

What drives mobile commerce? An empirical evaluation of the revised UTAUT model

AbdulMohsin Alkhunaizan

School of Information Systems, Computing & Mathematics,
Brunel University, UK

AbdulMohsin.Alkhunaizan@Brunel.ac.uk

Dr Steve Love

School of Information Systems, Computing & Mathematics,
Brunel University, UK

Steve.Love@Brunel.ac.uk

Abstract

When developing and aiming to achieve success in the arena of mobile commerce, user acceptance is a key aspect for consideration. This study aims to empirically examine some of the factors affecting the acceptance of m-commerce within the context of Saudi Arabia. Based on the revised UTAUT model, the revised model include two particular construct : costs and trust to enhance our understanding of m-commerce acceptance and usage. Survey data were collected from 574 participants in several cities across Saudi Arabia. The results emphasise that cost, effort expectancy, and performance expectancy all considerably affect the intention to use. In this regard, usage intention actually decides utilisation.

Keywords: Saudi Arabia, M-commerce, UTAUT. Adoption, User acceptance.

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1. Introduction

In Saudi Arabia, the concept of mobile commerce (m-commerce) has incited significant interest over recent years, and has benefitted from considerable development. According to De Vere (2012), in Saudi Arabia, 60% of mobile users own smart phones. In comparison, the market penetration of smart phones in the US was seen to be 44%, according to the study. Moreover, in Saudi Arabia, 85% of smart phone users have access to the internet (Chris Crum, 2012). In addition, the total number of mobile subscriptions had increased to approximately 53.7 million by the end of 2011—up from only 2.5 million in 2001 (CITC, 2011).

In contrast with more conventional electronic commerce (e-commerce), the key benefit associated with m-commerce is that, through the use of mobile terminals and networks, users may participate in omnipresent communications without the restrictions of wired solutions. Accordingly, it can be seen that m-commerce significantly enhances user efficiency (Chong, Chan, & Ooi, 2011). Through this initiative, mobile users are able to gain access to information in real-time, and can communicate and purchase anywhere, at any time. As can be seen through such advantages, m-commerce provides key innovation, and induces a number of opportunities, particularly for organisations (Chong et al., 2011). Furthermore, it is considered that user satisfaction may be enhanced significantly through m-commerce, thus providing the potential for user behaviours to be promoted and user satisfaction enhanced (Chong et al., 2011).

Currently, there exist a number of obstacles and issues in regard to the development of m-commerce, namely the restrictions associated with mobile terminals, i.e. inconvenient input method, limited power, low resolution, small screen, etc., as well as high costs associated with mobile services, and the complicated utilisation of various functions (Alkhunaizan & Love, 2013; Wei, Marthandan, Chong, Ooi, & Arumugam, 2009). Such issues will impact the acceptance of m-commerce amongst potential users of the technology.

In a number of industrialised, technology-savvy countries, namely China, the USA, and those within Europe, various theoretical frameworks have been devised in an attempt to understand the factors affecting the adoption of information and communication technologies (Carlsson, Carlsson, Hyvonen, Puhakainen, & Walden, 2006; Davis, 1989; Lu, Liu, Yu, & Wang, 2008). Accordingly, the overall aim of this paper is to examine and develop understanding regarding the issues surrounding m-commerce user adoption; this will be done through reviewing and analysing the UTAUT in specific consideration to Saudi Arabia.

2. Theoretical Background

It is argued through the UTAUT framework that factors surrounding user effort expectancy, performance expectancy, social influence, and facilitating conditions all markedly impact the acceptance of users concerning information technology (Dulle & Minishi-Majanja, 2011). Owing to the fact that the model considers eight different theories, these four factors are not considered new or dissimilar, but rather are adapted from external factors. More precisely, performance expectancy is acknowledged as being similar to the perceived usefulness of TAM and the relative advance of IDT (San Martín & Herrero, 2012). Moreover, it is known that there is similarity between effort expectancy and TAM's perceived ease of use and IDT's complexity (San Martín & Herrero, 2012). The social influence derives from TPB and TRA's subject norm, whilst facilitating conditions are linked with TPB's perceived behavioural control (Tao Zhou, 2008). Furthermore, the framework of UTAUT introduces a number of moderating factors,

such as age, experience, gender, and voluntariness. Such moderating factors are known to help deal with and manage the inconsistency- and weak explanation power-related problems associated with previous frameworks, and to further describe the groups of people's behavioural differences (Dulle & Minishi-Majanja, 2011).

In order to implement the UTAUT model in different IT application circumstances, such as m-commerce, a number of changes and reviews need to be carried out, as highlighted by (Venkatesh, Morris, Davis, & Davis, 2003). Moreover, as further stated by (Van der Heijden, 2004), "various adoption behavioural factors may result from different IS usage". With this noted, we propose to extend the UTAUT model, combined with two specific characteristics, namely trust and cost. Markedly, the factor 'voluntariness' was eradicated as a moderator in this regard owing to the fact that it is only considered pertinent when technology utilisation is essential (Dulle & Minishi-Majanja, 2011; Venkatesh et al., 2003). Notably, this is not the case in the context of the present research. In this same vein, owing to the originality of the m-commerce concept, 'experience' is recognised as being less important and powerful in establishing m-commerce user acceptance (Xiaolu Cheng & Luzhuang Wang, 2010). It is also recognised that removing 'experience' will also mean the framework is much less complex. In actual fact, such moderating factors may include independent variables. Furthermore, this study follows the proposition of (Dwivedi & Lal, 2007), who consider gender and age as an independent social variable. With this in mind, Figure 1 provides the revised UTAUT model (Figure 1).

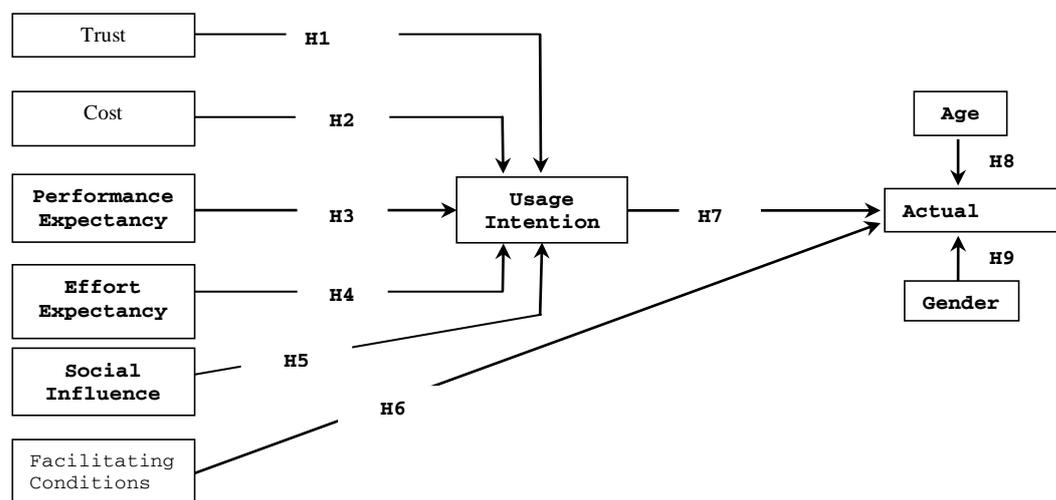


Figure 1: Revised UTAUT model

3. Research Hypotheses

3.1. Trust

In the context of m-commerce, which is a division of e-commerce, there is also the concern of trust, in addition to a number of other mobile-related factors (Siau & Shen, 2003). Previous studies found trust to be an important component to enhance customer satisfaction, which in turn improves consumer loyalty towards m-commerce (Lu et al., 2008; Siau & Shen, 2003).

Given that m-commerce is still in its infancy, and a number of payment systems, regulating policies, technical protocols and transaction standards need to be standardised, trust is a fundamental factor for user acceptance, and earning that trust is essential to achieve success in the arena of m-commerce (Min, Ji, & Qu, 2008). Accordingly, it is recognised (Lin, Lu, Wang, & Wei, 2011) that a trust component should be incorporated into m-commerce studies, particularly in terms of m-commerce service providers.

Moreover, trust should also be incorporated in concepts such as ease of use and perceived usefulness (Min et al., 2008). Additionally, given that security and privacy considerations are key obstacles to internet use/commerce, consumers will not communicate their personal data without trust (Hoffman, Novak, & Peralta, 1999). This research further emphasises that perceived trust impacts intention to use m-commerce through directly affecting behavioural intentions. In this study follows the definition of Wei et al., (2009) Trust in m-commerce 'the extent to which an individual believes that using m-commerce is secure and has no privacy threats'(p. 376). So, This research further emphasises that perceived trust impacts utilisation intention through directly affecting behavioural intentions. Thus,

H1: *Trust significantly influences behaviour usage intention*

3.2. Cost

Perceived price is known to signify the internalisation or encoding of a product or service's objective selling price, as noted by (Y. Wind, 1977). Shifting from wired e-commerce (EC) to m-commerce (MC) incurs additional costs, including access-, equipment- and transaction-related costs (Constantinides, 2002), which together means that MC is a more expensive solution than the wired possibility in general. Moreover, it has been found that financial and hardware/software resources are essential for users in regard to information systems (Wu & Wang, 2005).

In contrast to other m-commerce factors, cost is considered a fundamental aspect for consumers when deciding whether or not to purchase and use m-commerce (Hong, Thong, Moon, & Tam, 2008). For example, (Sathye, 1999) emphasises the significance of cost factors in terms of innovation adoption, stating that cost is one of the main factors hindering individuals in Australia and Singapore from adopting internet banking. (Anil, Ting, Moe, & Jonathan, 2003). With this taken into account, Wu *et al.* (2005) state that, in the context of Malaysia, behavioural intention is significantly impacted by cost amongst other factors. Additionally, when considering cost (Carlsson, Walden, & Bouwman, 2006) note that cost is an essential consideration when users take into account the implementation of 3G (third generation) services, with privacy and security issues not ranked as being as high priorities as cost by in Finland. Furthermore, (Wei et al., 2009) perceived cost to be one of the main obstacles hindering the utilisation of m-commerce amongst Malaysians.

Furthermore, cost is recognised as having one of the most significant negative impacts on behavioural intention to use (Chong et al., 2011; Wei et al., 2009). Moreover, (Luarn & Lin, 2005) conducted qualitative interviews, and subsequently found that a number of different consumers confirm that financial factors influence their intention to utilise mobile banking. Also, (Yu, 2012) found cost to influence the intention to use mobile banking.. Thus,

H2: *Cost significantly influences m-commerce behaviour usage intention.*

3.3. Performance Expectancy (PE)

Performance Expectancy (PE) is known to reveal performance improvement when users implement new technology. PE is a key factor in explaining consumer behaviour in recent m-commerce implementation research (Hong et al., 2008). Notably, (Davis, 1989) argues that a system's overall perceived usefulness can be explained as the degree to which people hold the belief that new technology utilisation will improve the overall performance of a certain task. Subsequently, there has been much research conducted in the Information Systems and M-commerce field, which provides support for the importance of perceived usefulness on adoption or utilisation intention (Davis, 1989; B. Kim, Choi, & Han, 2009; Kuo & Yen, 2009; Shin, 2009). Accordingly, it is believed that perceived usefulness will impact user intention to accept mobile commerce.

Recently, various empirical studies have provided support for the belief that perceived usefulness is a key predictor of m-commerce adoption, capturing the considered advantages linked with m-commerce adoption (Khalifa & Shen, 2008; B. Kim et al., 2009; Wei et al., 2009). In the present study, the concept of performance expectancy will be explained by (Wei et al., 2009), which is defined as the degree to which people maintain that m-commerce utilisation will enhance daily activities and job performance. Such a construct examines and analyses m-commerce's extrinsic characteristics, and further highlights the

way in which mobile commerce is able to facilitate users' capacity to achieve task-related aims and objectives, including efficiency and effectiveness (Wei et al., 2009). Therefore,

H3: *Performance Expectancy will significantly influence m-commerce behavioural usage intention.*

3.4. Effort Expectancy (EE)

Venkatesh *et al.* (2003, p. 450) define Effort Expectancy (EE) as 'the degree of ease associated with the use of the system'. This is similar to the perceived ease of use factor in the Technology Acceptance Model (TAM). According to (Davis, 1989), perceived ease of use in the context of a system is the extent to which an individual believes that the utilisation of a specific technology will be effort-free. In this regard, perceived ease of use has been encompassed as a fundamental aspect in the implementation of m-commerce (Bhatti, 2007; Li, Fu, & Li, 2007; Wei et al., 2009). Importantly, previous studies have established that perceived ease of use has a positive impact on the adoption of m-commerce (Khalifa & Shen, 2008; B. Kim et al., 2009; Wei et al., 2009). Accordingly, perceived ease of use is known to highlight the considered attempts in terms of developing mobile commerce (Khalifa & Shen, 2008). Furthermore, various studies have tested ease of use as a fundamental component in the intention to implement, as noted by (Agarwal & Karahanna, 2000). Studies such as (Xiaolu Cheng & Luzhuang Wang, 2010) have also found that effort expectancy exercises a mediation effect on the customer acceptance, and is regarded as being one of the main behavioural beliefs influencing user intention in regard to technology acceptance in the case of UTAUT (Unified Theory of Acceptance and Use of Technology) frameworks. Moreover, if m-commerce technology is considered easy to use, individuals who hold this belief will have positive attitudes towards m-commerce utilisation because services on mobile devices can be viewed as complicated and tedious owing to the various physical constraints associated with m-commerce, such as difficulties inputting information or the small screen display. Consequently,

H4: *Effort Expectancy will significantly influence behaviour usage intention*

3.5. Social Influence (SI)

The concept of Social Influence (SI) refers to 'the extent to which an individual perceives that important others believe he or she should use the new system' (Venkatesh et al., 2003, p.453). According to (Lu et al., 2008), SI is similar to the subject norm, and is described as an individual's belief concerning whether other people maintain that an individual should become involved in the activity. Subject norm is taken into account in terms of both TPB (Theory of Planned Behaviour) and TRA (Theory of Reasoned Action) as the fundamental aspect concerned with describing system implementation. Studies have found that the social factors, sourced from TPB, can, in accordance to the views of (P. V. C. Chang, 2004), improve the overall power and cogency associated with TAM in the context of intranet utilisation. Additionally, according to DOI (Diffusion of Innovation) theory, Social Influence may be broken down into two separate types, namely interpersonal influence and mass media (Rogers, 1995). With this in mind, it is stated that interpersonal influence commonly derives from social networks through friends, peers and superiors, etc.; on the other hand, mass media influence comprises internet, newspapers, magazines, radio, television, and other mediums (Fan, Saliba, Kendall, & Newmarch, 2005), which emphasise that a user is more inclined to propose and advocate a service to others if she or he is satisfied. This particular conclusion also highlights the belief that social influence has a stronger influence on the m-commerce acceptance of users than perceived ease of use and perceived usefulness. Moreover, SI is also believed to have a significant impact on consumers' intention to utilise m-commerce, as highlighted by (Khalifa & Cheng, 2002). In Saudi context, (Al-Gahtani, Hubona, & Wang, 2007; Al-Sobhi, 2011) found this construct is significantly affect ion the intention to use the information technology. Accordingly,

H5: *Social influence will have a significant influence on behaviour intention to use m-commerce.*

3.6. Facilitating Conditions (FC)

Facilitating Conditions (FC) considers the extent to which an individual believes that a technical and organisational framework is present to support system utilisation (Venkatesh et al., 2003). Simplifying conditions has been implemented with the aim of affecting actual utilisation of technology as opposed to

behavioural intention (Garfield, 2005; Schaper & Pervan, 2007). In regard to UTAUT, facilitating conditions involves compatibility, facilitating conditions and perceived behavioural control from the TPB, TAM, MPCU, and IDT models (Ajzen, 1991; Venkatesh et al., 2003). Importantly, a number of technology scholars (Al-Gahtani et al., 2007; I. Chang, Hwang, Hung, & Li, 2007; Venkatesh et al., 2003) have found that the facilitating conditions construct positively impacts actual use. In the case of the present study, facilitating conditions has been gauged through the perception of being able to gain access to the necessary resources, in addition to garnering knowledge, information and the required support to utilise m-internet services. It is also influenced by the perception of the technology incorporated within the user's lifestyle. In an attempt to describe those conditions relating to the actual use of m-commerce, we propose:

H6: *Facilitating Conditions will significantly impact people's actual use of m-commerce applications.*

3.7. Behavioural Intention

Behavioural intention is 'defined as a perceived notion between oneself and some action' (Jaccard & King, 1977, cited in (Liang, Illum, & Cole, 2008), p. 13). Behavioural intention always refers to future behaviour (Ajzen, 1991; Ajzen, 1991; Venkatesh & Brown, 2001; Venkatesh et al., 2003).

Importantly, according to (Irani, Dwivedi, & Williams, 2008), most technology implementation studies have examined behavioural intention as a predictor of associated adoption. Moreover, (Ajzen, 1991) highlights behavioural intention as being feasibly directly influential on adoption. Also, more recently, there have been a number of studies that have found behaviour intention predicts actual use, such as (Gao & Deng, 2012; Im, Hong, & Kang, 2011; Shin, 2009; Tao Zhou, 2008; Yu, 2012). The calculation of behavioural intention comprises the intention and estimated utilisation of m-commerce-related services. Thus:

H7: *Behavioural intention will have a positive impact on the actual utilisation of m-commerce applications*

3.8. Demographic Differences

3.8.1. Gender

Gender has been considered in a number of studies with the aim of examining whether or not there are differences between male and female in regard to technology utilisation. Various academics have examined the role adopted by gender in the utilisation and implementation of technology (Jackson, Ervin, Gardner, & Schmitt, 2001; Morris & Venkatesh, 2000; Venkatesh et al., 2003). Moreover, a number of researches have emphasised that gender markedly impacts when considering the use and implementation of technological in a business-related context. In this regard, it is illustrated by (Venkatesh & Davis, 2000) that males utilise computers more so than females. In addition, the differences between genders have been highlighted by (Jackson et al., 2001) in regard to internet utilisation. Moreover, Al-sahfi & Weerakkody (2010) found significant differences between men and women in e-government usage. Notably, (Venkatesh et al., 2003) have also established that perceived usefulness in regard to behavioural intention is controlled by gender. On the other hand, it was established by (Bigne, Ruiz, & Sanz, 2005) that women and men do not exhibit important differences in shopping behaviours in regard to mobile technology.

In the context of this study, the works of various scholars—including (Al-Shafi & Weerakkody, 2010; Dwivedi, Papazafeiropoulou, Gharavi, & Khoumbati, 2006a; Dwivedi & Lal, 2007) will be followed, with gender taken into account as a social, independent variable in an attempt to explain the differences between technology users. With this noted, the researcher proposes the following hypothesis:

H8: *The Actual Use of m-commerce will be greater amongst males than females.*

3.8.2. Age

Finch (1986, cited in (Dwivedi & Lal, 2007) state that age may be utilised as a factor to rationalise a certain social grouping or process, or individual or collective behaviour. Various IS studies have found that age has

important, direct and moderating effects on the adoption and use of behaviours, as well as behavioural intention (Bigne et al., 2005; Morris & Venkatesh, 2000; Venkatesh & Davis, 2000; Venkatesh et al., 2003). Furthermore, it has also been established that the 15–17 years age group is most likely to utilise computers in the USA, with the 26–35 age group following subsequently. Similarly, in several West European countries, Carveth & Kretchmer (2002) find that older demographic groups are less inclined to use computers and the internet compared with the younger population. In the United Kingdom, 85% of 16–24 year olds have internet access, but amongst older age groups, only 15% of 65–74 years and 7% of those 75 years and older have access (Carveth & Kretchmer, 2002). In addition, (Dwivedi & Lal, 2007) note that most broadband subscribers are aged 25–45 years. Accordingly, the present study predicts that younger and middle-aged individuals are expected to exhibit differences in m-commerce usage, with the younger groups expected to show more indifferent use, whereas older individuals will use m-commerce less often in Saudi Arabia, because most of the younger groups have more free time. Accordingly, the following hypothesis is considered:

H10: There will be a significant difference between age groups in terms of m-commerce use.

4. Research Methodology

The Survey Instrument Development

A quantitative approach has been adopted for the work report in this paper. The data has been analysed objectively with the use of statistical procedures provided by SPSS software. The questions were taken from a number of relevant studies with the necessary validation and wording change, such as (Cheong & Park, 2005; B. Kim et al., 2009; H. W. Kim, Chan, & Gupta, 2007; Lu et al., 2008; Park, Yang, & Lehto, 2007; Wei et al., 2009; Wu & Wang, 2005). For this work, a Likert scale ranging 1–5 was used, as follows: Strongly Disagree; Disagree; Neither; Agree; Strongly Agree. Moreover, a total of 574 completed surveys were collected online and manually from 574 smartphone users in Saudi Arabia. Table 1 summarises the demographic characteristics of the participants.

Table1: Demographic profile

<i>Demographic</i>	<i>Category</i>	<i>Frequencies (n)</i>	<i>%</i>
Gender	Male	249	43
	Female	325	57
Age	15-18 years	65	11
	18-25 years	260	45
	26-35 years	198	34
	36-45 years	39	7
	46+ years	12	2
Education	Less than high school	31	5
	High school	121	21
	Diploma	43	7
	Bachelor	303	53
	Postgraduate	76	13

Factor Analysis

In order to verify the construct validity, a factor analysis was conducted using principal component analysis (PCA) with the varimax rotation method.

Factor Loading

In this study, seven unique components naturally emerged, as hypothesised. These components/factors are arranged in decreasing order of importance in the rotated component matrix (in Table 2). Most coefficients loaded highly above 0.6 (Hair, Anderson, Tatham, & Black, 1998; Hu & Bentler, 1999). An item loading of 0.4 is the minimum recommended value in IS research (Dwivedi & Lal, 2007; Straub, Boudreau, & Gefen, 2004). Table 2 shows factor loadings also have a ‘simple structure’, meaning that each of the items loaded strongly on only one component, and each component comprised a number of strongly loading variables (Pallant, 2005; Thurstone, 1947). Together, the seven components accounted for 66% of the total variance explained. The first (rotated) component (Perceived Performance Expectancy) is associated with the largest Eigen value; this component explained 20.60% of the variance, and was thus found to be the most influential factor by a considerable margin. Factor 1 contained five items corresponding to the Perceived Performance Expectancy scale, which loaded with high coefficients above .7. Factor 2 explained 18.35% of the variance, and comprised four items pertaining to the Trust scale, which loaded with high coefficients above .7. The next five factors each explained a further 3.88 to 6.75% of the variance each. Factor 3 included the four Perceived Effort Expectancy items, which loaded above .6. Factor 4 comprised the three ‘costs’ items, which loaded above .5. Factor 5 contained three Social Influence items, which loaded highly above .7. Factor 6 contained the four Facilitating Conditions items, which loaded above .5. Finally, Factor 7 included the four Usage Intention items, which loaded above .6.

Table 2: Rotated Components Matrix^a

	Factor Components & Loadings						
	Factor 1 Performance Expectancy	Factor 2 Trust	Factor 3 Effort Expectancy	Factor 4 Costs	Factor 5 Social Influence	Factor 6 Facilitating Conditions	Factor 7 Usage Intention
PU3	.827						
PU4	.801						
PU2	.797						
PU1	.793						
PU5	.755						
TRUST4		.824					
TRUST3		.818					
TRUST1		.772					
TRUST2		.733					
PE2			.779				
PE1			.773				
PE3			.685				
PE4			.660				
COST2				.870			
COST1				.866			
COST3				.575			
SOCIAL2					.878		
SOCIAL1					.831		
SOCIAL3					.747		
FACILIT3						.785	
FACILIT4						.753	
FACILIT1						.622	
FACILIT2						.535	
IN4							.685
IN1							.681
IN3							.646

IN2							.636
Eigenvalues	5.56	4.96	1.82	1.76	1.49	1.17	1.05
% of 20.60		18.35	6.75	6.50	5.52	4.35	3.88
KMO = .85, $p < .001$							

Reliability Test

Prior to performing multiple regression analysis, this study used reliability analysis (Cronbach's alpha) with the aim of calculating the internal consistency for the seven subscales. According to (Gliem & Gliem, 2003), when using Likert-type scales, it is imperative to calculate and report Cronbach's alpha coefficient for internal consistency reliability for any scales or subscales one may be using. The analysis of the data then must use these composite scales or subscales. The closer Cronbach's alpha coefficient is to 1.0, the greater the internal consistency of the items in the scale. The lowest threshold for adequate reliability is $\alpha = .7$ (Gliem & Gliem, 2003); however, to some extent, it is acceptable at a level of .6. Markedly, various scholars (Hinton & Brownlow, 2004; Robinson, Wrightsman, & Andrews, 1991; Sekaran, 2000) suggest four points of reliability: excellent (0.90 and above), high (0.70–0.90), high-moderate (0.50–0.70), and low (0.50 and below).

Table 3 illustrates the reliability for each construct, along with their interpretation. A high Cronbach's value for all seven constructs indicates that they are internally consistent and measure the same content of the construct (Al-Shafi & Weerakkody, 2010). All items appear to be worthy of retention.

Table 3: Reliability of Measurements

Constructs	N	Number Of Items	Cronbach's Alpha(α)	Type
Usage Intention	574	4	0.73	High Reliability
Performance Expectancy	574	5	0.88	High Reliability
Trust	574	4	0.85	High Reliability
Effort Expectancy	574	4	0.76	High Reliability
Costs	574	3	0.79	High Reliability
Social Influence	574	3	0.80	High Reliability
Facilitating Conditions	574	4	0.73	High Reliability

N=Sample Size

Descriptive Statistics

Descriptive statistics, including means (average across items), medians and standard deviations for the constructs, are presented in Table 4.

Table 4: Descriptive statistics for the mobile internet constructs and Actual Use

Constructs	N	Scale Range	Mean	Median
Usage Intention	574	1-5	4.20	4.25
Actual Use	574	2-5	4.79	5.00
Performance Expectancy	574	1-5	4.03	4.20
Effort Expectancy	574	1-5	3.43	3.50
Trust	574	1-5	2.86	3.00
Costs	574	1-5	4.23	4.67

Social Influence	574	1-5	3.27	3.33
Facilitating Conditions	574	1-5	2.58	2.50

Demographic Differences

Gender Differences in Frequency of Actual Use

A chi-square test of independence was performed to examine the relation between gender and frequency of actual use. The relation between these variables was not significant. The findings in Table 5 show that the largest percentage (91%) of actual use was ‘daily use’ for males, followed by females (85%). Table 5 represents the Pearson’s chi-square test that confirms no significant difference between males and females in their frequency of actual use ($\chi^2(3, N=574) = 5.60, p = .133$).

Table 5: Crosstab Analysis: Gender by Actual Use of Mobile commerce.

		Gender		Total	
		Male	Female		
ACTUAL USE	Monthly	Count	6	12	18
	Weekly	Count	4	10	14
	More than Once Per Week	Count	12	28	40
	Daily	Count	227	275	502
		Count	249	325	574
Total					

Note: Pearson Chi-Square = 5.60 $p < .05$; $N=574$. 0 cells have expected count less than 5

Age Differences in the Frequency of Actual Use

A chi-square test of independence was performed with the aim of examining the relation between age group and frequency of mobile internet actual use. The relation between these variables was significant. Table 6 shows the cross-tabulation between actual use for the five age groups, and further shows that age groups consistently reported ‘daily use’, with the largest percentage of ‘daily use’ in the 15–18 age group (94%), followed by the 26–35 age group (89%), then the 19–25 age group (87%). Most older participants reported lower ‘daily use’, including the 36–45 age group (74%), and the 45+ age group (67%). These results support the idea that actual use differs for the age subgroups. Table 6 shows the Pearson’s chi-square test was significant, thus indicating a difference in age groups and frequency of actual use ($\chi^2(12, N=574) = 22.44$, Cramer’s $V = .144, p < .05$).

Table 6: Crosstab Analysis: Age Group by Actual Use

			Age Group					Total
			15-18	19-25	26-35	36-45	45+ years	
ACTUAL USE	Monthly	count	1	6	6	3	2	18
		% within age	2%	2%	3%	8%	17%	3%
	Weekly	count	0	7	4	3	0	14
		% within age	0%	3%	2%	8%	0%	2%
	More than once per week	count	3	20	11	4	2	40
		% within age	5%	8%	6%	10%	17%	7%
	Daily	count	61	227	177	29	8	502
		% within age	94%	87%	89%	74%	67%	88%
	Total	count	65	260	198	39	12	574
		% within age	100%	100%	100%	100%	100%	100%

Note: Pearson Chi-Square = 22.44, $p < .05$; Cramer's V = .144, $p < .05$; $N=574$.

a. 10 cells (50.0%) have expected count less than 5. The minimum expected count is .29.

Regression Analysis

First, the impact of five predictors on usage intention was investigated using standard multiple regression (Enter method). As a group, the five predictors explained 39.4% of the variation in usage intention; hence, this is reasonably a good model, although 60.3% of the variation in usage intention scores remains unexplained, i.e., there are other unknown factors that may influence usage intention that are not accounted for in this model (Field, 2009). The full model was significant ($F = 73.781$, $MSE = .352$, $p < .001$). Three of the predictors had a significant and positive impact on usage intention scores at the 0.001 level. The largest impact was for Performance Expectancy ($\beta = .509$, $t = 14.446$, $p < .001$); this factor had the largest standardised Beta (β) and t-values. This was followed by costs ($\beta = .185$, $t = 5.180$, $p < .001$), which was the second largest predictor of usage intention. Effort Expectancy had the lowest explanatory power ($\beta = .151$, $t = 4.085$, $p < .001$). Finally, neither Trust nor Social Influence was a significant predictor of usage intention. The results suggest that, for every one standard deviation increase in Performance Expectancy scores, usage intention increased, on average, by .509 points (based on the standardised Beta coefficient values). For every one standard deviation increase in Costs scores, usage intention increased, on average, by .185 points. Finally, for every one standard deviation increase in Effort Expectancy scores, usage intention increased on average by .151 points. Table 7 displays the standardised regression coefficients (β) and intercept (constant), the t-values, R^2 , adjusted R^2 for the impact of the five predictors on usage intention.

Table 7: Mobile commerce Acceptance Predictors → Usage Intention

Predictors	Usage Intention
Trust	0.016
Costs	0.185***
Performance Expectancy	0.509***
Effort Expectancy	0.151***
Social Influence	0.055
R^2	.394
Adj. $-R^2$.388
F -ratio	73.781***

*** significant at the 0.001 level of significance

Testing the impact of usage intention on actual use: Linear regression

Subsequently, a linear regression model was determined to test the impact of usage intention on actual use (see Table 8 below). The R square value (0.09) is low, thus indicating that usage intention explained only 9% of the variation in actual use. The model was highly significant ($F = 56.605$, $MSE = .369$, $p < .001$). Usage intention significantly predicted actual use ($\beta = .300$, $t = 7.524$, $p < .001$), with a one standard deviation increase in Usage Intention scores, increasing actual use by .300 points (based on the standardised Beta coefficient value).

Table 8: Usage Intention → Actual Use

Predictors	Usage Intention
Usage Intention (β)	.300
R^2	.090
Adj. $-R^2$.088
F -ratio	56.605***

*** significant at the 0.001 level of significance

Testing the impact of facilitating conditions on actual use: Linear regression

Finally, a second linear regression model was determined in order to investigate the influence of facilitating conditions on actual use (see Table 9 below). The R square value of .000 indicates that facilitating conditions explained none of the variation in actual use scores. The model was not significant ($F = .053$, $MSE = .406$, $p = .818$). Facilitating conditions had no significant impact on actual use ($\beta = .010$, $t = .231$, $p = .818$).

Table 9: Facilitating Conditions → Actual Use

Predictors	Usage Intention
Facilitating Conditions (β)	.010
R^2	.000
Adj. $-R^2$	-.002
F -ratio	.053 ns

ns=not significant

Summary of Regression Results

In summary, the results of the multiple and linear regression analyses found that trust, costs, and performance expectancy significantly predict usage intention. Performance expectancy had the strongest

impact on usage intention, followed by costs, and then effort expectancy. Usage intention also predicted actual use, although the magnitude of the effect was moderate. Finally, facilitating conditions had no significant influence on actual use (Figure 2).

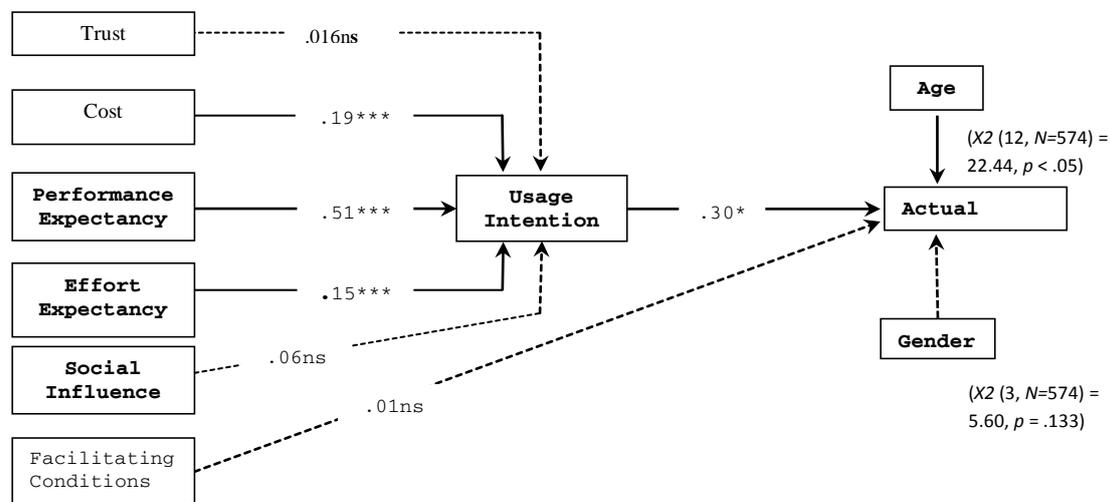


Figure 2: The empirical result of this study

5. Discussion and Conclusion

This paper presents the findings obtained from the data analysis of the survey that was conducted to examine citizens' adoption and usage of the m-commerce services in Saudi Arabia. The findings were shown in several sections. The first step was a discussion of the validation and findings obtained on the adoption of the m-commerce. The section presented findings that illustrated that the reliability test was confirmed and that the measures were internally consistent, as all of the constructs possessed a Cronbach's alpha above (0.70). The construct validity was established utilising the PCA. A significant probability tests resulted. The components consistent with the number of independent factors in the conceptual model resulted in Eigenvalues above (1), and factor validity were loaded and resulted in all items having a score of at least (0.40) (Dwivedi, Papazafeiropoulou, Gharavi, & Khoubati, 2006b; Straub et al., 2004). In addition, the results reveal that there were no cross loading above (0.40), which confirms that both types of the construct validity existed in the survey instrument. Findings from descriptive statistics imply that all the constructs rated strongly in the (1–5) likert scale. This concludes that the respondents showed strong agreement with factors included in the study in regard to examining the adoption of the m-commerce. Importantly, analysing the demographic differences genders as social variables through the employment of the Pearson chi square test, shows that there are no significant differences in terms of gender. However, there are significant differences in regard to age.

In relation to regression, the results of the multiple and linear regression analyses recognise that trust, costs, and performance expectancy significantly predict usage intention. Performance expectancy has the strongest impact on usage intention, followed by costs, and then effort expectancy. Usage intention also predicted actual use, although the magnitude of the effect was moderate. Finally, facilitating conditions shows no significant influence on actual use (see Figure 2).

6. Implication to Practice

There is a shortage of research focused on the adoption of m-commerce within Saudi Arabia; thus, in an attempt to attract a greater number of users and thereby encourage the application of m-commerce within the country, there is a need to acknowledge that the introduction of m-commerce may not be enough; rather, there should be

governmental policy and service providers to direct attention and place emphasis on attribute or construct improvement impacting the utilisation intentions of consumers. Owing to the fact that performance expectancy is one of the most apparent aspects impacting adoption, service providers need to develop the applications and content held by users as valuable, ensuring the capacity of the instrument to keep up with and improve users' fast-paced lifestyle. The design of the contents and services should be fundamentally concerned with the valuable and individual characteristics of m-commerce. In addition, there must be ease of use incorporated within the design: importantly, it has been found that one of the key variables affecting consumers' intention to utilise a technology is effort expectancy. Accordingly, management should redirect attention towards cost reduction, the development of application usefulness, and ease of use. The study implies that the creative pricing and promotional approaches, including cost reduction, should be considered and incorporated in order to attract those consumers more focused on price. Furthermore, conduction needs to be facilitated and improved through government initiatives and the telecommunications sector through enhancing the legal production for m-commerce users.

In order to provide a summary for this research, the study has determined that there are a number of strong, valuable correlations between cost, effort expectancy and performance expectancy, and that of usage intention. However, trust and social influence were not found to be relevant in regard to users' adoption behaviours in the context of m-commerce, although a key predictor was found to be usage intention. Furthermore, when taking into account the gender and age of users, the latter was found to affect utilisation.

Lastly, performance expectancy is recognised as the most important and noteworthy construct in terms of affecting the behaviours of consumers in relation to the adoption of m-commerce; thus, this element will be analysed in detail in the subsequent study. Finally, studies can usually be further developed; this paper is no exception. With this in mind, it should be highlighted that this research emphasises five individual determinants of behavioural intention in relation to the implementation of m-commerce adoption, with age and gender utilised as direct determinants impacting the adoption of m-commerce. One additional suggestion is to examine the adoption factors impacting m-commerce services, such as mobile social network services, which may highlight another result. Moreover, this research places emphasis on citizens' adoption of technology (m-commerce applications and services, in this case) through the testing of the Unified Theory of Acceptance and Usage of Technology framework in the context of a developing country (Saudi Arabia). Future studies could focus on extending this line of research into other regional countries, and accordingly conduct a comparative examination of the implementation of m-commerce.

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