulness, perceived ease of use and perceived enjoyment.*

The reason of including trust is that in an m-commerce purchase, there is a physical distance between the buyer and the seller, and the product is not present physically. Trust affects the attitude positively, which in turn affects customer intentions (McKnight and Chervany, 2001), (Chow and Holden, 1997), (Jarvenpaa et al., 2003), (Sahney et al., 2013). Hence, we propose the following hypothesis.

H2: Trust has a positive influence on the attitude towards adopting m-commerce.

Perceived usefulness (PU) captures a user's belief that using a particular system will enhance his or her job performance. In the context of m-commerce, PU can be defined as the degree by which a customer believes that engaging in mobile shopping will improve his effectiveness. PEOU captures the effort involved in learning to use the system. A system will only be used if its usefulness outweighs the effort involved in learning to use it. In terms of m-commerce, it can be defined as purchasing a product using mobile would be free of effort. Based on these observations, the following hypotheses have been proposed (Malik et al., 2013):

H3: Perceived usefulness has a positive influence on the attitude towards adopting m-commerce.

H4: Perceived ease of use has a positive influence on the attitude towards adopting m-commerce.

Perceived enjoyment (Davis et al., 1992) is the individual belief that technology is fun to use. In recent years, researchers have been using perceived enjoyment as a major construct in their m-commerce adoption models (Agrebi and Jallais, 2015). Hence, we propose the following hypothesis:

H5: Perceived enjoyment is positively related to the attitude towards the adoption of m-commerce.

3.2 Decomposition of Subjective Norm

The theory of Reasoned Action (TRA) posits that a person's normative beliefs affect the subjective norm(SN)- defined as the influence important others have on acceptance decision. The *important others* may be the family members, relatives, friends, classmates and colleagues. If social expectations are that

a person should engage in a behavior, then the individual is more likely to do so. There is a positive relationship between subjective norm and intention for a behavior (Karahanna et al., 1999). Hence, we propose the following hypothesis:

H6: What important others *think about adopting m-commerce influences the subjective norm of an individual.*

3.3 Decomposition of Control Beliefs

Control belief is decomposed into self-efficacy (Taylor and Todd, 1995), (Limayem et al., 2000), (Ajzen, 2002). Self-efficacy is an important antecedent of PBC. In terms of m-commerce, if an individual is more self-confident and engages in mobile shopping activities, then he/she feels more positive about control over his/her on-line purchasing behavior. This self-efficacy fuels further engagement with m-commerce (George, 2004). We include a hypothesis for the effect of PBC on behavioral intention from the TPB model as follows:

H8: Self-efficacy has a positive influence on perceived behavioral control for adopting m-commerce.

3.4 Effect of Personal Innovativeness on Intention is Mediated by Attitude

Personal innovativeness affects individual attitude towards performing a behavior. Many information system studies show that innovativeness has a direct and positive influence on attitude and intentions (Limayem et al., 2000). This construct has been of great importance in innovation diffusion and in marketing. This construct has also been used in the domain of information technology (Agarwal and Prasad, 1998). Personal innovativeness is a personality trait which is characteristically adapted by people (Limayem et al., 2000). Innovative people tend to adopt mobile shopping more easily making it an important construct for our model.

For the purpose of our study, we considered both direct and indirect effects of personal innovativeness on the intentions of adopting m-commerce. The indirect effect is mediated by the attitude. We propose the following hypotheses

H10: Personal innovativeness has a positive influence on the attitude towards adopting m-commerce.

H11: Personal innovativeness has a positive influence on the intention of adopting m-commerce.

We have not included behavior in our model. We rely on existing studies that have established a strong link between the intention to perform a behavior and the actual behavior (Ajzen and Madden, 1986). In
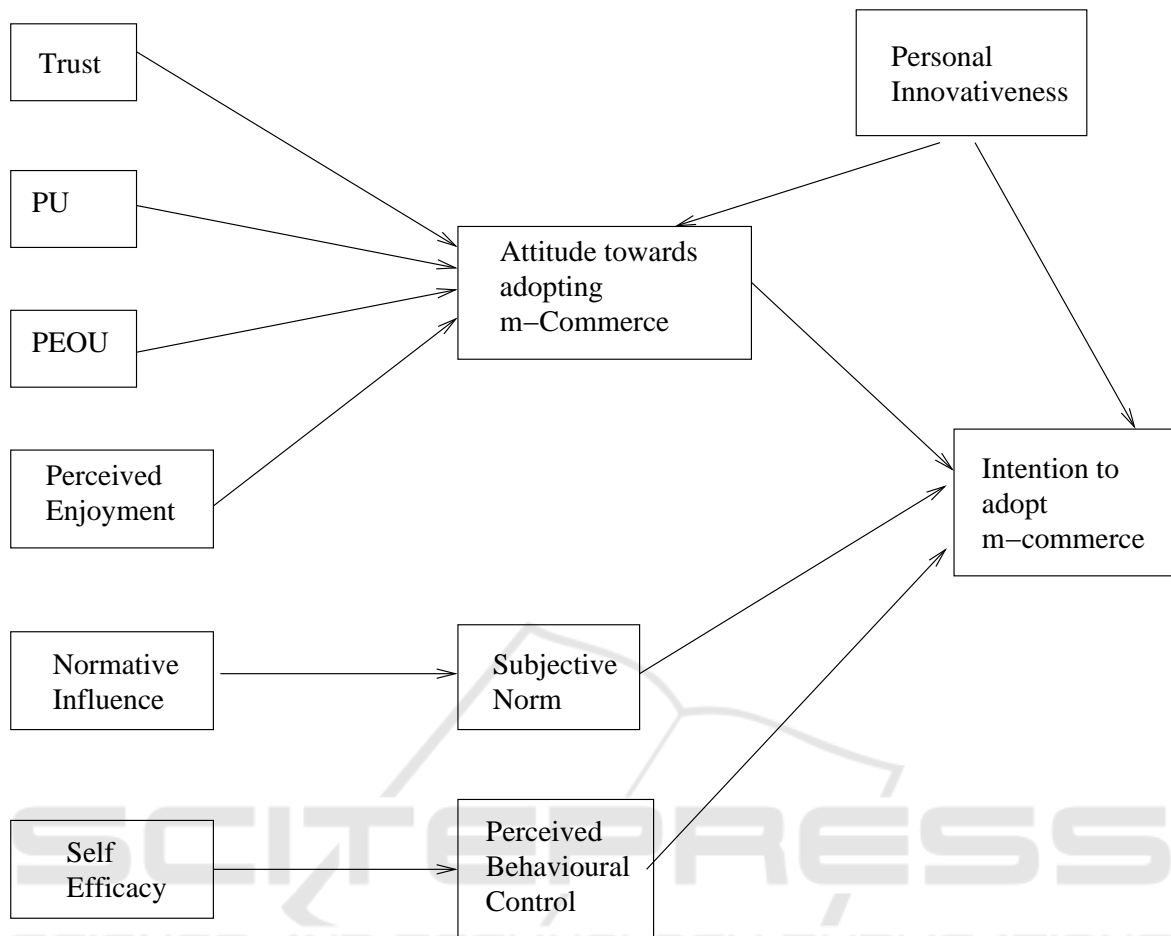
Figure 2: Proposed research model based on Decomposed Theory of Planned Behavior.

the next section, we present the details of our data analysis.

4 DATA ANALYSIS

To test our research model, we conducted a survey with multi-attribute scales that refer to the different variables. The growth of m-commerce will be driven by the young adult population as they are more technology savvy compared to other age groups. Therefore, we collected data from students an academic institute in northern India where students from all over the country come to study. The empirical data was collected through an on line form designed using the free service provided by *Google forms*. The hyperlink of the survey form was sent to participants through email and the link was also posted on various on line groups existing on social media sites like *Facebook and google*. The members of these social groups are the registered students of the institute. Students voluntarily participated in the survey.

The data was collected in the month-end of April, 2015. We received a total of 212 responses.

The collected data was analyzed and used to accept or reject our hypotheses. Since we are using the TPB framework, we define each behavior in terms of the TACT principle (Ajzen, 1991). The *target* for our study is m-commerce adoption, the *action* is using m-commerce for purchasing products and services, the *context* is the required environment (e.g. data connectivity, Internet standards, a high resolution mobile screen to view items) and the *time-frame* is a time window of 1 year. All questions were rated on a seven-point Likert Scale where 1 means that the user *strongly disagrees* with the given statement and 7 means that the user *strongly agrees*.

Our proposed model have 26 items describing 11 constructs: trust (3 items) (McKnight and Chervany, 2001), perceived usefulness (PU-2 items) (Gefen et al., 2003), perceived ease of use (PEOU-2 items) (Gefen et al., 2003), perceived enjoyment (Per_enj-2 items) (Davis et al., 1992), attitude (3 items) (Taylor and Todd, 1995), normative beliefs (Norm_bel-

3 items) (Taylor and Todd, 1995), subjective norm (SN-2 items) (Taylor and Todd, 1995), self-efficacy(2 items) (Taylor and Todd, 1995), perceived behavioral control (PBC-3 items) (Taylor and Todd, 1995), Personal innovativeness (2 items) (Hurt et al., 1977) and intentions (2 items) (Agarwal and Prasad, 1999) to adopt the m-commerce.

4.1 Sample Description

The majority of respondents in our survey were men (75.5%). Most of the respondents were enrolled in the postgraduate programs (64.6%) and aged between 25 to 30 years (47.2%). The respondents aged between 20 to 25 years constitute 44.3% and between 30 to 35 years constitute 7.5%. Respondents who were enrolled in undergraduate program constitute 29.2% and 6.1% students are enrolled in doctoral program. Nearly all respondents (97.2%) had the wireless gadgets like mobile phones, notepad, that support features required for m-commerce (data connectivity, Internet standards, a high resolution screen to view items). Respondents who had used m-commerce a couple of times in the previous year constitute 45.3% while 38.7% respondents had used it monthly. A small percentage of respondents (4.7%) had used m-commerce on a weekly basis.

4.2 Measurement Model

To evaluate the measurements of our research model, we used the confirmatory factor analysis (CFA) to test the reliability and validity of the constructs.

Each item in the belief construct (trust, PU, PEOU, Per_enj, normative beliefs, self_efficacy) had corresponding evaluation item. For analysis, each belief item score was multiplied by its corresponding evaluation item score to get the overall score for that item/variable.

The CFA was performed using the AMOS software, v21. Before conducting the CFA test, we calculated the Kaiser-Meyen-Olkin (KMO) measure of sampling adequacy and the Bartletts test of sphericity to check the suitability of the data for factor analysis. The value of KMO was 0.771 and the Bartletts test of sphericity was significant at p = .000 ($p - value <$ 0.05 is recommended) (Hair et al., 2006) indicating that the data were suitable for the CFA.

There are three types of measurements for the model fit: the measure of absolute model fit, the measure of incremental model fit and the measure of parsimonious model fit (Hair et al., 2006). From the results of CFA, we observed that the measurement model test presents a good fit between the data and the model. The chi square value for our model is 305.155 with degree of freedom (df) 220 and significant at $p - value < 0.001$. The degree of freedom is high and comparable to the chi-square value and the p-value is below the recommended level of 0.05-these are the good indicators for a model fit. The values of RMSEA (0.043) and GFI (0.901) give indications towards a perfect model fit. This is because the upper limit for RMSEA is 0.08 and the lower limit for GFI is 0.9 for a perfect model fit. The AGFI is 0.854, CFI is 0.963, NFI is 0.882 (not much less than required value 0.9) and TLI is 0.949. Overall we can say that our model fit is good and acceptable. Table 1 presents various indices of measurement model with their recommended value for a model fit.

We assessed the reliability and convergent validity of the scales by evaluating the cronbachs alpha, composite reliability (CR) and the average variance extracted (AVE) (Bagozzi and Yi, 1988). Cronbachs alpha and composite reliability statistics must be greater than 0.7 and the average variance extracted (AVE) must be above 0.5. Composite reliability (CR) for all constructs of our measurement model is higher than 0.7 and the AVE is greater than the recommended level of 0.5. We calculated the CR and AVE values using an excel plugin that uses the correlation table and standardized regression weight tables an inputs. These tables were generated in AMOS after performing the CFA. The difference between the CR and Cronbachs alpha is that the former enumerates the actual factor loadings of each item instead of assuming that each item is equally loaded in the composite load determination as in case of the latter.

Convergent validity of the model can also be evaluated by examining the factor loadings of each item and their respective squared multiple correlations that were generated after performing CFA. For our measurement model, the standardized factor loadings were above the level of 0.5 and most of them are above 0.7, in most cases the squared multiple correlation was also very high as shown in table 3. Due to space limitations, these values are not shown here. Factor loadings above 0.5, are consider significant (Hair et al., 2006). Therefore, we can say that all measures have strong and adequate reliability. To examine the discriminant validity of the constructs we used AVE, by comparing the squared of correlations between the constructs and AVE for the construct (Fornell and Larcker, 1981). As shown in Table 2, the square root of AVE scores (diagonal element in correlation table) is greater than the correlations among the constructs, hence establishing the dis criminant validity.

Table 1: Fit Indices of the Proposed Model.

Measure	Recommended Criteria	Measurement Model	Structural Model	Source
Chi-square/df	< 3.0	1.387	1.647	(Hair et al., 2006)
Goodness of fit (GFI)	> 0.9	0.901	0.871	(Bagozzi and Yi, 1988)
Adjusted goodness of fit (AGFI)	> 0.8	0.854	0.834	(Bagozzi and Yi, 1988)
Normed fit index (NFI)	> 0.9	0.882	0.839	(Hair et al., 2006)
Comparative fit Index (CFI)	> 0.9	0.963	0.928	(Bagozzi and Yi, 1988)
Tucker Lewis Index (TLI)	> 0.9	0.949	0.915	(Hair et al., 2006)
RMSEA	< 0.05	0.043	.055	(Bagozzi and Yi, 1988)

Table 2: Correlation matrix (diagonal elements represents the square root of the AVE); (1): PBC, (2): Trust, (3): Attitude, (4): PU, (5): PEOU, (6): Per_Enj, (7): Norm_Bel, (8): Self_Efficacy, (9): Per_Inno, (10): Sub_Norm, (11): Intentions.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1)	**0.784**										
(2)	-0.003	**0.760**									
(3)	0.193	0.497	**0.715**								
(4)	0.230	0.296	0.635	**0.826**							
(5)	0.157	0.267	0.557	0.466	**0.765**						
(6)	0.092	0.269	0.507	0.453	0.405	**0.893**					
(7)	0.232	0.047	0.176	0.033	0.029	0.076	**0.830**				
(8)	0.747	0.197	0.356	0.416	0.198	0.109	0.060	**0.816**			
(9)	0.157	-0.064	0.192	0.158	0.049	0.109	0.012	0.148	**0.811**		
(10)	0.318	0.137	0.344	0.305	0.119	0.201	0.531	0.359	0.062	**0.768**	
(11)	0.368	0.318	0.715	0.537	0.303	0.313	0.226	0.396	0.403	0.452	**0.866**

4.3 Structural Model

We examined the similar fit indices for the structural model. Chi-square value was 416.71 with degree of freedom (df) 253 and significance at a $p - value < 0.001$. Other fit indices are also shown in Table 1. Almost all fit indices (Chi-square/df = 1.647, AGFI=0.834, CFI= 0.928, TLI= 0.915 and RMSEA= .055) satisfied the recommended criteria as suggested in previous literature except GFI (0.871), and NFI (0.839). But these values did not vary too far from the required level of 0.9 and approached the recommended level. Hence our structural model adequately fits the data.

After examining the measurement fit of our proposed structural model we proceed to check the significance of each hypothesized path. All properties of the casual paths, including path coefficients, squared multiple correlation (R^2), significance level and t-value are shown in figure 3.

Our proposed model explains 60% of the variance in intentions for adopting m-commerce, which provides good explanatory power. All hypotheses except

(H4, H5, and H10) were significant at $p < 0.01$; H4, H5, H10 were significant at $p < 0.05$. We used the notations β and γ for the standardized direct and indirect path coefficients. The effect of trust ($p - value < 0.001, \gamma = 0.361, t = 4.90$), perceived usefulness ($p - value < 0.001, \gamma = 0.422, t = 4.393$), perceived ease of use ($p - value < 0.05, \gamma = 0.220, t = 2.462$) and perceived enjoyment ($p - value < 0.05, \gamma = 0.180, t = 2.322$) on attitude towards adopting m-commerce were significant and positive. This supports H2, H3, H4 and H5- factors that positively influence the attitude towards adopting m-commerce. Attitude correlates positively with behavioral intentions to adopt m-commerce ($p - value < 0.001, \beta = 0.570, t = 6.430$) indicating that H1 is supported.

The effect of normative influence ($p - value < 0.001, \gamma = 0.537, t = 5.892$) on the subjective norm was positive and significant supporting our H6 hypothesis. The effect of subjective norms on the intentions to adopt m-commerce ($p - value < 0.001, \beta = 0.262, t = 3.735$) was significant and positive supporting the H7 hypothesis. The effect of self-efficacy

Table 3: Reliability and Convergent Validity of the Measurement Scale; CR stands for composite reliability and AVE for average variance extracted.

Factor	Variable	Std. factor loadings	R^2
	Intentions		
BI_1	Assuming that I have access to m-commerce, I intend to use it.	0.788	0.622
BI_2	I intend to increase my use of m-commerce in the future.	0.937	0.878
	Attitude		
A_1	M-commerce would be a good idea.	0.747	0.558
A_2	M-commerce would be a wise idea.	0.773	0.597
A_3	Using m-commerce would be a pleasant experience.	0.615	0.378
	Trust		
B_1	Based on my experience, I know that vendors selling products/services using m-commerce are honest.	0.512	0.262
B_2	Based on my experience, I know that vendors selling products/services using m-commerce are opportunistic.	0.962	0.925
B_3	Based on my experience, I know that vendors selling products/services using m-commerce care about their customers.	0.738	0.545
	PU		
B_4	M-commerce would enhance my effectiveness.	0.816	0.666
B_5	M-commerce is useful for me.	0.835	0.696
	PEOU		
B_6	M-commerce cannot be used easily.	0.723	0.523
B_7	Learning how to use m-commerce will be easy for me.	0.804	0.646
	Perceived_Enj		
B_8	I would have fun in using m-commerce.	0.959	0.919
B_9	I would find m-commerce to be enjoyable.	0.822	0.675
	Personal_Inno		
PI_1	I am generally cautious about accepting new ideas.	0.695	0.483
PI_2	I am challenged by ambiguities and unsolved problems.	0.913	0.834
	Subjective Norms		
S_1	People who influence my behavior would think that I should use m-commerce.	0.807	0.651
S_2	People who are important to me would think that I should use m-commerce.	0.727	0.529
	Normative Beliefs		
NB_1	My parents would think that I should use m-commerce.	0.919	0.844
NB_2	My batch-mates would think that I should use m-commerce.	0.745	0.555
NB_3	My friends would think that I should use m-commerce.	0.816	0.665
	Perceived Behavioral Control		
PBC_1	Using m-commerce to purchase products/services is within my control.	0.802	0.643
PBC_2	Given the resources, opportunities and knowledge it takes to use mobile shopping, it would be easy for me to use the system.	0.765	0.586
	Self_Efficacy		
CB_1	I would feel comfortable in using m-commerce on my own.	0.963	0.927
CB_2	I would be able to use m-commerce even if there was no one around to show me how to.	0.636	0.405

($p-value < 0.001, \gamma = 0.725, t = 7.439$) on the perceived behavioral control was positive and significant supporting H8. H9 hypothesis was supported by significant and positive effect of perceived behavioral control on the intentions to adopt m-commerce ($p-value < 0.001, \beta = 0.186, t = 2.801$). The ef-
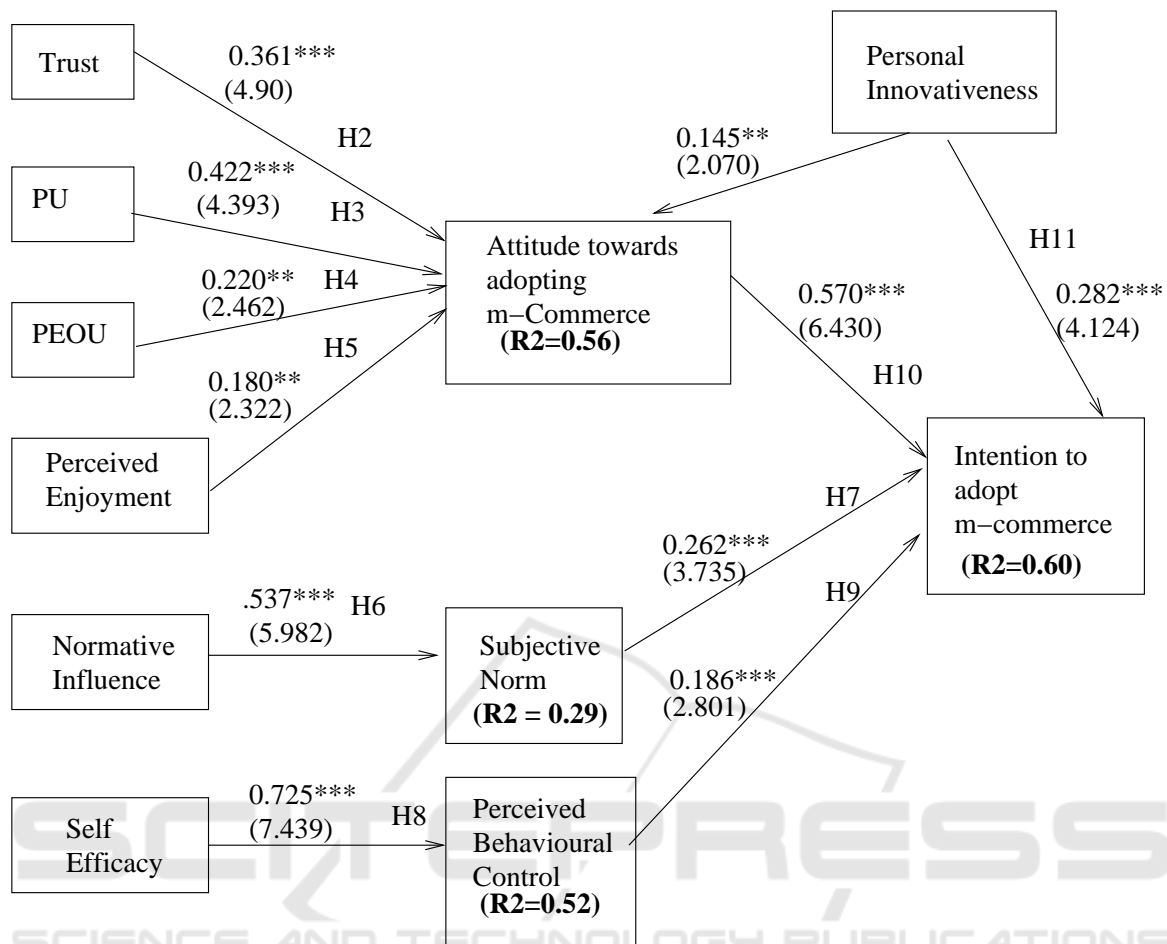
Figure 3: Proposed research model with path coefficients specified next to the links and t-value shown in parenthesis; $***p < 0.001$ and $**p < 0.05$.

fect of the personal innovativeness ($p - value < 0.001, \beta = 0.282, t = 4.124$) on the intentions to adopt m-commerce was significant and positive, thus supporting H11 hypothesis. The effects of personal innovativeness are partially mediated by attitude. The effect of personal innovativeness on the attitude towards adopting m-commerce ($p - value < 0.05, \gamma = 0.145, t = 2.070$) was also significant and positive, supporting H10. Therefore, both direct and indirect effects were significant.

5 DISCUSSION

The aim of our study was to identify factors that motivate Indian customers to adopt m-commerce. We used the decomposed TPB to determine the impact of attitudinal, normative and control beliefs. We also tested the effect of personal innovativeness on attitude mediated intentions. The effect of personal innova-

tiveness on intentions to adopt m-commerce was significant.

Among the 4 significant antecedents of behavioral intentions to adopt m-commerce, attitude is a strong predictor of behavioral intentions. The behavioral beliefs (trust, perceived usefulness, perceived ease of use, and perceived enjoyment) were all significant showing that they influence a persons attitude towards adopting m-commerce. All these factors together explained the 56% of the variation in the attitude. Among these predictors, perceived usefulness (with the highest path loading of 0.422) was the strongest predictor of the attitude towards the m-commerce. It suggests that people use m-commerce if and only if they find it useful such that it increases their effectiveness in their everyday life. The second important factor that determines the attitude of customers is trust (path loading of 0.361). If vendors or suppliers are not honest, callous towards their customers and opportunistic, it is difficult for them to at-

tract new customers or retain existing ones.

Perceived ease of use is also a significant determinant of the attitude towards adopting m-commerce showing that in addition to trust and perceived usefulness, customers also prefer m-commerce applications that provide easy to use services and require little effort to learn. Perceived enjoyment is significant but has low path loading as compared with other determinants. This may be because there are very few people who enjoy using m-commerce services. Consequently, m-commerce vendors should design their applications or services that are easy to use and enjoyable. Subjective norm and perceived behavioral control are also significant determinants of behavioral intentions. This means that ones decision to adopt m-commerce may be influenced by related opinions of people in ones social circle. The effect of normative beliefs on the subjective norm is significant which means that individuals give importance to opinions of their parents, friends and colleagues, which in turn, influences their decision to perform the behavior. Normative beliefs explain the 29% variation in the subjective norm. People with sufficient knowledge and resources also tend to use the m-commerce more as compared to people those with less resources and knowledge. Self-efficacy explains the 52% of variation in perceived behavioral control, which is a good sign for the efficiency of our model. One limitation of our study is that our sample included only young students, hence our results cannot be generalized to all age groups.

To summarize, in order to encourage people to use m-commerce, it is necessary to project the usefulness of m-commerce. The interface of applications should be designed in an elegant way to preserve ease and enjoyment of use. Targeting people with innovativeness is useful because they are the first adopters of new technology and spread the words about m-commerce. In addition, people are affected by choices made by those in their social circle; therefore selective advertising through social media may be helpful. If people have access to resources required for m-commerce (high speed data connectivity, mobile phone), they are more willing to engage in mobile shopping and hence adopt m-commerce.

6 CONCLUSION

The penetration rate of mobile phones is very high in India but the adoption rate of m-commerce is very low. In this study, we made an attempt to understand this situation. We examined the decomposed theory of planned behavior in the context of m-commerce

with added behavioral beliefs (trust, perceived usefulness, perceived ease of use and perceived enjoyment), normative belief (normative influence of family, friends and peers) and control beliefs (self-efficacy). We also probed the direct and indirect effects of personal innovativeness on behavioral intentions. We examined how these factors affect both attitude and intentions for adopting m-commerce. In our study, perceived usefulness, trust and perceived ease of use turned out to be more weighted factors. This implies that in order to increase their customer base, m-commerce vendors need to demonstrate the usefulness of m-commerce, design mobile applications with easy and enjoyable interfaces, and invest in marketing to gain the trust of customers trust and finally attempt to meet customer expectations. However, there are additional factors that affect use of m-commerce directly or indirectly . We recommend incorporating factors like perceived financial risk, network security, perceived quality of products and services, and the perceived cost to further study the adoption of m-commerce . Currently, the most popular m-commerce products and services are related to financial services, such services can be developed and used widely in other domains like health, retail and education.

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