

# A STUDY ON CONSUMERS' ADOPTION INTENTION FOR DIGITAL WALLETS IN INDIA

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**Abstract:** *The purpose of the present research study is to find out whether customer demographics influence adoption intention for e-wallets in India and to identify the parameters that are most important in predicting consumers' adoption intention and whether the market can be segmented into different customer groups. The regression model showed an impressive amount of variance explained for adoption intention ( $R^2 = 81.7\%$ ) and cluster analysis helped to reveal three different customer segments with their different set of criteria. The above findings will help digital wallet companies to have a better and clear understanding of factors that influence the adoption decision of Indian consumers concentrating particularly on the parameters that influence end-users to adopt their services.*

**Keywords:** *E-Wallet, Adoption Intention, Regression, Cluster, Anova*

## INTRODUCTION

In today's world, smartphones have become an integral part of our daily life. The number of smartphone users is increasing day by day as newer and cheaper versions are being made available overnight. According to a report, published in The Hindu on Feb 3, 2016 ([www.thehindu.com](http://www.thehindu.com)), the smartphone market in India has surpassed the US market with 220 million active users. To exploit the full potential of the modern smartphone, newer and unique services are being added every day. Smartphones have bypassed the use as mere communication devices, but are now being vouched for as a socialisation tool, entertainment tool, internet access tool, and even payment tool. Mobile phones are now being used to make money transaction or payment by using applications installed in the phone. Apart from payment, people can also store receipts, coupons, business cards, bills etc. in their smartphones.

The e-wallet application works by making prospective customers install the app created by companies like Google Inc., PayPal (Global companies providing mobile wallet services) or Paytm, Freecharge (Indian companies providing mobile wallet services) in the phone, and then use the app to pay directly for the products/ services.

Awareness is increasing gradually about the economic benefits that mobile payments provide to the society as it has significant lower costs than cash-based services and existing card payments (Mallat, Rossi, & Tuunainen, 2004). Moreover, it generates competitive advantage for enterprises via its ubiquity and convenience (Mallat, 2007). Thus,

governments and marketers are pushing and promoting the usage of digital money.

Mobile wallets have become popular in a very short span of time. Today, it is one of the most successful business ideas for start-ups. There is evidence that it has surpassed credit cards in terms of the number of users in just a fraction of time. Vijay Shekar Sharma's venture Paytm alone has 100 million users with over 10 million app downloads. Over the past four years, mobile wallet transactions have jumped from Rs 10 billion of transactions in 2012-13 to more than Rs 490 billion in the year 2015-16 (as per a report in Scroll.in accessed on 25/03/2017). According to a study by research firm RNCOS, the Indian market is estimated to rise to Rs. 1,210 crore by 2019.

Traditionally, financial transactions have been made through banks and financial institutions. Thus, customers nowadays have too many alternatives to choose from. E-wallet services bypass the time and place barrier by enabling the customer to conduct real time transaction any time and from anywhere.

On a global perspective, mobile wallets are pushing economies to progress to a cashless society. However, mobile wallet is a young concept in India. Hence, there is a need for better understanding of the factors affecting the adoption of mobile payments.

## THEORY AND MODEL

Before embarking on a detailed description of the research models studied for this research, we have to understand

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a general purchasing decision-making procedure. This consists of five major phases. These phases include (1) need identification, (2) information search, (3) alternatives evaluation, (4) purchase, and (5) after purchase evaluation. The first three phases of the decision making procedure fall into the category of “before purchasing experience” while the last two phases fall into the category of “after purchasing experience”. The research here will focus only on the “before purchasing experience”.

There are several models of technology adoption research. The models that stand out as the most widely applied are-

### Diffusion of Innovations Theory

*Diffusion of Innovations* by Everett Rogers explains how, why, and at what rate new ideas and technology spread. The theory states that there are five perceived attributes of an innovation that can determine the adoption of an innovation (Rogers, 1995). The five perceived attributes of the innovation are relative advantage, compatibility, complexity, trialability and observability (Rogers, 1995). Diffusion occurs through a five-step decision-making process. Rogers’ five stages (steps), viz. awareness, interest, evaluation, trial, and adoption form the basis of this theory. Several modifications have been made to the original variables. In later editions of *Diffusion of Innovation*, Rogers changes his terminology of the five stages to knowledge, persuasion, decision, implementation, and confirmation.

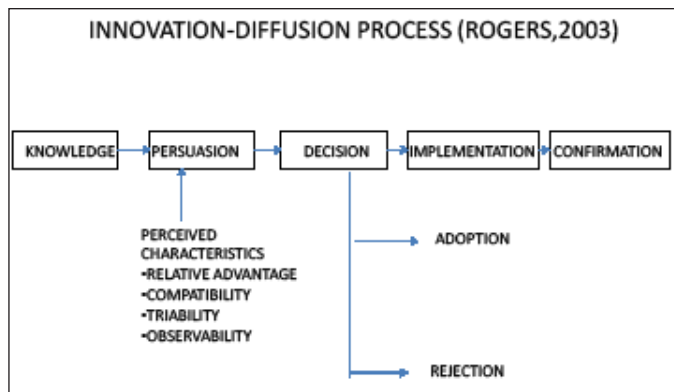


Fig. 1: Innovation-Diffusion Process (Rogers, 2003)

Our next model is the Theory of Reasoned Action (TRA).

### Theory of Reasoned Action (TRA)

The theory of reasoned action was developed by Martin Fishbein and Icek Ajzen in 1967. The theory aims to explain the relationship between attitudes and behaviours within

human action (Fishbein & Ajzen, 1975). TRA is used to predict how individuals will behave based on their pre-existing attitudes and behavioural intentions. The theory of reasoned action explains behaviour beyond the adoption of technology. Hence, it is a more generalised theory than the technology acceptance model (TAM) (explained later). However, when applied to adoption behaviour, the model includes four general concepts - behavioural attitudes, subjective norms, intention to use and actual use.

### Technology Acceptance Model (TAM)

The theoretical foundation for TAM is based on Fishbein and Ajzen’s theory of reasoned action (TRA) (Fishbein & Ajzen, 1975). It was developed by Fred Davis and Richard Bagozzi. TAM replaces many of TRA’s attitude measures with the two technology acceptance measures - ease of use and usefulness. TAM focuses on the attitudinal explanations of intention to use a specific technology or service. It includes five concepts - perceived user friendliness, perceived usefulness, attitudes towards use, intention to use and actual use. The TAM-model has been both extended and modified. Many recent studies have applied TAM when studying acceptance of online technologies like online shopping.

Amoroso and Hunsinger (2009) extended the TAM by including additional constructs of privacy, trust, perceived risk, e-satisfaction, and e-loyalty.

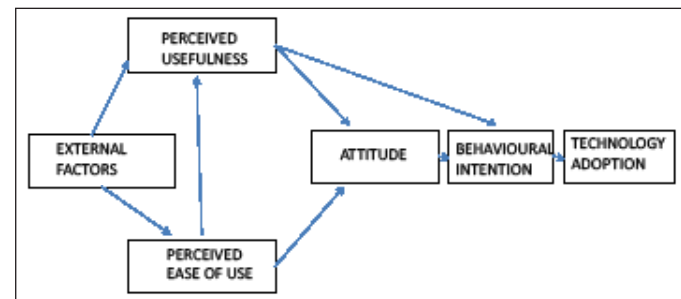


Fig. 2: Technology Acceptance Model (TAM)

### Theory of Planned Behaviour (TPB)

The theory of planned behaviour was suggested as an extension of the theory of reasoned action to take into account conditions where individuals do not have complete control over their behaviour. TPB model have been used to explain different types of behaviour. However, when applied to the study of adoption intention for new IT systems, the model has been validated to contain five concepts - behavioural

attitudes, subjective norm, behavioural control, intention to use, and actual use.

Researches on TRA, TPB, and TAM made significant contributions to the field of IT adoption theories. However, problems still exist among these each individual models. It was observed that due to the complexity of behaviour research and the limitation of the researchers, there is no single theory that covers all (or majority) of the factors. Therefore, efforts were made to combine the theories taking into account their individual limitations. Venkatesh *et al.* (2003) proposed UTAUT after reviewing eight IT adoption theories. UTAUT is so far the most comprehensive IT adoption theory.

### Unified Theory of Acceptance and Use of Technology (UTAUT)

The UTAUT (Venkatesh *et al.*, 2003) model integrates eight theories of user acceptance of technology derived from the existing information systems literature – the TAM, the innovation diffusion theory (IDT), the motivational model, the TRA, the theory of planned behaviour (TPB), a model combining the TAM and TPB, the model of PC utilisation, and the social cognitive theory. The model proposes that four constructs – performance expectancy (perceived usefulness and relative advantage), effort expectancy (similar to perceived ease of use and complexity), social influence (similar to subjective norm), and facilitating conditions (similar to perceived behavioural control) affect user adoption of an information technology. UTAUT has been empirically tested and proven superior to other prevailing competing models.

The UTAUT model includes four moderators that are significantly influential on the four main effects - age, gender, experience, and voluntariness of use. In this model, the dependent variables are behavioural intention to use and use behaviour. This model provides a comprehensive framework for technology adoption analysis. The UTAUT theory was widely used in adopting m-commerce acceptance research.

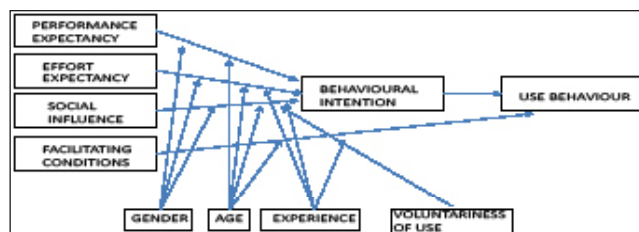


Fig. 3: Unified Theory of Acceptance and Use of Technology (UTAUT)

### LITERATURE REVIEW

Drawing from the TAM and UTAUT as theory foundation, the study here progressively integrates with the literature on technology adoption research to propose a conceptual model for adoption intention of mobile payment services. Some of the selected papers studied for this research are presented here in chronological order.

Clarke III (2001) explored factors that compose an effective m-commerce strategy. He has stated that an effective value proposition is developed as superior customer value is created through an increasingly targeted Internet experience for mobile users. His model is depicted in Fig. 4.

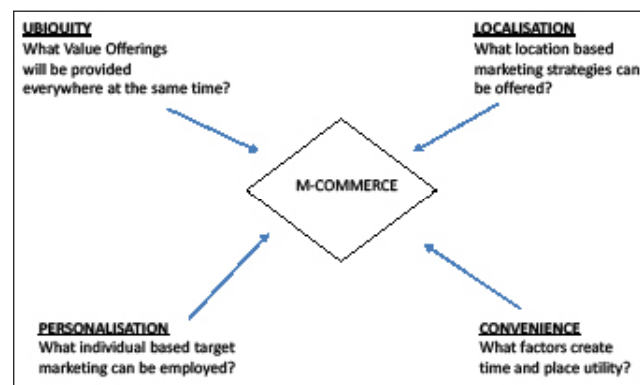
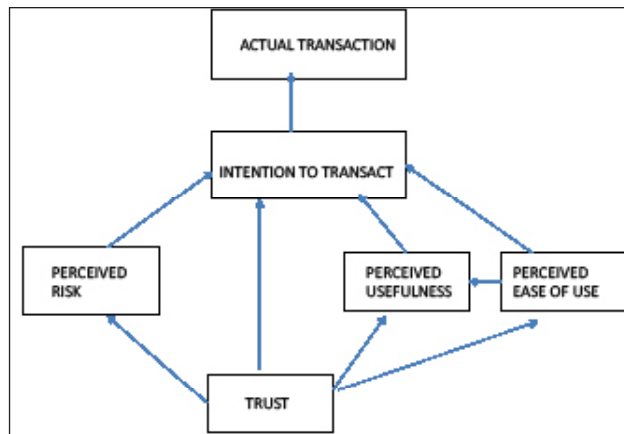


Fig. 4: Model Developed by Clarke III (2001)

According to Siau and Shen (2003), gaining customer trust in mobile commerce, is a difficult task. Some of the important factors that influence trust involve customer perception of security and privacy control, integrity, competence, third-party recognition and legal framework. Elements of corporate branding, such as personal experience, familiarity, affiliation and belonging, transparency, actual signals and heuristic cues, may also be used to engender trust in Internet business.

Suh and Han (2003) investigated the impact of customer perceptions of security control on e-commerce acceptance. In the premise of Internet banking, trust was examined as the mediating factor of the relationship. Statistical analyses, using structural equation modelling, indicated that perceptions of nonrepudiation, privacy protection, and data integrity have a significant impact on trust in e-commerce. Trust was also observed to have a significant impact on e-commerce acceptance.

Pavlou (2003) applied the technology acceptance model integrating trust and perceived risk. His proposed e-commerce acceptance model also draws from the theory of reasoned action (TRA). His model is shown in Fig. 5.

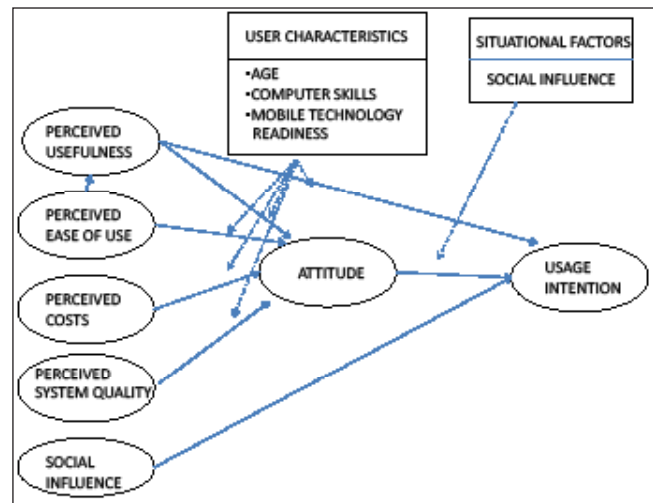


**Fig. 5: E-commerce Acceptance Model Proposed by Pavlou (2003)**

He conducted two independent studies to test the proposed research hypotheses. Study 1 was exploratory in nature. It used a student sample and did not test for actual behaviour, only intentions to transact were tested where three distinct e-tailers were selected and three different student groups were asked to rate them. The rationale behind these three different scenarios with either a predetermined or self-selected Web retailer or on-line retailers in general was to test the proposed research model in several contextual bases to assess its robustness and generalizability across different targets. It was observed that trust is positively associated with intention to transact. Perceived usefulness was also a significant predictor of behavioural intentions. However, perceived ease of use has a non-significant effect on intentions to transact and ease of use has a strong effect on usefulness. Perceived risk was strongly related to intentions to transact. The relatively weak effect of trust on behavioural intention suggests that trust also acts indirectly on intentions to transact through perceived usefulness, perceived ease of use and perceived risk. Reputation was a significant antecedent of intention to transact, suggesting that Web retailer reputation plays a role in consumer transaction intentions. Satisfaction with past outcomes and Web-shopping frequency had a positive but no significant effect on intentions to transact. Finally, the variance explained for transaction intentions was particularly high, well above the values found by other TAM researchers on intention to use, suggesting that the proposed model captures many of the significant variables that influence B2C e-commerce acceptance. Therefore, the integration of trust and perceived risk significantly adds to the explanatory value of TAM when applied to consumer on-line behaviour. Study 2 was confirmatory in nature. It measured and tested all the variables proposed in the conceptual model, using a generalizable on-line consumer population. Study 2 addressed the major limitations of study 1 (i.e., external validity, actual transaction behaviour) by

using a consumer population. Therefore, it used an on-line survey instrument that was communicated to the respondents via e-mail. It was observed that intention to transact was a significant predictor of actual transaction behaviour and trust was the most influential predictor of transaction intentions. Similarly, the effect of perceived ease of use was also statistically significant in the consumer population, as opposed to the student population in which ease of use had an insignificant effect. Perceived usefulness was also observed to be a strong predictor of transaction intentions. The effect of perceived ease of use on usefulness was also significant. Perceived risk was also found to be significantly related to intentions to transact. It is important to note that the direct effect of the four major predictors of trust, usefulness, ease of use, and perceived risk on actual transaction behaviour was insignificant, suggesting that these independent variables only influence actual behaviour indirectly through transaction intentions, as originally conceptualised.

Kleijnen *et al.* (2003) applied the technology acceptance model with added constructs like perceived cost, system quality, and social influence to investigate the adoption of mobile services in the context of wireless finance. Additionally, several moderating variables have been included like age, computer skills, mobile technology readiness, and social influence. Their model is presented in Fig. 6.



**Fig. 6: Technology Acceptance Model with Added Constructs by Kleijnen *et al.* (2003)**

The results indicate that no significant difference was observed in the effect that perceived ease of use has on attitude between younger and older consumers. Also, while investigating the moderating effect of computer skills and mobile technology readiness on the relationship between perceived ease of use and attitude, no significant results were found. The relationships between perceived

usefulness on intention and the effect of perceived costs on attitude were not significant in the core model; however, these relationships do become important when including the moderating effects. Perceived costs seem to play a less important role than was expected. An explanation for this finding might be that costs are of minor importance as long as the mobile service delivers high quality content.

Gefen and Straub (2004) observed that the relative paucity of regulations and customs on the internet makes consumer familiarity and trust especially important in the context of e-commerce. The study validates a four dimensional scale of trust in the context of e-products and e-service. The study shows that e-trust is composed of four distinct beliefs dealing with integrity, benevolence, ability, and predictability of the vendor. They also stated that social presence is an important characteristic of trust and social presence should also build trust through the perception that the vendor is displaying through the website a sense of personal, social and sensitive human contact. The model is shown in Fig. 7.

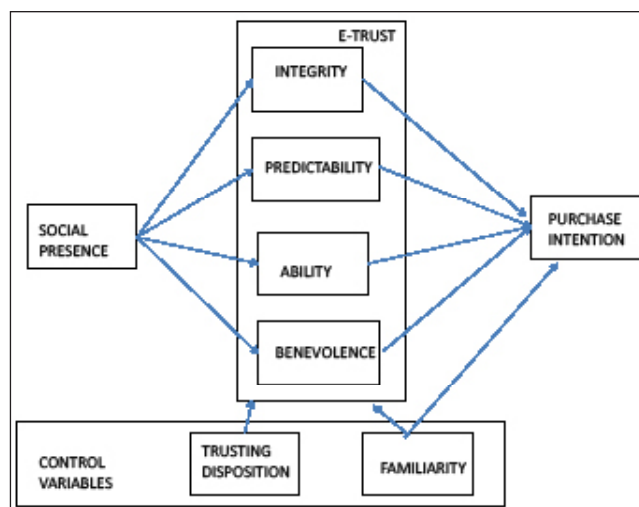


Fig. 7: Model Developed by Gefen and Straub (2004)

The research was conducted in two different but related studies. Both the experiments were simulation studies where real world situations were imitated as closely as possible. It was observed from Study 1 that purchase intentions were affected by e-trust and familiarity. However, among the dimensions of trust, only predictability and integrity affected purchase intentions. The second study tried to analyse the impact of social presence on e-trust. It was observed that even though a website is typically devoid of human interaction yet the perception of a social presence helps to gain and build trust.

According to Pederson (2005), the traditional adoption models need to be extended and modified when applied to mobile services. He applied a domestication research perspective that typically focuses on the consequences of

mobile service adoption and use, as opposed to traditional models of innovation diffusion theories. The main focus of domestication research is on the societal consequences of the domestication of technology; that is the process in which the use of technology becomes integrated into our everyday life. He formed a model using domestication research findings to extend and modify the decomposed theory of planned behaviour. As per his research findings, he concluded that the traditional TPB model should be modified with the addition of expectancy relationships, social influence of attitudes towards use, and self-control.

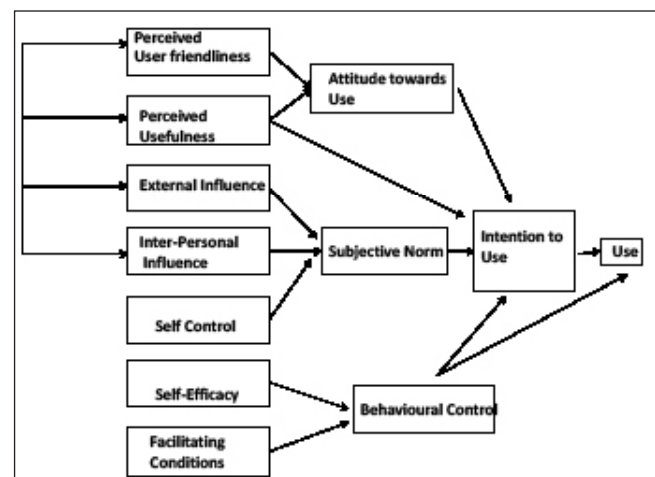


Fig. 8: Model Developed by Pederson (2005)

Rathore (2016) in her article, ‘Adoption of Digital wallet by Indian Consumers’ tried to find out the extent to which consumers are accepting digital wallet as a mode of payment as well as the level of satisfaction with this mode of payment. The major findings of the research include three factors that play an important role in adoption of digital wallet - convenience in buying products online, brand loyalty and usefulness of digital wallet. It was observed that users of digital wallet were satisfied with the services provided to them. However, concerns over security and safety of the funds as well as dependency on internet connection to make payment remains one of the major reasons for less adoption of digital wallet.

Kurnia *et al.* (2006) demonstrated the applicability of the technology acceptance model in assessing the acceptance of mobile Internet in Australia. Consistent with many previous studies, it was observed that perceived usefulness and perceived ease of use of mobile Internet technology were found to have positive impacts on the attitude towards using the technology. Attitude, in turn also strongly influences the behavioural intention to use mobile Internet. Finally, the behavioural intention to use mobile Internet affects the extent of actual usage. Apart from and in addition to the factors suggested by the TAM, this study also shows that

social influence has a strong positive impact on the attitude towards using mobile Internet. Their model is presented in Fig. 9.

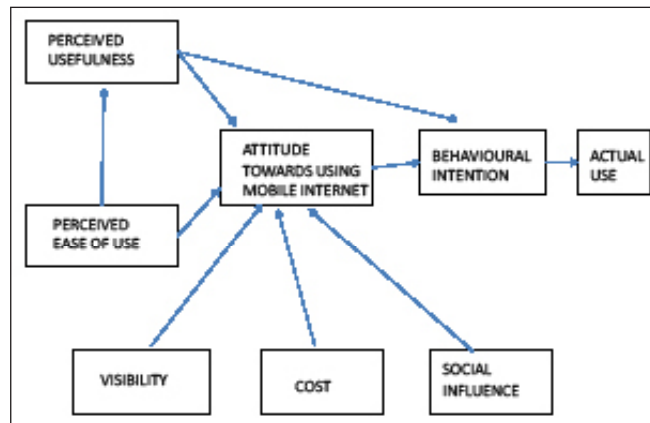


Fig. 9: Model Developed by Kurnia *et al.* (2006)

The model was mainly derived from the TAM, with three additional constructs, namely 'visibility', 'perceived cost' (derived from Everett Rogers' Diffusion of Innovations theory) and 'social influence' (derived from the theory of reasoned action). They have measured perceived cost rather than the amount spent, on the basis that logically, attitudes are most likely to be determined by the level of affordability rather than the market price. They conducted a test of the structural model which indicated that perceived ease of use and usefulness are the dominant factors affecting attitude, and that all three have a substantial influence on both intention to use and frequency of use. Social networks, particularly the behaviour of friends and family members, have a small but significant effect on attitude formation. In contrast, visibility and perceived cost appeared to play no role in either attitude formation or usage intentions.

Lin and Wang (2006) developed a customer loyalty model based on IS and marketing literature. The research delves into factors that influence a customer's attitudinal commitment & repeat purchase intentions. The model is presented in Fig. 10.

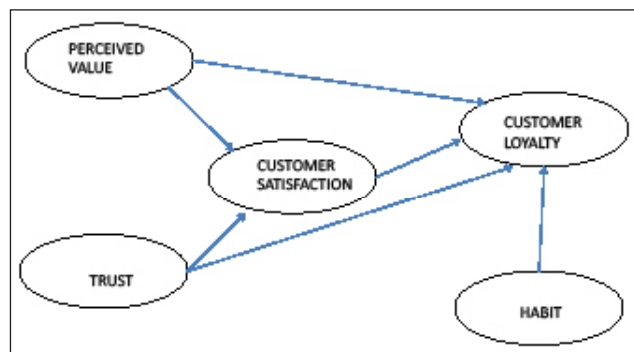


Fig. 10: Customer Loyalty Model Developed by Lin and Wang (2006)

They considered customer satisfaction as a mediating variable between trust and customer loyalty. They have also proposed that habit alone can explain a large proportion of the variance in the continued use of a website and thus habit has a positive effect on customer loyalty. The results indicated trust to be an important determinant of customer satisfaction and loyalty. In an m-commerce context, customers who do not trust an m vendor will not purchase from that m vendor, even when they are satisfied with the products/services. Habit was found to be a significant influence of customer loyalty.

Kallamarthodi and Vaithyanathan (2011) tried to determine the factors influencing the consumer's adoption of e-banking in India with the help of the technology acceptance mModel. The results of the regression analysis conducted on the variables of TAM indicate that perceived risk, perceived usefulness, and perceived ease of use were found to be the most influential factors explaining the use of e-banking services. The regression result shows that perceived risk is negatively related to the adoption of e-banking. It also shows that perceived usefulness and perceived ease of use have positive relation with e-banking usage. This finding refers to the fact that consumers use e-banking for the benefits and also due to the easiness in use.

Amoroso and Hunsinger (2009) extended the TAM by including additional constructs of privacy, trust, perceived risk, e-satisfaction, and e-loyalty. They formed a linear regression model using behavioural intention as a dependent variable and it showed a very strong amount of variance explained by the above factors (R=.606). They discovered that several constructs not included in the original TAM, institution based trust, and structural assurances play an important role in influencing consumers' attitudes toward purchasing. Their proposed model is presented in Fig. 11.

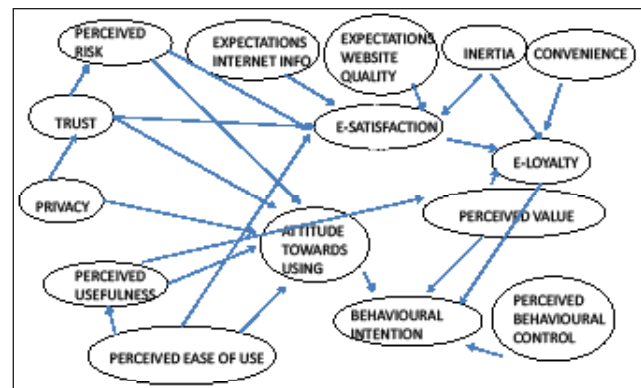
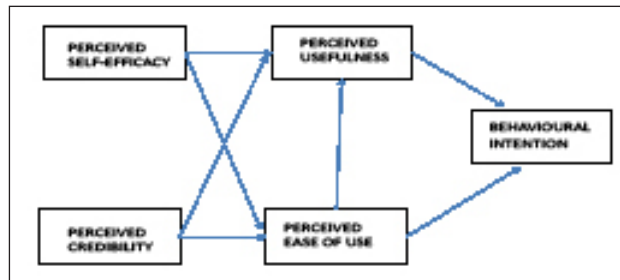


Fig. 11: Proposed Model by Amoroso and Hunsinger (2009)

Tang and Chiang (2009) tried to find out factors that reflect the characteristic of the mobile knowledge management. Specifically they attempted to understand the factors affecting user's behavioural intention to use the mobile

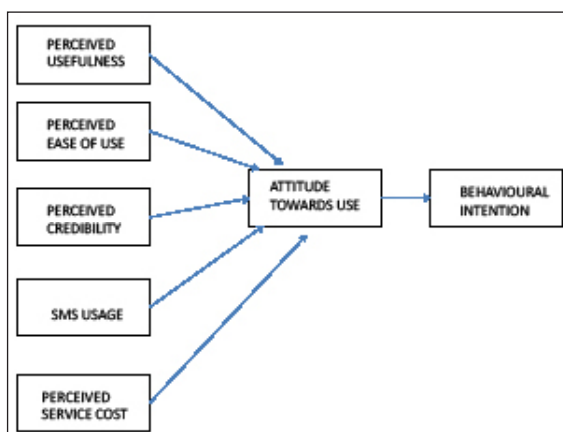
knowledge management. They have used the technology acceptance model with two additional constructs- self-efficacy and convenience. The research model is based on the extended version of Davis' TAM, and is developed to derive the exogenous variables affecting user acceptance. The diagram of the model is presented in Fig. 12.



**Fig. 12: Proposed Model by Tang and Chiang (2009)**

This study indicates that users are affected by perceived self-efficacy on their perceptions of perceived usefulness and perceived ease of use. Perceived ease of use had no significantly positive effect on perceived usefulness. The study findings suggest that perceived self-efficacy is the most important factor influencing behaviour intention for mobile knowledge management followed by perceived ease of use and perceived usefulness.

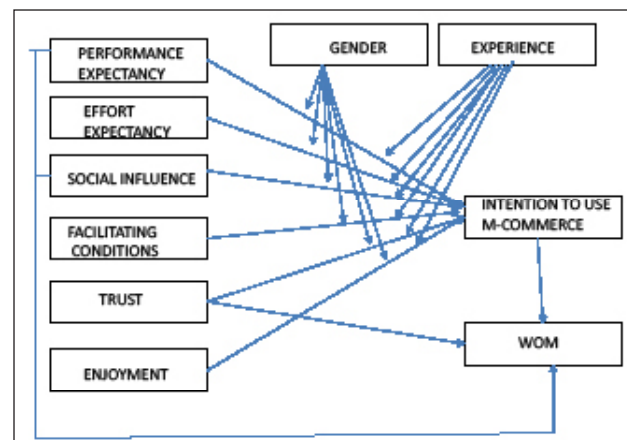
Deng, Lu, Deng, and Zhang (2010) applied technology acceptance model (TAM) and other three constructs to examine the factors that influence the adoption of mobile banking in China. The study here have extended TAM by adding perceived credibility, SMS service, and perceived costs to the model to explain user acceptance of mobile banking. In China, mobile banking services are mainly conducted through SMS. So, they hypothesised that the more frequently consumers use SMS, the more easily they will perceive mobile banking to use and then will have more positive attitude to use mobile banking. The research model is presented in Fig. 13.



**Fig. 13: Model Developed by Deng *et al.* (2010)**

It was observed from the SEM that neither perceived service cost nor perceived ease of use influence attitude to use significantly. It was also found that neither perceived ease of use nor behaviour attitude is affected by SMS usage. However, perceived usefulness and perceived credibility have significant effect on attitude to use, perceived ease of use significantly influences perceived usefulness and perceived credibility, attitude to use has significant effect on behaviour intention to use.

Song (2010) incorporated a new construct, word of mouth along with the variables of a revised UTAUT model with two added variables- trust and enjoyment. He also tried to analyse the moderating effects of gender and experience on the constructs. His model is presented in Fig. 14.

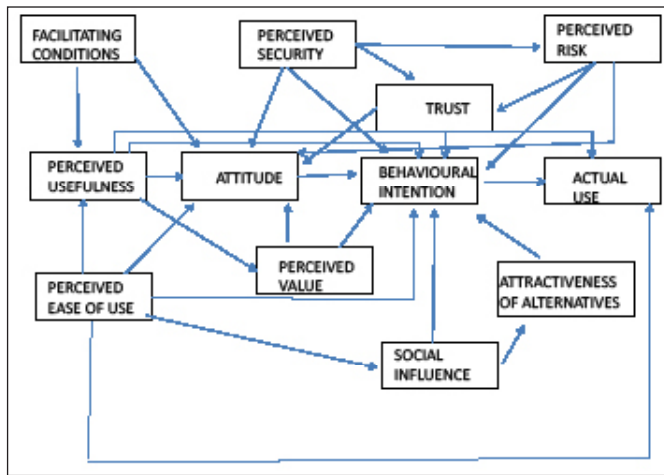


**Fig. 14: Model Proposed by Song (2010)**

The construct, performance expectancy, was found to have a strong impact on the model. However, contrary to what was hypothesised, this relationship was not moderated by experience or gender. Effort expectancy was not found to have a significant effect on purchase intention. Experience was not a significant moderator of this relationship as the ease of system use attenuated with experience. Gender also failed to moderate this relationship when testing the proposed model. Social influence also has a significant effect on purchase intention but with no moderated effects. Facilitating conditions as well as trust were also found to be insignificant. However, enjoyment had a positive effect on purchase intention with no moderated effects. The results also showed that adoption processes such as performance expectancy, social influence, trust, and intention to use are directly related to positive WOM recommendation.

Amoroso and Watanabe (2011) identified eleven key constructs for mobile payment adoption from a consumer perspective - perceived ease of use, perceived usefulness, facilitating conditions, attitude toward using, perceived value, perceived security and privacy, social influence, trust, behavioural intention to use, perceived risk, and

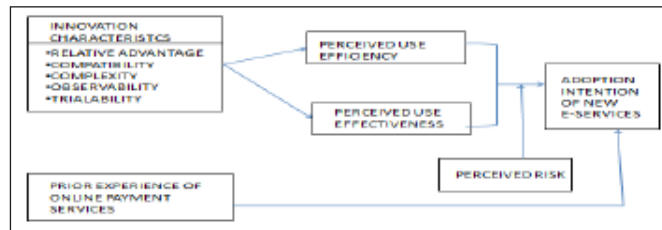
attractiveness of alternatives in the context of mobile payments. Their model is presented in Fig. 15.



**Fig. 15: Model Developed by Amoroso & Watanabe (2011)**

Using this framework, they have presented the case of the successful adoption of Mobile Suica in Japan.

Jaw (2011) expanded the traditional TAM by considering two mediators between innovation characteristics and the adoption of online payment services: perceived use efficiency and perceived use effectiveness. The study further included perceived risk as a moderator to these mediators because of various risk concerns, as well as prior experience as an independent factor that will affect the adoption decision. The model is shown in Fig. 16.



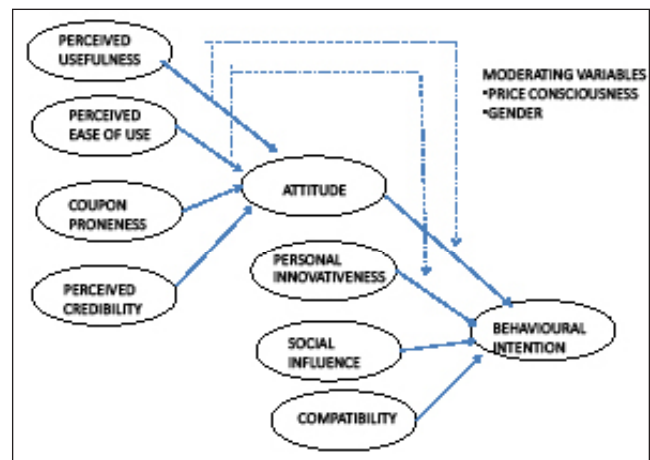
**Fig. 16: Model Developed by Jaw (2011)**

For the study a simulated online tuition payment website was developed. The results of the investigation indicate the significant mediating effects of perceived use efficiency and perceived use effectiveness on the relationship between innovation characteristics of online payment and adoption intention to use the technology. The direct effects of innovation characteristics on adoption intention are weaker when both mediators, perceived use efficiency and perceived use effectiveness, are added to the model. Specifically, compatibility of the online payment website has no significant

relationship with consumers' adoption intention. Relative advantage, complexity, observability, and trialability still have direct effect on adoption intention for online payment. Notably, examination of the relative strengths of the associations among innovation characteristics, mediators (perceived use efficiency and perceived use effectiveness), and adoption intention clearly indicates that the mediators, perceived use efficiency and perceived use effectiveness, can explain much of the variation in adoption intention. In other words, for predicting adoption of online payment services, the mediating model is better than the direct effect model.

Sadi and Noordin (2011) tried to identify factors that affect the adoption of m-commerce in Malaysia based on traditional technology models such as theory of reason action (TRA), theory of planned behaviour (TPB), technology acceptance model (TAM), and diffusion innovation theory (DOI). They included factors like perceived usefulness, perceived ease of use, personal innovativeness, perceived trust, perceived cost, subjective norms, perceived behavioural control, facilitating conditions, self-efficacy, and attitude towards use. Principal component analysis revealed that the maximum variation in the data is captured by facilitating conditions followed by personal innovativeness. The third component relates to perceived trust followed by perceived ease of use.

Sudarshan and Eze (2012) analysed the intention to use mobile coupons in Malaysia with the help of an extended TAM focussing on the moderating effects of price consciousness and gender. They have also clubbed the security and privacy risk dimension under a new head-perceived credibility. Their model is presented in Fig. 17.



**Fig. 17: Model Proposed by Sudarshan and Eze (2012)**

It was observed from the study that the intention to use mobile coupons was directly influenced by perceived usefulness, perceived ease of use, perceived credibility,

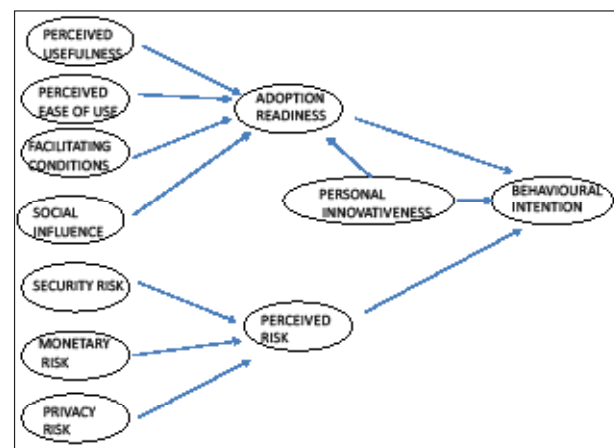
compatibility, and social influence. No direct or significant effect was observed for personal innovativeness on behavioural intention. They also identified two segments using cluster analysis of price consciousness customers and male versus female customers. High price conscious customers tended to be more sensitive to perceived ease of use than low price conscious consumers, whereas low price conscious consumers were found to be more sensitive to social influence and perceived usefulness. Gender also played a significant role as a moderating variable where it was observed that social influence is a strong determinant of behavioural intention to use mobile coupons for female consumers and personal innovativeness and compatibility was found to be strong determinants for male consumers.

Thakur and Srivastava (2013) in their study on factors influencing adoption of mobile wallet developed a construct named “adoption readiness (AR)” as a determinant of usage intention. Two other constructs were also included in the study- perceived risk (PR) and personal innovativeness. They also examined different customer groups for the variance in impact of perceptions of AR, personal innovativeness and risk attributes on their usage intention. Drawing from the past evidence of literatures supporting high degree of correlation between factors in UTAUT (perceived usefulness, perceived ease of use, SI, and perceived FC) observed by researchers, they have developed a new construct named “adoption readiness” as a second order construct with these four dimensions (Fig. 18). They have also theorised that perceived risk refers to the three important dimensions- security, privacy and monetary risk. The research indicated that AR is the most important factor in adoption of mobile payments. PR has significant negative impact on adoption usage intention. There was a direct and positive influence of innovativeness towards mobile payments - AR and usage intention. They also performed an invariance analysis which demonstrated that usage differences moderated the relationships among the constructs. The study showed that impact of innovativeness on usage intention is significantly different among users and non-users indicating critical role of innovativeness in usage intention of the mobile payment services.

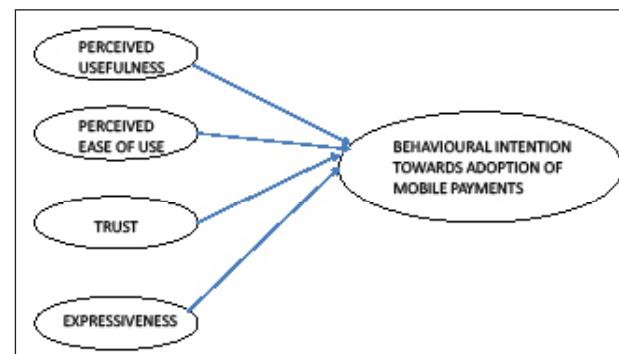
Padashetty and Kishore (2013) conducted a study on factors affecting mobile payments in Bangalore city. Their model is presented in Fig. 19.

The study through its critical analysis of data presents the findings that the identified elements like perceived use, trust, expressiveness, and perceived ease of use play a crucial role in facilitating adoption of mobile payment solution. To summarise, perceived usefulness was rated as an important factor that enhances mobile payments. The factor “ease of

use” received the highest number of respondents’ rating as the factor that enhances mobile payments.

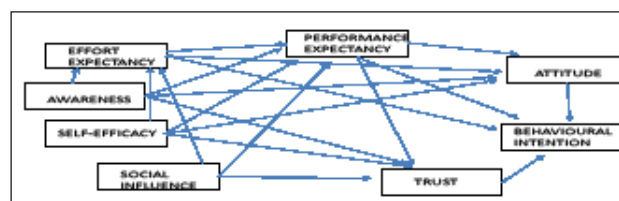


**Fig. 18: Model Proposed by Thakur and Srivastava (2013)**



**Fig. 19: Model Proposed by Padashetty and Kishore (2013)**

Saibaba & Naryana Murthy (2013) developed a comprehensive model called “Internet banking acceptance in India” which was partially based on the unified theory of acceptance and use of technology (UTAUT) and three additional variables. The model is shown in Fig. 20.



**Fig. 20: Model ‘Internet banking acceptance in India’ by Saibaba & Naryana Murthy (2013)**

Behavioural intention to use Internet banking in this study was jointly predicted by performance expectancy, social influence, attitude, and trust. But, effort expectancy was found to have insignificant impact on behavioural intention. All the four predictors i.e. effort expectancy, social influence, awareness, and self-efficacy, were found to be have significant impact on perceived performance expectancy of Internet banking services.

Mashagba, Mashagba, and Nassar (2013) again identified the technological factors that affect the intention to adopt mobile commerce in Jordan. Their model is based on the technology acceptance model with certain added constructs. The model is shown in Fig. 21.

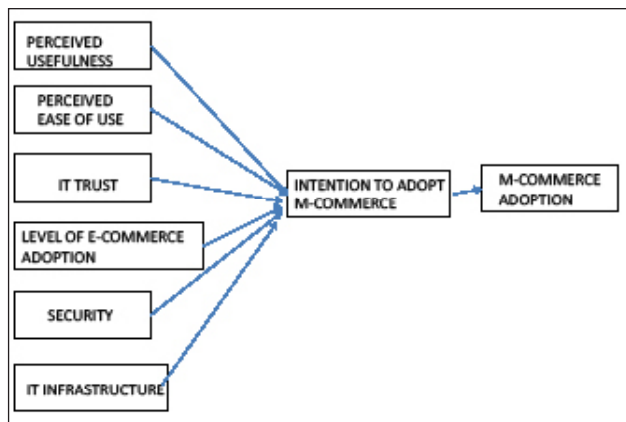


Fig. 21: Model Proposed by Mashagba *et al.* (2013)

The results also show that perceived usefulness (PU), perceived ease of use (PEOU), IT trust, the level of e-commerce adoption, security and IT infrastructure factors have direct significant effect in the intention to adopt mobile commerce. This research also finds that those factors are different in their effect in the mobile commerce adoption decision where security factor has the highest impact in mobile commerce adoption decision while perceived usefulness (PU) factor has the lowest impact in making such decision.

Shah, Fatimee, and Sajjad (2014) have used the technology acceptance model in order to measure intention to use mobile commerce by analysing the effect of various other variables on it (Fig. 22). Intention to use is taken as dependent variable and perceived ease of use, perceived usefulness, social influence, perceived trust and awareness are taken as the explanatory variables of the study.

Perceived usefulness was found as the most sustainable and significant element in determining Intention to use mobile commerce. Perceived ease of use (PEOU) was also found as a significant predictor of mobile commerce adoption. Social influence also has significant values showing positive

correlation on intention to use mobile commerce. Perceived cost was also found to have a significant influence on intention to use. Perceived trust in this study has insignificant values which contradicts with the prior research studies. Perceived awareness in this research has been found as a significant predictor.

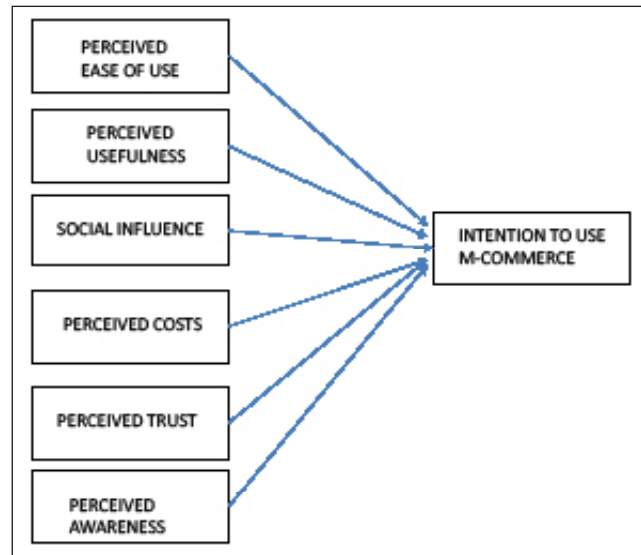


Fig. 22: Model Developed by Shah *et al.* (2014)

Wu and Ke (2015) conducted a meta-analysis involving the integration of models of personality traits, perceived risk, and TAM to identify the mediating effects of attitude and trust in the relationships relating to online shopping intention. Their proposed model is presented in Fig. 23.

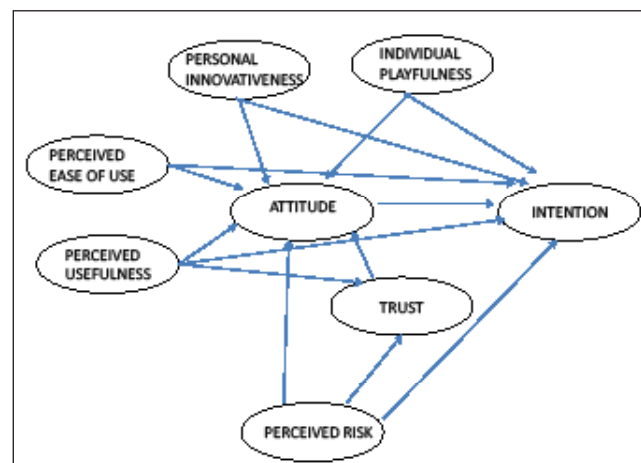


Fig. 23: Model Proposed by Wu and Ke (2015)

After carrying out the meta-analysis, they concluded that for all three models, both attitude and trust acted as significant

mediators and the indirect effects of personal innovativeness, perceived usefulness, and perceived risk on intention were close to fully mediating the relationships.

Madan and Yadav (2016) tried to examine the impact of various factors that affect m-commerce adoption intention of Indian consumers. Research model was developed borrowing constructs from the technology acceptance model and TAM2 along with two additional constructs based on review of available literature. Their proposed model included a new construct - variety of services (VOS). Although m-commerce have many applications, but the variety of services offered by it might not be comparable to services offered by e-commerce websites. Many previous researchers were of the opinion that the variety of m-commerce services available also affects m-commerce adoption intention. Their proposed research model is depicted in Fig. 24.

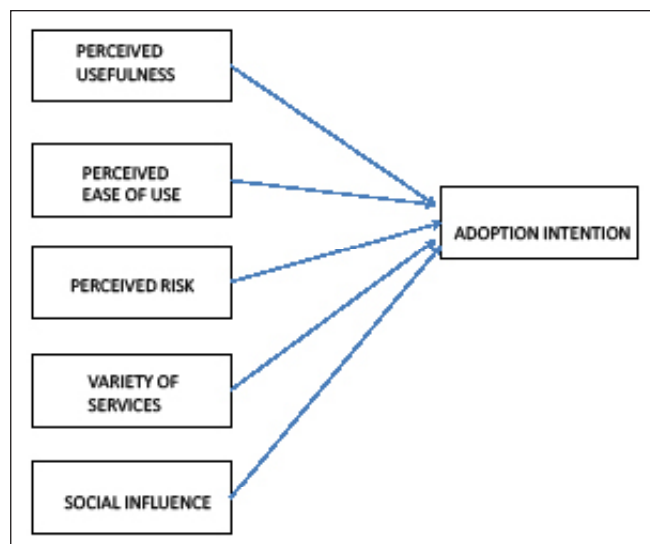


Fig. 24: Model Proposed by Madan and Yadav (2016)

The study indicates that factors such as perceived usefulness, variety of services, and social influence have a positive influence on the m-commerce Adoption intention of Indian consumers, whereas perceived risk has a negative influence on the adoption intention and perceived ease of use is found to be insignificant.

### OPERATIONAL DEFINITIONS

Drawing from the TAM & UTAUT as theoretical foundation and the subsequent literatures on mobile technology acceptance, online shopping/ mobile commerce, mobile marketing, online payments/ mobile banking, mobile payment adoption, mobile internet adoption, and mobile wallet adoption, a modified version of the UTAUT is constructed with certain additional variables. The research retains nine constructs and proposes a model as an integrated

framework for digital wallet adoption (Fig. 25). Several other constructs deemed redundant, such as perceived performance expectancy (which was observed to be similar to perceived usefulness) and perceived credibility (found similar to perceived risk), or word of mouth (similar to subjective norm or social influence) or unsupported in previous studies, such as perceived cost were not taken into consideration for the framework. The rest of this section describes in detail the relationships depicted in Fig. 25; these relationships are then summarised in the forms of hypotheses for mobile payment systems after the review of the relevant literature.

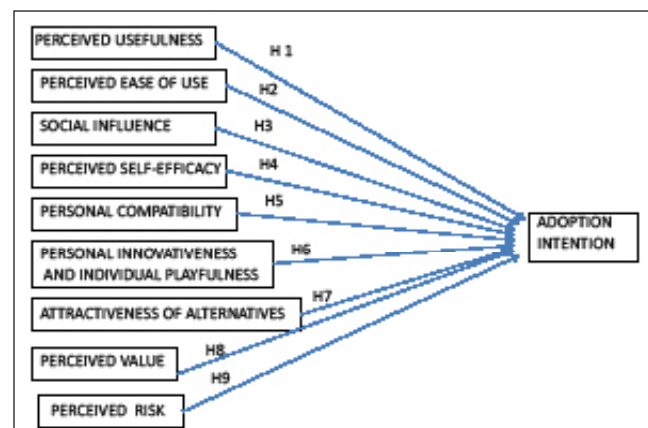


Fig. 25: Model as an Integrated Framework for Digital Wallet Adoption

The constructs of the model are presented as follows:-

### Adoption Intention

Adoption intention for mobile wallet involves the consumer’s propensity to accept and assimilates new technologies, specifically a mobile wallet in this instance. There is evidence in prior studies that shows that behavioural intention correlates with actual behaviour (Al-Maghrabi & Dennis, 2011; Venkatesh *et al.*, 2012; Yiu *et al.*, 2007). Therefore, measuring intention will give acceptable indication of consumer behaviour.

As evidenced from the TAM and UTAUT models, behavioural intention to use new technology is influenced by 4 factors namely- perceived usefulness (similar to performance expectancy), perceived ease of use (similar to effort expectancy), facilitating conditions, and social influence mediated by attitude towards use.

### Perceived Usefulness

This variable is similar to perceived performance expectancy of the UTAUT model. According to Davis, (1989), perceived usefulness of a system can be explained as the degree

to which individuals perceive that the new technology will help to improve their performance. Thus, perceived usefulness is perceived to influence the intention to adopt mobile commerce. Thakur & Srivastava (2013), Gitau and David (2014), Wu and Ke (2015) in their research proved the significant effect of Perceived Usefulness on adoption intention.

### **Perceived Ease of Use**

Perceived ease of use (PEOU) is similar to effort expectancy of the UTAUT model. It can be defined as the degree to which the prospective user expects a new technology to be free of effort. It is also defined as the degree to which the user expects the system to be user friendly. According to Davis, (1989); an individual may believe that an application is useful, but he or she might also find that the system is difficult to use. PEOU is considered as an important determinant in adoption of mobile services (Pederson, 2005), mobile knowledge management (Tang & Chiang, 2009), mobile Internet (kurnia *et al.*, 2006) and recently m-commerce (Gitau & David, 2014; Amoroso & Watanabe, 2011), mobile coupons (Sudarshan & Eze, 2012), mobile wallet (Thakur & Srivastava, 2013).

### **Social Influence**

Social influence is the extent to which an individual is influenced by people important to them. Social influences or perceived pressures from social networks to make or not to make a certain behavioural decision (Lin & Wang, 2006), has been recognised a critical element in innovation diffusion literature. The UTAUT model elevates social influence as one of the four prescriptive factors of behavioural intention to use.

### **Facilitating Conditions**

Facilitating conditions are defined as the belief about the accessibility to resources necessary to facilitate any service (Amoroso & Watanabe, 2011). Facilitating conditions, along with behavioural intention to use, are the two direct determinants of usage behaviour in the UTAUT.

### **Perceived Self-Efficacy**

Hill *et al.* (1987) pointed out that computer self-efficacy is an important determinant of an individuals' decision to use computer technology.

### **Perceived Individual Playfulness and Personal Innovativeness**

Personality traits like individual playfulness and personal innovativeness are found to be highly related to online purchase intention (Walczuch & Lundgren, 2004; Oh *et al.*, 2009; San Martin & Herrero, 2012). Individual playfulness is a personality trait that makes a person more likely to interact instinctively, creatively and imaginatively with others and with objects (Webster & Martocchio, 1992). Individuals with a high level of playfulness, are, thus, more likely than others to accept and apply new technology and to feel greater self-efficacy towards it (Sudarshan & Eze, 2012, Wu and Ke, 2015). Personal innovativeness is regarded as a key trait in the adoption of innovations in general and is a trait that makes an individual want to try new information technology (Wu & Ke, 2015; Gitau & David, 2014; Thakur & Srivastava 2013). According to Bhatti (2007) and Lee, Choi, Kim, and Hong (2007), personal innovativeness has a strong influence on adoption of innovations such as mobile commerce.

### **Perceived Compatibility**

Perceived compatibility is defined as the degree to which engagement in mobile commerce is perceived to being consistent with the consumers' lifestyle and current needs. Measuring compatibility is important to the success of mobile services as the services would perform well to the idea and beliefs of the consumers in order to be adopted (Sudarshan & Eze, 2012). Previous research findings indicate that high compatibility leads to an increased chance of adopting technology related applications (Chen, Lou, & Luo, 2002).

### **Attractiveness of Alternatives**

Attractiveness of alternatives can be explained as the extent to which [customers perceive] viable competing alternatives are available in the marketplace (Jones *et al.*, 2000). Cheong, Park, and Hwang (2004) found a negative relationship between attractiveness of alternatives and behavioural intention to use.

### **Perceived Value of Mobile Wallet**

Perceived value is the trade-off between what customers perceive as benefits like quality of service received and the amount of money/ time/ efforts they have spent in receiving the service. Since the concept of mobile wallets is still new in

India, companies offer substantial deals, discounts and offers to woo customers and increase awareness. For example, in 2015, Paytm offered INR 8,000 as discount on iPhones and iPads, while in 2016, Freecharge offered significant cash-backs on minimum bill payments. Paytm and MobiKwik are known for their regular discounts on products, offered either as credit to the wallet or as discount coupons at partner-merchant outlets. These offers tend to encourage customer usage of wallets as a primary mode of payment. Perceived value was a primary determinant of adoption intention in mobile commerce in Singapore (Kim, Chan & Gupta, 2007).

### Perceived Risk

Perceived risk is defined as the subjective belief of suffering a loss in pursuit of a desired outcome (Featherman & Pavlou, 2003). Drawing from several literatures reviewed above, the study here proposes that, security risk, privacy risk, and monetary risk form the dimensions of perceived risk in the adoption intention of digital wallet. Security risk in an online environment refers to the perceptions about security regarding the means of payment and the mechanism for storing and transmission of information (Kolsaker & Payne, 2002). Privacy risk is defined as the possibility that online businesses might use personal information inappropriately hence invading a consumer's privacy (Nyshadham, 2000). Monetary risk is customer perception of a particular online channel (mobile payment services in our study) costing more money than alternative channels. Some of the studies conducted in emerging economies like China (Yao & Zhong, 2011), Brazil (Cruz *et al.*, 2010), and Bangkok (Sripalawat *et al.*, 2011) have specifically found monetary risk as a deterrent to usage intention and perception on usefulness of mobile payments.

Therefore, the following hypotheses are proposed:

- **H1:** Perceived usefulness positively influences adoption intention of e-wallet services.
- **H2:** Perceived ease of use positively influences adoption intention of e-wallet services.
- **H3:** Social influence is positively related to adoption intention of e-wallet services.
- **H4:** Facilitating conditions of mobile wallet positively influence intention to use mobile wallet.
- **H5:** Higher self-efficacy positively influences adoption intention.
- **H6:** Presence of personal innovativeness and individual playfulness positively influence adoption intention.
- **H7:** Perceived compatibility with mobile wallet positively influences adoption intention.
- **H8:** Attractiveness of mobile payment alternatives

(e.g. credit card) is negatively related towards adoption intention.

- **H9:** Perceived value of mobile wallet positively influences adoption intention.
- **H10:** Perceived risk of mobile wallet influences adoption intention for e-wallet services.

## RESEARCH OBJECTIVE

The purpose of this research study includes:

- To develop and test a model to better understand the factors which are most important in predicting consumers' adoption intention to adopt digital wallets in India.
- To find out if the market can be segmented into different customer groups with their own unique criteria of adoption intention for e-wallet services.

## RESEARCH METHODOLOGY

### Research Design

The research followed an exploratory research approach since the subject is relatively new in India. To analyse the propositions, an empirical survey of adopters of digital wallet services was conducted. A questionnaire has been designed containing multiple measures of each of the nine constructs of the model.

The questionnaire was designed to provide data on two wide range of variables:-

- **Customer Demographic Variables:** Age, gender, educational background, income range, and user category.
- **Customer Psychographics:** Here various scales have been adopted for measurement of each of the ten constructs of the model.

The questions were measured on a 5-point Likert scale with ratings ranging from strongly disagree to strongly agree.

### Mode of Data Collection

The questionnaire was administered by personal and telephonic interview, and in some cases, questions were mailed to respondents. The respondents were selected by a random procedure from educational institutions, shops, offices and households.

### Universe and Sample Size

Most of the sample respondents belong to Kolkata and some are from Mumbai and Bangalore. As per Basu *et al.* (2013), the urban population residing in the metro cities of India shows uniformity in their attitudes and temperaments, hence the choice of three cities can be taken as an appropriate representation of the Indian urban population. In total, 150 questionnaires were distributed, of which only 80 valid questionnaires could be retained for analysis purpose.

### Statistical Tests Used

To find out meaningful relationships, data were analysed using the following techniques:

- **Descriptive Statistics:** To check to what extent the respondents showed agreement with the items of the scale.
- **Correlation Analysis:** As an initial measure to examine the relationship of the constructs with the dependent variable.
- **Regression Analysis:** To evaluate the contribution of each construct on overall satisfaction.
- **Cluster Analysis:** To find out the various target groups with their individual specific parameters that contribute towards their adoption intention for e-wallets.

### DATA ANALYSIS

The demographic profile of the respondents is presented in Table 1.

**Table 1: Demographic Profile of the Respondents**

Characteristics		No. Of respondents	% of respondents
Gender	Male	55	68.8
	Female	25	31.3
Age (in years)	<25	4	5
	26-40	62	77.5
	40-55	13	16.3
	>55	1	1.3
Education	High school or less	6	18.8
	College	15	42.3
	Graduate	51	63.8
	Post-graduate	8	10

Income range/ month (in Rs.)	<25000	4	5
	25000-50000	10	12.5
	50000-75000	21	26.3
	>75000	45	56.3
Duration of usage	<6 months	1	1.3
	6-12 months	41	51.3
	>12 months	3	47.5
User category	Student	1	1.3
	Housewife	2	2.5
	Service	69	86.3
	Businessman	2	2.5
	Self-employed	6	7.5

To assess internal consistency of the scale, reliability measures were conducted using the Cronbach's  $\alpha$  measure. The tests show satisfactory reliability results with  $\alpha > 0.7$  for nine constructs namely perceived usefulness, perceived ease of use, perceived self-efficacy, personal innovativeness & individual playfulness, perceived compatibility, attractiveness of alternatives, perceived value, perceived risk and adoption intention while for the social influence dimension Cronbach's  $\alpha$  value was more than 0.6.

### Descriptive Statistics

Table 2 shows the descriptive statistics for the constructs and for the individual questionnaire items, respectively. A look at the means of the constructs shows high agreement with all the items except attractiveness of alternatives which has been reverse coded.

**Table 2: Descriptive Statistics**

	Mean	Std. Deviation
Perceived usefulness	4.6709	.38834
Perceived ease of use	4.8458	.33937
Social influence	4.5000	.31822
Facilitating conditions	4.6292	.38972
Perceived self-efficacy	4.7167	.63000
Personal innovativeness and individual playfulness	3.3625	.65832
Personal compatibility	4.4250	.65383
Attractiveness of alternatives	1.9969	.75839
Perceived value	4.9000	.23955
Perceived risk	4.2395	.31701
Adoption intention	4.6625	.24873
Valid N (listwise)		

Source: Researchers' analysis

### Correlations

Correlations were used to examine the relationships between the constructs. This provides an initial test for how well the

hypotheses were supported. Pearson correlation measure revealed significant correlations of adoption intention with all the constructs. The results are presented in Table 3.

**Table 3: Correlation Measures**

		Correlations									
		Adoption Intention	Perceived Usefulness	Perceived Ease of Use	Social Influence	Perceived Self-Efficacy	Personal Innovativeness & Individual Playfulness	Personal Compatibility	Attractiveness of Alternatives	Perceived Value	Perceived Risk
Adoption Intention	Pearson Correlation	1	.316**	.563**	.552**	.782**	.462**	.750**	-.572**	.701**	.409**
	Sig. (2-tailed)		.005	.000	.000	.000	.000	.000	.000	.000	.000

Source: Researchers’ analysis

Very high positive & significant correlations could be observed for the variables- perceived ease of use, social influence, perceived self-efficacy, personal innovativeness & individual playfulness, perceived compatibility & perceived value with the dependent variable adoption intention. Moderately high positive & significant correlations were observed for variables perceived usefulness & perceived risk with adoption intention. Significant negative correlations were observed for the variable attractiveness of alternatives with adoption intention. Thus, hypotheses H1, H2, H3, H4, H5, H6, H7, H8, H9, and H10 all were supported.

### Regression Analysis

Regression analysis was used next to test the hypotheses and allow further validation of the instrument. The results are presented in Table 4.

The variance explained is 81.7% which is significant (F=33.627, p<0.00). Therefore, the model is a very good predictor of adoption intention for e-wallets in India. The coefficients table explains that seven coefficients- perceived usefulness, perceived ease of use, social influence, perceived self-efficacy, personal innovativeness & individual playfulness, attractiveness of alternatives, and perceived value are significant. From the descriptive statistics, it was observed that people mostly showed high agreement with the items perceived usefulness, perceived ease of use, and perceived value. However, the β values are negative. Hence, it can be

interpreted that even though these variables are significant, yet they are not positively influencing adoption of e-wallets. Rather, the other factors are positively influencing adoption intention, like social influence, perceived self-efficacy, and personal innovativeness & individual playfulness. The β value of attractiveness of alternative dimension is negative, as expected, because the more attractive an alternative is, like credit or debit card, the less people will adapt e-wallet services. From the collinearity statistics, it can be observed that all the significant parameters are having VIF scores less than 10. Therefore, serious multicollinearity is not there in the dataset.

Lastly, a cluster analysis was conducted to find out the various target groups with their inherent specific needs that drive them towards using a digital wallet. A two-stage clustering process was followed. Firstly, hierarchical clustering is conducted to find out the number of clusters. Then, K-means clustering is done to find out the individual profile of respondents belonging to their respective clusters.

The dendrogram from the hierarchical clustering process is presented in Fig. 26.

It can be seen that most of the respondents have similarity of opinion regarding adoption of e-wallets. Three clusters are being seen, one having the maximum number of respondents, while the other two are small clusters. The third cluster has only four respondents and one outlier.

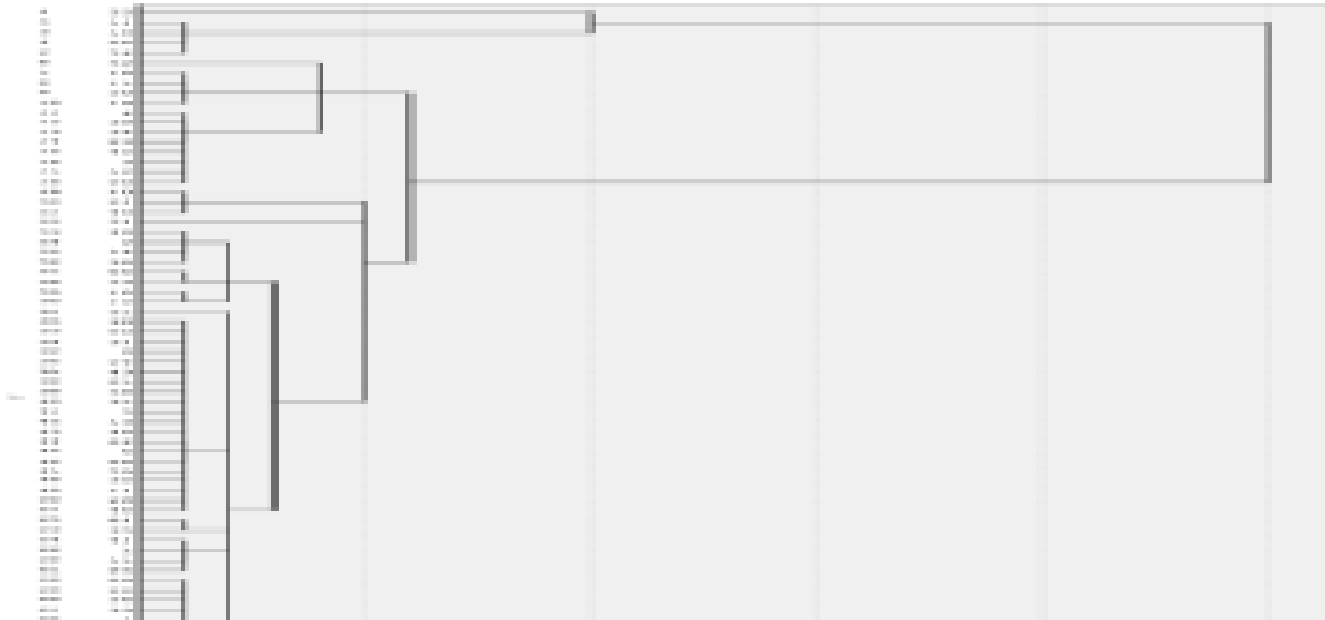
**Table 4: Regression Model Table**

Model B		Coefficients <sup>a</sup>						
		Unstandardised Coefficients		Standardised Coefficients	t	Sig.	Collinearity Statistics	
		Std. Error	Beta				VIF	
1	(Constant)	4.658	.773		6.027	.000		
	Perceived Usefulness	-.145	.063	-.226	-2.306	.024	.281	3.553
	Perceived Ease of Use	-.175	.078	-.238	-2.253	.028	.241	4.152
	Social Influence	.160	.068	.203	2.355	.021	.363	2.756
	Perceived Self-Efficacy	.348	.062	.880	5.652	.000	.111	8.978
	Personal Innovativeness & Individual Playfulness	.076	.031	.197	2.433	.018	.410	2.438
	Personal Compatibility	.042	.063	.111	.671	.504	.099	10.060
	Attractiveness of Alternatives	-.111	.030	-.335	-3.686	.000	.326	3.064
	Perceived Value	-.300	.128	-.287	-2.335	.023	.179	5.596
	Perceived Risk	.099	.067	.126	1.491	.141	.378	2.644

Notes: R Square : 0.817; Adjusted R Square:0.792, Sig. F=0.000, F-Value=33.627, p<0.01

a. Dependent Variable: Adoption Intention

Source: Researchers' analysis



**Fig. 26: Dendrogram**

Source: Researchers' analysis

To find out the specific profiling of cases as well as number of cases belonging to each cluster, a K-means clustering is conducted. The results are presented in Table 5.

For better interpretation of the result, the K-means clustering is conducted by converting the variable scores

to standardised Z scores. Respondents belonging to the first cluster have substantial negative perceptions on social influence, considerable negative perceptions on perceived self-efficacy & personal compatibility, but a positive substantial score on perceived value; and a considerable

positive score on attractiveness of alternatives. Therefore, this group gives importance to factors like perceived value which mainly relates to the various promotional offers like cashbacks, free recharge etc. offered by the digital wallet companies and also checks alternative options like benefit points given by credit card companies before deciding on using e-wallet services. They do not give any importance to advice provided by their friends and family or media and are not too much compatible with new technological products. Looking at the demographic profile, it could be observed that in this group, most of the respondents are females in the age group of 25-40, in service, and graduates earning Rs. 25-40k per month.

**Table 5: Results from K-Means Clustering**

	Final Cluster Centres		
	Cluster		
	1	2	3
Zscore: Perceived usefulness	-1.04089	-1.72757	.18858
Zscore: Perceived ease of use	-2.49236	-2.49236	.36761
Zscore: Social influence	-.20950	-2.67108	.15712
Zscore: Perceived self-efficacy	-.96119	-3.78304	.29412
Zscore: Personal innovativeness and individual playfulness	1.22154	-1.97472	.03574
Zscore: Personal compatibility	-.73498	-3.70890	.27215
Zscore: Attractiveness of alternatives	.99306	2.39407	-.25766
Zscore: Perceived value	.41745	-3.75705	.19235
Zscore: Perceived risk	1.30384	-1.74114	-.00925

Source: Researchers' analysis

The second group has extremely negative scores on most of the dimensions, barring the attractiveness of alternatives dimension. Therefore, this is not a satisfied segment. In this cluster, all are retired males above the age 55, graduates, earning Rs. 25-40k per month.

The third cluster has substantial positive scores on perceived usefulness, perceived ease of use, social influence, perceived self-efficacy & personal compatibility. They had a negative score on attractiveness of alternatives & perceived risk. Therefore, this group holds good impression of the services offered by digital wallet and is not much affected by alternative options (substantial negative scores) or by perceived risk (extreme negative score). This group mostly has males in the age group 25-40; most of them are in service and post-graduates, earning more than Rs. 75k per month.

## MAJOR FINDINGS

The linear regression model showed an impressive amount of variance explained for adoption intention ( $R^2 = 81.7\%$ ).

Perceived usefulness, perceived ease of use, social influence, perceived self-efficacy, personal innovativeness & individual playfulness, attractiveness of alternatives and perceived value all proved to be significant constructs.

It was discovered that several constructs not included in the original UTAUT model, like perceived self-efficacy, personal innovativeness & individual playfulness, attractiveness of alternatives and perceived value that play a significant role in influencing consumers' attitude towards e-wallet services.

Cluster analysis helped to reveal three different customer segments with their different set of criteria.

## VALUE TO THE PRACTITIONER

The model and the results from cluster analysis will help practitioners better understand the factors affecting adoption of e-wallet services in the Indian context.

The model presented in this paper also serves as an important first step towards subsequent predictive modelling techniques to be used with newer and other critical marketing variables.

## LIMITATIONS OF THE STUDY

There are several limitations of the study. The sample size is too small to generalise the results of the study. Also, there may be other individual and market oriented factors that may influence a customer's cognitive and emotional responses towards adoption intention.

## FUTURE SCOPE

There is a huge future scope for this research. The model can be extended with more constructs which may increase the predictive power of the model and provide new insight on consumers' adoption intention of e-wallets. Also, the continuance intention as well as satisfaction index can be calculated for digital wallets.

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