

A Structural Equation Modeling Approach for Determining Antecedents and Outcomes of Students' Attitude toward Mobile Commerce Adoption

Ra'ed (Moh'd Taisir) Masa'deh¹, Rifat O. Shannak², Mahmoud Mohammad Maqableh³

¹ Assistant Professor, Head of Management Information Systems Department, Faculty of Business, The University of Jordan, P.O. Box 13876 Amman 11942 Jordan, +962 6 5355000, Ext. 24286, r.masadeh@ju.edu.jo

² Associate Professor of Management Information Systems, Faculty of Business, The University of Jordan, rshannak@ju.edu.jo

³ Assistant Professor of Management Information Systems, Faculty of Business, The University of Jordan, maqableh@ju.edu.jo

Abstract: Mobile commerce (m-commerce) adoption has been considered as an important segment for young adults. Nevertheless, there is a modest empirical confirmation to indicate how these young adults value the richness of their mobile phones. This study aims to investigate the factors that influence users' m-commerce attitude to use, and the impact of the latter on the continuing intention to use, and on the innovativeness. Data collected from 1743 undergraduate students at the University of Jordan who had prior experiences with m-commerce were empirically tested using structural equation modeling (SEM). The findings revealed that perceived usefulness, perceived expressiveness, enjoyment, social influence, cost, trust, variety of services, and mobile self-efficacy have significant impact on users' m-commerce attitude to use; while perceived ease of use does not. The results of analysis also indicated that users' m-commerce attitude to use impacts continuing intention to use, which in turn influences innovativeness capability. This research proposes an innovative new approach to understand m-commerce adoption, and outlines some theoretical and managerial implications of the findings.

[Masa'deh R, Shannak R, Maqableh M. **A Structural Equation Modeling Approach for Determining Antecedents and Outcomes of Students' Attitude toward Mobile Commerce Adoption.** *Life Sci J* 2013;10(4):2321-2333] (ISSN:1097-8135). <http://www.lifesciencesite.com>. 310

Keywords: Mobile Commerce, Attitude to Use, Jordan, SEM Analysis

1. Introduction

It is quite apparent that the use of mobile services is in wide use. The growth continues worldwide. According to the Telecommunication Regulatory Commission (TRC) in Jordan, there were 9,955,799 mobile subscriptions in the second quarter of 2013 (TRC, 2013). The mobile market is the fastest growing market worldwide. The use of mobile devices has become widespread and continues to grow significantly. According to the International Telecommunication Union (ITU), the mobile cellular subscriptions worldwide were estimated at 4.6 billion by the end of 2009 (ITU, 2010). M-commerce is a relatively new issue in Information System (IS) research agenda. It refers to the utilization of a wireless terminal, such as a cellular telephone, smart phone or Personal Digital Assistant (PDA) with a network in order to access information and conduct transactions resulting in the transfer of value in exchange for information, services or goods. The United Nations Conference on Trade and Commerce (UNCTAD) suggested that m-commerce is concerned with buying and selling goods using wireless handheld devices (UNCTAD, 2004). It is the natural extension of e-commerce that that permits users the interaction with other users and businesses wirelessly all the time (Coursaris et al., 2003;

Vaggelis, 2013). Mobile commerce now provides some expanding content and services (Lee, 2008), including mobile banking, mobile marketing and other location-based services.

A large number of scholars have conducted attitudinal research focused on the adoption of technology in general and the mobile commerce adoption in particular, using the technology acceptance model (TAM) with profound implications. However, the mobile commerce adoption models proposed by existing research cover limited constructs (Zhang et al., 2012). Most have focused on using perceived usefulness, perceived ease of use, and other essential technological elements from established models like TAM, the theory of planned behavior (TPB) and innovation diffusion theory (IDT). It seems logical that other constructs that are critical to customers (e.g. perceived cost, perceived risk and perceived enjoyment) should be brought in to be considered in the adoption of mobile commerce. This research proposes a conceptual model that extends TAM with additional constructs deemed important based on previous mobile commerce adoption studies. The model was tested using structural equation modeling. Zhang and collaborators reported that there were some contradictory empirical findings from past

research and attributed the reason to being possibly the divergence of sample sizes, sample characteristics, or investigation contexts. Unlike electronic commerce, it seems that the development of mobile commerce in Eastern countries (e.g. Korea and Singapore) is similar to that in the Western countries. The main purpose of this research is to investigate the factors affecting the adoption of m-commerce by consumers (Users) in Jordan. The sample of this study is taken from a population of students at the University of Jordan. The rest of this paper is organized as follows. It commences with the theoretical background regarding m-commerce. Then, the research model and hypotheses development are described. After that, the methodology used for the study is discussed. It is followed by the presentation of the analyses and the results. The discussion and conclusion are then stated and areas for future research are also provided.

2. Theoretical Background and Hypotheses Development

Some scholars (e.g. Shannak et al., 2010; Masa'deh and Shannak, 2012; Shannak et al., 2012; Shannak, Masa'deh, and Alkour, 2012; Kannan et al., 2013) emphasize the need for large firms to integrate their Information Technology (IT) systems with their business strategies and processes in order to survive in their highly competitive business environments. Also, several researchers consider the IT and its flexibility as an enabler to achieve the desired competitive advantages, considered as a strategic weapon, and as a crucial support to operational and strategic business processes (Altamony et al. 2012; Masa'deh, 2012; Masa'deh, 2013). Indeed, in the information systems (IS) field, researchers have defined m-commerce from different perspectives. While some researchers (e.g. Wu and Wang, 2005; Yang, 2005; Wong and Hsu, 2008) viewed m-commerce as transactions conducted through a mobile device by using wireless connections, others (e.g. Feng et al. 2006; Tirawi and Buse, 2007) considered it as m-business which does not bound itself to the transactions of monetary values. For instance, users could share free games or music via their devices. However, Siau et al. (2001) characterized m-commerce by ubiquity, personalization, flexibility, and dissemination. Ubiquity means m-commerce providers are capable of reaching their customers anywhere on anytime, and users of m-commerce can obtain information whenever and wherever they want. Personalization permits m-commerce applications to be personalized to individuals or specific group of users. M-commerce allows users the flexibility of conducting

internet based activities wherever they are such as during travelling. The dissemination of information is on by providing simultaneous delivery of data to users who are located in a specific geographical region via their mobiles.

In 1975, Fishbein and Ajzen proposed the theory of reasoned action (TRA) which has been implemented in various domains in order to explain and forecast human behavior. TRA purports that actual behavior is defined by intention to perform the behavior, which in turn is determined by attitude towards the behavior and subjective norm. Derived from TRA, Davis (1989) proposed the Technology Acceptance Model (TAM) to present an explanation of the determinants of computer acceptance across a broad range of end-user computing technologies; whereas Ajzen (1991) revised and extended TRA into the theory of planned behavior (TPB). The main dimensions of TAM include actual use, behavioral intention, attitude toward use, perceived use, and perceived ease of use. Behavioral intention is determined by attitude toward using; whereas perceived use, and perceived ease of use influence attitude toward using. Davis (1989) defined attitude to use as the degree to which an individual has beliefs to use m-commerce; whereas Kim (2012) referred to continuing intention to use as the degree to which he or she has a conscious plan to carry out using m-commerce.

Although several researchers confirmed that TAM has become a vigorous model for predicting user acceptance by explaining a considerable proportion of the variance in usage behavior and intentions, several researchers (Wei et al. 2009; Chong et al. 2012; Chan and Chong, 2013; Chong, 2013; Shih and Chen, 2013) argued that TAM needs additional explanatory power of users' acceptance behavior by considering additional constructs. Furthermore, while TAM only focuses on users' internal perceptions, TPB concentrates on external factors. According to TPB, behavioral intention is determined by attitude, subjective norm, and perceived behavior control. Subjective norm refers to a people's perception by which most people who are important to him/her think he/she should or should not make the behavior; perceived behavior control defined as a person's perception of the easiness or complexity of performing the behavior of interest (Ajzen, 1991). However, based on the above discussion, TAM and TPB can be integrated in order to provide a better predictor of IT acceptance behavior, a view adopted by the current study. Figure 1 demonstrates the research's conceptual framework and the hypothesized relationships between the adopted constructs.

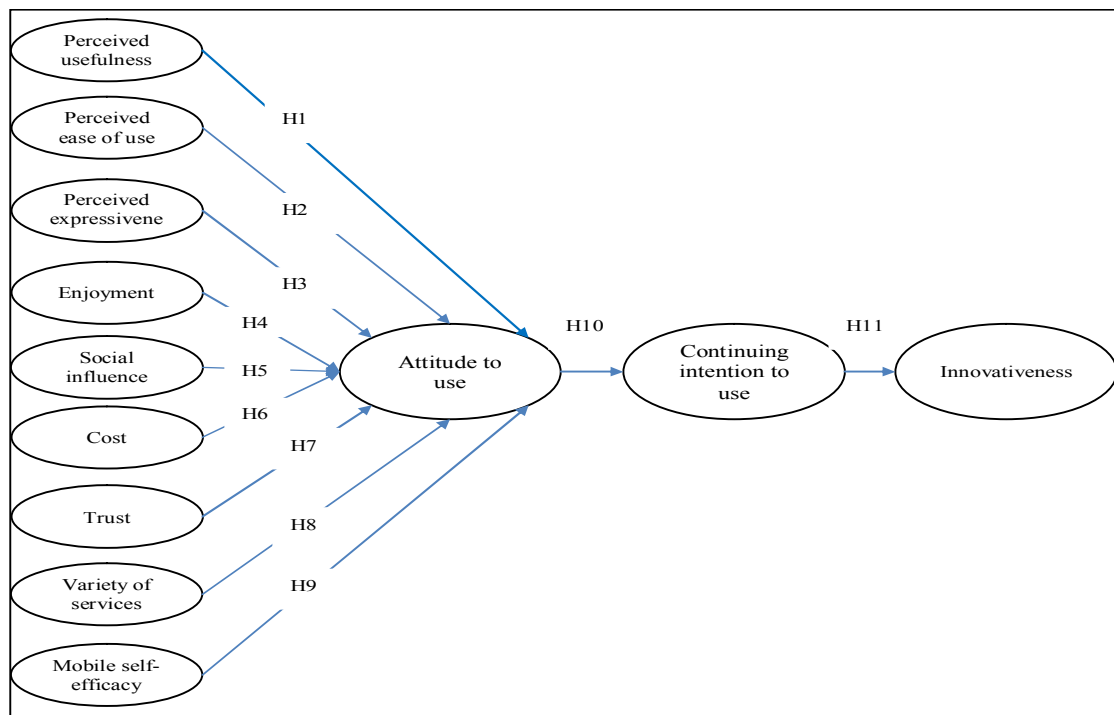


Figure 1: The Research Model

Since many researchers have studied the factors that influence the customers' attitude to adopt a certain technology such as mobile services, this research aims to examine the factors that influence the attitudes towards using m-commerce in Jordan. Variables such as perceived usefulness, perceived ease of use, perceived expressiveness, enjoyment, social influence, cost, trust, variety of services and self-efficacy are used to examine the consumer attitude to the use of m-commerce among young adults at the University of Jordan.

Perceived usefulness is known as the total value that a user receives from using the new technology. Perceived usefulness is considered one of the factors that affect the adoption of information systems (Chong, 2013). In general, it is argued that customers prefer to use m-commerce service rather than e-commerce services when offered services are relatively better. One of the advantages of conducting m-commerce rather than e-commerce is the ability to offer the services using wireless technology (Chong et al., 2011). Some researchers found that perceived usefulness has a fundamental role in adopting m-commerce and mobile internet activities (Wei et al., 2009; Leong et al., 2011; Zhang et al. 2012; Nassuora, 2013). Thus, the following hypothesis is proposed:
H1: Perceived usefulness has a positive relationship with attitude to use m-commerce

Davis (1989) defined the perceived ease of use as the degree an individual believes that using specific technology will be free of effort. Perceived

ease of use related to m-commerce have been studied in the literature with different models (Davis et al., 1989; Kim et al., 2007; To et al., 2008; Hsu et al., 2009; Wei et al., 2009; Featherman et al., 2010; Wu et al., 2011; Nassuora, 2013). These studies concluded that perceived ease of use is considered as a vital factor in adopting m-commerce. Furthermore, although most of the m-commerce users are familiar with using the mobile devices, many of m-commerce applications and services are still new to some users. With the rapid development of m-commerce applications and services, many new features are introduced that might be difficult for the new or inexperienced users. Consequently, the trade-off between the application functionality and its ease of use attribute is considered one of the challenges that face the m-commerce applications developers. Therefore, the following hypothesis is proposed:

H2: Perceived ease of use has a positive relationship with attitude to use

According to Cassidy et al. (1992), perceived expressiveness is defined as the capability of an individual user to express his or her identity. Perceived expressiveness in this research is focused on talking to others about the mobile phone's features in a way that expresses the personality of the user who uses mobile phone's features to impress others. This research considers if perceived expressiveness has a comparably vital in forming the user intention to adopting m-commerce. Consequently, the following hypothesis is proposed:

H3: Perceived expressiveness has a positive relationship with attitude to use m-commerce

Arguably, enjoyment has an important role in adopting and accepting information systems. M-commerce offers different types of applications such as business application, gaming and social networking. Therefore, many users experience enjoyment by using some m-commerce applications, which would most likely push the user to adoption (Kim et al., 2007; Tojib and Tsarenko, 2012). Hence, the following hypothesis is proposed:

H4: Enjoyment has a positive relationship with attitude to use m-commerce

According to Chong et al. (2010), social influence is defined as the “degree to which an individual user perceives the importance that others believe he or she should use an innovation”. The social influence has been added to the extended TAM model after it was studied in the literature with different technologies’ adoptions (Lu et al., 2005; Wu et al., 2005; Chong et al., 2010). Indeed, organizational culture has been defined as the specific collection of values and norms that are shared by people and groups in an organization and that control the way they interact with each other and with stakeholders outside the organization (Al Azmi et al., 2012; Alkalha et al., 2012; Obeidat et al. 2012; Shannak, Obeidat, and Masa’deh, 2012). In this research, it was considered important intriguing to study the relationship between the social influence and the attitude to use m-commerce in Jordan. So, the following hypothesis is proposed:

H5: Social influence has a positive relationship with attitude to use m-commerce

Cost in m-commerce is considered to be made up of the cost of the mobile device, the cost of using certain services, and the applications download cost. Ong et al. (2008) found that the relationship between the consumers’ intention to adopt the 3G services and cost was negative. This is to say that the more expensive the services were, the less likely that consumers’ would have intentions to use those services. Since the cost of the m-commerce applications and services plays vital role in intention to adopt the m-commerce (Nassuora, 2013), the following hypothesis is proposed:

H6: Cost has a positive relationship with attitude to use m-commerce

Trust in this research is focused on the m-commerce security of transactions and payments, confidence with the security measurements of m-commerce, and the privacy of m-commerce. M-commerce is relatively new compared with e-commerce; therefore users are less experienced with m-commerce. Gefen and collaborators conducted a study regarding trust and TAM model in online

shopping and found that trust plays an important role in affecting the customers’ intentions in online purchases (Gefen et al., 2003). Luarn and Lin found that the issues related to perceived usefulness and perceived ease of use had less significant influence than the issues related to trust and privacy (Luarn and Lin, 2005; Nassuora, 2013). Thus, the following hypothesis is proposed:

H7: Trust has a positive relationship with attitude to use m-commerce

Variety of services in Chong (2013) study highlighted the attractiveness of the current available m-commerce services/applications, m-commerce services/applications that meet needs, and m-commerce services/applications that are up to the expectations. M-commerce applications provide variety of services for a wide range of customers that meet their needs and expectations, to attract customers and to have influential positive effects on their intuitions toward attitude to use the m-commerce. Chong (2013) found that besides supplementing variety of services, m-commerce providers need to know the most prominent factors that attract and retain m-commerce users. Consequently, the following hypothesis is proposed:

H8: Variety of services has a positive relationship with attitude to use m-commerce.

Knowledge sharing self-efficacy is defined as ability of an individual to provide valuable knowledge/information to others in whatever form (Chen and Hung 2010). In this research, self-efficacy focuses on the ability and confidence of the mobile users to providing valuable information/knowledge to others, the required expertise to provide valuable information/knowledge, and the ability of other users to provide valuable information/knowledge. According to Wasko and Faraj (2005), Self-efficacy plays vital role in influencing individual’s behavior and motivations to share knowledge/information with others. Hence, the following hypothesis is proposed:

H9: Mobile self-efficacy has a positive relationship with attitude to use m-commerce.

Continuing intention to use m-commerce applications and services is a key factor for m-commerce providers (Kim, 2012). In this research, continuing intention focuses on the future customers’ intention to continue using and to increase the use of m-commerce services. Continuing intention to use m-commerce might depend on users’ perceived value. This study contends that the attitude to use m-commerce influences the consumers continuing intention. Therefore, the following hypothesis is proposed:

H10: Attitude to use m-commerce has a positive relationship with continuing intention to use m-commerce

Kumar and Rose (2012) defined innovativeness as the degree to which an individual perceives that using knowledge transfer enhances adopting creative and new ideas. Personal innovativeness measures the ability of individual to create and produce novel ideas by adopting information systems and technologies. According to Leung and Wei (1998), adopting various technologies is positively related to the individual personal innovativeness. In this research, consumer innovativeness focuses on the ability of the consumer to produce creative/novel and useful ideas by using m-commerce. Indeed, some researchers found personal innovativeness has strong influence to m-commerce adopting innovation (Bhatti, 2007; Li et al., 2007). In this study, it is postulated that continuing intention to use m-commerce influences the consumers' innovativeness. Therefore, the following hypothesis is proposed:

H11: Continuing intention to use m-commerce has a positive relationship with innovativeness

3. Research Methodology

3.1. Research Type and Measures

Since the current research aims at investigating the impact of m-commerce antecedents on attitude to use, and subsequently on continuing intention to use and innovativeness, it is designed as an empirical study in which relationships between variables will be tested using multifaceted scales

adopted from numerous previous researches. Furthermore, the positivist philosophy and deductive approach is considered to be appropriate for this type of research, and adopted to accomplishing the main goal of this study, which is to determine the impact of m-commerce antecedents on continuing intention to use and innovativeness. The basis for data collection and analysis is a field study in which respondents answered all items on a five point Likert-scales ranging from '1' meaning 'strongly disagree' to '5' meaning 'strongly agree'. In addition, elements used to consider each of the constructs were primarily obtained from prior research. These elements provided a valued source for data gathering and measurement as their reliability and validity have been verified through previous research and peer reviews. The variables of perceived usefulness, perceived ease of use, perceived expressiveness, enjoyment, and attitude to use; were adapted from Davis (1989) that were also validated by Head and Ziolkowski (2012). Social influence, cost, trust, and variety of services; were adapted from Chong et al. (2012). While mobile self-efficacy, continuing intention to use, and innovativeness; were adapted from Lin (2007), Kim (2012), and Kumar and Rose (2012) respectively. Moreover, Table (1) shows the measured constructs and the questions measuring each construct.

Table 1. Constructs and Measurement Items

Construct	Measurement Items
Perceived usefulness (PU)	PU1: My mobile phone's features help me be more effective. PU2: My mobile phone's features make it easier to accomplish tasks/activities. PU3: My mobile phone's features help me be more productive (e.g. by using the calendar).
Perceived ease of use (PS)	PS1: Interacting with my mobile phone's features does not require a lot of mental effort. PS2: I find it easy to get my mobile phone to do what I want to do (e.g. check my email). PS3: I find my mobile phone's features easy to use.
Perceived expressiveness (PE)	PE1: I often talk to others about my mobile phone's features. PE2: Using my mobile phone's features is part of how I express my personality. PE3: Other people are often impressed by the way I use my mobile phone.
Enjoyment (EN)	EN1: Using my mobile phone's features is exciting. EN2: Using my mobile phone's features is pleasant. EN3: I have fun using my mobile phone's features. EN4: I find using my mobile phone's features to be enjoyable.
Social influence (SI)	SI1: Friends and family members have an effect on my decision to use m-commerce. SI2: Mass media (e.g. TV, Radio, newspapers) do influence my decision of using m-commerce. SI3: Social media (e.g. Facebook, Twitter, Blogs) do influence my decision of using m-commerce. SI4: Using m-commerce is a current trend nowadays.
Cost (CS)	CS1: A Phone with m-commerce capabilities is relatively cheap. CS2: I consider Mobile subscription fee as cheap for me. CS3: M-commerce transactions are not that costly. CS4: I am using m-commerce because of its low costs. CS5: I do not prefer to spend money on other entertainments instead of m-commerce.
Trust (TR)	TR1: Payments made through m-commerce are processed securely. TR2: Transactions via m-commerce are secured. TR3: I am confident with the security measurements offered by m-commerce websites. TR4: Privacy on m-commerce is well protected. TR5: I am not worried about using credit card information for m-commerce transactions. TR6: M-commerce is as secure as any e-commerce websites.
Variety of services (VS)	VS1: The current available m-commerce services/applications are attractive to me. VS2: There are many m-commerce services/applications that meet my needs.

	VS3: Current m-commerce services/applications are up to my expectations.
Mobile self-efficacy (MS)	MS1: I am confident about my ability to provide information that others consider valuable. MS2: I have the expertise required to provide valuable information/knowledge for others. MS3: My contribution is critical when I share my information/ knowledge with others. MS4: Most other colleagues cannot provide more valuable information/knowledge than I can.
Attitude to use (AT)	AT1: I have positive feelings about my mobile phone's features. AT2: Using my mobile phone's features is a good idea. AT3: The thought of using my mobile phone's features is appealing to me. AT4: Using m-commerce makes me feel satisfied. AT5: Using m-commerce makes me feel happy.
Continuing intention to use (CI)	CI1: I intend to continue using m-commerce in the future. CI2: I intend to increase my use of m-commerce in the future. CI3: If I could, I would like to continue my use of m-commerce.
Innovativeness (IN)	IN1: M-commerce helps me in producing many creative/novel and useful ideas. IN2: I foster/support an environment that assists me to produce creative/novel and useful ideas. IN3: By using m-commerce, I spend much time in producing novel and useful ideas. IN4: I consider producing novel and useful ideas as being important activities.

Table 2. Respondents Demographic Profile

Category	Frequency	Percentage %
Gender		
Male	604	65.3
Female	1139	34.7
<i>Total</i>	<i>1743</i>	<i>100</i>
Age		
17 years- less than 19 years	548	31.4
20 years- less than 22 years	1038	59.6
22 years and above	157	9.0
<i>Total</i>	<i>1743</i>	<i>100</i>
Academic Level		
Year 1	447	25.6
Year 2	470	27.0
Year 3	444	25.5
Year 4	304	17.4
Year 5 and above	78	4.5
<i>Total</i>	<i>1743</i>	<i>100</i>
Faculty		
Business	691	39.6
Information Technology	142	8.1
Engineering	108	6.2
Pharmacy	110	6.3
Law	193	11.1
Islamic Studies	166	9.5
Rehabilitation Sciences	109	6.3
Art	129	7.4
Agriculture	95	5.5
<i>Total</i>	<i>1743</i>	<i>100</i>
Mobile Type		
Nokia	412	23.6
Blackberry	166	9.5
Samsung	777	44.6
Apple	265	15.2
Other	123	7.1
<i>Total</i>	<i>1743</i>	<i>100</i>
Use (Times Per Day)		
Less than 10	1167	67.0
10-less than 29	344	19.7
30-less than 50	123	7.1
50 and more	109	6.3
<i>Total</i>	<i>1743</i>	<i>100</i>

3.3. Research Sample and Data Collection

A survey questionnaire was used to gather data for hypotheses testing. Before implementing the

survey, the instrument was reviewed by four lecturers in the field of Management Information Systems (MIS) in order to identify problems with wording, content, and question ambiguity. After some changes were made based on their suggestions, the modified questionnaire was piloted on 22 undergraduate students at the University of Jordan. Based on the feedback of this pilot study, very minor edits were introduced to the survey questions, and the questionnaires were distributed to the university student population, who had prior experience with m-commerce. After eliminating incomplete surveys, 1743 eligible surveys were used. Demographic information is summarized in Table (2).

Overall, the sample consisted of slightly more females (65.3%), age of 20 years-less than 22 years (91%), from year 1 to year 3 at the university (78.1), using Samsung (44.6%), with a heavy mobile phone users of 86.7% using m-commerce up to 29 times per day. Also, most of the participants were from the Business school, followed by the faculty of law, and then the faculty of Islamic studies.

4. Data Analysis

In order to test the research hypotheses, the study employed SEM techniques with Analysis of Moment Structures (AMOS) 6 software for data analysis. SEM can be divided into two sub-models: a measurement model and a structural model. While the measurement model defines relationships between the observed and unobserved variables, the structural model identifies relationships among the unobserved/latent variables by specifying which latent variables directly or indirectly influence changes in other latent variables in the model (Byrne, 2001). Furthermore, the structural equation modeling process consisted of two components: validating the measurement model and fitting the structural model. While the former is accomplished through confirmatory factor analysis, the latter was accomplished by path analysis with latent variables (Kline, 2005).

Table (3) shows different types of goodness of fit indices in assessing this study initial specified model. It demonstrates that the research constructs fits the data according to the absolute, incremental, and parsimonious model fit measures, comprising chi-square per degree of freedom ratio (χ^2/df), Incremental Fit Index (IFI), Tucker- Lewis Index (TLI), Comparative Fit Index (CFI), and Root Mean Square Error of Approximation (RMSEA). The researchers went on to examine the standardized regression weights for the research's indicators and found that some indicators had a low loading towards

the latent variables. In particular (PU4 = 0.447, CS5 = 0.270, TR5 = 0.461, MS4 = 0.416). Moreover, since all of these items did not meet the minimum recommended value of factor loadings of 0.50 (Newkirk and Lederer, 2006), they were all removed and excluded from further analysis. Therefore, the measurement model was modified and showed a better fit to the data (as shown in Table 3). For instance, χ^2/df and RMSEA did change for the final model, the IFI = 0.916, TLI = 0.904, and CFI = 0.916 indicated better fit to the data after removing the low factor loading items.

Table 3. Measurement Model Fit Indices

Model	χ^2	df	p	χ^2/df	IFI	TLI	CFI	RMSEA
Initial Estimation	4459.330	968	0.0	4.607	0.898	0.886	0.898	0.046
Final Model	3525.450	794	0.0	4.440	0.916	0.904	0.916	0.044

4.1. Measurement Model

Having modified the final measurement model for all constructs, the next phase was to evaluate them for unidimensionality, reliability, and validity. The outcomes of the measurement model are presented in Table (4), which encapsulate the standardized factor loadings, measures of reliabilities and validity for the final measurement model.

4.1.1. Unidimensionality

Unidimensionality is the extent to which the study indicators deviate from their latent variable. An examination of the unidimensionality of the research constructs is essential and is an important prerequisite for establishing construct reliability and validity analysis (Chou et al., 2007). Moreover, in line with Byrne (2001), this research assessed unidimensionality using the factor loading of items of their respective constructs. Table (4) shows solid evidence for the unidimensionality of all the constructs that were specified in the measurement model. All loadings (except PU4, CS5, TR5, and MS4) were above 0.50, which is the criterion value recommended by Newkirk and Lederer (2006). These loadings confirmed that 43 (out of 47) items were loaded satisfactory on their constructs.

4.1.2. Reliability

Reliability analysis is related to the assessment of the degree of consistency between multiple measurements of a variable, and could be measured by Cronbach alpha coefficient and composite reliability (Hair et al., 1998). Some scholars (e.g. Bagozzi and Yi, 1988) suggested that the values of all indicators or dimensional scales should be above the recommended value of 0.60. Table (4) indicates that all cronbach alpha values for the twelve constructs exceeded the recommended value of 0.60 (Bagozzi and Yi, 1988) demonstrating that the instrument is reliable. Furthermore, as shown

in Table (4), composite reliability values ranged from 0.97 to 0.98, and were all greater than the recommended value of more than 0.60 (Bagozzi and Yi, 1988) or greater than 0.70 as suggested by Holmes-Smith (2001). Consequently, according to the above two tests, all the research constructs in this study are considered reliable.

4.1.3. Content, Convergent, and Discriminant Validity

Although reliability is considered as a necessary condition of the test of goodness of the measure used in research, it is not sufficient (Creswell, 2009; Sekaran, 2003), thus validity is another condition used to measure the goodness of a measure. Validity refers to which an instrument measures is expected to measure or what the researcher wishes to measure (Blumberg, et al., 2005). Indeed, the items selected to measure the nine antecedent variables (perceived usefulness, perceived ease of use, perceived expressiveness, enjoyment, social influence, cost, trust, variety of services, and mobile self-efficacy) besides the other variables (i.e. attitude to use, continuing intention to use, and innovativeness) were validated and reused from previous researches. Therefore, the researchers relied upon in enhancing the validity of the scale was to benefit from a pre-used scale that is developed from other researchers. In addition, the questionnaire items were reviewed by four instructors of the Business Faculty at the University of Jordan. The feedback from the chosen group for the pre-test contributed to enhanced content validity of the instrument. Moreover, in order to enhance the content validity of the instrument, 22 students from the University of Jordan were asked to give their feedback about the questionnaire, thus confirming that the knowledge presented in the content of each question was relevant to the studied topic.

Table 4. Properties of the Final Measurement Model

Constructs and Indicators	Std. Loading	Std. Error	Square Multiple Correlation	Error Variance	Cronbach Alpha	Composite Reliability	AVE
Perceived usefulness					0.790	0.98	0.95
PU1	0.734	0.041	0.539	0.030			
PU2	0.842	0.039	0.709	0.022			
PU3	0.689	0.040	0.475	0.031			
Perceived ease of use					0.828	0.98	0.96
PS1	0.666	0.045	0.443	0.030			
PS2	0.844	0.044	0.713	0.023			
PS3	0.848	0.044	0.719	0.023			
Perceived expressiveness					0.721	0.97	0.92
PE1	0.636	0.058	0.404	0.038			
PE2	0.799	0.062	0.638	0.041			
PE3	0.631	0.050	0.398	0.038			
Enjoyment					0.875	0.98	0.96
EN1	0.789	0.028	0.622	0.023			
EN2	0.878	0.027	0.771	0.017			
EN3	0.790	0.027	0.624	0.022			
EN4	0.742	0.027	0.551	0.023			
Social influence					0.703	0.97	0.92
SI1	0.521	0.073	0.272	0.045			
SI2	0.716	0.071	0.513	0.035			
SI3	0.773	0.079	0.597	0.040			
Cost					0.732	0.98	0.93
CS1	0.681	0.096	0.463	0.032			
CS2	0.725	0.098	0.526	0.030			
CS3	0.686	0.092	0.470	0.029			
CS4	0.501	0.094	0.216	0.033			
Trust					0.772	0.98	0.93
TR1	0.716	0.068	0.512	0.028			
TR2	0.759	0.064	0.576	0.023			
TR3	0.648	0.060	0.420	0.026			
TR4	0.547	0.062	0.299	0.032			
TR6	0.505	0.057	0.255	0.033			
Variety of services					0.771	0.98	0.95
VS1	0.757	0.054	0.573	0.028			
VS2	0.823	0.052	0.678	0.022			
VS3	0.629	0.053	0.396	0.027			
Mobile Self-efficacy					0.755	0.98	0.95
MS1	0.737	0.050	0.543	0.028			
MS2	0.742	0.047	0.551	0.024			
MS3	0.661	0.048	0.437	0.026			
Attitude to use					0.810	0.98	0.94
AT1	0.657	0.038	0.432	0.032			
AT2	0.734	0.036	0.539	0.024			
AT3	0.765	0.035	0.585	0.023			
AT4	0.675	0.034	0.455	0.025			
AT5	0.582	0.034	0.339	0.030			
Continuing intention to use					0.774	0.98	0.96
CI1	0.790	0.026	0.625	0.026			
CI2	0.860	0.027	0.740	0.021			
CI3	0.792	0.026	0.627	0.026			
Innovativeness					0.851	0.98	0.94
IN1	0.689	0.046	0.475	0.031			
IN2	0.709	0.044	0.502	0.027			
IN3	0.654	0.041	0.428	0.026			
IN4	0.669	0.043	0.447	0.028			

Moreover, as convergent validity test is necessary in the measurement model to determine if the indicators in a scale load together on a single construct; discriminant validity test is another main one to verify if the items developed to measure different constructs are actually evaluating those constructs. As shown in Table (4), all items were significant and had loadings more than 0.50 on their underlying constructs. Moreover, the standard errors for the items ranged from 0.026 to 0.098 and all the item loadings were more than twice their standard error. Discriminant validity was considered using several tests. First, it could be examined in the measurement model by investigating the shared average variance extracted (AVE) by the latent constructs. The correlations among the research constructs could be used to assess discriminant validity by examining if there was any extreme large

correlations among them which would imply that the model has a problem of discriminant validity. If the AVE for each construct exceeds the square correlation between that construct and any other constructs then discriminant validity is occurred (Fronell and Larcker, 1981). As shown in Table (4), this study showed that the AVEs of all the constructs were above the suggested level of 0.50, implying that all the constructs that ranged from 0.92 to 0.96 were responsible for more than 50 percent of the variance in their respected measurement items, which met the recommendation that AVE values should be at least 0.50 for each construct (Bagozzi and Yi, 1988; Holmes- Smith, 2001). Moreover, as shown in Table (5), discriminant validity was confirmed as the AVE values were more than the squared correlations for each set of constructs. Thus, the measures significantly discriminate between the constructs.

Table 5. AVE and Square of Correlations between Constructs

Constructs	PU	PS	PE	EN	SI	CS	TR	VS	MS	AT	CI	IN
(PU)	0.95											
(PS)	0.65	0.96										
(PE)	0.41	0.15	0.92									
(EN)	0.66	0.75	0.29	0.96								
(SI)	0.45	0.48	0.28	0.49	0.92							
(CS)	0.41	0.42	0.23	0.37	0.30	0.93						
(TR)	0.28	0.24	0.19	0.26	0.23	0.37	0.93					
(VS)	0.56	0.48	0.31	0.53	0.44	0.50	0.44	0.95				
(MS)	0.58	0.49	0.32	0.50	0.36	0.38	0.34	0.59	0.95			
(AT)	0.59	0.52	0.36	0.63	0.51	0.51	0.41	0.69	0.60	0.94		
(CI)	0.51	0.47	0.29	0.51	0.48	0.46	0.38	0.62	0.49	0.69	0.96	
(IN)	0.57	0.46	0.35	0.48	0.50	0.47	0.30	0.59	0.63	0.68	0.62	0.94

4.2. Structural Model

Following the two-phase SEM technique, the measurement model results were used to test the structural model, including paths representing the proposed associations among research constructs. Further, in order to examine the structural model it is essential to investigate the statistical significance of the standardized regression weights (i.e. t-value) of

the research hypotheses (see Table 6); and the coefficient of determination (R^2) for the research endogenous variables as well. The coefficient of determination for attitude to use, continuing intention to use, and innovativeness were 0.45, 0.46, and 0.44 respectively, which indicates that the model does moderately account for the variation of the proposed model.

Table 6. Summary of Proposed Results for the Theoretical Model

Research Proposed Paths	Coefficient Value	t-value	p-value	Empirical Evidence
H1: Perceived usefulness→Attitude to use	0.069	4.756	0.000	Supported
H2: Perceived ease of use→Attitude to use	0.001	0.084	0.933	Not supported
H3: Perceived expressiveness→Attitude to use	0.048	3.182	0.001	Supported
H4: Enjoyment→Attitude to use	0.187	13.072	0.000	Supported
H5: Social influence→Attitude to use	0.100	6.779	0.000	Supported
H6: Cost→Attitude to use	0.116	6.662	0.000	Supported
H7: Trust→Attitude to use	0.104	5.587	0.000	Supported
H8: Variety of services→Attitude to use	0.212	13.610	0.000	Supported
H9: Mobile self-efficacy→Attitude to use	0.134	8.186	0.000	Supported
H10: Attitude to use→Continuing intention to use	0.741	24.936	0.000	Supported
H11: Continuing intention to use →Innovativeness	0.416	23.661	0.000	Supported

5. Discussion and Conclusion

Some researchers investigated m-commerce antecedents on attitude toward use instead of the endogenous construct of intention to use although the sample respondents under investigation were already using mobile devices and services (Head and Ziolkowski, 2012). However, this paper contributes to the m-commerce literature by developing and empirically testing a causal chain model of students' attitude of mobile commerce adoption on innovativeness capability mediated by students' continuing intention to use. Moreover, this study has added to the body of knowledge by offering additional support to current research (e.g. Chong et al. 2012; Head and Ziolkowski, 2012; Kim, 2012; Tjib and Tsarenko, 2012; Zhang et al. 2012; Chong, 2013; Nassuora, 2013) in which attitude of mobile commerce adoption could occur by the very existence of perceived usefulness, perceived ease of use, perceived expressiveness, enjoyment, social influence, cost, trust, variety of services and self-efficacy constructs.

Consistent with Kim (2012), Zhang et al. (2012), Chong (2013), and Nassuora (2013) perceived usefulness, perceived expressiveness, enjoyment, social influence, cost, trust, variety of services, and mobile self-efficacy were found to be positively and significantly correlated with users' m-commerce attitude to use. However, the finding was not in line with Head and Ziolkowski (2012) and Kim (2012), who did not find a significant impact between perceived usefulness, and perceived expressiveness on consumer's m-commerce attitude to use; this study found some support for such an associations. This is to confirm that the more the m-commerce users know and ensure a high degree of perceived usefulness, perceived expressiveness, enjoyment, social influence, cost, trust, variety of services, and mobile self-efficacy (see Table 6); the more they would engage by having an attitude to use m-commerce. Consequently, hypothesis 1 and hypotheses 3-9 were supported. Moreover, based on the SEM results, variety of services was the most significant variable influencing the adoption of m-commerce among the students at the University of Jordan. Perceived enjoyment was the second most important variable in this study in influencing users' decision to adopt m-commerce. This result is consistent with Thong et al. (2006) and Ha et al. (2007). Furthermore, the current research found that perceived ease of use has no significant relationship with students' attitude to use mobile commerce. This is in line with Chong et al. (2012) and Chong (2013) but contradicts with the results from Wei et al. (2009). An explanation of such result could be due to the familiarity of users with m-commerce devices and

applications. Thus, whether the m-commerce services and applications are easy to use or not, it does not influence the users adoption decisions. Consequently, hypothesis 2 was not empirically supported.

In addition, unlike current studies (e.g. Chong et al. 2012; Head and Ziolkowski, 2012; Chong, 2013; Nassuora, 2013) that interpret the impact of relevant antecedent factors on m-commerce adoption, this research investigated the mediated impact of students' continuing intention to use construct between students' attitude of mobile commerce adoption and innovativeness capability. Concurring with Zhang et al. (2012), students' attitude for mobile commerce adoption was found to be positively and significantly correlated with students' continuing intention to use. Therefore, hypothesis 10 was strongly supported. The fact that students' continuing intention to use fully mediates the relationship between students' attitude of mobile commerce adoption and innovativeness capability suggests that in the absence of students' continuing intention to use, no matter how great the students' attitude of mobile commerce adoption, this adoption level will not translate into innovativeness. Thus, maintaining a high level of students' continuing intention to use is crucial especially in the recent m-commerce environment of swift technology advances, less switching cost, and fierce competition. Furthermore, once the attitude of mobile commerce adoption is being adapted to use m-commerce services and applications by users, it would directly impact their intent to use such services continuously, and in turn affects m-commerce users' innovativeness. This underlines the significant role of innovation capabilities in users' activities. Therefore, hypothesis 11 was strongly supported in the structural model. In other words, this study argues that a high degree of students' continuing intention to use m-commerce could lead to better innovativeness in adopting creative and useful ideas. All in all, the above findings increase our understanding of the students' attitude of mobile commerce adoption mechanisms, and their innovativeness capabilities association with the context of students' continuing intention to use as a key mediating variable.

This study has several implications. Firstly, it is one of the first known studies to confirm the impact of m-commerce attitude to use and its antecedents and outcomes in Jordan as one of the Arab countries. Since most of the recent m-commerce studies focused on developed countries (Zhang et al. 2012), this study focuses on Jordan as a developing country in the Middle East and North African region (MENA) in which the results would enable the Jordanian telecommunication and m-commerce companies to develop strategies that are

suitable to university students in developing countries. Second, this research extended previous m-commerce adoption studies by improving on TAM. Factors such as perceived expressiveness, enjoyment, social influence, cost, trust, variety of services, and mobile self-efficacy are included to extend TAM. Third, when designing m-commerce applications, it is important to ensure that the applications are useful, and at the same time they are enjoyable to use. Based on the SEM analysis, ease of use is not a predictor of m-commerce adoption. Therefore, m-commerce developers and telecommunication providers should emphasize providing better variety of services, and designing applications that are useful and offer enjoyable entertainments. A variety of techniques are also needed to improve university students' trust in m-commerce besides the security, safety, and privacy elements. Therefore, service providers should help educate them and build awareness among them toward different applications and services.

Fourth, although ease of use is essential of mobile adoption, developers should not put extra emphasis on this element when designing and promoting their applications. However, m-commerce developers and providers should take a more university student-centric view when considering the significant role of the mobile service's operating environment. For instance, they should consider the ways in which students can exploit the full services for learning and training purposes as well. This can be achieved via social network channels and using word of mouth methods which have become readily available on many mobile phones. Finally, the findings have several important implications for the investment, design, and marketing of m-commerce. For instance, if telecommunication firms desire to attract and maintain m-commerce users, they should take notice of a variety of services, enjoyment, and self-efficacy. Users would appreciate having access to useful and enjoyable knowledge or information on the Internet via their mobiles without any restrictions in terms of time and place, and can share such information and knowledge anytime from anywhere. In addition, service providers should develop an effective pricing strategy as cost reduction is helpful in attracting new customers and retaining existing ones.

Notwithstanding the useful findings discussed before, there are some limitations for this study. Mobile commerce providers and manufacturers should pay more attention to important factors from the students' perspectives instead of focusing only on technological considerations. Thus, in order to attract more users, companies and developers need to carefully consider elements like enjoyment, social influence, cost, trust, and variety of

services that relate more to users' roles from both social and consumer perspectives. Additionally, in order to better understand how actual m-commerce use can translate into business performance measures, further research should consider variables such as customer loyalty and positive word of mouth besides other financial metrics. Through the integration of different methodologies from the fields of IS and marketing, further research should encourage the assumptions around technology consumers and their perceptions and preferences for both leisure and business customers that would ensure an increase to service utilization.

Moreover, this study came from a single country, which implies that replication in a cross-national setting might be useful. Future research projects might chose to survey users who use m-commerce across different geographical contexts and thereby, carry out cross-country and cross-cultural comparisons. In addition, this study did not consider the role of moderating factors such as demographic characteristics of age, gender, and educational level on user decision-making processes in the context of m-commerce. Thus, further research is necessary regarding the impact of such moderators. In addition, this study conducted a cross-sectional survey method of data collection. However, a cross-sectional survey may not fully capture the changes in user perceptions. Hence, longitudinal studies might assist in examining the role of students' attitude of mobile commerce adoption and its antecedents and outcomes in the m-commerce phenomenon. Furthermore, the current study reports a 45% variance in the m-commerce attitude to use construct, whereas continuing intention to use, and innovativeness were found to be 46%, and 44% respectively. Thus, more generalizations on the application of the theoretical premises that were developed when building the research model would be needed. This is to say, a more generalized research model that overcomes the current research limitations by adding further impacting variables to the model would be required. All in all, the findings from this study should be helpful to m-commerce providers among others who are planning to enter the Jordanian market, and they can formulate appropriate strategies based on them.

Corresponding Author:

Ra'ed (Moh'd Taisir) Masa'deh
Assistant Professor,
Head of Management Information Systems
Department
Faculty of Business,
The University of Jordan, P.O. Box 13876 Amman
11942 Jordan, +962 6 5355000, Ext. 24286
r.masadeh@ju.edu.jo

References

- Ajzen, I. The theory of planned behavior. *Organizational Behavior and Human Decision Processes*. 1991; 50(2): 179-211.
- Al Azmi, N., Al-Lozi, M., Al-Zu'bi, Z., Dahiyat, S., and Masa'deh, R. Patients attitudes toward service quality and its impact on their satisfaction in physical therapy in KSA hospitals. *European Journal of Social Sciences*. 2012; 34(2): 300-314.
- Alkalha, Z., Al-Zu'bi, Z., Al-Dmour, H., Alshurideh, M., and Masa'deh, R. Investigating the effects of human resource policies on organizational performance: An empirical study on commercial banks operating in Jordan. *European Journal of Economics, Finance and Administrative Sciences*. 2012; 51(August): 44-64.
- Altamony, H., Masa'deh, R., Alshurideh, M., and Obeidat, B. Information systems for competitive advantage: Implementation of an organisational strategic management process. In *Proceedings of the 18th IBIMA Conference on Innovation and Sustainable Economic Competitive Advantage: From Regional Development to World Economic*. 2012; Istanbul, Turkey, 9th-10th May.
- Bagozzi, R., and Yi, Y. On the evaluation of structural evaluation models. *Journal of the Academy of Marketing Science*. 1988; 16(1): 74-94.
- Bhatti T. Exploring factors influencing the adoption of mobile commerce. *Journal of Internet Banking & Commerce*. 2007; 12(3): 1-13.
- Blumberg, B., Cooper, D.R., and Schindler, P.S. *Business research methods*. McGraw-Hill, Maidenhead, UK. 2005.
- Byrne, B. *Structural equation modeling with AMOS: Basic concepts, applications, and programming*. Lawrence Erlbaum Associates, Mahwah, New Jersey, London. 2001.
- Cassidy, J., Park, R.D., Butovsky, L., and Braungart, J.M. Family-peer connections-The roles of emotional expressiveness with the family and children's understanding of emotions. *Child Development*. 1992; 63: 603-618.
- Chan, F., and Chong, A. Analysis of the determinants of consumers' m-commerce usage activities. *Online Information Review*. 2013; 37(3): 443-461.
- Chen, C.J., and Hung, S.W. To give or to receive? Factors influencing members' knowledge sharing and community promotion in professional virtual communities. *Information & Management*. 2010; 47(4): 226-236.
- Chong, A.Y. A two-staged SEM-neural network approach for understanding and predicting the determinants of m-commerce adoption. *Expert Systems with Applications*. 2013; 40: 1240-1247.
- Chong, A. Y. L., Chan, F. T. S. and Ooi, K. B. Predicting consumer decisions to adopt mobile commerce: Cross country empirical examination between China and Malaysia. *Decision Support Systems*. 2011; 53(1): 34-43.
- Chong, A.Y.L., Darmawan, N., Ooi, K.B., and Lin, B. Adoption of 3G services among Malaysian consumers: An empirical analysis. *International Journal of Mobile Communications*. 2010; 8: 129-149.
- Chou, T., Chang, P., Cheng, Y., and Tasi, C. A path model linking organizational knowledge attributes, information processing capabilities, and perceived usability. *Information & Management*. 2007; 44: 408-417.
- Coursaris, C., Hassanein, K., and Head, M. M-commerce in Canada: An interaction framework for wireless privacy. *Canadian Journal of Administrative Sciences*. 2003; 20(1): 54-73.
- Creswell, J. *Research design: Qualitative, quantitative, and mixed methods approaches*. 3rd edition. Thousand Oaks, Sage Publications. 2009.
- Davis, F. D. Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*. 1989; 13: 983-1003.
- Davis, F. D., Bagozzi, R.P., and Warshaw, P.R. User acceptance of computer technology: A comparison of two theoretical models. *Management Science*. 1989; 35(8): 982-1003.
- Featherman, M. S., Miyazaki, A.D., and Sprott, D.E. Reducing online privacy risk to facilitate e-service adoption: The influence of perceived ease of use and corporate credibility. *Journal of Services Marketing*. 2010; 24(3): 219-229.
- Feng, H., Hoegler, T., and Stucky, W. Exploring the critical success factors for mobile commerce. In *Proceedings of the IEEE International Conference on Mobile Business*. 2006; Copenhagen, 26-27th June.
- Fishbein, M., and Ajzen, I. *Beliefs, attitudes, intention, and behavior: An introduction of theory and research*. Addison-Wesley, Reading, MA. 1975.
- Fronell, C., and Larcker, D. Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*. 1981; 18: 39-50.
- Gefen, D., Karahanna, E., and Straub, D.W. Trust and TAM in online shopping: An integrated model. *MIS Quarterly*. 2003; 27(1): 51-90.
- Ha, I., Yoon, Y., and Choi, M. Determinants of adoption of mobile games under mobile broadband wireless access environment. *Information & Management*. 2007; 44(3): 276-286.
- Hair, J., Anderson, R., Tatham, R., and Black, W. *Multivariate data analysis*. 5th edition. Prentice-Hall International Inc., New Jersey. 1998.
- Head, M., and Ziolkowski, N. Understanding student attitudes of mobile phone features: Rethinking adoption through conjoint, cluster and SEM analyses. *Computers in Human Behavior*. 2012; 28: 2331-2339.
- Holmes-Smith, P. *Introduction to structural equation modeling using LISREL*. ACSPRI Winter Training Program, Perth. 2001.
- Hsu, C. I., Shih, M.L., Huang, B.W., Lin, B.Y., and Lin, C.N. Predicting tourism loyalty using an integrated Bayesian network mechanism. *Expert Systems with Applications*. 2009; 36(9): 11760-11763.
- International Telecommunication Union. *Measuring the information society 2010: International Telecommunication Union*. CH-1211 Geneva, Switzerland. 2010.
- Kanaan, R., Masa'deh, R., and Gharaibeh, A. The impact of knowledge sharing enablers on knowledge sharing capability: An empirical study on Jordanian telecommunication firms. *European Scientific Journal*. 2013; 9(22): 237-258.
- Kim, B. The diffusion of mobile data services and applications: Exploring the role of habit and its antecedents. *Telecommunications Policy*. 2012; 36: 69-81.
- Kim, H.W., Chan, H.C., and Gupta, S. Value-based adoption of mobile internet: An empirical investigation. *Decision Support Systems*. 2007; 43(1): 111-126.
- Kline, R. *Principles and practice of structural equation modeling*. 2nd edition. The Guilford Press, New York. 2005.
- Kumar, N., and Rose, R. The impact of knowledge sharing and Islamic work ethic on innovation capability. *Cross Cultural Management*. 2012; 19(2): 142-165.
- Lee, Y. H. Exploring factors affecting mobile commerce adoption in the US, Korea and China: The tests of theories, models and cultural differences. Honors Thesis of University of South California. 2008.
- Leong, L. Y., Ooi, K.B., Chong, A.Y.L., and Lin, B. Influence of individual characteristics, perceived usefulness and perceived ease of use on mobile entertainment adoption in Malaysia: An SEM approach. *International Journal of Mobile Communications*. 2011; 9(44): 359-382.
- Leung, L., and Wei, R. Factors influencing the adoption of interactive TV in Hong Kong: Implications for

- advertising. *Asian Journal of Communication*. 1998; 8(2): 124-147.
39. Li, Y., Fu, Z.T., and Li, H. Evaluating factors affecting the adoption of mobile commerce in agriculture: An empirical study. *New Zealand Journal of Agricultural Research*. 2007; 50: 1213-1218.
 40. Lin, H. Knowledge sharing and firm innovation capability: An empirical study. *International Journal of Manpower*. 2007; 28(3): 315-332.
 41. Lu, J., Yao, J.E., and Yu, C.S. Personal innovativeness, social influences and adoption of wireless Internet services via mobile technology. *Journal of Strategic Information Systems*. 2005; 14: 245-268.
 42. Luarn, P., and Lin, H. Toward an understanding of the behavioral intention to use mobile banking. *Computers in Human Behavior*. 2005; 21(6): 873-891.
 43. Masa'deh, R. The impact of Management Information Systems (MIS) on Quality Assurance (QA): A case study in Jordan. *International Journal of Information, Business and Management*. 2012; 4(2): 93-110.
 44. Masa'deh, R. The impact of information technology infrastructure flexibility on firm performance: An empirical study of Jordanian public shareholding firms. *Jordan Journal of Business Administration*. 2013; 9(1): 204-224.
 45. Masa'deh, R., and Shannak, R. Intermediary effects of knowledge management strategy and learning orientation on strategic alignment and firm performance. *Research Journal of International Studies*. 2012; 24: 112-128.
 46. Nassuora, A. Understanding factors affecting the adoption of m-commerce by consumers. *Journal of Applied Sciences*. 2013; 13(6): 913-918.
 47. Newkirk, H., and Lederer, A. The effectiveness of strategic information systems planning under environmental uncertainty. *Information & Management*. 2006; 43: 481-501.
 48. Obeidat, B., Shannak, R., Masa'deh, R., and Al-Jarrah, I. Toward better understanding for Arabian culture: Implications based on Hofstede's cultural model. *European Journal of Social Sciences*. 2012; 28(4): 512-522.
 49. Ong, J., Poong, Y.S., and Ng, T.H. 3G services adoption among university students: Diffusion of innovation theory. *Communications of the IBIMA*. 2008; 3(16): 114-121.
 50. Sekaran, U. *Research methods for business: A skill-building approach*. 4th edition. John Wiley and Sons, Inc. 2003.
 51. Shannak, R., Masa'deh, R., Al-Zu'bi, Z., Obeidat, B., Alshurideh, M., and Altamony, H. A theoretical perspective on the relationship between knowledge management systems, customer knowledge management, and firm competitive advantage. *European Journal of Social Sciences*. 2012; 32(4): 520-532.
 52. Shannak, R., Masa'deh, R., and Akour, M. Knowledge management strategy building: Literature review. *European Scientific Journal*. 2012; 8(15): 143-168.
 53. Shannak, R., Masa'deh, R., Obeidat, B., and Almajali, D. Information technology investments: A literature review. In the Proceedings of the 14th IBIMA Conference on Global Business Transformation through Innovation and Knowledge Management: An Academic Perspective. Istanbul-Turkey, 23rd-24th June. 2010; 1356-1368.
 54. Shannak, R., Obeidat, B., and Masa'deh, R. Culture and the implementation process of strategic decisions in Jordan. *Journal of Management Research*. 2012; 4(4): 257-281.
 55. Shih, Y., and Chen, C. The study of behavioral intention for mobile commerce: via integrated model of TAM and TTF. *Quality & Quantity*. 2013; 47(2): 1009-1020.
 56. Siau, K., Lim, E.P., and Shen, Z. Mobile commerce: Promises, challenges and research agenda. *Journal of Database Management (JDM)*. 2001; 12(3): 4-13.
 57. Telecommunication Regulatory Commission. Available from: http://www.trc.gov.jo/index.php?option=com_content&task=view&id=2597&Itemid=978&lang=arabic&lang=arabic&lang=arabic [Accessed 15 September 2013]. 2013.
 58. Thong, J. Y. L., Hong, S.J., and Tam, K.Y. The effects of post-adoption beliefs on the expectation-confirmation model for information technology continuance. *International Journal of Human-Computer Studies*. 2006; 64(9): 799-810.
 59. Tiwari, R., and Buse, S. *The mobile commerce prospects: A strategic analysis of opportunities in the banking sector*. Hamburg University Press. 2007.
 60. To, P. L., Liao, C., Chiang, J.C., Shih, M.L., and Chang, C.Y. An empirical investigation of the factors affecting the adoption of instant messaging in organizations. *Computer Standards & Interfaces*. 2008; 30(3): 148-156.
 61. Tojib, D., and Tsarenko, Y. Post-adoption modeling of advanced mobile service use. *Journal of Business Research*. 2012; 65: 922-928.
 62. United Nations Conference on Trade and Commerce. *E-commerce and development report 2004*. United Nations Conference on Trade and Development, New York. 2004.
 63. Vaggelis, S. A longitudinal investigation on Greek university students' perceptions towards online shopping. *Journal of Electronic Commerce in Organizations*. 2013; 11(1): 43-62.
 64. Wasko, M.M., and Faraj, S. Why should I share? Examining social capital and knowledge contribution in electronic networks of practices. *MIS Quarterly*. 2005; 29(1): 35-57.
 65. Wei, T. T., Marthandan, G., Chong, L.Y., Ooi, K., and Arumugam, S. What drives Malaysian m-commerce adoption? An empirical analysis. *Industrial Management and Data Systems*. 2009; 109(3): 370-388.
 66. Wong, Y., and Hsu, C. A confidence-based framework for business to consumer (B2C) mobile commerce adoption. *Personal and Ubiquitous Computing*. 2008; 12: 77-84.
 67. Wu, C. S., Cheng, F.F., Yen, D.C., and Huang, Y.W. User acceptance of wireless technology in organizations: A comparison of alternative models. *Computer Standards & Interfaces*. 2011; 33(1): 50-58.
 68. Wu, J.H., and Wang, S.C. What drives mobile commerce?: An empirical evaluation of the revised technology acceptance model. *Information Management*. 2005; 42: 719-729.
 69. Yang, K. C. Exploring factors affecting the adoption of mobile commerce in Singapore. *Telematics and Informatics*. 2005; 22(3): 257-277.
 70. Zhang, L., Zhu, J., and Liu, Q. A meta-analysis of mobile commerce adoption and the moderating effect of culture. *Computers in Human Behavior*. 2012; 28: 1902-1911.