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Exploring Critical Determinants in Deploying Mobile Commerce Technology

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Abstract

Problem statement: The research's problem lies in the fact that deploying m-commerce technology in Jordan represent the first serious trail to understand and explore the critical determinants that affect deploying mobile commerce technology. **Approach:** This research applied TAM model using the following variables: Perceived trust, perceived usefulness, perceived ease of use, social and cultural values and economic issues to explore determinants. **Results:** The result of the distributed 210 questionnaires to mobile commerce users in Amman Stock Exchange (Brokers and Investors) and 179 were returned correct and studied, reveal that perceived trust, perceived usefulness, perceived ease of use, social and cultural values have significant association with intention to deploy mobile commerce technology while economical issue is not significant. **Conclusion:** The results of the research indicate that TAM have capability in exploring critical determinants that affecting the intention to deploy mobile commerce technology in Jordanian marketplace, therefore, further studies are recommended to explore the critical determinants of deploying mobile commerce technology in other economic sectors.

Keyword: Technology Acceptance Models, Mobile Commerce Information and Communication Technology

Introduction

Deploying mobile commerce technology is a very difficult issue, because m-commerce services are increasingly large and enhancing enterprises' abilities to offer mobile commerce services anytime and anywhere. However, studies on the use and adoption of mobile services indicate that traditional acceptance models need to be extended and modified when applied to mobile commerce technology. The need for exploring critical determinants that actually affect deploying mobile commerce is essential due to explosive growth and penetration of mobile devices worldwide in general and in Jordan in particular due to technological advances, regulatory changes and market demand, which prompted the willingness of the innovators and the organizations to deploy m-commerce. The significance of the research lies in the fact that deploying mobile commerce technology in

Jordan represents the first serious trial to understand and explore the critical determinants that affect deploying mobile commerce technology and to understand the social phenomenon accompanied to the spread of mobile commerce.

This study aims to present an in-depth study of M-commerce adoption, analyzing the variables which influence the decision maker's to determine the influence of relations with the characteristics of mobile device and the applications that can be obtained and to identify key drivers of future M-commerce intention in Amman Stock Exchange.

Background and related research

The Technology Acceptance Model (TAM) can be traced back to the doctoral dissertation of Davis in 1989. Davis et al. (Davis 1989, Davis et al, 1989) looked at user acceptance of computer technology by comparing two models those of TAM and TRA(Ajzen, and, Fishbein, 1980) (Ajzen, 1991) TAM is tailored to IS context and was designed to predict IT acceptance and usage. TAM is based on the theory of reasoned action and theory of planned behavior Ajzen (Ajzen, 1991). Chau and Hu.(2002) decomposed perceived usefulness into two parts-perceived near term usefulness and perceived long term usefulness and he found that perceived near term usefulness had the most significant relation with the intention to use a technology, followed by perceived long term usefulness variable. In adoption research, the technology acceptance model focuses on the attitudinal explanations of intention to use a specific technology or service. Davis et all (Davis ,1989) According to this model, both perceived usefulness and ease of use influence the attitude of individuals towards the use of technology, while attitude and perceived usefulness of the technology predict the individual's behavior to use the technology. This model has been widely used over the past decade as a means of predicting user's intention to use new technologies. There TAM could be useful in predicting user's intention to adopt new services and applications. Numerous empirical studies have provided support for the proposition that perceived usefulness is the primary predictor of information technology usage[(Davis, Bagozzi and Warshaw, 1989), (Davis F, R Bagozzi and Warshaw, 1989), (Davis , Bagozzi and ,Warshaw, 1992), (Gefen, Karahanna and Straub 2003), (Wang. Shun, Wang .Min. Lin. Hsin and Tang, 2003) (Igbaria et al, 1997), (Gefen and Straub, 2003), (O'Cass and Fenench (Shih, 2004) argue that TAM is appropriate for research areas in electronic commerce applications since electronic commerce is based on computer technology. As scholars indicate that M-commerce is an extension of e-commerce, it is thus justifiable to extend TAM to examine consumer intention to adopt behavior. Unifying the various models of IT acceptance was completed by[(Chau & Hu. 2002) (Davis ,2001)] and wherein they integrated the elements of eight prominent models. The UTAUT aims to explain user intentions to use an IS and subsequent usage behavior. The theory holds that four key constructs (performance expectancy, effort expectancy, social influence and facilitating

conditions) are direct determinants of usage intention and behavior (Venkatesh and Speier, 1999). Gender, age, experience and voluntariness of use are posited to mediate the impact of the four key constructs on usage intention and behavior (Venkatesh and Speier, 1999). Moreover, Prior studies have extended TAM with new constructs such as perceived playfulness, perceived enjoyment and others. It is also widely recognized that subjective norms and perceived behavioral control are important for understanding and predicting intentions and behavior in specific contexts [(Chan, Cheung and Ming, 2004) (Chismar and Patton, 2003), (Klopping, Inge and McKinney, 2004), (Luarn and Lin Hsin, 2004) (Triandis, Kagitcibasi and Yoon, 1980) (Venkatesh, Morris, Davis and Davis, 2003) (Malhotra *et al.*, 1996)]. Based on the literature discussed and relations hypothesized between different variables, we constructed a research model shown in Fig. 1, this model is used to test how people and organizations deal with new technology, accept, resist or reject and potentially influence an individual and organizational adoption decision regarding mobile commerce, because mobile commerce technology is considered the new wave of IT. An extended version of the technology acceptance model was employed to determine factors such as trust, perceived usefulness, perceived ease of use, social and cultural values, economic issues that influence a decision maker intention to adopt this type of technology in doing business.

Perceived trust

Trust is considered as a key factor for succeeding in doing e-commerce and m-commerce, trust is major enabler of mobile device transactions because of a natural human need to believe in the social surrounding of the virtual environment Perceived Usefulness: "The degree to which a person believes that using a particular system would enhance his or her job performance, by ubiquity, convenience localization, personalization, device optimization" (Davis *et al.*, 1989).

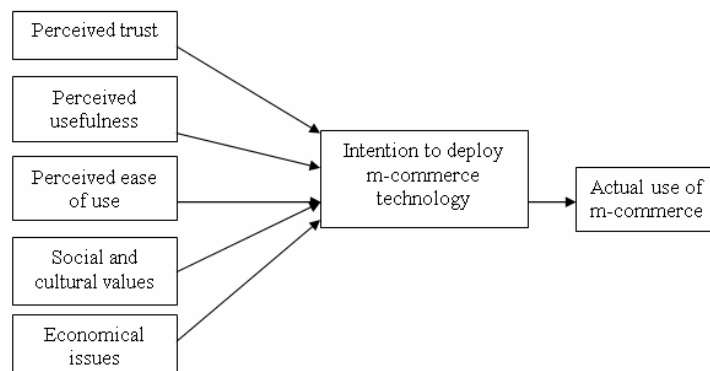


Figure 1. The proposed model. Source: Prepared by the researchers

Perceived ease of use

"The degree to which a person believes that using a particular system would be free of

physical and mental effort"(Davis et al., 1989), freedom from difficulty and effort

Social and cultural trends

Social factors are defined as "an individual's internalization of the reference group's subjective culture and specific interpersonal agreements that the individual has made with others, in specific social situations"(Venkatesh V. and M. G. Morris, 2000). Thus, social factors try to capture the congruency between social norms and individual beliefs and how the human part of an individual's environment affects one in performing a specific behavior. Social factors are defined as "an individual's internalization of the reference group's subjective culture and specific interpersonal agreements that the individual has made with others, in specific social situations"(Venkatesh and Morris, 2000).

Economic issues

Economics is the social science that studies "mankind in the everyday business of life".

Intention

Intention is an indication of a person's readiness to perform a given behavior and it is considered to be the immediate antecedent of behavior.

Hypothesis

To accomplish the objectives of this research, the following hypothesis will be tested:

H1: Perceived Trust have direct significant effect on m-commerce users' intention to deploy m-commerce technology.

H2: Perceived Usefulness have direct significant effect on m-commerce users' intention to deploy m-commerce technology.

H3: Perceived ease of use has significant effect on m-commerce users' intention to deploy m-commerce technology.

H4: Social and cultural values have direct significant effect on the m-commerce users' intention to deploy m-commerce technology.

Materials and Methods

In this study brokers and mobile commerce technology users from Amman stock exchange are chosen to conduct study.

Reliability

The results of reliability show that Alpha Cronbach's was 0.7098 for trust variable, 0.663 for usefulness variable, 0.703 for ease of use, 0.7636 for social and cultural values, 0.9033 for economical issues, 0.834 for intention and 0.8184 for actual use (Table 1). The

values of Alpha Cronbach's for each variable were higher than 0.6, which is the acceptable value for such research (Venkatesh and Morris, 2000)

Model validity

In this study, summative scale technique was used to merge several sub factors into a single factor by calculating average scale of each factor (Heck, 2004). Factor Analysis was used applying Varimax procedure and Eigen value more than one. When the loading factor is more than 0.40 (Heck M., 2004), then the paragraph is valid to measure the variable.

Eigen value determines the accepted factors, Kaiser-Meyer-Olkin (KMO) measured the fitness of using factor analysis for this data. The value of KMO was more than 0.50 reflecting the fitness of factor analysis for this data, KMO measure provides a means to assess the extent to which the variables of the model belong together. Loading factor and explained variance were used to measure the validity of each construct as shown in Table 1. The respondents were closed in their predominantly positive intention toward using mobile commerce technology and actual use.

Table 1

Construct validity of research variables

Variable	Loading factor	Explained variance	KMO	Eigen value	Cronbach's Alpha
Trust	0.880 0.863 0.606 0.279	49.086	0.597	1.963	0.7100
Usefulness	0.736 0.799 0.747 0.512	50.023	0.671	2.001	0.6630
Ease of Use	0.747 0.760 0.727 0.682	53.273	0.616	2.131	0.7030
Social and cultural issues	0.772 0.871 0.801 0.614	59.334	0.737	2.373	0.7636
Economical issues	0.839 0.899 0.871 0.893 0.355	63.866	0.847	3.193	0.9033

Variable	Loading factor	Explained variance	KMO	Eigen value	Cronbach's Alpha
Intentions	0.841	66.908	0.794	2.676	0.8340
	0.816				
	0.830				
	0.783				
Actual use	0.792	58.748	0.770	2.937	0.8180
	0.813				
	0.812				
	0.763				
	0.640				

Results

To accomplish the objectives of this study, hypotheses should be tested to find out the relationship between variables. These tests as follow:

First hypothesis:

H1: Trust will have direct significant effect on m-commerce users' intention to deploy m-commerce technology.

The testing result of the analysis is as follow:

$$Y = 1.963 + 0.420X$$

$$(t = 5.854 \text{ with significance} = 0.001) (t = 1.96 \text{ tabulated})$$

$$R^2 = 0.113$$

$$F = 22.50 (F = 2.34 \text{ tabulated})$$

Where:

Y = Intention to deploy m-commerce technology

X = Trust of using m-commerce technology

Perceived trust explained 11.3% of the effect on the user's intention of deploying mobile commerce technology. The Trust effect on the user's intention to deploy mobile commerce was significant with probability 0.001 (<0.05).

Second hypothesis

H2: Perceived usefulness has significant effect on the intention of mobile commerce user's to deploy m-commerce technology.

The testing result of the analysis is as follow:

$$Y = 1.804 + 0.471 X$$

$$(t = 5.854 \text{ with significance} = 0.001) (t = 1.96 \text{ tabulated})$$

$$R^2 = 0.162$$

$$F = 34.72 \text{ (} F = 2.34 \text{ tabulated)}$$

Where:

Y = Intention to deploy m-commerce technology

X = Perceived usefulness to deploy m-commerce technology

Perceived usefulness explained 16.2% of the effect on the user's intention of deploying mobile commerce technology. The effect of usefulness is significant with values 0.001. This means that perceived usefulness has considerable effect on user's intention of deploying m-commerce.

Third hypothesis

H3: Perceived ease of use has a significant effect on the m-commerce users' intention to deploy m-commerce technology. The testing result is as follows:

$$Y = 2.007 + 0.413 X$$

$$(t = 5.296 \text{ with significance} = 0.001) \text{ (} t = 1.96 \text{ tabulated)}$$

$$R^2 = 0.137$$

$$F = 28.05 \text{ (} F = 2.34 \text{ tabulated)}$$

Where:

Y = Intention to deploy m-commerce technology

X = Perceived ease of use to deploy m-commerce technology

The increase of perceive ease of use by one unit will improve the intention of deploying mobile commerce technology by 0.413. This means that there is a positive relationship between perceive ease of use on the user's intention to deploy mobile commerce. This relation is highly significant with probability value equal 0.001; ease of use explains 13.7% of the user's intention to deploy mobile commerce technology.

Fourth hypothesis:

H4: Social and cultural values have significant effect on the m-commerce users' intention to deploy m-commerce technology.

The testing result is as follows:

$$Y = 2.460 + 0.301 X$$

$$(t = 2.697 \text{ with significance} = 0.008) \text{ (} t = 1.96 \text{ tabulated)}$$

$$R^2 = 0.039$$

$$F = 7.271 \text{ (} F = 2.34 \text{ tabulated)}$$

Where:

Y = Intention to deploy m-commerce technology

X = Perceived social and cultural values that affect the user's intention of deploying

mobile commerce technology

Perceive social and cultural values have the lowest effect on the user's intention of deploying mobile commerce technology. This is resulted of the low perceive of the social and cultural values. The increase of perceive of social and cultural values will affect the intention of deploying mobile commerce technology significantly ($p < 0.01$), despite the low explanation of this variable for the intention of deploying mobile commerce.

Fifth hypothesis:

H5: Economical issues have a significant effect on m-commerce intention to deploy m-commerce technology. The testing result is as follows:

$$Y = 3.298 + 0.069 X$$

$$(t = 0.782 \text{ with significance} = 0.435) (t = 1.96 \text{ tabulated})$$

$$R^2 = 0.003$$

$$F = 0.612 (F = 2.34 \text{ tabulated})$$

Where:

Y = Intention to deploy m-commerce technology

X = Perceived economical issues on the user's intention to deploy m-commerce technology

The economical issues do not affect the user's intention of deploying mobile commerce because brokers and investors did not find that deploying of mobile commerce technology is related to economical issues.

Sixth hypothesis:

H6: Intention to deploy m-commerce technology has a significant effect on the actual use of m-commerce users.

The testing result is as follows:

$$Y = 2.044 + 0.409 X$$

$$(t = 6.091 \text{ with significance} = 0.001) (t = 1.96 \text{ tabulated})$$

$$R^2 = 0.173$$

$$F = 37.105 (F = 2.34 \text{ tabulated})$$

Where:

Y = Actual use of m-commerce technology

X = Intention to deploy m-commerce technology

User's intention to deploy mobile commerce technology affects positively the actual use of mobile commerce. This effect is positive and significant ($p < 0.001$). The change in the user's intention explains 17.73% of the change in the actual use of mobile commerce.

Discussion

In most cases, mobile commerce technology users' adoption was much slower than originally anticipated, this trend is often attributed to technological limitations, security issues and significant economic investments associated with implementing mobile commerce technology (Deans, 2002). Despite those issues that must be overcome, the main reason for the lack of mobile commerce users adoption stems from the fact that current mobile applications fail to deliver a sufficiently compelling value proposition to corporate decision makers (Igbaria, 1993). The results of this study found that brokers and investors are not completely satisfied with the benefits achieved by deploying mobile commerce which is similar to Deans (2002) and Heck (Igbaria, 1993) results.

The results of the first hypothesis show that perceived trust has no significant effect on mobile commerce users' intention to deploy mobile commerce technology. The results of the second hypothesis when applying multiple regression show that perceived usefulness has a positive relationship with the user's intention to deploy mobile commerce technology. The results of our research are consistent with many previous studies that focused on the acceptance and use of new technology and have provided support for the proposition that perceived usefulness is considered as one of the primary predictors of mobile commerce technology usage [(Davis, Bagozzi and Warshaw, 1992), (Gefen, Karahanna and Straub, 2003), (Wang, Shun, Wang, Min, Lin, Hsin and Tang, 2003) (Igbaria *et al.*, 1997; Gefen and Straub, 1997, 2003)]. The results of the third hypothesis testing show that perceived ease of use has a more powerful and consistent predictor than perceived usefulness towards user's intention to deploy mobile commerce technology. The results of our study are consistent with many previous studies that focused on the acceptance and use of new technology and the results of their studies demonstrated that perceived ease of use has a positive correlation with behavioral intention [(Davis, Bagozzi and Warshaw, 1989), (Davis, 1989, Davis *et al.*, 1989), (Gefen, Karahanna, and Straub, 2003), (Wang, Shun, *et al.*, 2003)]. A possible explanation of these findings is that the stability of the legislative environment for economic issues, in addition to the interest rate, the cost of transaction and the income of the mobile commerce users affects their planning to deploy m-commerce technology in the Jordanian environment. The results of the sixth hypothesis show that user's intention to deploy mobile commerce technology in the Jordanian market place has a positive relationship with the actual use of mobile commerce. These results are consistent with many previous studies that focused on the acceptance and use of new technology [(Compeau and Higgins, 1995), (Venkatesh V. and F. Davis, 2000)]

Conclusion

The current research represents one of the first empirical efforts for eliciting, analyzing, specifying and exploring critical determinants such as: (Perceived trust, perceived

usefulness, perceived ease of use, social and cultural values and economical issues) on the user's intention of deploying mobile commerce technology on the Jordanian marketplace, by incorporating variables from technology acceptance/adoption models. The findings of this study are supportive of the fact that more usefulness and more ease of use of mobile commerce technology are more likely to affect the user's intention of mobile commerce technology adoption. This indicates that mobile commerce is perceived to be high in instrumentality leading to higher acceptance/adoption rates. The results coincide with other studies and the link between these two determinants is in agreement with the prior study [(Davis, Bagozzi and Warshaw, 1989), (Davis, Bagozzi and Warshaw, 1989)]

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