Investigating the main implementation factors of M-commerce: A case study in Saderat Bank, Iran

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Abstract

Nowadays, M-Commerce influences on organizational and social activities cause to change the nature of performance styles. This research explores how organizations are influenced to adopt the M-commerce. The research employed the Technology Acceptance Model (TAM) to examine factors affecting organization attitudes toward this emerging mobile technology and applications. In present research the sample size consisted of 79 employees that were selected at random from 42 branches of employees from Saderat Bank in Tabriz-Iran in 2012. Data analyses were carried out by using Factor Analysis, Structural Equation and Freidman Mean Ranking Test. The results of present study illustrated that there was a significant relationship between factors together, and also considering the Ranking Analyses it can be said that the Compatibility of performance factors is more important factor than others for improving M-Commerce in studied place.

Keywords: TAM, PEOU, M-Commerce, Bank, Information-Communication Technology, organization.

Introduction

Mobile commerce (henceforth, M-commerce) refers to commercial transactions conducted through a variety of mobile equipment over a wireless telecommunication network in a wireless environment (Barnes, 2002; Coursaris and Hassanein, 2002; Gunsaekaran and Ngai, 2003). Currently, these wireless devices include two-way pagers/SMS (short message systems), wireless application protocol (WAP)-equipped cellular phones, personal digital assistants (PDA), Internet-enabled laptop computer with wireless access capacity, and consumer premise IEEE 802.11(a/b) wireless network devices (Leung and Antypas, 2001). M-commerce applications can be broadly divided into two categories: content delivery (i.e., reporting, notification, consultation) and transactions (i.e., data entry, purchasing, promotions) (Balasubramanian *et al.*, 2002; Leung and Antypas, 2001). With the explosive growth of the mobile telephone population, combined with the development of wireless technologies, M-commerce is becoming increasingly important to many businesses nowadays (Hung *et al.*, 2003). According to Wireless Week (2004), there are currently 94.9 million M-commerce users in 2003 worldwide and the segment is expected to grow to 1.67 billion by 2008. In addition, global revenues from M-commerce are $6.86 billion in 2003 and expected to reach $554.37 billion in 2008 (Wireless Week, 2004).

Although there have been many recent publications that discuss various marketing issues related to M-commerce technologies and applications (Balasubramanian *et al.*, 2002; Barnes, 2002; Coursaris and Hassanein, 2002; Leung and Antypas, 2001; Kumar and Zahn, 2003), but only a few scholars have attempted to explain factors influencing the adoption of M-commerce (Coursaris and Hassanein, 2002; NG-Kruelle *et al.*, 2002). As such, this study aims to investigate which factors cause to increase and to develop the implementation of M-commerce in financial companies and organizations. Because of this reason, the researchers have selected bank sector as a population and sample of present study.

Literature Review

Various disciplines have considered the adoption process of new information communications technologies (ICTs). These include communication (Rogers,

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1995), consumer behavior (Gatignon and Robertson, 1985), economics (Kraemer *et al.*, 1992), sociology (Rogers, 1995; Wejnert, 2002), and information systems research (Knol and Stroeken, 2001). Nevertheless, the Technology Acceptance Model (TAM) provides one of the most parsimonious, yet robust, models in explaining ICT characteristics and their effects on consumer adoption/use of new ICTs. The following sections will describe the history, key components of TAM, and its applicability to the present study.

Since the mid-1980s, research on information technology adoption has focused on developing and testing models to predict intention to use and/or actual usage of information technology by individuals and organizations (Legris *et al.*, 2003; Olson and Boyer, 2003; Pijpers *et al.*, 2001). One of the most salient models is the Technology Acceptance Model (TAM, henceforth) proposed by Davis (1989) and later validated by many other researchers in a variety of academic disciplines. Empirical studies have found that TAM consistently accounts for about 40% of variance in usage intentions and behavior (Venkatesh and Davis, 2000).

Originally developed from Fishbein and Ajzen_s (1975) Theory of Reasoned Action (TRA), TAM aims to examine why users' beliefs and attitudes affect their acceptance and rejection of information-communication technology. This model has been validated through examining various types of technologies pertinent to individual and organization adoption (see Horton *et al.*, 2001). Due to the popularity of Internet and other emerging ICTs, TAM has also been used to study these applications, such as the World Wide Web (Lederer *et al.*, 2000; van der Heijden, 2003), intranet (Horton *et al.*, 2001), electronic commerce (Olson and Boyer, 2003; Pavlou, 2003), and online shopping (Gefen, 2003; O_Cass and Fenench, 2003). Coursaris and Hassanein (2002) argue that M-commerce can be viewed as a subset of E-commerce. As TAM has been extended to examine electronic commerce usage, it is appropriate to further extend the model to study M-commerce technology as both are closely related. TAM is a parsimonious and theoretically justified model intended to explain information technology adoption (van der Heijden, 2003).

TAM theorizes two critical - 260 K.C.C. Yang / Telematics and Informatics 22 (2005) 257—277 beliefs determining a user's adoption intention and actual usage of information technology. The first of these beliefs is ''perceived usefulness'' (PU), which is defined as ''the degree to which a person believes using a particular system would enhance his or her job performance'' (van der Heijden, 2003, p. 542). The second belief is ''perceived-ease-of-use'' (PEOU), which is defined as ''the degree of to which a person believes that using a particular system would be free of effort'' (van der Heijden, 2003, p. 542). The model further theorizes that PU and PEOU mediate the effects of ICT system characteristics on consumer adoption decisions (Venkatesh and Davis, 2000). Other key components in the model include ''attitude toward using'' (AT), ''behavioral intention to use'' (BI), and ''actual system use'' (AU) (Legris *et al.*, 2003). ''Attitude toward using'' (AT) is determined by a user has PU and PEOU in information technology usage (O_Cass and Fenench, 2003). As TAM is an intention- based model, ''intention to use an information technology'' (BI) is also included in the model and is theorized as a key factor between ''attitude toward using'' (AT) and ''actual system use'' (AU).

Davis (1989) finds that a user has overall attitude toward using a specific information technology and application is a major factor determining whether an individual uses that system. Attitude toward using is also determined by a user's perceived usefulness (PU) and perceived-ease-of-use (PEOU). Cass and Fenench (2003) also argue that TAM is appropriate for research areas in electronic commerce applications (e.g., Internet retailing) since E-commerce is also based on computer technologies. Van der Heijden (2003) also supports the robustness of TAM to study website usage in a non-US context. As scholars indicate that M-commerce is an extension of E-commerce (Coursaris and Hassanein, 2002), it is thus justifiable to extend TAM to examine consumer adoption behavior.

Consumer innovativeness has been used to study adoption behavior of new products and services (Wood and Swait, 2002). Innovativeness is often identified as a personality constructs (Hirschman, 1980; Venkatraman and Price, 1990; Wood and Swait, 2002) that has been employed to predict consumer innovative tendencies to adopt a wide variety of technological innovations. Researchers often identify key components of consumer innovativeness, including novelty-seeking, optimal stimulation level, variety-seeking, and exploratory tendencies (Wood and Swait, 2002). Past research has classified two types of consumer innovativeness: open-processing (general) innovativeness and domain-specific innovativeness (Citrin *et al.*, 2000). Open-processing innovativeness refers to individuals' intellectual, attitudinal, and perceptual characteristics that predict general innovations adoption behavior (Citrin *et al.*, 2000). On the other hand, domain-specific innovativeness refers to consum-

ers' tendency to obtain knowledge about and adopt innovations within a specific product category (Citrin *et al.*, 2000). Citrin *et al.* (2000) study finds that innovativeness predicts consumer adoption of Internet shopping. Furthermore, recent studies on consumer adoption of wireless application protocol (WAP) also indicate that personal innovativeness can predict adoption of M-commerce (Hung *et al.*, 2003). Although actual system usage, rather than antecedents of adoption/use has been studied by Citrin *et al.* (2000) and Hung *et al.* (2003), consumer innovativeness is likely to have the same effect on PU, PEOU, and AT, given close relationships between these variables and the moderating role of PU, PEOU, and AT for predicting AU in earlier TAM research (Pijpers *et al.*, 2001).

Rogers (1995) innovation diffusion model identifies ''compatibility'' as a critical factor in consumer adoption decision. ''Compatibility'' is defined as ''the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters'' (Rogers, 1995, p. 224). Rogers (1995) further argues ''the adoption of one new idea may trigger the adoption of several others in a cluster which consists of one or more distinguishable elements of technology that are perceived as being interrelated.'' The technology cluster concept has been used to examine the adoption of videotext (Etteman, 1984), cable television (LaRose and Atkin, 1992), ICQ (Leung, 2001). Eastin (2002) studies four E-commerce activities (i.e., online shopping, banking, investing, and electronic payment system) and finds that prior adoption, perceived convenience and financial benefits predict adoption decision.

According to above context about M-commerce and the explanation of its factors, can be said that the main questions of present study are following and this paper tends to respond to these questions:

1) According to factors of M-commerce, which factors is important considering to the responders expectation?

2) Is the model of present study goodness of fit, due to factor analysis?

3) Which factors are more important that others in the present study according to the M-commerce factors?

Methodology

The sample size of the present study is 79 selected from 42 branches of the Saderat Bank of Tabriz in East-Azerbaijan-Iran. On the other hands, questionnaire of current survey was designed by researcher oneself. It contains 44 items and it has five factors that respectively: "Expected risk", "Cost", "Compatibility", "Be useful", and "Ease of use". Its reliability of this questionnaire was reported 0.873.

All questions analyzed by 5 points Likert-type scale ranging from "I strongly disagree" to "I strongly agree". Data analysis was carried out by using the statistical program packages SPSS17.0, and LISREL8.54. Among the responses were answered by bachelor that were about more than 60%.

Hypothesis testing

Table 1 is illustrating the independent sample t-test of five selected items of M-commerce namely "Expected risk", "Cost", "Compatibility", "Be useful", and "Ease of use". The information of the table-1 is respectively; mean, standardize deviation, mean difference, significant amount, and t-value. According to the hypnotizes of present study, the selected items would be acceptable as long as the amount of significant and t-value are respectively less than 0.5 and not between -1.96 and 1.96 and these situation show that the result of each item should be agreeable in 95 percent confidence level. In brief, due to the table-1 can be said that all item, considering to the 95 percent laws, are acceptable according to responders' expectations, and among studied factors for M-commerce, Expected risk have more mean scale than others and vice-versa, Ease of use have less mean scale than other items.

**Table1. Independent sample t-test of personals expectation about The Performance Factors (n=103)**

Varieties of Present Survey	Mean	S.D.	Mean Difference	Sig. (2-tailed)	t-Value
Expected risk	3/7797	1/08960	/077971	/0000	5/944
Cost	3/6638	/098786	/066377	/0000	5/581
Compatibility	3/6609	1/19376	/066087	/0000	4/599
Be useful	3/5333	1/13897	/053333	/0000	3/890
Ease of use	3/5043	1/06529	/050435	/0000	3/933

In accordance with Byrne (1998), a ratio of X2 to DF of less than 3 was generally considered an indicator of good model fit, and a ratio of less than 5 was considered acceptable. An adjusted goodness-of-fit index(AGFI) of more than 0.90, a root-mean-square error of approximation (RMSEA) of less than 0.08, and Root Mean Square Residual (RMR) of less than 0.045 and a normal fit index (NFI), Non-Normed Fit Index (NNFI), Comparative Fit Index (CFI) and Incremental Fit Index (IFI) of more than 0.90were considered indicators of "good fit" Given their complementary features all four indexes were used to evaluate the path model. In this model, we use an abbreviation of both of criteria's dimensions that the abbreviation names of them are respectively: "Expected risk" = RIS, "Cost" = HAZ, "Compatibility" = SAZ, "Be useful" = MOF, "Ease of use" = SOH, and M-commerce = PTS. The data of figure(1), (2) and table (2) are illustrated that the exploratory model, including all hypothesized variables provided an adequate fit (x2=87.57; DF=27; p=0.0000; a ratio of X2 to DF of less than 3; goodness of fit index [GFI]=0.94; adjusted goodness-of-fit index [AGFI]=0.89; root-mean-square error of approximation [RMSEA]=0.071and [RMR]=0.031) for the data and indicated that the model of present study about organizational performance factors due to factor analysis law are acceptable and all necessary output of this process are respectively structural equation modeling (Estimate State and T-value)and the Model summary of Goodness of fit statistics. All outputs are inconformity with Byrne's(1998) procedures.
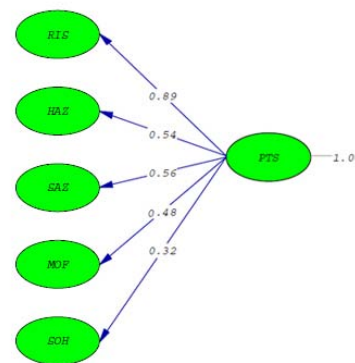
Chi-Square=175.75, df=67, P-value=0.00000, RMSEA=0.063

Figure 1: Structural Equation Modeling (Estimate State) of M-commerce factors.
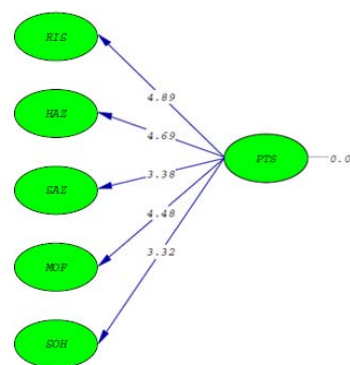
Chi-Square=175.75, df=67, P-value=0.00000, RMSEA=0.063

Figure 2: Structural Equation Modeling (T-Value) of Social M-commerce factors.

Table2. Model summary of Goodness of fit statistics (n=383)

Chi-square	DF	RMSEA	GFI	AGFI	NFI	NNFI	CFI	IFI	RMR
175.75	67	0.063	0.96	0.91	0.95	0.95	0.96	0.96	0.031

The table 3 illustrate Friedman test of factors of M-commerce that it shows mean rank of M-commerce factors and as well as it shows which item or factor considering to expectations and perceptions of responders is more or less important, and if one item is less important, it means, the organizations do not need to improving that item like others and vice-versa. All results of present test are in 95 percent confidence level and if the significant scale is less than 0.05 and the ratio of $X2$ to DF is more than 3, it means that the test has done correct and the output of it is acceptable and extendable.

Table 3. Friedman test of Dimensions of Structural Factors for M-commerce (n=342).

M-commerce Factors	Mean Rank
Expected risk	1.92
Cost	2.51
Compatibility	3.28
Be useful	4.15
Ease of use	2.13
$X2 = 37.856$ $df = 4$ $Sig. = .000$	

The result of table (3) was illustrated that Compatibility has high score and has effect on M-com-

merce and on the other hands; Expected risk has low score than other items. Also, according to significant of this test is less than 0.05, so it means that difference between items or factors of M-commerce is acceptable and extendable.

Conclusions and Suggestions

The results of the first question analysis showed that the factors were selected for probing and investigating the M-commerce factors by researcher form some references, were acceptable and agreeable considering to the expectation of responders and they can be selected as most important factors of M-commerce. On the other hands, probed factors' mean score are more than the average of responses of people which selected as population of present study, so, can be said that the first question of present study was acceptable and agreeable in 95 percent confidence level.

Secondly, the results of goodness of fit in second question were indicated that the second question was acceptable and the model of present study was goodness of fit, because the ratioofX2toDFoflessthan3, and the adjusted goodness-of-fit index(AGFI) of more than 0.90,theroot-mean-square error of approximation (RMSEA) of less than 0.08, and Root Mean Square Residual (RMR) of less than 0.045 and the normal fitindex (NFI), Non-Normed Fit Index (NNFI), Comparative Fit Index (CFI) and Incremental Fit Index (IFI) of more than 0.90.

Thirdly, considering to the results of third question test (Freidman Ranke Test), can be said due to expectation of responders, Compatibility has high score and has effect on M-commerce and on the other hands, Expected risk has low score than other items. Also, according to significant of this test is less than 0.05, so it means that difference between items or factors of M-commerce is acceptable and extendable.

Considering to the results of questions can be argued that this survey were showed five most important factors for improving and developing organizational factors for sectors of Saderat Bank and especially each organization which tends to improve its M-commerce in both sectors. The researcher suggestions according to the results and findings are as follows:

• Using participation management for supporting the strategies and increasing the efficiency of operations and processes.

• Identifying the effectiveness strategies for finding and applying opportunities and escaping from treatments, and amending the weakness sectors of communication and information units.

• Nourishing the transactions of organization with others for presenting appropriate services to their customers and clients.

• Recognizing and investigating the new and modern substitute technologies.

• Planning and managing the information resources for making suit decisions.

• Considering to the complexities of organizations and attempting to decrease the non-confidence and risk situations.

• Sensing about productions/services distribution and presenting high quality and low expenditures of productions/services.

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