

2005

## Acceptance Of Wireless Internet Via Mobile Technology In China

June Lu

*University of Houston- Victoria*

Chang Liu

*Northern Illinois University*

Chun-Sheng Yu

*University of Houston – Victoria*

James E. Yao

*Montclair State University*

Follow this and additional works at: <https://scholarworks.lib.csusb.edu/jitim>



Part of the [Management Information Systems Commons](#)

---

### Recommended Citation

Lu, June; Liu, Chang; Yu, Chun-Sheng; and Yao, James E. (2005) "Acceptance Of Wireless Internet Via Mobile Technology In China," *Journal of International Technology and Information Management*. Vol. 14 : Iss. 1 , Article 10.

Available at: <https://scholarworks.lib.csusb.edu/jitim/vol14/iss1/10>

This Article is brought to you for free and open access by CSUSB ScholarWorks. It has been accepted for inclusion in *Journal of International Technology and Information Management* by an authorized editor of CSUSB ScholarWorks. For more information, please contact [scholarworks@csusb.edu](mailto:scholarworks@csusb.edu).

## **Acceptance Of Wireless Internet Via Mobile Technology In China**

**June Lu**  
**University of Houston – Victoria**

**Chang Liu**  
**Northern Illinois University**

**Chun-Sheng Yu**  
**University of Houston – Victoria**

**James E. Yao**  
**Montclair State University**

### **ABSTRACT**

*This study explores factors associated with the acceptance of Wireless Internet via Mobile Technology (WIMT) in China. The results indicate that the acceptance of WIMT is related to the factors of perceived usefulness, perceived ease of use, social influences, wireless trust environment, and facilitating conditions. It provides diagnostic insight into how different factors influence user intention to accept WIMT in China, and thus help business develop strategy to prompt WIMT communications and mobile commerce there.*

### **INTRODUCTION**

Mobile Commerce (m-commerce) represents the convergence of the web and wireless technology (Coyle, 2001). As a subset of e-commerce, m-commerce is forecasted to grow continuously and generate a profound impact on the global business environment despite recent poor performance from the Internet sector (Forrest Research, 2001). Indeed, m-commerce can be a force with strong potential to expedite business transactions and significantly change how businesses serve customers in the global market (Jensen, 1998; Cassano, 2000; Kutler, 2000).

While enjoying recent high economic achievement, China is rapidly heading towards having the largest mobile communications network in the world in both cellular and paging businesses. The McKinsey Research predicted that China will overtake the US as the world's largest mobile phone market with more than 300 million mobile subscribers in year 2005 (Kenyon & Perkins, 2000). According to the same research, there are two main factors driving the growth of wireless Internet via mobile technologies in China: a mobile infrastructure that is more developed than its fixed-line counterpart and the greater affordability of mobile telephones as compared with personal computers. In addition, a number of world leading telecommunications suppliers, such as Ericsson, Nokia, Motorola, and Siemens, have been actively involved in China's telecommunications industry, especially in cellular supply and service business (Zhang, 2001). The turnaround of the Internet portals in China by integrating Short Messaging Services (SMS) into traditional e-portal services in 2003 reflected enormous potential of the Chinese wireless data communications market (Liang & Wei, 2004; Xu, 2003).

Unlike in the United States and Europe, e-commerce practices in China can hardly reach ordinary people because of the limited household possession of wired personal computers. Notwithstanding, many mobile users have already established comfort level with mobile devices' interface and functionality. This may well alleviate the reluctance to conduct mobile commerce activities. However, it might be too optimistic to say that the acceptance of using WIMT will be based on the popularity of mobile devices since research has shown that the volume of e-commerce activities were not significantly increased simply because of huge penetration of personal computers (Anckar & D'Incau, 2002). WIMT goes far beyond mobile devices. The substantial volume of using WIMT should not be seen as an obvious outcome of high penetration of mobile phones, PDA, or pagers. Therefore, the major objective of this study is to explore the factors associated with acceptance of WIMT in China. The following question makes up this work:

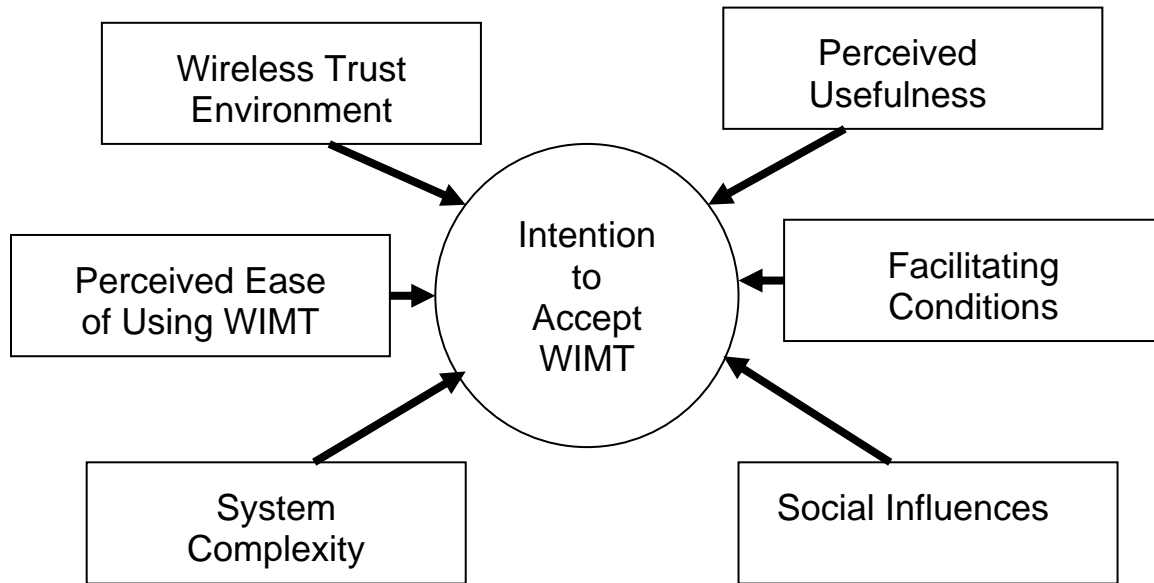
What factors significantly impact acceptance of wireless Internet services via mobile technologies in China?

**THEORETICAL FRAMEWORK**

The theory of reasoned action (Albarracin, Johnson, Fishbein, & Muellerleile, 2001; Madden, Ellen, & Ajzen, 1992) has been used extensively as a theoretical basis for predicting behavioral intentions and/or behaviors. The theory of reasoned action (TRA) contends that behavioral intentions are antecedents to specific behaviors that an individual will perform. More specifically, an individual’s attitudes and perceptions will influence that individual’s actions in a particular manner when he or she believes that certain behavior will be linked to a specific outcome. Deeply rooted in TRA, Technology Acceptance Model (TAM) assumes that beliefs about usefulness and ease of use are always the primary determinants of information technology and information system (IT/IS). A key purpose of TAM is to provide a basis for discovering the impact of external variables on internal beliefs, attitudes, and intentions. Over the last two decades, a number of studies have provided additional theoretical frameworks for research in IT/IS acceptance.

Under the theoretical guidance of TRA and TAM, our model presented in Figure 1, integrated the relevant findings in literature on technology acceptance, system success, technology adoption, with a clear emphasis on the unique features of WIMT. Assuming the positive direct connection between attitudes and intentions, we believe that in addition to the widely recognized impact from perceived usefulness and ease of use on intentions, other perceptions such as wireless trust environment, social influences, system complexity, facilitating conditions also influence intention to accept WIMT respectively.

**Figure 1: Factors Influencing Wireless Internet via Mobile Technology Acceptance.**



**Wireless Trust Environment**

As business marketers place greater emphasis on building long-term relationships with their customers, trust has assumed a central role (Doney & Cannon, 1997; Garbarino & Johnson, 1999; Viega, Kohno & Potter, 2001). Trust is a complex social phenomenon that reflects technological, behavioral, social, psychological, as well as organizational aspects of interactions among various human and non-human agents. All business transactions require an element of trust, especially those conducted in the uncertain environment of mobile commerce (Lee, 1998).

There are two key ingredients of a wireless trust environment: security and privacy. Wireless security must be seen in the border context of Internet-based e-commerce systems to include confidentiality, authentication, and

message integrity (Coyle, 2001). Comparing to e-commerce which relies on wired Internet, m-commerce depends on wireless Internet and is exposed to greater danger of insecurity, since hackers may intercept anywhere in the free air.

Privacy concerns often arise when new information technologies such as the Web enabled mobile technology that support enhanced capabilities for collection, storage, use, and communication of personal information (Webster, 1998; Milberg, Burke, Smith and Kallman, 1995, Culnan, 1993). Reports of concerns about privacy on wireless Internet are recently on the rise (Marchewka, Liu, and Petersen, 2003; Phillips, 2002; Green, Alster, Borrus and Yang, 2000). Customers have to trust the wireless Internet environment from which they purchase, assuming, in reality, that wireless business will be ethical and behave in a socially suitable manner, or else the overwhelming social complexity will cause them to avoid purchasing (Gefen, 2000). It is impossible to translate the potential business applications of the wireless technology into viable business ventures without first setting up trustworthy online environment.

Based on the same logic, privacy and security issues should be addressed to ensure a customer's positive perception and attitudes regarding trust in a wireless commercial environment in China as well. This should influence his or her attitudes toward wireless Internet transactions and in turn, shape his or her behavioral intentions to accept WIMT. This leads to the following hypothesis:

*H1: Wireless trust environment is directly related to intention to accept WIMT in China.*

### **Perceived Usefulness**

Prior research indicates that perceived usefulness is an important indicator for the technology acceptance (Davis, 1993; Taylor & Todd, 1995; Chau, 1996; Jiang, Hsu, Klein, & Lin, 2000, Zhang & Prybutok, 2003). Throughout the years, technology acceptance model (TAM) has received extensive support through validations, applications, and replications. Perceived usefulness has a direct effect on intentions to use over and above its influence via attitude (Davis, Bagozzi, & Warshaw, 1989; Davis, 1993; Taylor & Todd, 1995). Triandis (1980) proposed that an important factor influencing behavior is the expected consequences of the behavior. Individuals evaluate the consequences of their behavior in terms of perceived usefulness and base their choice of behavior on the desirability of the perceived usefulness.

Some recent researches have explored user acceptance of the Internet. The result suggests that the acceptance of Internet technology is positively related to perceived usefulness (Jiang et al, 2000; Seyal, Rahman & Rahim, 2002). However, these studies only investigated the use of wired Internet. It will be interesting to see if their findings can be confirmed in use of WIMT. If WIMT does not help people conduct their desired wireless communications and business transactions, it is not likely to be received favorably despite that wireless devices have high penetration rate in China. Thus, we propose:

*H2: Perceived usefulness is directly related to intention to accept WIMT in China.*

### **Perceived Ease of Using WIMT**

Perceived ease of use can be an important determinant of user satisfaction. It is also another major determinant of attitude toward using an IT/IS in TAM model. This internal belief ties to an individual's assessment of the mental effort involved in using a system (Davis, 1989). Perceived usefulness and perceived ease of use are distinct but related constructs. Improvements in perceived ease of use may contribute to improved performance.

Quite a few empirical studies have confirmed the effect of ease of use on attitude toward using IT/IS (i.e., Al-Gahtani & King, 1999; Lu & Gustafsen, 1994; Moore & Benbasat, 1991; Venkatesh & Davis, 1996). Venkatesh (2000) believes that for any emerging IT/IS, perceived ease of use is an important determinant of users' intention of acceptance and usage behavior. Even though Chau (1996) excluded the original construct of perceived ease of use in his Modified TAM model, he also admitted that in the exploratory state of technology use, ease of use plays an important role. This point was also supported by a recent survey done in Europe. A mail survey by Embedded Solutions among 800 professionals in England in 1999 found that ease of use is among the top five factors in order of significance for determining use of wireless handheld devices (Clark, 2000). Therefore, another hypothesis is:

*H3: Perceived ease of use is directly related to intention to accept WIMT in China.*

### **Facilitating Conditions**

Facilitating conditions originally provide two dimensions: resource factors such as time and money needed and technology factors regarding compatibility issues that may constrain usage. The argument is that when all other things are equal, behavioral intention and IT usage would be expected to be less likely as less time and money are available and as technical compatibility decreases (Taylor & Todd, 1995). In the context of workplace technology use, facilitating conditions are believed to include the availability of training and provision of support. This variable was tested in a number of technology acceptance researches, and empirical supports were found on the proposed effect on the technology acceptance (Jiang et al., 2000; Taylor & Todd, 1995; Thompson, Higgins & Howell, 1994; Vekatesh, 2000).

It has been argued that the facilitating conditions for WIMT is much better than for the PC based Internet access (Anchar & D'Incau, 2002) due to the lower hardware investments and the proficiency with mobile devices. The high cell phone penetration in China provides favorable facilitating conditions for the acceptance of WIMT.

Facilitating conditions, however, can also be viewed as external control related to the environment (Terry, 1993; Triandis, 1980). Behavior could not occur if objective conditions in the environment prevent it (Triandis, 1980), or if the facilitating conditions make the behavior difficult (Thompson et al., 1994). Policies, regulations, and legal environment are therefore all conditions critical to technology acceptance. Both businesses and consumers who engage m-commerce activities need legal and regulatory protection as they are conducting traditional business transactions. Therefore, facilitating conditions can hardly be neglected in wireless environment:

*H4: Facilitating conditions is directly related to intention to accept WIMT in China.*

### **System Complexity**

Literature has revealed that characteristics of wireless mobile systems link directly to issues concerning user demand (e.g., Beaulieu, 2002; Bergeron, 2001; Burnham, 2002; Coyle, 2001; Dornan, 2001). To study the impact of the typical wireless mobile technology on user intentions to accept WIMT, we propose a conceptual construct, System Complexity. The impact of system characteristics has been widely recognized in system and technology user acceptance research. Davis et al. (1989), for example, proposed that system characteristics exhibit indirect effects on usage intentions or behaviors through their relationships with perceived usefulness and perceived ease of use.

WIMT has its own complexity that is different from what has been discussed in the technology user acceptance research. WIMT system complexity can be defined as the degree of integration between wireless Internet and mobile technologies supporting various communications and services.

Operationally, it could be examined in four facets: efficiency of data transfer, system functionality, interface design, and mobile device capacity. Effectiveness of WIMT largely depends on efficiency of data transfer on the system (Clark, 2000; Macker, Park, & Corson, 2001; Varshney & Vetter, 2001). In addition, the mobile devices for accessing wireless Internet all provide small screens. The smaller the screen, the less information is displayed at any one time. The user interface, therefore, becomes central in application delivery (Bergeron, 2001; Regis, 2001). Mobile devices currently serve as entry points into the wireless Web, carrying with them their own capabilities and limitations (Beaulieu, 2002; Bergeron, 2001; Raisinghani, 2001). Each aspect serves as an indispensable part of the entire WIMT system complexity. Any aspect may have some impact on users' satisfaction of performance and mental effort, which in the long run would shape their overall intention to accept WIMT. Thus, we propose:

*H5: System complexity is directly related to intention to accept WIMT in China.*

## Social Influences

In Taylor and Todd's study (1995), social influences were equivalent to subjective norm and defined as other people's opinion, superior influence, and peer influence. Further, subjective norms, social pressures to perform or not perform a particular behavior, also influence behavioral intentions, determined by an individual's positive or negative evaluation of a certain behavior. Venkatesh and Davis (2000) later expanded social influences to include subjective norm and image as well. Image is derived from the research on diffusion of innovations. Moore and Benbasat (1991) defined it as the extent to which use of an innovation is perceived as enhancement of one's status in a social system. Davis and his colleagues (1989) believed that in some cases people might use a system to comply with others' mandates rather than their own feelings and beliefs. Empirical support for the relationship between social norms and behavior can be found in many studies (e.g., Lucas & Spitzer, 2000; Tornatsky & Klein, 1982; Venkatesh & Davis, 2000). Mobile users are usually in social situations. In front of another person, sense of social image is rendered as critical for many. In China, 73 percent of the executive class in big cities owned mobile phones early in 1998 not only for its convenience but also as a symbol for social status (Samson & Hornby, 1998). In addition, young people treat smart-phones as new fashion items to show off in the public. Thus, we propose the final hypothesis is:

*H6: Social influences are directly related to intention to accept WIMT in China.*

## RESEARCH METHODOLOGY

Survey technique was used in this study. Research subjects were selected from enrollment in a required MBA-level e-commerce course at a large university in Beijing, China in year 2002. Over 160 students participated in the survey; however, only 128 data points were usable. Although the use of students is questioned in research, the use of students as subjects may be appropriate when trying to explore certain patterns of relationships (Dickson, 1989; DeSanctis, 1989). Moreover, the use of MBA-level students who were taking e-commerce course in Beijing, China might be even more appropriate since most of them are mobile technology users and have enough knowledge to explore wireless technology issues in China.

### Measurement of Variables

The research model was derived from the literature on technology acceptance, system success, technology adoption, and on theoretical reasoning with the objective of identifying value-added features of WIMT. Some measurement variables were adopted from previous studies such as TAM. Others were from literature review on mobile commerce and key word searches of mobile device, m-commerce security, privacy, system design, technology acceptance, and China in ABI/INFORM, an online database marketed by University of Microfilms (UMI). All variables in the survey were measured on a seven-point Likert scale from (1) completely disagree to (7) completely agree. Table 1 shows the research constructs, their measurement variables, and the internal reliability values. A copy of questionnaire can be found in Appendix 1.

### Reliability of the Measure

In order to ensure that the variables comprising each proposed research construct were internally consistent, reliability assessment was carried out using Cronbach's alpha. As can be seen in Table 1, the internal consistency reliability coefficients for research constructs in this study are equal to or well above the commonly acceptable level of 0.70. Therefore, we believe that the internal consistency is achieved for the proposed constructs (Nunnally, 1978).

### Validity of the Measure

To ensure content validity, an examination was made of the relevant literature. To further reduce the possibility of non-random errors, a pilot was conducted in April 2002 among the MBA students of a regional university in the United States to examine the questionnaire for validity (measuring what is intended), completeness (including all relevant variable items), and readability/understandability. Thirty-five percent of the respondents had direct experiences accessing wireless Internet via mobile devices. Quite a few were MIS professionals working in business corporations. The results of the pilot study suggested several changes to the questionnaire items. These changes were incorporated in this study. To achieve the equivalence of instrumentation, the questionnaire was

translated into Chinese by one of the authors. This Chinese instrument was then critiqued among a few Business Professors in Beijing to ensure that the interpretation of both questionnaires (used in the pilot study in US and the one in China) had the same linguistic interpretations for all subjects.

## DATA ANALYSIS AND RESULTS

Table 2 presents the characteristics of the respondents. Almost all respondents included in this study have some experience of using WIMT.

### Hypothesis Testing

Mean values, standard deviations and a matrix of inter-correlations among the six research constructs are presented in Table 3 as important descriptive data. If the intention to accept WIMT mean rating value correlated positively and significantly with the six research constructs, the six hypotheses could be supported. For data analysis, SPSS version 11.5 was used as the statistical tool. Univariate General Linear Model was used for hypotheses testing. The alpha was established *a priori* at the .05 level, as suggested in the literature.

**Table 1: Research constructs, measurements, and reliability assessment.**

Hypothesis No.	Research Construct	Measurement Variables	$\alpha$
H1	Wireless Trust Environment	notice; choice; access; managerial security protection; security technique protection;	0.70
H2	Perceived Usefulness	decreased the time needed for work/study/life; increase quality or output for life; increase the effectiveness of life; improve works/study/life; increase opportunities; increase varieties; increase flexibilities; gain job/life security;	0.88
H3	Perceived Ease of Use	clear and understandable; doesn't require a lot of mental effort; easy to use; easy to do what I want it to do;	0.71
H4	Facilitating Conditions	help/instruction availability; training; resource; knowledge; wireless access availability; legal protection; government policies/regulations;	0.71
H5	System Complexity	screen design; input feature; response time; roaming capabilities; data transmission rate; data throughput in uplinks and downlinks; bandwidth; memory storage; battery power; screen size; email and messaging services; time and location based services; personalization; long time wireless access;	0.75
H6	Social Influences	more prestige; high profile; status symbol; other people influences	0.75

**Table 2: Characteristics of Respondents.**

Category	Number	Percentage
1. Experience with mobile devices		
(1) Web phones (e.g., the US/European WAP Phone, Japanese I-Mode phone)	36	25.90%
(2) Wireless handholds (e.g., palmtops, PDA)	65	46.76%
(3) Two-way pages	18	12.95%
(4) Voice portals (receiving information services via mobile devices)	28	20.14%
(5) Wireless Web PCs	109	78.42%
(6) Others	27	19.42%
2. Gender		
(1) Male	78	56.12%
(2) Female	61	43.88%
Total	139	100%
3. Age Group		
(1) 20-25	113	81.29%
(2) 26-30	12	8.63%
(3) 31-35	2	1.44%
(4) 36-40	1	0.72%
(5) 41-45	2	1.44%
(6) Greater than 45	2	1.44%
(7) Missing	8	5.76%
Total	139	100%

The univariate GML tests reveal that five of the hypothesized relationships are strongly supported with one exception. The unsupported relationship is that between facilitating conditions and intention to accept WIMT. Meanwhile, facilitating conditions is found strongly correlated with wireless trust environment, user perceived usefulness and ease of use ( $p = 0.0001$ ,  $p = 0.0001$ ,  $p = 0.001$ ). Since these three factors are identified as strongly correlated with intention to accept WIMT, they seem to serve as mediating factors in this study between facilitating conditions and intention to accept WIMT.

**Table 3: Matrix of Intercorrelations Among Study Constructs (N=139).**

Construct	Mean	St.D.	1	2	3	4	5	6	7
1. Intention to accept WIMT	5.53	1.46	1.00 (0.0)						
2. Wireless Trust Environment	5.23	0.83	0.21 (0.0112)	1.00 (0.0)					
3. Perceived Usefulness	4.80	0.96	0.36 (0.0001)	0.31 (0.0002)	1.00 (0.0)				
4. Perceived Ease	4.65	1.16	0.32	0.27	0.36	1.00			



of Use			(0.0001)	(0.0014)	(0.0001)	(0.0)			
5. Facilitating Conditions	4.44	0.80	0.15 (0.0883)	0.43 (0.0001)	0.40 (0.0001)	0.36 (0.0001)	1.00 (0.0)		
6. System Complexity	4.77	0.61	0.39 (0.0001)	0.35 (0.0001)	0.33 (0.0001)	0.29 (0.0004)	0.36 (0.0001)	1.00 (0.0)	
7. Social Influences	4.06	1.05	0.17 (0.0441)	0.33 (0.0001)	0.49 (0.0001)	0.31 (0.0003)	0.47 (0.0001)	0.28 (0.0001)	1.00 (0.0)
<p>Note: (1) p values are in the ( ).                  (2) The measurement scale of mean values is from 1 (strongly disagree) to 7 (strongly agree).</p>									

### DISCUSSION

In this study, over 78% survey participants used wireless Internet services via web PCs, little less than half used Internet services via mobile handhelds such as palmtops and PDAs, and one fourth used mobile phones. About 90% of the participants were young people (in the age range of 20-30). Except age level, the descriptive data obtained were not that different from the findings in the United States (e.g., Lu, Hayes, Liu, & Yu, 2003; Lu, Liu, Yu, & Ku, 2004). The fact that this study was conducted in a MBA E-Commerce class, may more or less contribute to this similarity. These findings also indirectly reflect a phenomenon that college students in Beijing in 2002 were as familiar with wireless Internet services. The fact that the number of participants accessing wireless Internet services was not as big as expected may be explained by the possibility that in year 2002, despite the popularity of the mobile phones, most cell phones did not carry attractive Internet data services, or for the incomparable Internet services and easy access on the university campus, most users preferred using mobile phones for voice communications only.

The mean values displayed in Table 3 on the research model seem to tell us that the participants obviously had strong intention to accept WIMT (M=5.53), since unit 5 on the 7-point scale indicates positive agreement. The participants also had positive perception of the Wireless Trust Environment (M=5.23). This finding was contrary to the finding in a study among the American graduate students (Lu, Yu, & Liu, in press) where the subjects appeared to be more concerned with the trust issue in wireless environment. Since the data we got from this study was too limited, it may be premature to conclude whether the result was indicative of any trend in the wireless virtual environment in China, or the users were not as concerned of the trust issue. Similarly the participants' perceptions toward Usefulness (M=4.80) and Ease of Use (M=4.65) tended to be positive. Mean score on System Complexity (M=4.77) also tended to agree with our descriptions of the WIMT system variables. However, the participants seemed doubtful on Facilitating Conditions (M=4.44) and Social Influences (M=4.04).

The significant correlations between Perceived Usefulness and Perceived Ease of Use and Intentions to Accept WIMT support our research hypotheses on the relationships between these two perceptual beliefs and the intention. These results seemed to support the findings in the general technology acceptance studies (e.g., Davis, 1989; Davis et al., 1989; Davis, 1993).

The significant positive correlation between WIMT system complexity and intention to accept WIMT in China should be valuable for researchers as well as practitioners in recognizing the importance of improving WIMT system utility. In addition, results of the measurement procedures reveal that each of the four sub-constructs of System Complexity – data transfer efficiency, interface design, mobile device capacity, and functionality – is correlated closely with one another. This fact implies that these four conceptual sub-factors are indispensable parts of WIMT technology complexity. To analyze the system characteristics of WIMT, these four aspects have to be carefully examined.

Although the mean perception score on wireless trust environment tended to be higher, the significant correlation between perceived wireless trust and intention to accept WIMT seemed to echo the similar finding in the United States (Lu, Yu, & Liu, in press).

The findings on facilitating conditions seem to be conflicting with the findings by Thompson et al., (1994), but supportive of Venkatesh's modeled relationship (2000). The weak support for the hypothesized tie between facilitating conditions and intention to accept wireless Internet services via mobile technology may be related to two facts. First, the target population for this study is the general mobile users in China. Formal support and training for mobile users at large can hardly be traced. Second, early penetration of mobile devices in China has rendered formal training and support much less important for wireless access via mobile devices. Meanwhile, facilitating conditions is found strongly correlated with wireless trust environment, user perceived usefulness and ease of use ( $p = 0.0001$ ,  $p = 0.0001$ ,  $p = 0.001$ ). The correlation between facilitating conditions and wireless trust environment also seemed to support a finding in the United States that facilitating conditions impact perceived wireless trust environment (Lu, Yu, & Liu, in press). The strong relationships between facilitating conditions and perceived usefulness and ease of use are also worth our attention. Since these three factors are identified as strongly correlated with intention to accept WIMT, they seem to serve as mediating factors in this study between facilitating conditions and intention to accept WIMT. More research efforts are needed to explore its true nature of influence.

Social influences in this study was directly related to intention to accept WIMT in China, however, the effect was only of statistical value. On the contrary, social influences were strongly correlated with all other perceptual beliefs. Similar to facilitating conditions, social influences seemed to influence formation of the other beliefs about WIMT rather than intention. This recurring event seemed to suggest that our research model should be adjusted to reflect more complex, different layers of influences on intention to accept WIMT.

## CONCLUSIONS

The survey of the MBA students in Beijing reveals that a good number of MBA students in China had strong intention to accept WIMT. Intention to accept WIMT was clearly associated with four antecedents – Perceived usefulness, perceived ease of use, wireless trust and wireless system complexity. The first three types of perceptions display strong correlations with social influences, facilitating conditions and wireless system complexity. The empirical data seemed to imply the causal relationship pattern of external variables influencing perceptual determinants that in turn impact user intention to accept WIMT in China. This more or less reflects the WIMTAM model published in Internet Research (Lu, Yu, Liu & Yao, 2003).

For all its preliminary nature, this study contributed to our understanding of the determinants for accepting wireless Internet data services among graduate students in Beijing in 2002. From a theoretical perspective, the findings add value to mobile data services acceptance literature by providing a current profile of what needs to be considered in China. Apparently, business organizations that launch wireless applications in China should also be aware of the impacts of the theoretical constructs investigated in this study, when designing strategies for promoting wireless Internet data services in China.

Based on the findings of this study, several recommendations can be advanced. Since the most important selling points are on the practical use value and ease of use, businesses should continue their efforts in improving and promoting the practical use values of the wireless data services on the mobile devices, while keeping the easy to use data input and output features. In addition, wireless application designers should focus more on interface and input feature design to facilitate user access to the wireless Internet services via mobile devices. Second, businesses should actively seek ways to utilize social influences in China for shaping potential users' perceptions toward wireless Internet data services and promoting acceptance of WIMT. Third, although the mobile users in this study did not reveal any particular concern for wireless trust environment, they still regarded wireless trust environment an important determinant for accepting wireless Internet data services, together with perceived usefulness and ease of use. This study at least implied that positive social influences, facilitating conditions which were weak in China and constant improvement to wireless system complexity could all be the means and channels for forging positive perceptions.

Meanwhile, it should also be noted that the causal relationships implied in this study are based on input from a small and convenient sample from Beijing. The study should be replicated in other cities or regions or nation-

wide in China with a more theoretically solid model like WIMTAM and more sophisticated data analysis procedures. Thus the findings can be compared with similar findings in other countries and regions to identify the general implications as well as propositions meaningful to special geographical and cultural settings. Efforts should also be made to explore other determinants of intention to accept WIMT in China as well.

## REFERENCES

- Albarracin, D., Johnson, B.T., Fishbein, M., & Muellerleile, P.A. (2001). Theories of reasoned action and planned behavior as models of condom use: A meta-analysis, *Psychological Bulletin*, 127(1), 142-161.
- Al-Gahtani, S. S., & King, M. (1999). Attitudes, satisfaction and usage: Factors contributing to each in the acceptance of information technology, *Behavior and Information Technology*, 18(4), 277-297.
- Anckar, B., & D’Incau, D. (2002). Value creation in mobile commerce: findings from consumer survey, *Journal of Information Technology Theory & Application*, 4(1), 43-64.
- Beaulieu, M. (2002). *Wireless Internet: Applications and architecture*. Boston, MA: Addison-Wesley.
- Bergeron, B. (2001). *The wireless Web: How to develop and execute a winning wireless strategy*. New York, NY: McGraw-Hill.
- Burnham, J. P. (2002). *The essential guide to the business of U.S. mobile wireless communications*, Saddle River, NJ: Prentice Hall PTR.
- Cassano, D. (2000). E-business unplugged, *Communications News*. 37(11), 54-55.
- Chau, P.Y. K. (1996). An empirical assessment of a modified technology acceptance model, *Journal of Management Information Systems*, 13(2), 185-204.
- Clark, C. (2000). Coming attraction, *Wireless Review*, 17(12), 12-16.
- Coyle, F. P. (2001). *Wireless Web: A Manager’s Guide*, New Jersey, NJ: Addison Wesley.
- Culnan, M.J. (1993). How did you get my name? An exploratory investigation of consumer attitudes toward secondary information use, *MIS Quarterly*, 17(3), 341-363.
- Davis, F.D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology, *MIS Quarterly*, 13(3), 319–340.
- Davis, F. D. (1993). User acceptance of information technology: System characteristics, user perceptions and behavioral impacts, *International Journal of Man-Machine Studies*, 38, 475-487.
- Davis, F.D., Bagozzi, R.P., & Warshaw, P.R. (1989). User acceptance of computer technology: A comparison of two theoretical models, *Management Science*, 35(8), 982–1003.
- DeSanctis, G. (1989). Small group research in information systems: Theory and method. From *The Information Systems Research Challenge: Experimental Research Methods*. (Benbasat, ed.): Vol. 2, *Harvard Business School Research Colloquium*, 53-78.
- Dickson, G. W. (1989). A programmatic approach to information systems research: An experimentalist’s view. In *the Information Systems Research Challenge: Experimental Research Methods*. (Benbasat, ed.): Vol. 2, *Harvard Business School Research Colloquium*.
- Doney, P.M., & Cannon, J. P. (1997). An examination of the nature of trust in buyer-seller relationships, *Journal of Marketing*, 61(2), 35-31.

- Dornan, A. (2001). *The essential guide to wireless communications applications: From cellular systems to WAP and M-Commerce*, Upper Saddle River, NJ: Prentice Hall PTR.
- Forrest Research (2001). The digital consumer is here to stay, Retrieved 2002 from <http://www.forrester.com/ER/Research/Brief/Excerpt/0,1317,12681,00.html>
- Garbarino, E. and M.S. Johnson (1999) "The Different Roles of Satisfaction, Trust, and Commitment in Customer Relationships", *Journal of Marketing*, Vol. 63 No.2, pp. 70-87.
- Gefen, D. (2000). E-commerce: the role of familiarity and trust, *Omega*, 28(6), 725-737.
- Green, H., Alster, N., Borrus, A., & Yang, C. (2000). Privacy: Outrage on the web, *Business Week*, 3668(2), 38-40.
- Jensen, E. (1998). Mobile commerce going global, *Wireless Review*, 15(2), 14.
- Jiang, J. J., Hsu, M. K., Klein, G., & Lin, B. (2000). E-commerce user behavior model: An empirical study, *Human Systems Management*, 19(4), 265-276.
- Kenyon, P.B., & Perkins, T. (2000). China: Data in the air, *The McKinsey Quarterly*, 4, 15-18.
- Kutler, J. (2000). Mobile commerce without the hype, *Institutional Investor*, 34(5), 20-22.
- Lee, H. G. (1998). Do electronic marketplaces lower the price of goods? *Communications of the ACM*, 41(1), 73-80.
- Liang, T. P. & Wei, C. P. (2004). Introduction to the special issue: Mobile commerce applications, *International Journal of Electronic Commerce*, 8(3), 7-17.
- Lu, H. P., & Gustafsen, D. H. (1994). An empirical study of perceived usefulness and perceived ease of use on computerized support system use overtime, *International Journal of Information Management*, 14(5), 317-329.
- Lu, J., Yu, C. S., & Liu, C. (In press). Facilitating conditions, wireless trust and adoption intention, *Journal of Computer Information Systems*.
- Lu, J., Hayes, L., Liu, C., & Yu, C. (2003). Conceptual and operational definition of system complexity in the domain of wireless Internet via mobile technology. *International Journal of Mobile Communications*, 1(4), 360-371.
- Lu, J., Liu, C., Yu, C. S., & Ku, C. Y. (2004). Wireless Trust: Conceptual and Operational Definition, *International Journal of Mobile Communications*, 2(1), 38-50.
- Lu, J., Yu, C. S., Liu, C., Yao, J. (2003). Technology Acceptance Model for Wireless Internet. *Journal of Internet Research*, 13(2), 206-222.
- Lucas, H. C., & Spitler, V. (2000). Implementation in a world of workstations and networks, *Information & Management*, 38, 119-128.
- Macker, J. P., Park, V. D., & Corson, M. S. (2001). Mobile and wireless Internet services: Putting the pieces together, *IEEE Communications Magazine*, 39(6), 148-156.
- Madden, T.J, Ellen, P.S., & Ajzen, I. (1992). A comparison of the theory of planned behavior and the theory of reasoned action, *Personality and Social Psychology Bulletin*, 18(1), 3-9.
- Marchewka, J.T., Liu, C., and Petersen, C.G. (2003). Perceptions of unsolicited electronic mail or Spam, *Journal of International Technology and Information Management (JITIM)*, 12(1), | 121-136.

- Milberg, S.J., Burke, S.J., Smith, H. J., & Kallman, E.A. (1995). Values, personal information privacy, and regulatory approaches, *Communications of the ACM*, 38(12), 65-84.
- Moore, G. C., & Benbasat, L. (1991). Development of an instrument to measure the perceptions of adoption an information technology innovation, *Information Systems Research*, 2(3), 192-222.
- Nunnally, J.C. (1978). *Psychometric theory*, New York, NY: McGraw Hill.
- Phillips, J.T. (2002). Welcome to the new wireless culture, *Information Management Journal*, 36(1), 64-68.
- Raisinghani, M.S. (2001). WAP: Transitional technology for m-commerce, *Information Systems Management*, 18(3), 8-17.
- Regis, J. B. (2001). *Wireless broadband handbook*, New York, NY: McGraw-Hill.
- Samson, C., & Hornby, L. (1998). Spending for tomorrow, *Far Eastern Economic Review*, 161(50), 46-52.
- Seyal, A. H., Rahman, M. N., & Rahim, M. M. (2002). Determinants of academic use of the Internet: a structural equation model, *Behavior & Information Technology*, 21(1), 71-86.
- Taylor, S., & Todd, P.A. (1995). Understanding information technology usage: A test of competing models, *Information Systems Research*, 6(2), 144-174.
- Terry, D.J. (1993). Self-efficacy expectancies and the theory of reasoned action. In Terry, D.C., C. Gallois, and M. McCamish (eds.) *The theory of reasoned action: its application to aids preventive behavior*, Oxford, U.K.: Pergamon.
- Thompson, R. L., Higgins, C. A., & Howell, J. M. (1994). Influence of experience on personal computer utilization: Testing a conceptual model, *Journal of Management Information Systems*, 1(1), 167-187.
- Tornatsky, L.G., & Klein, K.J. (1982). Innovation characteristics and innovation adoption-implementation: A meta-analysis of findings, *IEEE Transactions on Engineering Management (EM-29)*, 28-45.
- Triandis, H. (1980). Values, attitudes, and interpersonal behavior, *Nebraska Symposium on Motivation, 1979: Beliefs, Attitudes, and Values*. Lincoln: University of Nebraska Press, 195-259.
- Varshney, U., & Vetter, R. (2001). A framework for the emerging mobile commerce applications. Proceedings of the 34<sup>th</sup> Hawaii International Conference on System Sciences 2001.
- Venkatesh, V. (2000). Determinants of perceived ease of use: integrating control, intrinsic motivation, and emotion into the technology acceptance model. *Information Systems Research*, 11(4), 342-365.
- Venkatesh, V., & Davis, F. D. (1996). A model of the antecedents of perceived ease of use: Development and test, *Decision Science*, 27(3), 451-481.
- Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: four longitudinal field studies. *Management Science*, 46(2), 186-204.
- Viega, J., Kohno, T., & Potter, B. (2001). Trust (and mistrust) in secure applications. *Communications of the ACM*, 44(2), 31-36.
- Webster, J. (1998). Desktop videoconferencing: Experiences of complete users, wary users, and non-users. *MIS Quarterly*, 22(3), 257-286.
- Xu, Y. (2003). Mobile data communications in China, *Communications of ACM*, 46(12), 81-85.

Zhang, X.N. and Prybutok, V.R. (2003). TAM: The moderating effect of gender on online shopping, *Journal of International Technology and Information Management (JITIM)*, 12(2), 99-118.

Zhang, X. (2001). The road of developing CDMA mobile networking in China, Retrieved March, 2002 from <http://www.enet.com.cn/eNews>.

## APPENDIX

### RELEVANT SURVEY ITEMS

**Gender:** Male \_\_\_\_\_ Female \_\_\_\_\_

**Age:**    Less than 20    20-25    26-30    31-35  
              36-40            41-45    Above 45

#### Mobile Devices for Accessing Wireless Internet Services

Web phones (e.g., the US/European WAP Phone, Japanese I-Mode phone)  
 Wireless handholds (e.g., palmtops, PDA)  
 Two-way pages  
 Voice portals (receiving voice services via mobile devices)  
 Wireless Web PCs  
 Others (Please specify)

#### Intention to Accept WIMT

Assuming I have access to the wireless Internet via mobile devices, I intend to use it.

#### Perceived Ease of Use

I have no problem to use the wireless Internet via mobile devices.  
 I find the wireless Internet via mobile devices to be easy to use.  
 I find it easy to get the wireless Internet via mobile devices to do what I want it to do.

#### Perceived Usefulness

Use of the wireless Internet via mobile devices will have no impact on my work/study/life.  
 Use of the wireless Internet via mobile devices can decrease the time needed for my work/study/life tasks.  
 Use of the wireless Internet via mobile devices can significantly increase the quality or output of my work/study/life.  
 Use of the wireless Internet via mobile devices can increase the effectiveness of my performance.  
 Considering all tasks, the use of the wireless Internet via mobile devices can assist my work/study/life.  
 Use of the wireless Internet via mobile devices will increase the opportunity for preferred job assignments.  
 Use of the wireless Internet via mobile devices will increase the amount of variety on my job/study/life.  
 Use of the wireless Internet via mobile devices will increase the opportunity for more meaningful work/life.  
 Use of the wireless Internet via mobile devices will increase the flexibility of changing jobs.  
 Use of the wireless Internet via mobile devices will increase my opportunity to gain job/life security  
 Overall, the use of the wireless Internet via mobile devices can assist my job/life opportunity and job performance

#### Social Influences

People around me who use the wireless Internet via mobile devices have more prestige than those who do not.  
 People who use the wireless Internet via mobile devices have a high profile.  
 Using the wireless Internet via mobile devices is considered a status symbol among my friends.

#### Facilitating Conditions

Wireless Internet via mobile devices is available to me when I need it.  
 Help is available for assistance with the wireless Internet via mobile devices.  
 Training for the wireless Internet via mobile devices is available to me  
 Overall, the use of the wireless Internet via mobile devices is very supportive.

I have the resources necessary to use the wireless Internet via mobile devices  
I have the knowledge necessary to use the wireless Internet via mobile devices  
Overall, using wireless Internet via mobile devices is still too expensive.

**Wireless Trust Environment**

Government/Corporate policies encourage use of wireless Internet via mobile devices.  
Legal protections are available for using wireless Internet via mobile devices.  
When using wireless Internet via mobile devices, I am sure that I will be notified if personal information is collected.  
When using wireless Internet via mobile devices, I am sure that I will be allowed to access the data collected from me.  
When using wireless Internet via mobile devices, I am sure that I have a choice to opt-in and/or opt-out to share my personal information with third parties.  
When using wireless Internet via mobile devices, I am sure that certain managerial and technique procedures exist to protect my personal information  
Mobile telecommunication is reliable all the time  
Overall, I trust the wireless online environment by using wireless Internet via mobile devices.

**Technology Complexity**

Wireless Internet is highly functional with rich m-commerce features (application capabilities)  
Wireless telecommunications support long time Internet access  
Wireless Internet applications provide easy to use user interfaces  
The screen design of the mobile devices is effective  
The terminology used on wireless Internet is easy to understand  
The bandwidth is not wide enough for heavy data transmission  
Mobile devices have limited storage memory and processing power comparing to desktop computers  
Wireless Internet has too complex application standards.  
Wireless Internet via mobile devices ensure personalization  
Wireless Internet services are time and location sensitive.