



Adoption of M-Commerce Amongst Pakistani Consumers: By Using TAM with Effect of Social Influence and Mobile Self-Efficacy

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Abstract

M-commerce, or mobile commerce, has gained popularity due to its expanded possibilities over Electronic commerce, which has been growing at a far faster pace because to the Covid-19 outbreak in Pakistan. The utilization of wireless technologies has increased in the M-commerce sector. There are more mobile phone users than personal computer users. In spite of Pakistan's apparent interest in M-commerce as a means of trade, nothing is known about the country's citizens' desire to utilize this new wireless electronic platform. Thus, customers' behavioral intention to use m-commerce has been investigated using an improved technology acceptance model (TAM) that takes into account the consequences of social influence and mobile self-efficacy. The sample size for this study was 220 people from Lahore, Karachi, Islamabad, and Multan, which is a statistically significant number. A variety of statistical techniques, including factor and reliability analysis as well as correlation and regression, were used to examine the data by using SPSS version 19. Customers' attitudes toward adopting M-commerce are positively influenced by their perceptions of its utility, ease of use, social influence, and personal efficacy on their mobile devices, according to this study, which also found a link between these factors and their behavioral intent to use M-commerce.

Keywords: Mobile commerce, M-commerce, Electronic Commerce, E-commerce, Wireless Communication, Technology Acceptance Model, TAM, Social Influence, Mobile Self-Efficacy, Theory of Planned Behavior, TPB.

1. Introduction

During the COVID-19 pandemic, practically all international trade company operations were hit, particularly the global commercial real estate markets. Government restrictions on the operation of retail malls, service outlets, catering, entertainment, and amusement have led to a change in consumer behavior and a significant increase in e-commerce and m-commerce sales. (Vinerean et al., 2022).

With the advent of new technologies, businesses are reaching out to customers through a variety of channels, including electronic commerce, mobile commerce, and brick-and-mortar stores. The people who participated were divided into three access platforms: two involved m-commerce (using a web browsers or the app) and one used traditional e-commerce (via notebooks or PCs). We confirmed that consumers' perceived value of the online platform has a significant impact on their desire to continue using it (Lucas et al., 2023).

Mobile commerce (M-Commerce) is becoming a significant application for both businesses and customers due to the rapid expansion of wireless communication technologies. Currently, computing, the Internet, and wireless communication are converging. The rapid transmission of information between consumers has altered the e-business environment and facilitated the development of a social and trustworthy transaction environment. Moreover, the expansion of mobile phone manufacturing technology has opened the path for the formation and growth of mobile commerce (M-Commerce) (Thangavel & Chandra, 2023; Sarkar et al., 2020).

This post-PC era is differentiated by the widespread use of portable and wireless handheld mobile devices such as data collection terminals, gaming terminals, PDAs (personal digital assistants), smart phone etc. With a wide range of attractiveness of mobile devices, such as smart phones, laptops, net books, tablet computers, powerful mobile technologies like 3G, 4G and the Internet, mobile commerce has appeared as a new business phenomenon which has become a market with great prospective. Mobile commerce now provides ever-widening content and services (Lee, 2008), including mobile ticketing, mobile banking, mobile marketing and other location-based services. Research efforts in M-Commerce also continue to gain great steps over the last few years. For example, according to Venkatesh and Benbasat 2003, the identification and implementation of e-commerce is not equal to M-Commerce due to more operational, user-friendly environment are given in wireless/mobile application design in M-commerce.

Three major types of M-commerce transaction, the first is carried-based, the second type of M-commerce transaction related with using credit card number over the wireless network connection, the third type of M-commerce transaction related with financial services involving mobile ticketing, mobile vouchers, coupons, balance sharing, loyalty SMS cards, contents service purchasing, location based services (LBS), information services, mobile banking, mobile brokerage, Auctions, Mobile purchase, Mobile marketing and advertising (AlSondos & Salameh 2020; Omar et al., 2021).

According to the Annual report of Pakistan Telecommunication Authority (PTA) 2022, In Pakistan, the telecom sector continued to grow during fiscal year 2021-22 with teledensity is about 87%, telecom and ICT services covering over 89% population, total broadband subscribers are 110 million, higher ever telecom revenues are

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about PKR 644 billion and foreign direct investment is about US\$ 202 million. Now, mobile commerce will become an interesting research agenda and research on m-commerce has not kept silence. Similarly in China, in 2019 one trillion dollars was spent on mobile shopping (Anwar et al., 2020; PTA, 2023).

In Pakistan, there exist a growing number of wireless technology users in the area of M-commerce. Numbers of consumer having mobile phone are more than who have personal computers. Despite the rapidly growing number of mobile phone users in Pakistan, M-commerce is a relatively new phenomenon in Pakistan compared to other markets in Europe, the U.S., and the Asia Pacific. The M-commerce service providers in Pakistan lack a clear direction toward understanding the factors affecting the adoption of M-commerce. Therefore, there is a huge potential regarding to explore the factors that influence the adoption of M-commerce services among mobile users in Pakistan.

Researchers have different opinion about M-commerce and E-commerce. Jobodwana(2009)in his research in South Africa context argued that E-commerce is useful to both producers and consumers in Africa as it helps countries overcome the traditional barriers (barriers of distance, lack of information) and eliminated intermediary between transactions. Virtual shop increased advertising possibilities worldwide may help small and medium industries and businesses in Africa that traditionally find it difficult to reach customers abroad and M-commerce in Africa as a method of choice for digital commerce transactions. It is the buying and selling of goods and services through wireless handheld devices such as cell phones and personal digital assistants (PDAs) known as next-generation ecommerce.

M-commerce is much more than mobile e-commerce because it changes the place of demand by using unique features of mobile handsets and cells (Kemp, 2013; Ho, 2012). There are various researches about adoption of M-commerce and influence of different variables on individual behavioral intention and also the major effect of COVID pandemic (Dumanska et al., 2021; Nguyen, G. D., & Ha, M. T., 2021; Ashraf et al., 2021; Salam et al., 2021).

Wu and Wang (2005) presented an extended technology acceptance model (TAM) that integrates innovation diffusion theory, perceived risk and cost into the TAM to investigate what determines user M-commerce acceptance. Zhang et al., 2012 aims to discover the general factors that influence mobile commerce adoption in his meta-analysis of previous empirical studies retested the proposed mobile commerce adoption model by using structural equation modeling. Chang (2012) examined the factors that influenced on consumers' M-commerce adoption intention. Variables such as perceived usefulness, perceived ease of use, perceived enjoyment, trust, cost, network influence, and variety of services were used to examine the adoption intentions of consumers. Chen et al., 2011 investigated how the consumers perceive the M-commerce applications in China. The survey results show Chinese consumers prefer more the mobile applications with convenience. Mishra, 2014 captured users' acceptance behaviour towards M-commerce by applying theory of planned behaviour (TPB) model developed by Ajzen (1991) in India context. Results indicate that attitude and perceived behavioral control have positive and significant impact on individual's intention while subjective norm has a positive but not significant impact on intention. Further, intention is found to be significantly and positively related with behaviour. Although M-commerce, as a mechanism of commerce, appears to have huge potential in Pakistan but there is scarcity of research about the consumers' willingness to adopt this new wireless electronic platform. Therefore, this study attempts to explore factors that effect on customers' attitude towards M-commerce adaptation and further explore effect of attitude on user's behavioral intention to use M-commerce by applying technology acceptance model (TAM) developed by Davis (1989) with effect of social influence and mobile self-efficacy as independent variables.

2. Literature Review

2.1. M-Commerce

M-commerce has gained attention because of extra features as compared to E-commerce. Various management information system researchers have provided different definitions of M-commerce. M-commerce is often considered a subset of e-commerce (E.W.T. Ngai, A. Gunasekaran, 2007). Kannan et al. (2001), Keen and Mackintosh (2001) suggested that M-commerce is an extension of E-commerce. E-commerce only proceeds on computer or other related devices but M-commerce proceeds by anyone, anywhere, through wireless devices. Mylonopoulos and Doukidis (2003) proposed a systematic definition, which views mobile commerce as a collaborative ecology system of individuals and corporations, and this ecology system is built upon the social economic background. It is a learning process that the two parties jointly create brand new experiences within social interactions. Tsalgatidou and Veijalainen (2000), Clarke (2001), Tsalgatidou and Pitoura (2001) and Barnes (2002) perceived from a viewpoint of transactions, that transaction of any type but manage through any mobile telecommunication network is considered as a part of M-commerce. Feng et al. (2007) provide new business model, usage patterns and value chains of M-commerce, proposed that M-commerce is more than extension of E-commerce. (Wei et al, 2009).

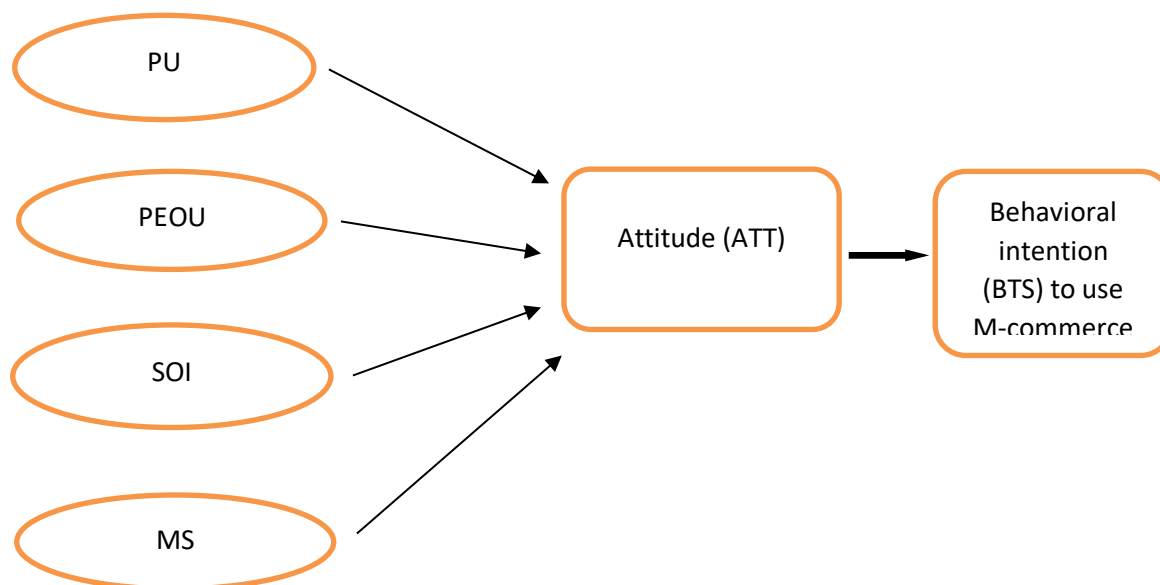


Fig 1: Conceptual Model

2.2. Technology Acceptance Model (TAM)

Theoretical frameworks of technology acceptance are IS theories that model how users come to accept and use a specific technology. These theories suggest that when users are presented with a new technology, a number of factors influence their decision about how and when they will use it. The technology acceptance model (TAM) provides a seminal framework for this study. Since the early stages of its conception, there have been many improvements and/or extensions to the TAM, as well as the development of other models which also take into consideration the potential influence of technological elements. TAM was designed to predict information technology acceptance and use on the job, in which perceived usefulness and perceived ease of use are the main determinants of the attitudes (Davis, 1989).

These determinants are also easy for system developers to understand and can be specifically considered during system requirement analysis and other system development stages. These factors are common in technology-usage settings and can be applied widely to solve the acceptance problem (Taylor and Todd, 1995).

The theory of reasoned action (TRA), proposed by Fishbein and Ajzen (1975), is a well-established model that has been used broadly to predict and explain human behavior in various domains (Chen, Gillenson, Sherrell, 2002). Davis proposed a TAM derived from TRA; it has been tested and extended in (Davis (1989), Igbaria, Zinatelli, Cragg, Cavaye (1997), Venkatesh, Morris (2007)). The original TAM consisted of perceived ease of use (PEOU), perceived usefulness (PU), attitude toward using (ATU), behavioral intention to use (BI), and actual system use (AU). PU and PEOU are the two most important determinants for system use. The ATU directly predicts users' BI which determines AU.

2.3. Perceived Usefulness (PU) and Perceived Ease of Use (PEOU)

Perceived usefulness (PU) is one of the most broadly studied variables in technology adoption. Jeyaraj et al. (2006) in their meta-analysis of the predictors of IT adoption found that perceived usefulness is one of the most important predictor. Jeyaraj, Rottman, & Lacity, 2006; Lederer, Maupin, Sena, & Zhuang, 2000 have shown that perceived usefulness plays an important role in determining consumer adoption decisions on m-commerce or mobile internet activities. A number of studies (Wei et al. 2009 Chong, Chong, Ooi, & Lin 2011, Leong, Ooi, Chong, & Lin, 2011) have found that perceived usefulness plays an important role in consumers' behavioral intention to use M-commerce because mobile phone can be easy to carry anywhere as compared to notebook and laptop computers. Based on literature survey, following hypotheses are formulated in context of Pakistan.

H1. Perceived usefulness has a positive and significant relationship with Pakistani consumer's attitude toward m-commerce adoption

H2. Perceived usefulness has a positive and significant relationship with behavioral intention to use m-commerce

The perceived ease of use of M-commerce will be different for different level of customers i.e. education level, age group and education level. Although one may argue that M-commerce is expensive in features and functionalities but it has a simple interface.

M-commerce's advantage also been presented in different studies, however it differs person to person. Similarly, The perceived ease of use has been studied in previous technologies, such as mobile gaming, EG, World Wide Web and online banking (Chi, 2018; Hsu and Lu, 2004; Chong et al., 2010; Lederer et al., 2010; Cheng, Lam and Yeung, 2006). Additionally, The application features of mobile device, such as small screen and difficulty in key

data also addressed in many studies, which might affect the perceived ease of use and also act as barriers in adaptation of M-commerce (Wu and Wang, 2005 ; Mostafa & Eneizan, 2018).

Perceived ease of use has been also studied in various information systems related to m-commerce, such as e-service (Featherman, Miyazaki, & Sprott, 2010), multimedia messaging service (MMS) (Hsu et al., 2009), wireless technology (Wu, Cheng, Yen, & Huang, 2011), Mobile Internet (Kim, Chan, & Gupta, 2007; Singh, S., Sahni & Kovid, 2020) and instant messaging (To, Liao, Chiang, Shih, & Chang, 2008; Thongpapanl & Venkatesh, 2018).

Therefore on the basis of literature survey, following hypotheses are formulated in context of Pakistan:

H3. Perceived ease of use has a significant and positive relationship with Pakistani consumer's attitude toward to adopt m-commerce

H4. Perceived ease of use has a significant and positive relationship with behavioral intention to use m-commerce

2.4. Theory of Planned Behavior (TPB)

The TPB (Ajzen, 1991) was developed from TRA i.e. theory of reasoned action (Ajzen & Fishbein, 1980). Based on the TPB, customer's behavior is combination of intention to engage in that behavior and perception of control over performing the behavior. Moreover, customer's intention that is engaged with their behavior can be predicted by the attitude toward their behavior, subjective norm, and perceived behavior control. In this study two variables are used Social Influence and Mobile self-efficacy as independent variables. These are linked with TPB because the study of social influence has been conducted predominantly within the frameworks of the theories of reasoned action (Fishbein & Ajzen, 1975) and planned behaviour (Ajzen, 1985). In these models, social influence is represented by the concept of subjective norm, which describes the amount of pressure that people perceive for perform and not perform a specific behaviour.

According to the theory of planned behaviour (TPB), subjective norm, in simultaneously with attitude (i.e., an evaluation of the behavior that may be positive or negative) and perceived behavioural control (i.e., the level to which an individual feels capable to perform the behaviour), is a key predictor of behavioural intention, which move toward predicts perceived behavior control. The recent research has demonstrated that the overall concept of perceived behavioral control, is comprised of two components: self-efficacy (i.e., dealing largely with the ease or difficulty of performing a behavior) and controllability (i.e., the extent to which performance is up to the actor) (Pejic Bach, Aleksic & Merkač-Skok, 2018).

In contrast, it was argued that self-efficacy do not necessarily correspond to beliefs about internal control factors, and not impact on the perceived operation of external factors. Instead, it was suggested that self-efficacy, reflects beliefs about the presence of internal as well as external factors. Support for the theories of reasoned action and planned behaviour has been established across a wide range of behavioural domains and in a variety of populations (Armitage & Conner, 2001; Conner & Armitage, 1998; Aboelmaged, 2021; Tornikoski & Maalaoui, 2019).

2.5. Social Influence (SI)

According to empirical researches, Social influence is the "degree to which an individual user perceives the significance that others believe he or she should use an innovation" (Chong et al., 2010). Social influence has studied past technology adoption such as WAP (Wu and Wang, 2005), mobile Internet services (Lu, Yao, Yu, 2005), mobile wallet services (Singh, Sinha & Liébana-Cabanillas, 2020) and 3G (Chong et al., 2010). These studies have added the social influence to extend the TAM model. As the users for this research are from Pakistan, it would be impact positively, to test if social influence will affect users in general toward the attitude of adoption of m-commerce.

Hence, On the basis of above literature survey, following hypotheses are formulated in context of Pakistan:

H5. Social influence has a significant and positive relationship with Pakistani consumer's attitude toward to adopt m-commerce

H6. Social influence has a significant and positive relationship with behavioral intention to use m-commerce

2.6. Mobile Self-efficacy (MS)

Self-efficacy shows the concern of the customers regarding their usage related to system or technology. Computer self-efficacy has been included as a moderating effect in different empirical researches (Cockrill et al. 2009 ; Featherman and Pavlos 2003 ; Verhagen et al. 2004).

Compeau and Higgins (1995), claimed in their research that computer self-efficacy is associated with the individual's attitude towards the adoption of computer technologies.

Previous studies also highlighted the effect of computer self-efficacy in adopting new innovations like mobile health apps. (Igbaria and Iivari 1995; Johnson 2005; Mcilroy et al. 2007; Balapoul, et al., 2019)

Self-efficacy plays an important role in motivation and behavior intention (Chang and Tung, 2008) . Similarly, Computer self-efficacy variable has been used in different studies, however, there is lack of mobile self-efficacy variable studies. In this study, mobile self-efficacy will be used as independent variable to test the relationship between Mobile self-efficacy, attitude and behavioral intention to use m-commerce. Thus hypothesized in context of Pakistan that;

H7. Mobile self-efficacy has a significant and positive relationship with Pakistani consumer's attitude toward to adopt m-commerce

H8. Mobile self-efficacy has a significant and positive relationship with behavioral intention to use m-commerce

2.7. Attitude (ATT)

Attitude variable consider an important element of TAM because it has significant effect on customer action toward use of online banking (Yeow and Yee 2008). This variable has high explanatory power in major of studies which contributed in the extension of TAM model (Wang et al. 2003, Yanga and Yoo 2004, Shih 2004; Chawla, & Joshi, 2020). Different scholars mentioned the connection between the belief variables and behavior intention. Attitude toward the new system is an essential eye of TAM (Lai and Li 2005).

Fishbein and Ajzen (1975) defined attitude as “an individual's positive or negative feelings (evaluative effect) about performing the target behavior” and proposed sudden and unexpected meetings that are encountered can exercise that attitude. Underlining attitude's importance in the development process, Robey (1979) drive on the designers to create a helpful user attitude by engaging users in system development work.

Melone (1990), also suggested that attitude is essential and that it is mediating role in systems development must be implicit better, leading to the following hypothesis in the context of Pakistan:

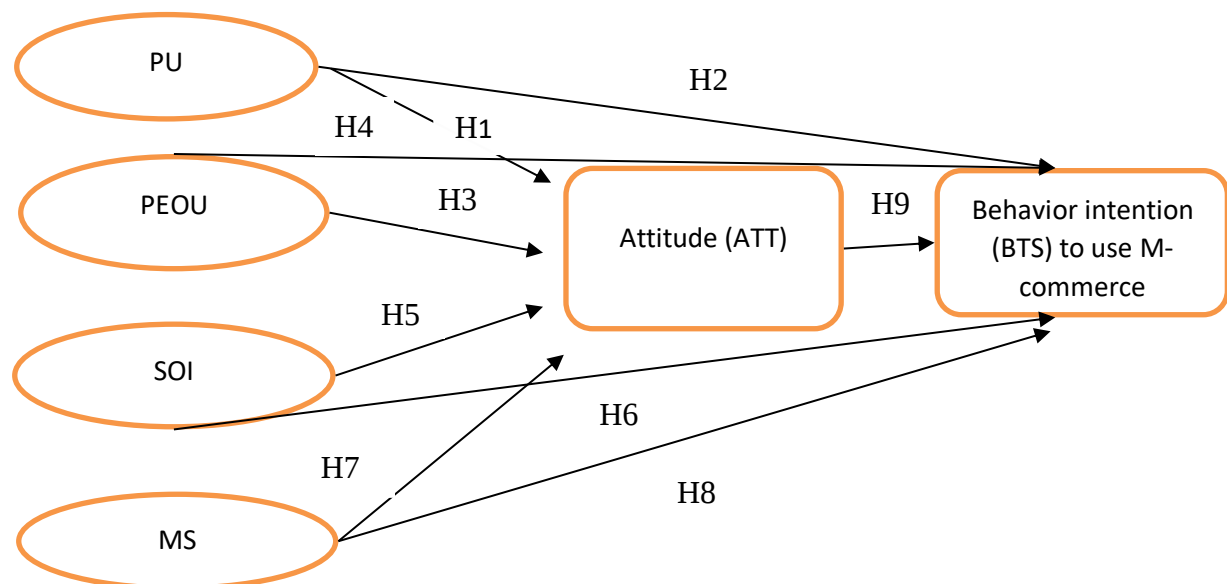
H9. Attitude towards adoption of m-commerce has a significant effect on the behavioral intention to use m-commerce

H10. Attitude toward adoption of m-commerce mediates between Perceived ease of use, Perceived usefulness and behavioral intention to use m-commerce

H11. Attitude toward adaptation of m-commerce mediates between Mobile self-efficacy, social influence and behavioral intention to use m-commerce

2.8. Behavioral intention to use m-commerce

We incorporate many relevant findings from prior research into a comprehensive model of constructs and their relationships to explain behavioral intention to use m-commerce. In particular, we incorporate user involvement constructs into our model. Our model is founded upon the TAM (Technology Acceptance Model), which applies TRA (Theory of Reasoned Action) to the acceptance of m-commerce. Literature exploring the relationship between behavioral intentions and actions notes that consumers with a higher intention to accept a new technology are very much more likely to become adopters of the technology (Kuo and Yen, 2009), and then often recommend the technology to others (Lee, Yen and Joshi, 2011).



3. Methodology

3.1. Sampling and Data Collection

The study was quantitative in nature. Scales are adapted to empirical studies mentioned in appendix A. Convenience sampling technique was used to collect data from respondents. The questionnaire was based on 5-point (strongly agree=5, strongly disagree=1) likert scale, consisted of elements of constructs and demographic information of respondents such as gender, age, education, career, frequency of using mobile commerce (per month).

The data was collected from the users of mobile commerce and mainly the target population was from the four major cities of Pakistan which include Lahore, Multan, Karachi and Islamabad. Total 350 questionnaires were

sent to the users of mobile commerce of which 270 were returned back by respondents. There were 50 questionnaires which were found to be incomplete and were excluded from the final analysis. A total of 220 questionnaires were complete in all respect and those 220 responses were finally selected for data analysis purpose. In this regard the overall response rate was 77%, while 14% of the questionnaire were received incomplete and 61% of the questionnaire were complete in all respect.

3.2. Descriptive Statistics

Table 1 illustrates the demographics of respondents. Among 220 respondents, male respondents were dominant 176 (80%) on female 44 (20%). There were five age groups of respondents i.e. four respondents (1.8%) were of less than 20 years group. Seventy two (34.7%) respondents were of 21-30 year group. A great proportion of 109 (84.5%) respondents lies from 31-40 year segment and 26 (96.3%) respondents were of between 41-50 years and 8 (3.7%) respondents were of above 50 years. There were 135 (61.7%) respondents who held a master / PhD degree. The university and college were 72 (32.9%), and under junior high school / Junior high school 12 (5.5 %) represent the total sample. Thirty two respondents (14.6%) are student, Ninety six (43.8%) respondents are employees, Fifty seven (26%) respondents are Managers, Twenty three (10.5%) respondents are Self-employed and eleven (5%) respondents are others. Forty nine (22.4%) respondents' frequencies of using mobile commerce (per month) are less than once; Fifty two (23.7%) respondents' frequencies of using mobile commerce are 2-3 times; Fifty six (25.6%) respondents' frequencies of using mobile commerce are 4-5 times, Sixty two (28.3%) respondents' frequency of using mobile commerce are more than 5 times. The sample comprised of young people. Most of respondents have Master degree. Most of respondents are employees. Most of respondents' frequencies of using mobile commerce are more than 5 times.

Table 1: Demographic of Respondent

Measure	Item	Frequency	Percentage %	Cumulative
Gender	Male	176	80	176
	Female	44	20	220
Age	Under 20	4	1.8	1.8
	21-30	72	32.9	34.7
	31-40	109	49.8	84.5
	41-50	26	11.9	96.3
	Above 50	8	3.7	100
Education	Under/ junior high school	12	5.5	5.5
	University/College	72	32.9	38.4
	Master/PhD	135	61.7	100
Career	Student	32	14.6	14.6
	Employees	96	43.8	58.4
	Managers	57	26.0	84.5
	Self-employed	23	10.5	95.0
	Other	11	5.0	100
Frequency	Less than once	49	22.4	22.4
	2-3 times	52	23.7	46.1
	4-5 times	56	25.6	71.7
	More than 5 times	62	28.3	100

3.3. Measurement Scale

The survey questionnaire comprised of twenty three questions to measure adoption of mobile commerce. Perceived usefulness and perceived ease of use was measured using five and four items respectively. The social influence hold three items and self-efficacy were determined through three questions. The fifth construct was usage attitude which included four questions. The four construct which study took is behavioral intention to use m-commerce, contained four questions. TAM-related construct questions such as perceived usefulness, perceived ease of use, attitude toward adoption and behavioral intention to use m-commerce were taken from studies by Davis et al. (1989), Venkatesh and Davis (2000) and Moon and Kim (2001). These constructs have been well researched, developed, validated and adopted in several previous TAM research projects. Although these studies also examined usage behaviors, the questions used in this study were modified to suit the authors' intentions. Mobile self-efficacy questions were taken from measurements evaluated by Yi and Hwang (2003) and Chan and Lu (2004). The three items used aimed to assess the confidence of the user in using a mobile commerce. Social influences were taken from measurements adapted from Venkatesh et al. (2003).

4. Data Analysis and Results

4.1. Factor and Reliability analysis

Data is analyzed by using the Statistical Package for Social Science version 16 (SPSS16). Principle component factor analysis with varimax rotation was performed for all four measurement scales. The results are shown in table 2a, 2b & 2c. As per suggestions of (Field, 2005), to test the validity of scale items principle component factor

analysis is the appropriate method. Results in Table 2a show four factor solutions: First factor PEOU, (one items have been removed out of 5 items due to low loading). Second factor PU (no items have been removed out of 5 items). Thirdfactor SOI (noitems have been removed out of 3 items). Fourth factor CS (noitems have been removed out of 3 items). The value of Kaiser-Meyer-Olkin (KMO) measure of sampleadequacy is .814 and the value of total variance explained is 61.021 % which is significant and acceptable.

Table 2b illustrates the factor solution of Mediating variable named Attitude (ATT) which consists of four items. The value of Kaiser-Meyer-Olkin (KMO) measure of sampleadequacy is .683 and the value of total variance explained is 53.973% which is significant and acceptable. Table 2c illustrates factor solution of Dependent variable named Behavioral Intentions to use m-commerce (BTS), which consists of 5 items (one item has been removed out of 5 items due to high cross loading). All the items loaded substantially on the extracted factor. The value of Kaiser-Meyer-Olkin (KMO) measure of sampleadequacy is .727 and the value of total variance explained is 52.229% which is significant and acceptable.

The values of Cronback's alpha are given in the table 2a, 2b, and 2c respectively. From the tables it could be observed that all the values with an acceptable reliability scores which are Perceived usefulness PU, perceived ease of use PEOU, social influence SOI and mobile self-efficacy MS are independent variable having alpha reliability = .830. Similarly, $\alpha = .703$ for ATT and $\alpha = .693$ for BTS, which is significant acceptable according to standard of .50 and .70.

Table 2a: Factor Analysis and Reliability Results for Independent Variables

Factor	Component	Factor Loading	Eigen Value	% of variance
Perceived ease of use (PEOU)	PEOU1	.518	1.832	14.561
	PEOU2	.819		
	PEOU3	.763		
	PEOU4	.626		
Perceived usefulness (PU)	PU1	.850	4.520	20.954
	PU2	.843		
	PU3	.754		
	PU4	.695		
	PU5	.579		
Social Influence (SOI)	SOI1	.766	1.495	12.754
	SOI2	.753		
	SOI3	.746		
Self-efficacy	CS1		.808	1.144
	CS2		.748	
	CS3		.469	

KMO=.814, Cronbach Alpha=.830, Total % of variance=61.021%

Table 2b: Factor Analysis and Reliability Results for Mediating Variable

Factor	Component	Factor Loading	Eigen Value	% of variance
Attitude (ATT)	ATT1	.570	2.159	53.973
	ATT2	.848		
	ATT3	.749		
	ATT4	.745		

KMO=.683, Cronbach Alpha=.703

Table 2c: Factor Analysis and Reliability Results for Dependent Variables

Factor	Component	Factor Loading	Eigen Value	% of variance
Behavior Intention (BTS)	BTS1	.662	2.089	52.229
	BTS2	.741		
	BTS3	.778		
	BTS4	.704		

KMO=.727, Cronbach Alpha= .693

4.2. Correlation Analysis

Our conceptual framework shows the relationships between Perceived ease of use, perceived usefulness, Social influence, Mobile self-efficacy, and attitude and behavior intention. To test this relationship correlation analysis is performed. Table 3 shows the mean values, standard deviations and correlation matrix for the key variables of this study. The matrix shows that there is significant positive correlation between Perceived usefulness and social influence ($r = .340$, $p < 0.01$), between social influence and mobile self-efficacy ($r = .420$, $p < 0.01$), and between

Perceived ease of use and mobile self-efficacy ($r=.202$, $p<0.01$). The correlation matrix also shows the significant positive correlation between Perceived ease of use, attitude and behavior intention. Therefore, this strong correlation among the variables confirms our all hypotheses initially. For testing the impact of perceived ease of use, perceived usefulness, social influence and mobile self-efficacy on attitude and on behavior intention and to test the two mediating first, effect of attitude between perceived ease of use, perceived usefulness and behavior intention. Second, the mediating effect of attitude between social influences, mobile self-efficacy and behavior intention then we have performed regression analysis.

Table 3: Correlation Matrix for Key Variables

Variables	Mean	S.D	1	2	3	4	5	6
1.Perceived usefulness	3.9473	.66795	1					
2.Social Influence	3.9284	.55762	.340**	1				
3.Mobile self-efficacy	3.7424	.54370	.317**	.420**	1			
4.Perceived ease of use	3.7758	.55743	.346**	.288**	.202**	1		
5.Attitude	3.9057	.55200	.481**	.610**	.340**	.293**	1	
6.Behavior intention	3.9602	.57025	.464**	.537**	.360**	.313**	.611**	1

Notes: **Correlation significant at the 0.01 level (2-tailed)

4.3. Regression Analysis

Regression Analysis was carried out in order to test the extent of impact of independent variables on dependent variable and the full or partial mediating effect of attitude. According to Baron & Kenny (1986), following conditions should be met if we want to test the mediating effect of a certain variable: First, Independent and mediating variable must be significantly related. Second, there must be a significant relationship between independent variable and dependent variable. Third, when the mediating variable is introduced the impact on dependent variable by independent variable will significantly decrease. We have used the same method of regression analysis that was suggested by Baron & Kenny (1986) to perform mediation effect. Results of Regression Analysis are shown in Table 4a. As indicated in the first step (part1), Adjusted R^2 is .445 which shows that variation in attitude is explained up to 45% through variation in independent variables (perceived ease of use, perceived usefulness). Standard regression coefficient between perceived ease of use and attitude is significant ($\beta = .482$, $p<.001$) with significant T value (9.296, $p<.001$) and F value (88.770, $p<.001$). Standard regression coefficient between perceived usefulness and attitude is also significant ($\beta = .300$, $p<.001$) with significant T and F values i.e. 5.563 ($p<.001$) and 88.770 ($p<.001$) respectively. Thus hypothesis H1,H3 are supported.

Table 4a: Regression Analysis of Independent Variable (PU,PEOU) and Attitude (ATT)

Model	R	R Square	Adjusted R Square	Standard Error of estimation	F	Sig
1	.671a	.450	.445	.41126	88.770	.000a

Model		Unstandardized co-efficient	Standardized co-efficient	T	Sig
	B	Std. error	Beta		
1	(Constant)	1.010	.219	4.605	.000
	PU	.248	.300	5.563	.000
	PEOU	.488	.502	9.296	.000

Dependent variable: Attitude. Note: ATT= attitude, PU=Perceived usefulness, PEOU=Perceived ease of use.

In the first step (part2), Table 4b shows Adjusted R^2 is .168 indicating that the variation in attitude is explained up to 16% through variation in independent variables (Social influence, mobile self-efficacy). Standard regression coefficient between social influence and attitude is significant ($\beta = .234$, $p<.001$) with significant T value (3.705, $p<.001$) and F value (21.905, $p<.001$). Standard regression coefficient between Mobile self-efficacy and attitude is also significant ($\beta = .292$, $p<.001$) with significant T value (4.623, $p<.001$) and F value (21.905, $p<.001$). Thus hypothesis 2 is supported. Thus Hypothesis H5,H6 are supported.

Table 4b: Regression Analysis of Independent Variable (SOI, MS) and Attitude (ATT)

Model	R	R Square	Adjusted R Square	Standard Error	F	Sig
1	.410a	.168	.160	.50582	21.905	.000a

Model		Unstandardized co-efficient	Standardized co-efficient	T	Sig
	B	Std. error	Beta		
1	(Constant)	1.919	.303	6.334	.000
	SOI	.232	.234	3.705	.000
	MS	.297	.292	4.623	.000

Dependent variable: Attitude. Note: ATT= attitude, SOI = Social influence, MS= Mobile self-efficacy

In the second step (part 1), Table 4c shows Adjusted R^2 is .367 indicating that the variation in behavior intention is explained up to 37% through variation in independent variables (perceived ease of use, perceived usefulness). Standard regression coefficient between perceived ease of use and behavior intention is significant ($\beta = .425$, $p < .001$) with significant T value (7.373, $p < .001$) and F value (64.493, $p < .001$). Standard regression coefficient between perceived usefulness and behavior intention is also significant ($\beta = .312$, $p < .001$) with significant T value (5.407, $p < .001$) and F value (64.493, $p < .001$). Hypothesis H2, H4 are supported.

Table 4c: Regression Analysis of Independent variable (PU, PEOU) and Behavior intension (BTS)

Model	R	R Square	Adjusted R Square	Standard Error of estimation	F	Sig
1	.611a	.373	.367	.45369	64.493	.000a

Model		Unstandardized co-efficient	Standardized co-efficient	T	Sig
		B	Std. error	Beta	
1	(Constant)	1.234	.242		.000
	PU	.266	.049	.312	.000
	PEOU	.427	.058	.425	.000

a. Dependent variable: Behavior intention. Note: BTS= Behavior intention, PU=Perceived usefulness, PEOU=Perceived ease of use.

In the second step (part 2), Table 4d shows Adjusted R^2 is .182 indicating that the variation in behavior intention is explained up to 18% through variation in independent variables (Social influence, mobile self-efficacy). Standard regression coefficient between social influence and behavior intention is significant ($\beta = .234$, $p < .001$) with significant T value (3.705, $p < .001$) and F value (25.370, $p < .001$). Standard regression coefficient between perceived mobile self-efficacy and behavior intention is also significant ($\beta = .292$, $p < .001$) with significant T value (4.623, $p < .001$) and F value (64.493, $p < .001$). Thus, hypothesis H6, H8 are supported.

Table 4d: Regression Analysis of Independent Variable (CS, SOI) and Behavior Intension (BTS)

Model	R	R Square	Adjusted R Square	Standard Error of estimation	F	Sig
1	.435a	.190	.182	.51574	25.370	.000a

Model		Unstandardized co-efficient	Standardized co-efficient	T	Sig
		B	Std. error	Beta	
1	(Constant)	1.919	.303		.000
	SOI	.232	.063	.234	.000
	CS	.297	.064	.292	.000

a. Dependent variable: Attitude. Note: ATT= attitude, SOI = Social influence, CS= Mobile self-efficacy
 In the Third step (part1), Table 4e shows Adjusted R^2 is .370 indicating that the variation in behavior intention is explained up to 37% through variation in mediating variables (attitude). Standard regression coefficient between attitude and behavior intention is significant ($\beta = .611$, $p < .001$) with significant T value (11.393, $p < .001$) and F value (129.790, $p < .001$). Thus hypothesis H9 is supported.

Table 4e: Regression Analysis of Attitude (ATT) and Behavior Intension (BTS)

Model	R	R Square	Adjusted R Square	Standard Error of estimation	F	Sig
1	.611a	.373	.370	.45251	129.790	.000a

Model		Unstandardized co-efficient	Standardized co-efficient	t	Sig
		B	Std. error	Beta	
1	(Constant)	1.495	.218		.000
	ATT	.631	.055	.611	.000

a. Dependent variable: Behavior intention. Note: ATT= Attitudes

In the third step (part2), Table 4f shows that Attitude is added into the overall model of Perceived ease of use, Perceived usefulness and behavior intention. The results indicate that standard regression coefficient in case of perceived ease of use has decrease in magnitude but still is significant ($\beta = .254$, $p < .001$); however, in case of Perceived usefulness, it has decreased in magnitude but become significant ($\beta = .240$, $p < .001$). Hence, attitude

partially mediates the relationship between perceived ease of use and behavior intention and also partially mediates the relationship between perceived usefulness and behavior intention. So, H10 is well supported.

Table 4f: Mediation Analysis (PU, PEOU-ATT-BTS)

Model	R	R Square	Adjusted R Square	Standard Error of estimation	F	Sig
1	.635a	.403	.398	.40662	73.393	.000a
2	.684b	.468	.460	.38498	63.278	.000b

Model		Unstandardized co-efficient		Standardized co-efficient	t	Sig
		B	Std. error	Beta		
1	(Constant)	1.331	.217		6.138	.000
	PU	.269	.044	.343	6.103	.000
	PEOU	.393	.052	.425	7.570	.000
2	(Constant)	1.004	.215		4.664	.000
	PU	.189	.045	.240	4.227	.000
	PEOU	.234	.058	.254	4.036	.000
	ATT	.325	.064	.342	5.107	.000

Dependent variable: Behavior intention. Note: BTS= Behavior intention, PU=Perceived usefulness, PEOU=Perceived ease of use, ATT=Attitude (mediating variable)

In the third step (part3), Table 4g shows that Attitude is added into the overall model of social influence, mobile self-efficacy and behavior intention. The results indicate that standard regression coefficient in case of social influence has decrease in magnitude but still is significant ($\beta = .129$, $p < .001$); however, in case of mobile self-efficacy, it has decreased in magnitude but become significant ($\beta = .157$, $p = < .001$). Hence, attitude partially mediates the relationship between social influence and behavior intention and also partially mediates the relationship between mobile self-efficacy and behavior intention. So, H11 is well supported.

To further support the proposed mediation model, we also conducted Sobel (1982) test as suggested by Baron & Kenny (1986). This test is conducted to see the effect of mediating variable (attitude) on dependent variable (behavior) intention. Computed p values are significant which show the support for mediation.

Table 4g: Mediation Analysis (SOI, MS-ATT-BTS)

Model	R	R Square	Adjusted R Square	Standard Error of estimation	F	Sig
1	.435a	.190	.182	.51574	25.370	.000a
2	.644b	.414	.406	.43943	50.930	.000b

Model		Unstandardized co-efficient		Standardized co-efficient	T	Sig
		B	Std. error	Beta		
1	(Constant)	.780	.309		5.760	.000
	SOI	.256	.064	.251	4.016	.000
	MS	.324	.065	.309	4.951	.000
2	(Constant)	.749	.287		2.614	.010
	SOI	.132	.056	.129	2.350	.020
	MS	.165	.058	.157	2.817	.005
	ATT	.537	.059	.520	9.105	.000

a. Dependent variable: Behavior intention. Note: BTS= Behavior intention, SOI = Social influence, MS= Mobile self-efficacy, ATT=Attitude (mediating variable)

5. Discussion and Conclusion

This paper aims to develop an extended TAM with the influence of mobile self-efficacy and social influence to predict and explain customers' behavioral intentions with regard to adopting mobile commerce. The proposed model incorporates four variables to provide a more comprehensive investigation covering the positive aspects of Mobile commerce. The results show that the proposed model has good explanatory power and confirms its strength in predicting customers' behavior intentions to use such services.

Gathering a larger sample using an alternate survey modality and convenience sampling methods, the result shows the Behavior of customer to use m-commerce among Pakistan context. The people of Pakistan always consider the usefulness of products before purchase and consume. The ease of use of mobile technology, social influence and self-efficacy are very much important to them. The consumers feel boredom due to traditional methods of commerce and other services. The changing trends are booming in Pakistan, which urged people to use m-commerce for quick transactions. Now, the people give importance to electronic systems of being easy to use, because of presence of their literacy and telecom industry also introduce more contemporary methods and tools through which operations and transactions could be executed easily. According to the previous researches It has been concluded that Pakistanis are risk averted showing reluctance to use mobile technologies in their banking transactions i.e. money transfer People do not show confidence on technology usage in their confidential matters. Majority of bank customers are not sure about virtual existence of such type of business activities (Sabir et al, 2014). But this research shows the result perceived usefulness, perceived ease of use, social influence and mobile self-efficacy has a positive and significant effect on attitude toward adaptation of m-commerce and it relate with positive behavioral intention to use m-commerce. This poses a greater challenge for researches to conduct research on resistance of technology adoption among Pakistanis. The result of this study also supported by results of empirical researches (Verkijika, 2018; Zhang et al., 2012; Chang, 2012; Chen et al., 2011 and Mishra, 2014; Chau, Deng & Tay, 2020). The finding of this research is, H1: there is positive and significant relationship between Perceived usefulness and attitude toward M-commerce adoption. Jeyaraj et al. (2006) in their meta-analysis of the predictors of IT adoption found that perceived usefulness is one of the most important predictor and is defined as a degree to which consumers' believes that using technology (M-commerce) by using very little effort. (Jeyaraj, Rottman, & Lacity, 2006; Lederer, Maupin, Sena, & Zhuang, 2000). So, these studies support my hypothesis. H2: there is a positive and significant relationship between Perceived usefulness and Behaviour intention and H4: There is a positive and significant relationship between perceived ease of use and behavior intention. Past literatures by Wei et al. (2009) and Chong, Chong, Ooi, and Lin (2011), and Leong, Ooi, Chong, and Lin, 2011 have found that perceived usefulness, perceived ease of use plays an important role in consumers' behavior intention toward adoption H3: there is a positive and significant relationship between perceived ease of use and attitude toward M-commerce adoption. The perceived ease of use has been studied in past technologies such as mobile gaming (Hsu and Lu, 2004), 3G (Chong et al., 2010), World Wide Web (Lederer et al., 2010), and Online Banking (Cheng, Lam and Yeung, 2006), features of mobiles devices (Wu and Wang, 2005), their results supports this study result. H5: there is positive and significant relationship between social influence and attitude and H6: there is positive and significant relationship between social influence and behavior intention. So, this study contributed in extension of TAM model, these results supported by Chong et al., 2010, Wu and Wang, 2005, Lu, Yao, Yu, 2005. H7: There is a positive and significant relationship between mobile self-efficacy and attitude. Empirical studies also claim that self-efficacy of any technology is associated with the individual's attitude towards the adoption new technology. (see Cockrill et al. 2009, Featherman and Pavlos 2003, Verhagen et al. 2004, Igbaria and Iivari 1995, Johnson 2005, Mcilroy et al., 2007. H8: there is positive and significant relationship between mobile self-efficacy and behavior intension. Capistrano, Gomez and Isleta (2023) also proposed that self-efficacy plays an important role in motivation and behavior intention. H9: there is a positive relationship between attitude and behavior intension supported by the study of Lai and Li, 2005. H10, H11 related with the mediating effect of attitude. The result of this study shows the partial mediation supported by the empirical studies of Wang et al. 2003, Yanga and Yoo 2004, Shih 2004.

5.1. Managerial implications

The implications that this study provides for managers are the following: if a company or a firm want to expand their business from offline to online relate with mobile commerce, it may not be enough to consider only the benefits of online mobile commerce (i.e., the usefulness and ease of use). Managers must keep in mind that users' adoption of online mobile commerce is not just an acceptance of the new technology, but a behavioral switch from physical transactions to online transactions. Thus the factors relating to traditional commerce will play an important part in the switching process. A first step for a company or a firm is to work on enhancing its customers' attitude toward adoption of mobile commerce. In this way, it will help improving their attitude towards switching from offline to online mobile commerce. These results can be useful to m-commerce developers and practitioners to better understand behavior intention toward adoption of M-commerce from the point view of customers, as well as to better design innovative and satisfying M-commerce applications for meeting customers' needs.

5.2. Limitations and Future Research Directions

The mobile commerce is an emerging area and it needs a sound research. The future studies could focus on determinants of trust and perceived risk, which need an in-depth analysis regarding rejection of technological innovations by people. Researches can also use interview method for better understanding the dilemma of technology adoption. Small sample size and confined area entail the constraints on applicability of research. The most of the areas of Pakistan have been totally neglected in this study in data collection and future researcher can target these neglected areas for the more generalization of the results.

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