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Adoption of Mobile Services Upgrade: New and Current Users

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ABSTRACT

The third generation (3G) mobile channels allow individuals to download digital content in anytime, at anywhere. The 3G mobile services include services like peer chatting, mobile games and movie download. While many studies explore why individuals adopt 3G mobile services, most of them consider 3G adoption to be a new technology adoption. Will users' experience on older version of mobile services (e.g. 2G and 2.5G) influence their adoption decision on their 3G adoption? Hypotheses linking variables based on diffusion innovation technology and user's mobile services usage background were developed. We conducted a survey and collected 175 responses. Our findings establish that different factors affecting users who have used the older version of mobile services and users' decision to use or not to use 3G mobile services is a service upgrade decision, rather than an adoption decision.

Keywords

Mobile service adoption, Diffusion of Innovations Theory, 3G mobile services, Security issues, Social effects

INTRODUCTION

Mobile services have become a crucial communication method for both personal and commercial uses. In the commercial world, firms now use this efficient channel to promote their business activities, such as mobile advertising (Tsang et al., 2004), mobile auctions (Tang and Forster, 2007), and distance education (Varshney and Vetter, 2002), etc. With the propensity of mobile services, individuals also use their handheld devices, including both cell phones and personal data assistants (PDAs), for work and entertainment purposes, such as mobile banking (m-banking), web-surfing, and communicating with the others via emails and short message service (SMS). As the third generation (3G) network provides broadband networking with high-speed data, it enables firms and individuals to achieve the ubiquitous "anywhere, anytime" nature of m-commerce (Balasubramanian et al., 2000; Tang and Forster, 2007). Mobile services are not only showing their significance in business, but also gaining the attention in the Information Systems (IS) research community, in recent years. Much IS research examines whether and why users adopt mobile services, and how they behave and perform when interacting with the mobile channel (Anckar and D'Incau, 2002; Balasubramanian et al., 2002; Frolick and Chen, 2004; Herzberg, 2003; Hong and Tam, 2006; Lee et al., 2003; Leung and Antypas, 2003; Nohria and Leestma, 2001; Raisnghi, 2002; Robins, 2003; Tang and Forster, 2007; Tsang et al., 2004; Varshney and Vetter, 2002; Wang and Cheung, 2004; Zhang and Prybutok, 2005).

3G network supports a higher data transmission rate and offers increased capacity than the old version of mobile services (i.e. 2G and 2.5G). These features make 3G mobile services suitable for supporting high-speed data applications, including multimedia e-mails, instant messengers (such as MSN and Yahoo! Messenger), and other Internet applications. According to Varshney and Vetter (2002), 3G network provides numerous chances for firms to open up new opportunities for all the stakeholders of the society. For example, as 3G mobile bandwidth, which has 1.5 Mbps, can provide a steady service for real-time video communications between personal devices, small and medium enterprises (SMEs) can replace the traditional costly video-conferencing service with 3G services. Also, the stable 3G services can also help firms to maintain close communications with their business partners through phone calls, e-mails, and SMSs.

Apart from the business sector, 3G technology has a significant impact on the public sector and individuals. Government departments, such as the Transport Department and the Police Department can disseminate real time traffic information to drivers via mobile devices, including cell phones and navigation systems. Hence, drivers who are driving on the highway are better informed and have a chance to choose alternative routes in the hope of reducing the traffic congestion problems arising from traffic accidents or poor weather. Also, with the help of mobile devices, frontline public officers can maintain a close communication, including verbal, pictorial and video information, with their head offices. This can help the senior officers to maintain better supervision of their staff on-site. In addition, mobile services can provide useful information, like news and

weather reports, to individuals in an efficient way. Moreover, individuals can enjoy multimedia entertainment, such as video-on-demand services, online games and music-on-demand, etc. from mobile service content providers.

In summary, 3G is one of the latest mobile technologies, which has a significant impact on business, private and public sectors. With the speed connection, mobile services can enable users to transfer and to receive digital photos, as well as video images and high-quality sound clips from their mobile devices. Corporate 3G users are able to connect to office computer networks, both to access files and to send and receive emails quickly and easily (Robins, 2003). Another important new feature of 3G networks is their capability of carrying data at 1.5Mbps, which offers subscribers a wide range of data services, such as mobile Internet access and multimedia applications (Raisnighani, 2002).

With high-speed data access, 3G networks can achieve a high-speed mobile Internet access with substantially higher data rates compared with other existing mobile networks. Even though these new and enhanced services are attractive, users adopt this new technology for different reasons. In this paper, we shall investigate factors affecting individual users' decisions on the adoption of 3G mobile services. With a better understanding of these factors, mobile service providers can develop better strategies to enhance the subscription rate of 3G services in the market (Lee et al., 2003). This study, in particular, is focused in the following two research questions:-

- (1) *What are the factors affecting users' decision to adopt 3G mobile services?*
- (2) *Are current users of a lower version of mobile services more likely to adopt 3G mobile services?*

The result of this study will be useful for both mobile service providers and mobile device manufacturers. With the better understanding on factors affecting users' decision to adopt 3G mobile services, mobile service providers can develop tailor-made promotion campaigns to attract potential users to adopt their services. This can enhance the subscription rate of their mobile services and thus, increase their revenue. Also, mobile device manufacturers can also develop better mobile devices and web applications, which can fulfill the needs and expectations of their users.

This paper is organized as follows. In the next section, we review the literatures on mobile services (m-services) and mobile commerce (m-commerce) and diffusion of innovation. Afterwards, we present our research model. In Section 4, we present our methodology and findings. In the last sections, we conclude our paper with our discussion on our findings and their impacts on the development of business strategies of mobile service providers.

LITERATURE REVIEW

Research on Mobile Services (m-services) and Mobile Commerce (m-commerce)

Since the launching of 2.5G mobile service in the end of the last century, IS researchers have been attracted by the potential business opportunities in m-commerce, as well as problems associated with developing tailor-made services to m-service customers (Nohria and Leestma, 2001; Frolick and Chan, 2004). To gain a better understanding of the needs of m-service customers, various studies have been conducted to examine the mobile value to customers (Anckar and D'Incau, 2002), its impact on markets and marketing (Balasubramanian et al., 2002; Robins, 2003), the adoption of m-services and m-commerce (Hong and Tam 2006) and the general impacts of m-services applications on customers (Varshnehy and Vetter, 2002). Leung and Antypas (2003) also identify that bandwidth, interoperability of networks, and mobile equipment are key factors affecting the success of m-commerce. Moreover, while Turel et al. (2007) study the user acceptance of SMS, Zhang and Prybutok (2005) study the difference between the mobile communication markets, in terms of 3G service and SMS, in China, the US and the European countries.

Other m-service research studies focus on specific areas of mobile applications. Herzberg (2003) investigates the development of m-commerce applications including m-banking, m-brokerage and m-retail in general and discusses the importance of developing a secure payment system for supporting the m-commerce. Lee et al. (2003) also develop a research framework using the Zaltman Metaphor Elicitation Technique (ZMET) and diffusion of technology approach to analyze m-banking. Tsang et al. (2004) investigate factors affecting consumer attitudes in m-advertising. They observe that generally consumers dislike m-advertising and their attitudes affect their behavior. Wang and Cheung (2004) also investigate the adoption of m-service by travel agencies in Taiwan. They suggest that travel agencies can be a good candidate for engaging in m-commerce. There are also studies focused on the adoption of m-auctions (Tang and Forster 2007).

Research on Diffusion of Innovations

As an innovation, studies on mobile services often employ the diffusion of innovations theory as the method used. Early studies on Diffusion of Innovations (DOI) were conducted by Rogers in the early 1960s (Rogers, 1995), who observed that

relative advantage, compatibility, trialability, observability, and complexity and factors affecting the rate of adoption of innovation. IS researchers have applied DOI Theory in analyzing IS adoption problems in general, as well as specific issues like the adoption of e-commerce (Seyal and Rahman, 2003), e-Health (Atkinson, 2007), enterprise resource planning (Rajagopal, 2002), expert systems (Armstrong and Yokum, 2001), Internet banking (Tan and Teo, 2000), knowledge management (Purvis et al., 2001), organizational innovation (Mustonen-Ollila and Lyytinen, 2003), software application adoption (Lai et al., 2003), total quality management, (Ravichandran, 2000), etc.

Several recent studies on m-service and m-commerce also apply DOI in their research model. For example, Hung et al. (2003) apply DOI in analyzing the factors affecting the adoption of wireless application protocol (WAP) services. Wu and Wong (2005) include the feature, compatibility, in the technology acceptance model (TAM) and examine users' adoption of m-commerce. Alam et al. (2007) include security in DOI and examine the adoption decision of e-commerce by the manufacturing industry in Malaysia.

To sum up, DOI is a useful theory for the study of innovation adoption. As 3G mobile services is a new innovation for mobile technology, we intend to apply DOI in our study on the adoption of 3G services. In particular, we would like to investigate the interaction effect on users of 2G and 2.5G mobile services, who are supposed to be "innovators", on the adoption of 3G mobile services. We anticipate that 2G and 2.5G mobile services users are ready adopters of 3G mobile services compared with users of 2G mobile services.

RESEARCH MODEL

Diffusion of Innovations

The first group of constructs in our model is adapted from the Diffusion of Innovations model (Roger, 1995). The constructs include trialability, relative advantage, observability, compatibility and complexity. Thus, we develop the first set of hypotheses on the adoption of 3G mobile services as follows:

(i) Trialability

Trialability is defined as "the degree to which an innovation may be experimented with on a limited basis" (Atkinson, 2007). It is also known as interactivity. According to Rogers (1995), trialability is positively correlated with the rate of adoption of innovation; therefore, we conjecture, the higher the level of trialability of 3G mobile services, the higher the rate of adoption of 3G mobile services. Thus, we have the following hypothesis:

H1a: If the trialability of 3G mobile services is high, users are more likely to adopt 3G mobile services.

Since current 2G and 2.5G mobile services users know the technology better, they have a lower need to trial the mobile services before they decide to adopt or not to adopt the services. In short, they are more ready to adopt the innovation. Thus, we have the following hypothesis to describe this interaction effect:

H1b: The effect of the trialability of 3G mobile services on users' adoption is more salient for new adopters than current mobile users.

(ii) Relative advantage

Relative advantage is defined as "the degree to which an innovation is perceived as being better than the idea it supersedes" (Atkinson, 2007). It is the degree to which an innovation is seen as superior to existing practice. According to Rogers (1995), relative advantages are also positively correlated with the rate of adoption of innovation. As 3G mobile services employ new technology on data access and can provide high-speed data connection, more convenience services can be provided to users through the 3G mobile handset compared with the traditional mobile services; hence, we conjecture the higher the level of relative advantages of 3G mobile service, the higher the rate of adoption of 3G mobile service. So, we have:-

H2a: If the relative advantage of 3G mobile services is high, users are more likely to adopt 3G mobile services.

Similar to the case of trialability, current 2G and 2.5G users would more readily understand the relative advantage of 3G mobile services. Thus, we have:-

H2b: The effect of the relative advantage of 3G mobile services on users' adoption is more salient for new adopters than current mobile users.

(iii) Observability

Observability is defined as “the degree to which the results of an innovation are visible to others”. It is the degree to which the relative advantage of the innovation is visible to others and has a positive impact on the rate of adoption of innovation; as a result, we conjecture that the higher the level of observability of 3G mobile services, the higher the rate of adoption of 3G mobile services. Our third set of hypotheses is developed as follows:-

H3a: If the observability of 3G mobile services is high, users are more likely to adopt 3G mobile services.

Current 2G and 2.5G users are innovators and thus, they are more active to seek for information about new technology. Hence, they would be more concerned about the observability of the 3G services compared with non-users. Hence, we develop the following hypothesis.

H3b: The effect of the observability of 3G mobile services on users' adoption is more salient for new adopters than current mobile users.

(iv) Compatibility

Compatibility is the “degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters” (Atkinson, 2007) and positively correlated to the rate of adoption of innovation; therefore, we conjecture that the higher the compatibility of 3G mobile services, the higher the rate of adoption of 3G mobile services. Thus, our fourth set of hypotheses is developed:-

H4a: If the compatibility of 3G mobile services is high, users are more likely to adopt 3G mobile services.

As current 2G and 2.5G users are already using relatively high-technology cell phones, they would be more concerned about the compatibility of the current and 3G services. Thus, we have:-

H4b: The effect of the compatibility of 3G mobile services on users' adoption is more salient for new adopters than current mobile users.

(v) Complexity

Complexity is “the degree to which an innovation is perceived as relatively difficult to understand and use” (Atkinson, 2007) and is negatively correlated to the rate of adoption of innovation; therefore, we conjecture that the higher the complexity of 3G mobile services, the lower the rate of adoption of 3G mobile services. Hence, our fifth set of hypotheses is developed:-

H5a: If the complexity of 3G mobile services is high, users are less likely to adopt 3G mobile services.

As an innovator, 2G and 2.5G users are more familiar with the technology and hence, they would have less concerned on the complexity of the service compared with non-users. Therefore, non-users would be more concerned about the potential complexity of 3G services. Hence, we have:-

H5b: The effect of the complexity of 3G mobile services on users' adoption is more salient for new adopters than current mobile users.

Other Constructs – Security and Social Effect

Apart from the five constructs adopted from DOI, we also include two constructs, viz. *security* and *network effect*, which have been reported in prior research that they have a significant impact on the adoption of e-commerce and m-commerce. Our justifications for including these two constructs in our research are as follows:-

(vi) Security

Security has been shown as an important factor for a consumer to make a decision on whether s/he would subscribe to a service or to purchase an item. The higher the security level, the lower is the perceived risk associated with the subscription to a service or the procurement of an item (Mitchell, 1998). As 3G mobile services also include a large number of m-commerce applications, including m-banking, security is expected to be one of the prime concerns of users (Herzberg, 2003). Thus, we have the following hypothesis:-

H6a: If the security level of 3G mobile services is high, users are more likely to adopt 3G mobile services.

Non-users are less familiar with the technology and hence, they will have a lower tolerance in the security issues in 3G services compared with current users of 2G and 2.5G. As a result, we have the following hypothesis.

H6b: The effect of the security level of 3G mobile services on users' adoption is more salient for new adopters than current mobile users.

(vii) Social Effect

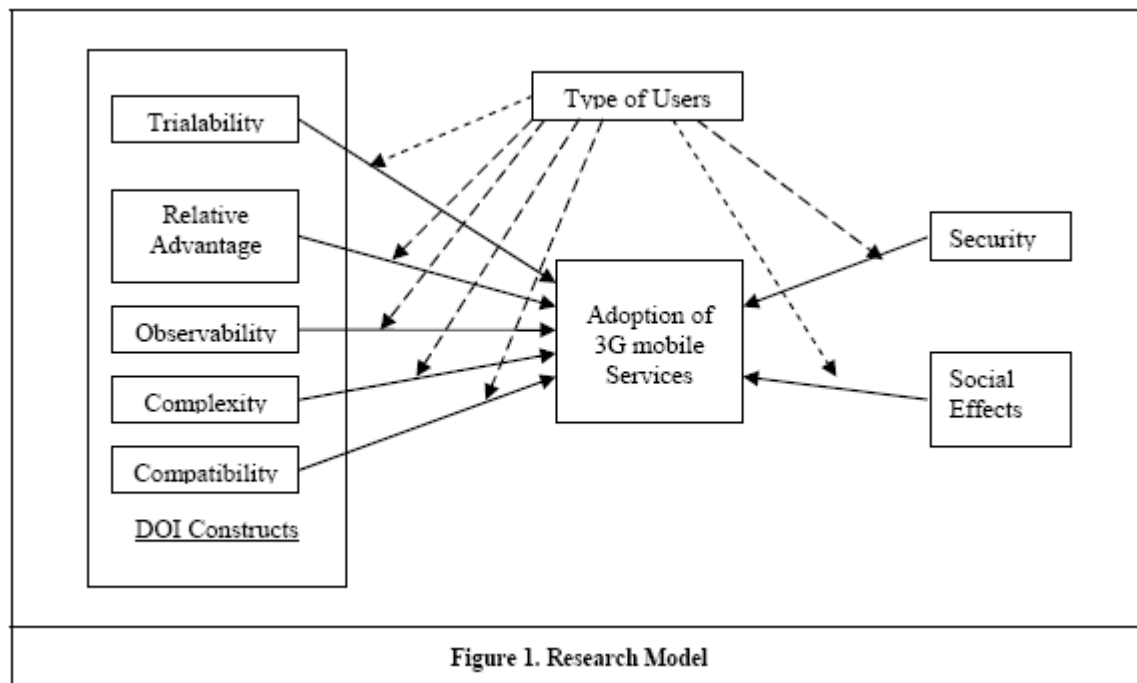
Whether a person adopts an innovation is also influenced by the social group preference (Grudin, 1994). Thus we conjecture that the social group preference will have a significant impact on the adoption of 3G mobile services. Thus, our seventh set of hypotheses is as follows:-

H7a: If members of the social group that users are user of 3G mobile services, users are more likely to adopt 3G mobile services.

As non-users are not familiar with technology, their decision will be more easily be affected by their peers on adopting new technology like 3G mobile services. Hence, we have our last hypothesis.

H7b: The effect of social group on 3G mobile services on users' adoption is less salient for new adopters than current mobile users.

Figure 1 summarizes our research model, of which the solid and dotted lines reflect the proposed main effects and moderating effects respectively.



METHODOLOGY AND DATA ANALYSIS

Methodology

The survey was conducted in Hong Kong using paper questionnaires, which contained 39 questions in a 5-point Likert scale (see Appendix). The instruments were drawn from prior literature, of which questions on DOI constructs were drawn from Atkinson (2007), the questions on social effects were drawn from Grudin (1994), and the questions on security were drawn from Herzberg (2003). Of these 39 questions, the first 16 questions were related to the demographic background and their experience of using 3G services. 500 paper questionnaires have been sent to two public universities in Hong Kong. 175 completed questionnaires were collected, i.e. the overall response rate was 35.0%. The profiles of our respondents are summarized in Table 1.

Indicators	Statistics (N = 175)
Gender	➤ Male: 108 (61.7%) ➤ Female: 67 (38.3%)
Average Age	19.12 years
Monthly Airtime Fee	< US\$30 (HK\$240)
Mobile Service Subscribed	➤ 3G: 130 (74.3%) ➤ 2.5G: 45 (25.7%)
Table 1. Profile of Respondents	

Convergent Validity and Discriminant Validity

We used SPSS version 16.0 to conduct our statistical analysis. To assess convergent validity and discriminant validity, we first conducted a factor analysis. Table 2 reports the results, which reveals the item loadings were consistent with seven distinct theoretical constructs. A seven-factor solution was obtained with all component eigenvalues greater than one. The factors were *Trialability (T)*, *Relative Advantage (AD)*, *Observability (OB)*, *Compatibility (CP)*, *Complexity (CX)*, *Security (S)* and *Social Effect (SE)*. These factors explained 85.1% of the total variance in the survey and all items, loaded highly (>0.70) on its associated factors.

The Cronbach's alpha values for the constructs are shown in Table 3. All constructs, except *compatibility*, have Cronbach's alpha values greater than 0.7. According to Nunnally (1978), these factors are deemed reliable, except *compatibility*, which is a marginally acceptable as suggested by Bagozzi and Yi (1988).

Results

Multiple regression analyses were conducted, with the seven constructs of the research model plus the user background as independent variables, and with the adoption of 3G mobile services as the dependent variable. As shown in the result of the regression analysis at Table 4, *trialability*, *relative advantage* and *complexity*, are not significant factors and thus, our H1a, H2a and H5a are rejected. Also, as the impact of *observability* and *social effect* have negative signs and thus, the result is opposite to our hypotheses. Therefore, our H3a and H7a are also rejected. Therefore, only *compatibility* and *security issues* are significant factors and have primary effects to our model (i.e. H4a and H6a).

To understand the interaction effects, we conduct another regression analyses to analyze these effects. The results are summarized in Table 5. We find that the interaction effects between user type and *trialability* (H1b), *relative advantage* (H2b), *complexity* (H5b), and *social effect* (H7b) are exist.

To have a better understanding of the adoption of mobile services, we also look into the adoption of Wireless Application Protocol (WAP) services, which was a widely used function by 3G users, of our subjects. Out of 130 3G users, 93(71.5%) of them used WAP function. 91(70.0%) of them had the WAP function bundled with the service plan, and were not required to pay extra fee for using the WAP service. Mobile games and video downloading were the two most popular WAP functions used by these respondents. 54(41.5%) respondents used WAP to play mobile games and they, on average, downloaded two mobile games in every six weeks. 51(39.2%) respondents indicated that they used WAP to download videos. Apart from these two functions, our respondents also reported that they used their 3G phones for used WAP function for browsing the WAP pages (38 respondents/29.2%) and for online chatting (24 respondents/18.5%).

	Relative Advantage (AD)	Security Issues (S)	Social Effects (SE)	Trialability (T)	Complexity (CX)	Observability (OB)	Compatibility (CP)
T1				-0.93			
T2				-0.93			
T3				-0.93			
AD1	0.96						
AD2	0.94						
AD3	0.96						
OB1						0.89	
OB2						0.88	
OB3						0.91	
CP1							-0.70
CP2							-0.80
CP3							-0.77
CX1					-0.91		
CX2					-0.90		
CX3					-0.91		
S1		-0.95					
S2		-0.96					
S3		-0.95					
SE1			0.96				
SE2			0.95				
SE3			0.92				

Table 2. Results of Factor Analysis

Note: We used the Principal Component Analysis, with Varimax with Kaiser Normalization in our analysis. Rotation converged in 6 iterations.

Construct	Number of Items	Reliability
Trialability (T)	3	0.94
Relative Advantage (AD)	3	0.97
Observability (OB)	3	0.88
Compatibility (CP)	3	0.65
Complexity (CX)	3	0.91
Security Issues (S)	3	0.96
Social Effects (SE)	3	0.95

Table 3. Cronbach's Alpha Values

Construct	Coefficient	t-value
Trialability (T) [H1a]	-0.145	-1.07
Relative Advantage (AD) [H2a]	-0.00460	-0.557
Observability (OB) [H3a]	-0.304	-2.03 **
Compatibility (CP) [H4a]	0.604	3.13 ***
Complexity (CX) [H5a]	-0.00748	-0.464
Security Issues (S) [H6a]	0.696	4.041 ****
Social Effect (SE) [H7a]	-0.384	-2.51 **
User	0.306	0.981
Constant	-1.236	-1.126
R ²		0.387
R ² (adj)		0.247
Table 4. Primary Effects		
Note: **** $p < 0.001$, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$		

DISCUSSION

According to the regression analysis on the primary effects, we notice that *compatibility* and *security issues* are the only two factors, which have significant impacts on the adoption of 3G mobile service as predicted by our model. Concerning the compatibility issue, this reflects that the current users of 2G and 2.5G service, as well as non-users, are concerned about whether 3G mobile services can provide a compatible service compared with the current 2G and 2.5G services. The compatibility is on the sense of whether the hardware accessories (such as hand-free device, chargers, etc.) and software applications (such as WAP games, user interface of mobile phones, as well as utility software applications provided by the manufacturers) procured for 2G and 2.5G services are compatible to the 3G mobile device. As most of the hardware and software are compatible, we observe a positive result. Moreover, as 3G mobile services include more up-to-date applications, which can allow users to conduct more personal business (such as online chatting as well as m-banking). Hence, it is understandable that users are concerned about the security issues related to the services.

It is interesting to observe that *observability* and *social effect* have significant effects but reverse results in this study. When we conducted this study in early 2006, 3G mobile services were a relatively new service in Hong Kong and operators of the 3G networks only allow users of the same network to make 3G (video) phone calls. As the ability to make videophone calls was the killer's application of 3G when it was launched and it was unusable for 2G and 2.5G users, and users from different 3G network could not make calls to each other, the observability of 3G mobile service was perceived to be low. Also, the same reason can also induce a negative perception of the service in a social group easily. Hence, this contributes to the opposite results.

Concerning the interaction effects, it is observed that all but *observability* (H3b), *compatibility* (H4b) and *security* (H6b) have significant results. This indicate that both users of 2G and 2.5G mobile services, as well as non-users, are concerned about the negative impacts of low observability of 3G mobile services in Hong Kong, which we have just discussed. Also, both users of 2G and 2.5G mobile services and non-users are both aware of the high compatibility of the hardware accessories and software applications, probably due to the heavy advertising campaigns of 3G mobile device manufacturers which eased the worry of users on the compatibility of the products.

CONCLUSION

To sum up, results of this study show that there is a significant difference between the adoption intention of 3G mobile service by 2G and 2.5G mobile services users and non-users. The former group of users, as innovator, is more likely to adopt 3G mobile services compared with non-users. Therefore, 3G mobile service operators and 3G mobile device manufacturers should consider developing specific advertising campaigns to target this specific group of users. As shown by our results, their advertising campaign should focus on the compatibility and the security issues of the 3G services.

Construct / Coefficients	Main Effect	H1b	H2b	H3b	H4b	H5b	H6b	H7b
Trialability (T)	-0.145	-0.534	-0.147	-0.146	-0.145	-0.115	-0.151	-0.150
Relative Advantage (AD)	-0.00460	-0.00566	-0.100	-0.00461	-0.00456	-0.00177	-0.00580	-0.00246
Observability (OB)	-0.304 **	-0.295 *	-0.310 *	-0.303	-0.304 *	-0.301 *	-0.305 *	-0.301 *
Compatibility (CP)	0.604 ***	0.619 ***	0.601 ***	0.604 ***	0.616	0.577 ***	0.612 ***	0.585 ***
Complexity (CX)	-0.00748	-0.133	-0.00796	-0.00750	-0.00755	0.505	-0.00805	0.00110
Security Issues (S)	0.696 ****	0.708 ****	0.706 ****	0.696 ****	0.696 ****	0.732 ****	0.854 *	0.679 ****
Social Effect (SE)	-0.384 **	-0.393 **	-0.380 **	-0.384 **	-0.384 **	-0.466 **	-0.387 **	-0.745 *
User	0.306	-0.585	0.230	0.308	0.328	1.24	0.602	-0.320
Trialability (T) × User	-	0.264	-	-	-	-	-	-
Relative Advantage (AD) × User	-	-	0.00358	-	-	-	-	-
Observability (OB) × User	-	-	-	-0.0000862	-	-	-	-
Compatibility (CP) × User	-	-	-	-	-0.000799	-	-	-
Complexity (CX) × User	-	-	-	-	-	-0.368	-	-
Security Issues (S) × User	-	-	-	-	-	-	-0.00978	-
Social Effect (SE) × User	-	-	-	-	-	-	-	0.257
Constant	-1.236	0.126 *	-1.12	-1.24	-1.27	-2.72	-1.66	-0.501
R ²	0.387	0.402	0.388	0.387	0.387	0.402	0.389	0.402
R ² (adj)	0.247	0.244	0.226	0.225	0.225	0.244	0.228	0.244
Interaction Effect Exists?	-	Yes	Yes	No	No	Yes	No	Yes

Table 5. Interaction Effects

Note: **** $p < 0.001$, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

REFERENCES

1. Alam, S.S., Khatibi, A., Ahmad, M.I.S. and bin Ismail, H. (2007) Factors affecting e-commerce adoption in the electronic manufacturing companies in Malaysia, *International Journal of Commerce & Management*, 17, 1/2, 125-139.
2. Armstrong, J.S. and Yokum, J.T. (2001) Potential diffusion of expert systems in forecasting, *Technology Forecasting and Social Change*, 67, 1, 93-103.
3. Anckar, B. and D’Incau, D. (2002) Value creation in mobile commerce: Findings from a consumer survey, *Journal of Information Technology Theory and Applications*, 4, 1, 43 -60.
4. Atkinson, N. (2007) Developing a questionnaire to measure perceived attributes of eHealth innovation, *American Journal of Health Behavior*, 31, 6, 612-621.
5. Balasubramanian, S., Peterson, R.A. and Jarvenpaa, S.L. (2002) Exploring the implications of m-commerce for markets and marketing, *Journal of the Academy of Marketing Science*, 30, 4, 348-361.
6. Bauer, R.A. (1960) Consumer behaviour as risk taking, *Dynamic Marketing for a Changing World*, 389-398.
7. Bagozzi, R.P. and Yi Y. (1988) On the evaluation of structural equation models, *Journal of the Academy of Marketing Science*, 16, 1, 74-94.
8. Frolick, M.N. and Chen L.-d. (2004) Assessing m-commerce opportunities, *Information System Management*, 21, 2, 53-61.
9. Grudin, J. (1994) Groupware and social dynamics: Eight challenges for developers, *Communications of the ACM*, 37, 1, 92-105.
10. Herzberg, A. (2003) Payments and banking with Mobile Personal Devices, *Communicates of ACM*, 46, 5, 53-58.
11. Hong, S.-J. and Tam, K.Y. (2006) Understanding the adoption of multipurpose information appliances: The case of mobile data services, *Information Systems Research*, 17, 2, 162-179.
12. Hung, S., Ku, C. and Chang, C. (2003) Critical factors of WAP services adoption: An empirical study, *Electronic Commerce Research and Applications*, 2, 1, 42-60.
13. Lai, M.C.L., Ho, S.S.Y. and Hui, W.W.Y. (2003) Adoption process of upgrading software: An empirical study of Windows XP, in *Proceedings of 36th Annual Hawaii International Conference on Systems Sciences (HICSS 03)*, January 6-9, Waikoloa, HI, US.
14. Lee M.S.Y., McGoldrick, P.J., Keeling, K.A. and Doherty, J. (2003) Using ZMET to explore barriers to the adoption of 3G mobile banking services, *International Journal of Retail & Distribution Management*, 31, 6/7, 340-348.
15. Leung K. and Antypas, J. (2001) Improving returns on m-Commerce investments, *Journal of Business Strategy*, 22, 5, 12-13.
16. Mitchell, V.W. (1999) Consumer perceived risk: Conceptualisations and models, *European Journal Marketing*, 33, 1/2, 163-195.
17. Mustonen-Ollila, E. and Lyytinen, K. (2003) Why organizations adopt information system process innovations: A longitudinal study using Diffusion of Innovation Theory, *Information Systems Journal*, 13, 3, 275-297.
18. Nohria, N. and Leestma, M. (2001) A moving target: The mobile-commerce customer, *MIT Sloan Management Review*, 42, 3, 104.
19. Nunnally, J.C. (1978). *Psychometric theory* (2nd edition). New York: McGraw-Hill.
20. Purvis, R.L., Sambamurthy, V. and Zmud, R.W. (2001) The assimilation of knowledge platforms in organizations: An empirical investigation, *Organization Science*, 12, 2, 117-135.
21. Raisnghani, M. (2002) Mobile commerce: Transforming the vision into reality, *Information Resources Management Journal*, 15, 2, 3-4.
22. Rajagopal, P. (2002) An innovation-diffusion view of implementation of enterprise resource planning (ERP) systems and development of a research model, *Information & Management*, 40, 2, 87-114.
23. Ravichandran, T. (2000) Swiftness and intensity of administrative innovation adoption: An empirical study of TQM in information systems, *Decision Sciences*, 31, 3, 691-724.
24. Robins, F. (2003) The market of 3G, *Marketing Intelligence & Planning*, 21, 6, 370 -378.
25. Rogers, E.M. (1995) *Diffusion of Innovations*, 4th ed., Free Press, New York, NY.

26. Seyal, A.H. and Rahman, M.N.A. (2003) A preliminary investigation of e-commerce adoption in small and medium enterprises in Brunei, *Journal of Global Information Technology Management*, 6, 2, 6-26.
27. Tan, M. and Teo, T.S.H. (2000) Factors influencing the adoption of internet banking, *Journal of the Association for Information Systems*, 1, 5, 1-42.
28. Tang, Y. and Forster, P.W. (2007) Exploring the value structure behind mobile auction adoption intention, *Proceedings of the Americas Conference on Information Systems 2007 (AMCIS 2007)*, August 9-12, Keystone, CO, US.
29. Turel, O., Serenko, A. and Bontis, N. (2007) User acceptance of wireless short messaging services: Deconstructing perceived value, *Information & Management*, 44, 1, 63-73.
30. Tsang, M.M., Ho, S.-C. and Liang, T.P. (2004) Consumer attitudes towards mobile advertising: An empirical study, *International Journal of Electronic Commerce*, 8, 3, 65-78.
31. Varshney, U. and Vetter, R. (2002) Mobile commerce: Framework, applications and network support, *Mobile Networks and Applications*, 7, 3, 185-198.
32. Wang, S. and Cheung, W. (2004) E-business adoption by travel agencies: Prime candidates for mobile e-business, *International Journal of Electronic Commerce*, 8, 3, 43-63.
33. Wu, J. and Wang S. (2005) What drives mobile commerce? An empirical evaluation of the revised technology acceptance model, *Information & Management*, 42, 5, 719-729.
34. Zhang X. and Prybutok, V.R. (2005) How the mobile communication markets differ in China, the U.S., and Europe, *Communications of ACM*, 48, 3, 111-114.
35. Zhu, K. and Kraemer, K.L. (2005) Post-adoption variations in usage and value of e-business by organizations: Cross-country evidence from the retail industry, *Information Systems Research*, 16, 1, 61-84.

APPENDIX: SAMPLE QUESTIONNAIRE

Trialability of 3G (T)

- T1. I can experience 3G mobile services easily.
- T2. I can try out 3G mobile services in telecommunication shops easily.
- T3. Trying out 3G mobile services is easy.

Relative Advantage of 3G (A)

- A1. 3G mobile services are better than mobile services of lower grades (e.g. 2G and 2.5G).
- A2. 3G mobile services have more functions than mobile services of lower grades (e.g. 2G and 2.5G).
- A3. 3G mobile services are more useful than mobile services of lower grades (e.g. 2G and 2.5G).

Observability of 3G (OB)

- OB1. I notice that people consider 3G mobile services to be good.
- OB2. Many people (e.g. friends, sales persons) tell me the benefits of 3G mobile services.
- OB3. I observe that people using 3G mobile services like the services.

Compatibility of 3G (CP)

- CP1. 3G mobile services fit right to my mobile phone handset.
- CP2. My mobile phone handset supports 3G mobile services.
- CP3. It is easy to get a mobile phone handset for 3G mobile services.

Complexity of 3G (CX)

- CX1. I have no difficulty in using 3G mobile services.
- CX2. I have no difficulty in understanding how to get 3G mobile services.
- CX3. I have no difficulty in understanding how to work with a 3G mobile phone.

Security Issue under 3G (S)

- S1. The business activities operating on 3G platform is secure.
- S2. It is secure to provide credit card information on 3G platform.
- S3. It is secure to provide banking information on 3G platform.

Social Effect on 3G (SE)

- SE1. Most of my friends use 3G network.
- SE2. Most of my friends use 3G mobile handsets.
- SE3. Most of my friends make video call.

Adoption Intention (AI)

- AI1. I am using / will use 3G network in the future.
- AI2. I have an intention to use / continue using 3G network in the future.

(1 = Strongly Disagree, 5 = Strongly Agree)