Examining user acceptance of SMS: An empirical study in China and Hong Kong

Kwok Yue Chan  
*Hong Kong University of Science and Technology, frankcky@ust.hk*

Min Gong  
*Samsung Economic Research Institute, mr.gong@samsung.com*

Yan Xu  
*Hong Kong University of Science and Technology, xuyan@ust.hk*

James Thong  
*Hong Kong University of Science and Technology, jthong@ust.hk*

Follow this and additional works at: [http://aisel.aisnet.org/pacis2008](http://aisel.aisnet.org/pacis2008)
EXAMINING USER ACCEPTANCE OF SMS: AN EMPIRICAL STUDY IN CHINA AND HONG KONG

Chan, Kwok Yue, Hong Kong University of Science and Technology, Clear Water Bay, Kowloon, Hong Kong, frankcky@ust.hk
Gong, Min, Samsung Economic Research Institute, 25/F, 118 Jian Guo Lu, Chao Yang District, Beijing, China, mr.gong@samsung.com
Xu, Yan, Hong Kong University of Science and Technology, Clear Water Bay, Kowloon, Hong Kong, xuyan@ust.hk
Thong, James Y.L., Hong Kong University of Science and Technology, Clear Water Bay, Kowloon, Hong Kong, jthong@ust.hk

Abstract

Short message service (SMS) has become an integral part of people’s lives. It is one of the most popular services for mobile communications. This paper examines the determinants of user intention to use SMS. We proposed and empirically tested a model with seven main determinants of user acceptance and two key moderators (i.e., gender and region). Our data were collected via a survey of 471 mobile phone users in China and Hong Kong. The results showed that perceived usefulness, perceived ease of use, perceived enjoyment, and perceived critical mass were the key direct determinants of user acceptance of SMS. Visibility, subjective norm, and perceived cost-effectiveness were found to have indirect influences on user acceptance via the key determinants. In addition, the results showed that gender and region each played an important role in affecting user acceptance, and the significant determinants vary across regions. We discuss implications related to mobile communication services.

Keywords: Technology acceptance, mobile communication services, short message service.
1 INTRODUCTION

In the information era, the fast-evolving information and communication technologies (ICT) and their corresponding applications and services, such as fixed-line telecommunications, wireless communications, and the Internet, are rapidly changing the society. ICT play an important role in social and economic development, such as substituting old technologies by the new ones, enabling new phenomena (e.g., mobile communication), and generating new technology-related business and societal changes (Sein and Harindranath 2004). Mobile communication technology is among one of the fast growing ICT. The number of mobile communication users surpassed that of fixed telephone users globally in 2003, and there were around two billion mobile phone users in the world by 2005, which means that one out of three people in the world is using mobile communication services (ITU 2005).

With the increased number of mobile subscribers across the world, short message service (SMS) has gained much popularity. Available on GSM (Global System for Mobile Communication) or CDMA (Code Division Multiple Access) digital networks, SMS allows text messages to be sent or received via the network operators’ message centers on mobile handsets, or from the Internet using the “SMS gateway” websites. In the second- or third-generation mobile communication networks, all mobile handsets allow users to send short messages at a reasonable price. As SMS operators use a “store-and-forward” packet switching concept (even if the recipients’ handset is switched off, they will still be able to receive the message once they turn on the handset), SMS can be considered an almost instantaneous communication medium (Tung 2004). Users can connect to ICQ, MSN or AOL instant messaging services via SMS. In addition to basic person-to-person messaging, SMS can provide many other value-added service applications, such as ring tones downloading, stock alerts, sports and entertainment news delivery, and electronic commerce authentication.

SMS has become an integral part of people’s lives, with significant implications for communications (Tung 2004). According to the GSM association, by mid-2004 SMS messages were being sent over GSM wireless networks at a rate of 500 billion messages per annum, making SMS the most popular mobile data service (GSM, http://www.gsmworld.com/index.shtml). In China, the usage volume of SMS increased from 440.1 million messages in 2000 to 304.6 billion messages in 2005 (MII, http://www.mii.gov.cn). On Chinese New Year’s day in 2006, i.e. 29 January 2006, more than 1 billion short greeting messages were delivered over the mobile operators’ networks, which brought in a revenue of about 100 million Yuan (or US$12.1 million) within a single day (Xu 2006). On the other hand, although Hong Kong has the world’s highest penetration rate of mobile phones, the diffusion of SMS in Hong Kong was much slower than expected. The usage volume of SMS increased gradually from 112.8 million messages in 2003 to 193 million messages in 2005 (OFTA, http://www.ofta.gov.hk).

The substantial difference in SMS usage in China and Hong Kong has given rise to a series of research questions: (1) what are the factors that lead to SMS acceptance in general? And (2) are the effects of these factors different across China and Hong Kong? Although prior studies have studied the telecommunications sector in China and Hong Kong, most of these studies have focused on the telecommunications network operations (e.g., Shen 1999, Xu 2000, 2001), and only a limited number of studies have studied user adoption of telecommunication services in China (e.g., Xu 2003). As mobile communication systems are currently moving towards the third-generation systems (3G) and beyond, a better understanding of the critical factors that affect user acceptance of SMS has significant implications for both research and practice. For research, in addition to introducing the technology acceptance perspective to the telecommunications field, a comparative study on user acceptance of SMS across regions helps extend prior literature beyond examining technology acceptance within a single institution or within a single region. For practice, a comparative study across regions can provide useful insights into the usage behavior of SMS users, which will assist mobile operators in
designing region-specific strategies when launching new mobile data services in different regions. Therefore, our paper has the following objectives:

1. To formulate a model of user adoption of SMS: We draw from prior research to identify potential determinants of individual adoption of SMS, and formulate a research model that helps understand user acceptance of SMS.

2. To empirically validate our model: We empirically validate our model using data collected in a survey among mobile phone users in China and Hong Kong.

2 LITERATURE REVIEW

The research stream examining the acceptance and use of new information technologies has been one of the richest and most mature research streams in the information systems (IS) discipline (Venkatesh, Morris, Davis & Davis 2003, Venkatesh, Davis & Morris 2007). Research in this area has resulted in several theoretical models with roots in the psychological and consumer behavior disciplines, which routinely explain around 40 to 60 percent of the variance in an individual’s behavioural intention to use technological innovations (e.g., Davis 1989, Hu, Chau, Sheng & Tam 1999, Venkatesh and Davis 2000, Venkatesh et al. 2003. Brown and Venkatesh 2005). Venkatesh et al. (2003) reviewed and synthesized these various user acceptance models, formulated the unified theory of acceptance and use of technology (UTAUT) and empirically validated it in their study. In the UTAUT, performance expectancy, effort expectancy, social influence, and facilitating conditions are the key determinants of acceptance and use of technology. UTAUT accounts for 70 percent of the variance in intention to use, a substantial improvement over any of the original eight models and their extensions (Venkatesh et al. 2003).

Although UTAUT represents the latest work that synthesizes previous models and provides a unified view of technology adoption, it does not incorporate certain key factors, such as intrinsic motivations (e.g., perceived enjoyment) as mentioned in previous studies (e.g., Van der Heijden 2004, Hong and Tam 2006). Given the differences in technological and user characteristics across technologies, intrinsic motivations may have strong influences on the intention to use, and sometimes may overweight the influence of performance expectancy (e.g., Chin, Marcolin & Newsted 2003, Hong and Tam 2006). Further, as noted by Hu et al. (1999), the explanatory power of a particular model or theory would depend on the characteristics of the user populations, the characteristics of the technology, and the characteristics of the organizational context for the use of the technology. However, most of previous technology acceptance models have mainly focused on productivity-oriented technologies in the work contexts (Davis 1989, Davis, Bagozzi & Warshaw 1992, Hu et al. 1999, Venkatesh et al. 2003).

An emerging stream of research has focused on technology adoption in the non-work contexts. Brown and Venkatesh (2005) studied personal computer (PC) adoption in households, and their results were different from previous findings in the workplace. Hu et al. (1999) studied physicians’ acceptance of telemedicine technology and found that perceived ease of use was not a significant determinant of attitude towards and intention to use the technology, results deviating from what Davis’s (1989) Technology Acceptance Model (TAM) postulated. Hong, Thong, Wong, and Tam (2002) examined the adoption of a digital library, and found that both individual differences and system characteristics were important determinants of perceived ease of use. Kwon and Chidambaram (2000) examined the adoption of cellular telephones and found that nearly two-thirds of the respondents in their survey subscribed to cellular services for personal use rather than for business purposes. They concluded that intrinsic motivation, such as perceived enjoyment, had a significant effect on the intention to use cellular telephones. Chin et al (2003) found that perceived enjoyment had a greater effect than perceived usefulness on the intention to use emails.

In sum, prior research has suggested that technological characteristics, such as perceived usefulness and perceived ease of use, are significant determinants of user adoption of technologies in
general. However, in non-work contexts, the influences of these technological characteristics may be outweighed by other factors, such as individual differences and intrinsic motivations. Further, most of technology acceptance models have not taken into account the possible influences of economic factors, such as the cost of using the technology. This is possibly because in workplace settings, end users usually do not need to pay for the use of the technology and thus they may not concern about the usage cost when they decide whether to use the technology.

3 RESEARCH MODEL AND HYPOTHESES

Based on prior research, we identify a number of potential factors that may affect user acceptance of SMS. The selection of variables is supported by prior studies on technology adoption and telecommunication services. The proposed research model includes seven main determinants—i.e., perceived usefulness, perceived ease of use, perceived enjoyment, perceived critical mass, visibility, subjective norm, and perceived cost-effectiveness. In addition, gender and region are included in the model and are expected to have moderating effects on certain relationships. Finally, age, experience of using mobile phones, and consumption amount on mobile communications service per month are added as control variables. The research model is depicted in Figure 1.

Figure 1. The research model

3.1 Main effects of proposed determinants

Perceived usefulness is defined as “the degree to which a person believes that using SMS would enhance his or her personal communication performance or effectiveness” (Davis 1989), since the use of SMS is usually for personal communication rather than work purposes in the the context of mobile communication. Prior research has found that perceived usefulness is the strongest predictor of intention to use and remains significant over time (Venkatesh et al. 2003). We expect such an influence will persist in the current context. Therefore, it is hypothesized that:

H1: Perceived usefulness has a positive influence on user’s intention to use SMS.

Perceived ease of use is defined “the degree to which a person believes that using SMS would be free of effort” (Davis 1989). It has been found to be an important factor affecting the intention to adopt an innovation in previous studies on various technologies (e.g., Davis, Bagozzi & Warshaw 1989). In addition, perceived ease of use has been found to indirectly influence intention through perceived usefulness (Davis et al. 1989). Therefore, it is hypothesized that:
H2a: Perceived ease of use has a positive influence on user’s intention to use SMS.

H2b: Perceived ease of use has a positive influence on perceived usefulness of SMS.

Perceived enjoyment is defined as “the extent to which the activity of using SMS is perceived to be enjoyable in its own right, apart from any performance consequences that may be anticipated” (Davis et al. 1992). Deci’s (1975) motivation theory proposes that people expend effort due to both intrinsic and extrinsic motivation. Perceived usefulness is an example of extrinsic motivation, whereas perceived enjoyment is an example of intrinsic motivation. Since the purpose of using mobile communication technologies (e.g., personal communication and entertainment) is much different from that of using computing information technologies in the workplace (e.g., productivity), intrinsic motivation is expected to play a more important role in determining user’s intention to use SMS (e.g., Hong and Tam 2006). Further, Venkatesh (2000) suggested that perceived enjoyment might have an indirect impact on intention via perceived ease of use. He suggested that the lack of enjoyment may cause system use to be perceived to be more effortful. Therefore, it is hypothesized that:

H3a: Perceived enjoyment has a positive influence on user’s intention to use SMS.

H3b: Perceived enjoyment has a positive influence on perceived ease of use of SMS.

Perceived critical mass is a potential adopter’s perception of whether SMS has attracted a sufficient number of individuals to indicate that critical mass has been reached (Lou, Lou & Strong 2000). Perceived critical mass has been shown to be a key determinant in groupware acceptance (Lou et al. 2000). The understanding of critical mass has been cited as a key area for future research, particularly with respect to communications innovations (McGrath and Zell 2001). Since the utility of SMS depends heavily on the number of senders and recipients, users may be more likely to use SMS if they perceive that lots of people in their social circles have used SMS. Further, SMS may help improve their performance in communications. For example, instead of making individual phone calls to a group of friends, users are able to send a message to multiple recipients at one time. Meanwhile, when more SMS users are present, users are better able to seek help from others when they meet with difficulties in using SMS. Therefore, it is hypothesized that:

H4a: Perceived critical mass has a positive influence on user’s intention to use SMS.

H4b: Perceived critical mass has a positive influence on perceived usefulness of SMS.

H4c: Perceived critical mass has a positive influence on perceived ease of use of SMS.

Visibility is defined as the degree to which one can see others using SMS in the surroundings (Rogers 1995). Prior research has suggested that visibility can facilitate the adoption of an innovation (Moore and Benbasat 1991, Rogers 1995). Since the use of mobile communications is often in the public, it is likely that people can observe others using SMS. Further, visibility of SMS may help users form a better perception of the popularity of SMS. Therefore, it is hypothesized that:

H5a: Visibility has a positive influence on user’s intention to use SMS.

H5b: Visibility has a positive influence on perceived critical mass of SMS.

Subjective norm is defined as “the degree to which an individual perceived that important others believe he or she should use SMS” (Venkatesh et al. 2003). In the context of mobile communications, the use of SMS is not mandatory. Since the use of SMS is often used among a group of people (or at least between one sender and one recipient), it is considered a group activity and it will be significantly influenced by other people who can influence the behavior of potential users. Further, the presence of a strong subjective norm may imply that people in the social circle of a potential user have already been the users of SMS. SMS will provide an additional channel for the potential user to communicate with these people, resulting in better effectiveness in communications. Therefore, it is hypothesized that:

H6a: Subjective norm has a positive influence on user’s intention to use SMS.
Subjective norm has a positive influence on perceived usefulness of SMS.

Perceived cost-effectiveness is defined as an individual’s subjective assessment whether SMS can provide better service quality than voice service, relative to the costs of using SMS and voice service. Prior research has suggested that most consumers cognitively encode prices in ways that are meaningful to them, such as “expensive” or “cheap” (Jacoby and Olson 1977). Marketing price theories indicate that there is no absolute high or low price, but consumers have subjective assessments about prices. These subjective prices can be associated with both the price and the quality of the product (Monroe and Krishnan 1985). When people make a purchasing decision, they usually select some alternative goods and then compare their costs and benefits. People are more likely to purchase goods or services that are cost-effective (i.e., relatively cheap but useful). Therefore, it is hypothesized that:

H7a: Perceived cost-effectiveness has a positive influence on user’s intention to use SMS.

H7b: Perceived cost-effectiveness has a positive influence on perceived usefulness of SMS.

3.2 Moderating effects of gender

Previous psychology studies have indicated that gender would influence the decision-making process, and schematic processing by women and men is different (Bem 1981). For instance, research on gender differences has indicated that men tend to be highly task-oriented (Minton and Schneider 1980). In IS research, some studies have explored gender’s role in technology acceptance and usage (e.g., Venkatesh and Morris 2000, Venkatesh et al. 2003). Venkatesh and Morris (2000) found that “perceived usefulness influences behavioral intention to use a system more strongly for men than it influences women” (p.118), “perceived ease of use will influence behavioral intention to use a system more strongly for women than it influence men” (p.119), and “subjective norm influences behavioral intention to use a system more strongly for women than it influences men” (p.119). Venkatesh et al. (2003) reported consistent findings.

In addition, the influence of perceived enjoyment on intention is expected to be more significant for women than for men, since women are more people-oriented, compliant and focused on solidarity than men, and are more anxious about computer use than men (Bozionelos 2001, Coates 1986, Preisler 1987). Further, previous studies on gender’s effect on people’s economic behaviors have suggested that men seem to be more generous than women. For example, Conlin, Lynn, and O’Donoghue (2003) found that male consumers were more generous in giving tips in restaurants. Cox and Deck (2002) stated that women generally were more price-sensitive than men. Therefore, it is hypothesized that:

H8a: The influence of perceived usefulness on user’s intention to use SMS will be stronger for men than for women.

H8b: The influence of perceived ease of use on user’s intention to use SMS will be stronger for women than for men.

H8c: The influence of perceived enjoyment on user’s intention to use SMS will be stronger for women than for men.

H8d: The influence of subjective norm on user’s intention to use SMS will be stronger for women than for men.

H8e: The influence of perceived cost-effectiveness on user’s intention to use SMS will be stronger for women than for men.
3.3 Moderating effects of region

Prior research has suggested that researchers should give a richer treatment to the context in theorizing (Benbasat and Zmud 2003; Orlikowski and Iacono 2001). As noted by Hu et al. (1999), the technology usage context will have impact on the predicative and explanatory power of the acceptance model.

Xu (2003) suggested that China and Hong Kong were two different regions with substantial differences in terms of politics, economics, culture, and social development. These differences have significant influences on the acceptance of SMS in the two regions. First, due to cultural differences, users in China are reluctant to leave voice messages but text messages, whereas voicemail is more preferable and is one of the most commonly used value-added mobile services in Hong Kong. Further, in China, SMS is regarded as a substitute for email, and it allows users to exchange a wide variety of information, such as news, stock price alerts, mobile payment confirmations, and weather updates. Users in China are used to use SMS for more purposes than those in Hong Kong. They are more likely to find the use of SMS useful and enjoyable.

Second, the input language poses a hurdle to the use of SMS. In China, inputting Chinese on a mobile phone is relatively easy, because “Pinyin”, a method to input Chinese characters with the sounds in Mandarin, is very popular and easy to use. Pinyin has been taught in almost all primary schools since the early 1950s. To input Chinese characters is almost as easy as to input English words. In Hong Kong, however, a different and more difficult character system is used. Specific Chinese input methods are needed in order to input traditional Chinese characters. This poses a hurdle to the use of SMS in Hong Kong.

Third, the use of SMS among friends or colleagues to exchange greetings or information has become a social activity in China (Xu, 2003). This forms a social norm, and people may feel isolated if they do not participate in using SMS.

Fourth, communication via SMS is more cost-effective in China. The end-user price for sending a message was 0.10 Yuan, whereas a one-minute call costs 0.40 Yuan for both the calling party and the called party. In Hong Kong, however, users enjoy very low prices for mobile voice services due to the keen competition. The average rate per minute for voice services is less than HK$0.08, whereas the rate for SMS is HK$0.4 per message. Therefore, it is hypothesized that:

\[ H9a: \text{The influence of perceived usefulness on user’s intention to use SMS will be stronger for users in China than for those in Hong Kong.} \]

\[ H9b: \text{The influence of perceived ease of use on user’s intention to use SMS will be stronger for users in Hong Kong than for those in China.} \]

\[ H9c: \text{The influence of perceived enjoyment on user’s intention to use SMS will be stronger for users in China than for those in Hong Kong.} \]

\[ H9d: \text{The influence of subjective norm on user’s intention to use SMS will be stronger for users in China than for those in Hong Kong.} \]

\[ H9e: \text{The influence of perceived cost-effectiveness on user’s intention to use SMS will be stronger for users in China than for those in Hong Kong.} \]

4 RESEARCH METHODOLOGY

4.1 Sample and measurement

Subjects in this study were university undergraduate students who used mobile phones (not necessarily SMS users) in China and Hong Kong. The data were collected via a survey that was conducted in three universities in Beijing and Guangzhou, and one university in Hong Kong. In total, 471 responses
were received: 250 in China, and 221 in Hong Kong. Of the 471 respondents, 200 (42.5%) were men and 271 (57.5%) were women. Their average age was 20.7 years, with a standard deviation being 2.3. In terms of experience in using mobile phones, about 95% of respondents had more than 1 year of experience, and the majority of them (43.7%) had 2 to 5 years of experience. In terms of consumption amount on mobile communications service, 76.4% of respondents spent less than $100 per month, and less than 10% of them spent more than $150 per month.

We used previously validated scales for most constructs and modified them to fit the context of SMS. Perceived usefulness, perceived ease of use, and intention to use were measured with items adapted from Davis et al. (1989). Perceived enjoyment was measured with items adapted from Davis et al. (1992). Perceived critical mass was measured with items adapted from Lou et al. (2000). Visibility was measured with items adapted from Rogers (1995). Subjective norm was measured with items adapted from Taylor and Todd (1995). Perceived cost-effectiveness was measured with items that were self-developed based on the prior literature. The measurement items were translated to Chinese and back-translated to English by professional translators. Minor wording discrepancies were discussed and resolved. The questionnaire was administered in Chinese, the main lingua franca of people in China and Hong Kong.

## 5 RESULTS

### 5.1 Instrument validation

We conducted reliability and validity assessment of the measurement items following the procedures of Bhattacherjee and Premkumar (2004). Confirmatory factor analysis (CFA) was conducted using partial least squares (PLS). Results of the CFA show that the factor loadings for all items were significant and exceeded 0.70, thus demonstrating internal consistency. Table 1 shows that the composite reliabilities of all constructs exceeded 0.80 and average variance extracted (AVE) for each construct was greater than 0.50. Table 1 shows the correlation between variables. The correlations were all below the square root of AVE of either construct. This suggests that the constructs have adequate discriminant validity (Fornell and Larcker 1981). In sum, these results provide evidence of both reliability and validity.

<table>
<thead>
<tr>
<th></th>
<th>M</th>
<th>SD</th>
<th>CR</th>
<th>AVE</th>
<th>PU</th>
<th>PEOU</th>
<th>PENJ</th>
<th>PCM</th>
<th>VS</th>
<th>SN</th>
<th>PCE</th>
<th>INT</th>
</tr>
</thead>
<tbody>
<tr>
<td>PU</td>
<td>5.10</td>
<td>1.10</td>
<td>0.89</td>
<td>0.73</td>
<td>0.76</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PEOU</td>
<td>6.02</td>
<td>0.99</td>
<td>0.85</td>
<td>0.58</td>
<td>0.22***</td>
<td>0.85</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PENJ</td>
<td>4.73</td>
<td>1.36</td>
<td>0.89</td>
<td>0.73</td>
<td>0.52***</td>
<td>0.32***</td>
<td>0.93</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PCM</td>
<td>5.89</td>
<td>1.04</td>
<td>0.95</td>
<td>0.86</td>
<td>0.46***</td>
<td>0.32***</td>
<td>0.85</td>
<td>0.87</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VS</td>
<td>6.19</td>
<td>0.89</td>
<td>0.90</td>
<td>0.76</td>
<td>0.17***</td>
<td>0.26***</td>
<td>0.14**</td>
<td>0.36***</td>
<td>0.81</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SN</td>
<td>4.14</td>
<td>1.36</td>
<td>0.86</td>
<td>0.66</td>
<td>0.51***</td>
<td>0.13**</td>
<td>0.41***</td>
<td>0.29***</td>
<td>0.14**</td>
<td>0.89</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PCE</td>
<td>4.21</td>
<td>1.44</td>
<td>0.92</td>
<td>0.79</td>
<td>0.45***</td>
<td>0.21***</td>
<td>0.39***</td>
<td>0.24***</td>
<td>0.12**</td>
<td>0.31***</td>
<td>0.89</td>
<td></td>
</tr>
<tr>
<td>INT</td>
<td>5.04</td>
<td>1.25</td>
<td>0.92</td>
<td>0.79</td>
<td>0.57***</td>
<td>0.31***</td>
<td>0.62***</td>
<td>0.43***</td>
<td>0.19***</td>
<td>0.39***</td>
<td>0.41***</td>
<td>0.85</td>
</tr>
</tbody>
</table>

Note: 1. M: Mean; SD: Standard deviation; CR: Composite reliability; AVE: Average variance extracted.
2. PU: Perceived usefulness; PEOU: Perceived ease of use; PENJ: Perceived enjoyment; PCM: Perceived critical mass; VS: Visibility; SN: Subjective norm; PCE: Perceived cost-effectiveness; INT: Intention to use SMS.
3. Figures on diagonals are the square root of average variance extracted (AVE).
4. *** Correlations are significant at p < 0.001, ** Correlations are significant at p < 0.01.

Table 1. Descriptive statistics and correlations

### 5.2 Model testing

We tested our research model on the sample using PLS. The data analysis examined the combined sample collected in China and Hong Kong and also the two subsamples separately. To test the moderating effects of region, we conducted multi-group analyses to compare the differences in path
coefficients in the two subsamples, both with and without controlling for the moderating effect of gender (Chin 2000).

Table 2 presents the path coefficients and their significance levels of the hypotheses. The results showed that most of the proposed factors were significant predictors of user’s intention to use SMS, as well as significant antecedents of the key variables (i.e., perceived usefulness, perceived ease of use, and perceived critical mass). Most of the hypotheses regarding the main effects of the proposed factors were supported (except H2b, H5a, H6a, and H7a). Two moderating effects of gender were confirmed (i.e., H8a and H8c).

For the two subsamples (i.e., China and Hong Kong), the significant predictors varied. The results of the group comparison indicated that the effects of perceived enjoyment, perceived critical mass, and subjective norm on user’s intention to use SMS were significantly different across regions, when the moderating effect of gender was controlled. First, perceived enjoyment had a stronger effect for women in China than for women in Hong Kong. Second, perceived critical mass had a stronger effect for users in China than for those in Hong Kong. Third, subjective norm had a stronger effect for men in China than for men in Hong Kong. On the other hand, when the moderating effect of gender was not controlled (i.e., not included in the model), perceived ease of use was found to have a stronger effect for users in Hong Kong than for those in China. In sum, the results indicated that the effects of the proposed determinants differed across regions (i.e., China and Hong Kong) for all users, or for men/women only. The results provided partial support to our hypotheses (i.e., H9b, H9c and H9d).

6 DISCUSSION

This study proposes a model for predicting users’ intention to use SMS. We empirically validate our model using data collected from 471 users in China and Hong Kong. The results generally support the proposed model.

The seven main determinants have significant influences (i.e., direct, indirect, or both) on user’s intention to use SMS. Further, we find partial support to our hypotheses related to gender (i.e., H8a and H8c). In sum, the results confirm the importance of the proposed determinants, as well as the role of gender, in influencing user acceptance of SMS in general.

Further, the results indicate a number of differences across China and Hong Kong. First, the significant determinants vary across regions. In China, user’s intention to use SMS is determined by a number of factors, including perceived usefulness, perceived critical mass, subjective norm, and perceived enjoyment (moderated by gender). In Hong Kong, user intention is determined mainly by perceived usefulness and perceived enjoyment. The results of multi-group analyses confirm that the influences of perceived ease of use, perceived enjoyment, and subjective norm do differ across China and Hong Kong. This indicates the need to closely examine the possible differences in users’ concerns, which may be attributed to the differences in culture and the telecommunication markets in China and Hong Kong.

Surprisingly, a close examination of results shows that some of the findings are opposite to our conjectures. First, the effect of subjective norm is stronger for men than women in China, whereas the effect has been found to be opposite in prior research. This indicates that previous findings on gender differences in the work contexts (e.g., Venkatesh et al. 2003) may not be readily applicable to all circumstances. It is likely that gender’s moderating roles may vary across technologies and usage contexts. In the case of SMS, men may represent the lagging users, as they reported significant lower use of SMS than women in our sample (5.08 for men, and 5.36 for women on a 7-point scale). As a result, it is likely that the social pressure exerted by leading users on men is relatively stronger than that on women. Further, we find that although perceived enjoyment is an important determinant of intention on the whole, its effect is moderated by gender in the China sample only. This again indicates that the role of gender in influencing user acceptance may differ across usage contexts.
In sum, our findings have several implications. First, mobile communication technologies are complex technologies that users in different regions may encounter different hurdles (e.g., input methods) to successful use. Second, SMS can be used for multiple purposes. Its uses can be instrumental (e.g., confirming meeting time) or entertaining (e.g., receiving sports news). It is unclear whether users will obtain the same enjoyment or satisfaction from these different activities, and whether such enjoyment is perceived equally by both men and women. This may attribute to our findings that the effect of perceived enjoyment is moderated by gender in the China sample only.

For practitioners, our findings suggest that in order to facilitate users’ acceptance of mobile communication services, it is crucial to strengthen user perception on the services’ enjoyment, effortlessness, and usefulness simultaneously. When introducing a new mobile service, such as 3G-based Internet browsing, service providers should provide a variety of features to induce users’

| Table 2. Hypotheses testing |

In sum, our findings have several implications. First, mobile communication technologies are complex technologies that users in different regions may encounter different hurdles (e.g., input methods) to successful use. Second, SMS can be used for multiple purposes. Its uses can be instrumental (e.g., confirming meeting time) or entertaining (e.g., receiving sports news). It is unclear whether users will obtain the same enjoyment or satisfaction from these different activities, and whether such enjoyment is perceived equally by both men and women. This may attribute to our findings that the effect of perceived enjoyment is moderated by gender in the China sample only.

For practitioners, our findings suggest that in order to facilitate users’ acceptance of mobile communication services, it is crucial to strengthen user perception on the services’ enjoyment, effortlessness, and usefulness simultaneously. When introducing a new mobile service, such as 3G-based Internet browsing, service providers should provide a variety of features to induce users’

<table>
<thead>
<tr>
<th>Variables</th>
<th>Full Sample (n=471)</th>
<th>China (n=250)</th>
<th>Hong Kong (n=221)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Usage intention</td>
<td>$R^2=0.51$</td>
<td>$R^2=0.50$</td>
<td>$R^2=0.56$</td>
</tr>
<tr>
<td>Perceived usefulness</td>
<td>0.33***</td>
<td>0.20*</td>
<td>0.41***</td>
</tr>
<tr>
<td>Perceived ease of use</td>
<td>0.12*</td>
<td>0.03</td>
<td>0.16</td>
</tr>
<tr>
<td>Perceived enjoyment</td>
<td>0.24***</td>
<td>0.16</td>
<td>0.35***</td>
</tr>
<tr>
<td>Perceived critical mass</td>
<td>0.14***</td>
<td>0.21***</td>
<td>0.04</td>
</tr>
<tr>
<td>Visibility</td>
<td>0.01</td>
<td>0.02</td>
<td>-0.01</td>
</tr>
<tr>
<td>Subjective norm</td>
<td>0.08</td>
<td>0.24**</td>
<td>-0.05</td>
</tr>
<tr>
<td>Perceived cost-effectiveness</td>
<td>0.05</td>
<td>0.05</td>
<td>0.02</td>
</tr>
<tr>
<td>Age</td>
<td>0.01</td>
<td>-0.03</td>
<td>0.03</td>
</tr>
<tr>
<td>Gender</td>
<td>0.03</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>Experience</td>
<td>-0.07*</td>
<td>-0.04</td>
<td>0.01</td>
</tr>
<tr>
<td>Consumption</td>
<td>0.06</td>
<td>0.05</td>
<td>0.07</td>
</tr>
<tr>
<td>Perceived usefulness $\times$ Gender</td>
<td>-0.13*</td>
<td>-0.00</td>
<td>-0.18*</td>
</tr>
<tr>
<td>Perceived ease of use $\times$ Gender</td>
<td>-0.06</td>
<td>-0.10</td>
<td>0.04</td>
</tr>
<tr>
<td>Perceived enjoyment $\times$ Gender</td>
<td>0.17**</td>
<td>0.29***</td>
<td>0.04</td>
</tr>
<tr>
<td>Subjective norm $\times$ Gender</td>
<td>-0.04</td>
<td>-0.22**</td>
<td>0.09</td>
</tr>
<tr>
<td>Perceived cost-effectiveness $\times$ Gender</td>
<td>0.06</td>
<td>0.07</td>
<td>0.04</td>
</tr>
</tbody>
</table>

Notes: 1. * p < 0.05, ** p < 0.01, *** p < 0.001
   2. For gender, male is coded as 0, and female is coded as 1.
perceived enjoyment, ease of use, usefulness to improve user acceptance of the service. In addition, achieving critical mass through intensive promotions, potential user discovery, and user education, may also help improve acceptance.

7 CONCLUSION

The objectives of this study were to formulate a model of user acceptance of a mobile communication service, SMS. We empirically validated our model using data collected from 471 mobile phone users in China and Hong Kong. The results demonstrated the importance of our proposed factors in affecting user acceptance of SMS. Further, the results highlight the importance of taking regional differences into account when designing strategies to promote mobile communication services in different regions. In sum, the findings of this work significantly enhance our understanding of user acceptance of mobile communication services, particularly in a multi-region setting.

References


