M-commerce development in China: Users' perspectives

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ABSTRACT

M-commerce (mobile commerce) is growing increasingly popular, and China has a huge potential to develop m-commerce technology. This study focuses on users' perspectives of m-commerce development in China. The development of m-commerce was measured by the extent of m-commerce businesses adopting business intelligence. A research framework was developed for users' perceptions on m-commerce development, survey questionnaires were used to collect data, and ANOVA was used for data analysis.

Keywords: M-Commerce, BI, e-commerce, users' perspectives, China

INTRODUCTION

Many businesses have noticed that the influence of m-commerce, unlike e-commerce, has to date been unpredictable (Feldman, 2000). Electronic commerce refereeing to conducting businesses through computer networks (Kalakota, 1996). E-commerce customers can make transactions at the same time from geographically spread locations and with different hardware and software resources (Maamar, 2003). Although m-commerce is derived from e-commerce, and they share some common functionalities and features, there are important distinctions. M-commerce and e-commerce handle transactions differently; and M-commerce allows wireless access of the systems. Therefore, m-commerce needs more security controls while transmitting transactions because there are certain limitations in wireless access protocol (Cillenson, 2003). There are many new technology developments in mobile devices, which allow more devices to be interconnected and more intelligent (Hamad, Samalo, & James, 2009). Although the stability of the internet connection is critical for both e-commerce and m-commerce, the device used for the m-commerce presents clear technical differences.

For m-commerce, the systems and geographic environment of accessing the internet is a big differentiation. First of all, owing to the change to wireless internet access, the mobile application actually becomes more complicated. Users of the mobile application can access the systems at "any time, any place" (Tarasewich, 2003). The growth of mobile technology and m-commerce applications presents potential benefits and risks (Turban, King, Lee, Liang, & Turban, 2010). Wireless technologies added convenience and complications to m-commerce applications. The special challenge of m-commerce is that mobile devices are subject to constant changes of the outside environment. The advantage of m-commerce is the ability to complete traditional e-commerce transactions wirelessly. Despite the advantages and added vales m-commerce could bring, the users of the m-commerce application have contain concerns due to the limited knowledge of the new technologies and systems, and lack of the trust of m-commerce transactions.

China has 1.155 billion mobile subscriptions by April 2013, which makes it the world number one country in term of total mobile subscriptions (mobiThinking, 2013). With the largest mobile market in the world, there has been one of the most rapid growths of the development of mobile communications in China. Unlike in developed countries, China's m-commerce applications have wide ranges of differences in levels of adoption, availability and coverage (Kshetri & Cheung, 2002). Nonetheless, with the largest number of mobile subscribers, China has huge potential for m-commerce development (Dai, Singh, & Iyer, 2007). But the question is whether the application or developing foreground of m-commerce in China is prospective or not.

This research study is designed to determine the current situation of m-commerce development in China from users' perspectives.

LITERATURE REVIEWS

Mobile computing infrastructure consists of the following major components: mobile devices, mobile computing software and services, and wireless telecommunications networks (Hu, Yeh, Yang, & Lee, 2006). More m-commerce businesses are attempting incorporate business intelligent (BI) and information systems (IS) technologies into their applications to provide additional functionalities. For example, m-commerce businesses utilize location-based services (LBS) (Turban et al., 2010), which is to provide services based on customers' location at a given time. More and more people are using mobile devices for their personal and business purposes, m-commerce businesses have large amount of customers, transactions and devices information available to them, which deserve attention and require in-depth analysis.

One of the challenges of m-commerce is to precisely determine the customer's location and physical space due to the dynamic nature of the mobile communications (Rao, Minakakis, 2003). In m-commerce, locations based services is largely adapted, together with global position systems (GPS) and geographical information systems (GIS), m-commerce businesses are able to identify their customers' physical location when they are using their mobile devices. For example, with LBS, GIS and GPS, UPS already provides its customers with wireless options for tracking items (Mah, Siau, Sheng, 2005).

If an organization could provide good quality product and services to their consumers, which are likely to meet their needs, it could help increase customers' retention, satisfaction, and loyalty (Yeung, Shim, Lai, 2003). Customer relationship management (CRM) has its new meanings in m-commerce, because of the large amount of customer and transactions information available. Businesses could really take advantage of the data mining tools to identify the most useful information in helping build a strong customer relationship with their m-commerce customers, such as create personalized location based services / advising, increase individual customer's satisfaction, and establish long-term customer loyalty programs. What is more, the exploitation of wireless data centers, connecting businesses to customers or businesses to businesses, m-commerce consumers' are able to form "intelligent" decisions based on information available to them (Varshney, 2001).

Besides these functions, what other opportunities exist for mobile commerce? M-commerce can benefit from the utility of useful functions like multimedia messaging service (MMS), which allows customers to receive combined audio and video information (Leung, Chan, Chan, 2003). Another added convenience for the workforce by m-commerce application is mobile offices that allow employees of the organizations to work remotely from anywhere 24/7 (Varshney, 2001). Another m-commerce application is mobile auction; users can use online mobile bidding to perform normal auction functions remotely and wirelessly (Varahney, 2003).

In supply chain management (SCM), mobile commerce could help with warehouse and inventory management such as establishing just-in-time inventory management that helps to optimize the organization's inventory level. Enterprise resource planning (ERP) systems integrate all the business processes into one centralized system; m-commerce applications could benefit ERP systems in mobile environments. Mobile banking is another

application that is made possible by the m-commerce concept, where mobile devices can play a powerful role (Turban et al., 2010). Mobile banking is gaining popularity and acceptance as consumers discover the utility it provides and the secure nature of the platform (PaymentsNews, 2009).

With all the advantages and functionalities of the m-commerce, businesses adapting m-commerce applications could benefit from it. It is likely to change the way organizations used to do business, and if implemented and managed appropriately, it might be able to help to improve the effectiveness of how their business operate. Since mobile devices can be used at any time and any place (Peter, 2003), which provide m-commerce organizations opportunity to obtain large amount of consumer and transaction information, which could be used to assist better business decision making. Correct adaption of m-Commerce could possibly reduce operational costs of the business (Kumar, Petersen, 2006). Successful implementation of m-commerce could help reducing process errors, response time, and reducing waste, therefore would likely to help organizations to increase the efficiency of business processes.

THE RESEARCH FRAMEWORK

The research model of this study is shown in figure 1. The model proposed that here are difference factors that might have influence on consumers' perceptions of the mobile commerce development in China. Those factors are users' age, gender, background, economic level, and education level. The perceptions of the m-commerce development were measured by consumers' opinion on whether incorporate different types of BI and IS applications would help increase business efficiency.

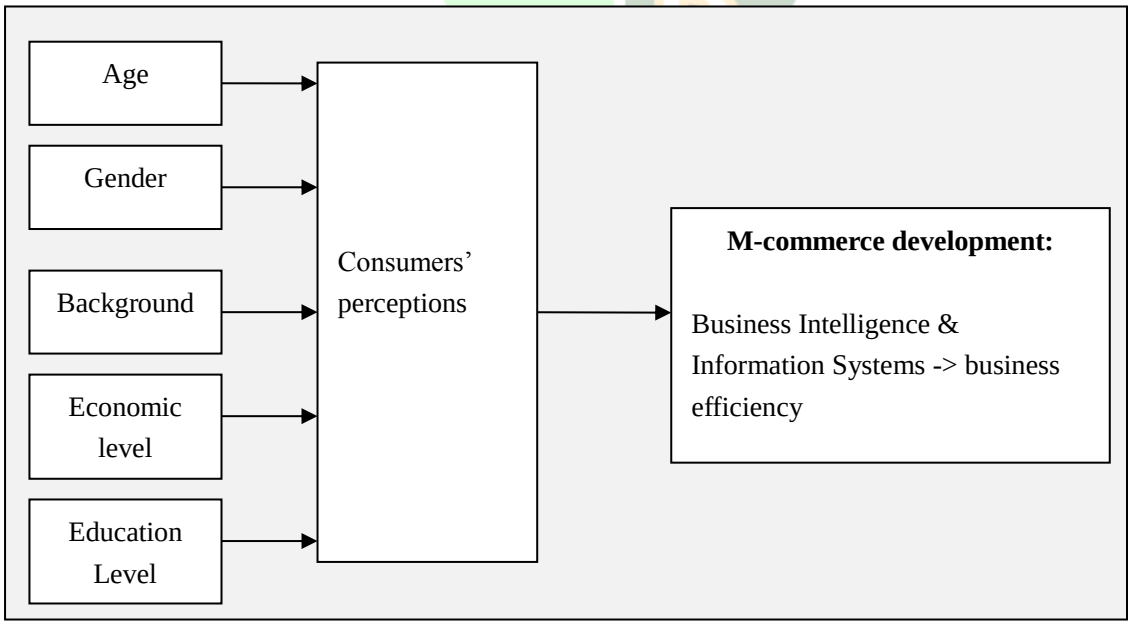

Figure 1: factors impact on consumers' perceptions of mobile commerce development in China

Five research hypotheses were therefore developed to test the research framework:
H1: The age of mobile commerce users has significant influence on perceptions of the

impact of BI and IS on mobile commerce development.
H2: The gender of mobile commerce users has significant influence on perceptions of the impact of BI and IS on mobile commerce development.
H3: The background of mobile commerce users has significant influence on perceptions of the impact of BI and IS on mobile commerce development.
H4: The economic level of mobile commerce users has significant influence on perceptions of the impact of BI and IS on mobile commerce development.
H5: The education level of mobile commerce users has significant influence on perceptions of the impact of BI and IS on mobile commerce development.

METHODOLOGY

Survey questionnaires were used to collect the data for this study. The development of the survey instrument was based on the literature and the research framework. The questionnaire focuses on the research hypotheses as well as the research model.

Since Chinese IT professionals would likely to have knowledge of m-commerce application and development in China, the survey questionnaires were sent to Chinese IT professionals that worked in different large IT companies, the IT department of mobile service providers in China. The questionnaire were designed in English and translated into Chinese since the respondents are from China. The sample size of the survey is around 500 and 101 valid responses were included in the analysis of this study, which make the response rate of around 20%.

Dependent variables

In the analysis, the dependent variables are as follows:
BI and IS technologies which might help m-commerce organizations to increase the business efficiency. Those technologies including global pointing systems, geographic information systems, intelligent transportation and systems infrastructure, intelligent searching, multimedia messaging service, mobile financial applications, wireless data center, mobile inventory, mobile auction, mobile office, location based services, and products recommendation, customer relationship management, supply chain management, enterprise research planning.

Independent variables

The independent variables are as follows:
Five factors that may influence the answer to the questions: age, gender, background, economic conditions, and education levels.

DATA ANALYSIS

ANOVA analysis

The purpose of the data analysis is to determine whether the independent variables have some impact on the dependent variables in order to find out whether the conclusion from the sample can be extended to a more general situation. Since the difference of answers is quite considerable according to the standard deviation, the measurement 0.05 was chosen as the significant level instead of 0.01.

Table1: ANOVA for H1

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Intelligent transportation and systems infrastructure	Between Groups	17.873	4	4.468	3.489	.010
	Within Groups	124.215	97	1.281		
	Total	142.088	101			
ERP	Between Groups	16.006	4	4.001	2.649	.038
	Within Groups	146.514	97	1.510		
	Total	162.520	101			
mobile auction	Between Groups	17.752	4	4.438	3.479	.011
	Within Groups	123.739	97	1.276		
	Total	141.490	101			

According to the output of ANOVA, for the independent variable age, only the functions of intelligent transportation and systems infrastructure, ERP, and mobile auction adding in to m-commerce are significant. Other dependent variables do not have significance with the independent variable age. We can find that different age ranges have different ideas for these three functions. Moreover, table 2 shows that the age range younger than 20, 26 to 30, and older than 50 have comparatively large differences in response. People younger than 20 and older than 50 are more likely to express less understanding of new technologies, while people aged 26 to 30 express that they have some experience of using these systems and feel that the functions are somewhat useful. The reason for this situation may be that only people aged 26 to 30 have both interest and money to accept this new technology. In addition, people in this age range play an important role in operational business and have more chance to use and receive training of new business techniques. Intelligent transportation and systems infrastructure and mobile auctions are quite new terms for m-commerce application. Also, compared with other functions such as CRM or mobile office, not everyone has the chance to use ERP in m-commerce. On the other hand, young people may have interest in these techniques but have no opportunity to use them; and older people are more likely to be used to traditional

transactions and not eager to learn these new techniques. Thus, we can conclude that age can influence the acceptance of new techniques of m-commerce. Therefore, with regard to H1 (the age of mobile commerce users has significant influence on perceptions of the impact of BI and IS on mobile commerce development), the hypothesis is partly supported.

For the factor of background, significant differences exist with regard to mobile office, wireless data center, location based services, and mobile auction. Other dependent variables do not show significant difference. The cause may be that people with specific backgrounds require certain application functions in m-commerce. Finance groups require more wireless data center applications, while industries with complex transactions and transportation systems need more help from LBS. Some groups do not have the experience of using mobile inventory and mobile office. Therefore, the type of background influences personal choice to some degree. With regard to H3 (the background of mobile commerce users has significant influence on perceptions of the impact of BI and IS on mobile commerce development), the hypothesis is partly supported.

For economic levels, multimedia messaging service, CRM, intelligent transportation, and mobile financial applications are influenced by the factor of salary. Other factors are not. In addition, according to the data, the smaller the salary, the less useful people think about these four functions. Not every level of employee can utilize or have familiarity with CRM or mobile financial applications. Also, not every company provides intelligent transportation and systems infrastructure. For multimedia messaging service, because it provides the function of mixing image, text, and sounds together, it requires advanced techniques, which cost more. Thus, in common sense, only people with more money have more interest in these new but not basic/required functions. Therefore, with regard to H4 (the economic level of mobile commerce users has significant influence on perceptions of the impact of BI and IS on mobile commerce development), the hypothesis is partly supported.

The other two factors -- gender and education level -- are not significant to these dependent variables. Therefore, with regard to both H2 (the gender of mobile commerce users has significant influence on perceptions of the impact of BI and IS on mobile commerce development); and H5 (the education level of mobile commerce users has significant influence on perceptions of the impact of BI and IS on mobile commerce development), the hypotheses are rejected.

Table 2: multiple comparisons for H1

Multiple Comparisons

Tamhane

Dependent Variable	(I) age_range	(J) age_range	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Intelligent transportation and systems infrastructure	0-20	21-25	-1.582*	.132	.000	-1.96	-1.20
		26-30	-1.000*	.277	.032	-1.93	-.07
		31-50	-.500	.500	.993	-4.20	3.20
		>50	.000	.000	.	.00	.00
	21-25	0-20	1.582*	.132	.000	1.20	1.96
		26-30	.582	.307	.531	-.39	1.55
		31-50	1.082	.517	.708	-2.22	4.39
		>50	1.582*	.132	.000	1.20	1.96
	26-30	0-20	1.000*	.277	.032	.07	1.93
		21-25	-.582	.307	.531	-1.55	.39
		31-50	.500	.572	.996	-2.21	3.21
		>50	1.000*	.277	.032	.07	1.93
	31-50	0-20	.500	.500	.993	-3.20	4.20
		21-25	-1.082	.517	.708	-4.39	2.22
		26-30	-.500	.572	.996	-3.21	2.21
		>50	.500	.500	.993	-3.20	4.20
	>50	0-20	.000	.000	.	.00	.00
		21-25	-1.582*	.132	.000	-1.96	-1.20
		26-30	-1.000*	.277	.032	-1.93	-.07
		31-50	-.500	.500	.993	-4.20	3.20
ERP	0-20	21-25	-1.392*	.134	.000	-1.78	-1.01
		26-30	-2.071*	.399	.002	-3.41	-.73
		31-50	-.250	.250	.993	-2.10	1.60
		>50	-1.000	1.000	.996	-14.93	12.93
	21-25	0-20	1.392*	.134	.000	1.01	1.78
		26-30	-.679	.421	.740	-2.04	.68
		31-50	1.142	.284	.098	-.21	2.50
		>50	.392	1.009	1.000	-12.71	13.50
	26-30	0-20	2.071*	.399	.002	.73	3.41
		21-25	.679	.421	.740	-.68	2.04
		31-50	1.821*	.471	.015	.28	3.36
		>50	1.071	1.077	.994	-8.14	10.29
	31-50	0-20	.250	.250	.993	-1.60	2.10
		21-25	-1.142	.284	.098	-2.50	.21
		26-30	-1.821*	.471	.015	-3.36	-.28
		>50	-.750	1.031	1.000	-12.26	10.76
	>50	0-20	1.000	1.000	.996	-12.93	14.93
		21-25	-.392	1.009	1.000	-13.50	12.71
		26-30	-1.071	1.077	.994	-10.29	8.14
		31-50	.750	1.031	1.000	-10.76	12.26
mobile auction	0-20	21-25	-.880	.518	.977	-35.84	34.08
		26-30	.143	.528	1.000	-26.97	27.25
		31-50	.250	.559	1.000	-14.47	14.97
		>50	-.167	.833	1.000	-6.35	6.02
	21-25	0-20	.880	.518	.977	-34.08	35.84
		26-30	1.023*	.217	.000	.37	1.67
		31-50	1.130	.285	.100	-.22	2.48
		>50	.713	.680	.994	-7.40	8.82
	26-30	0-20	-.143	.528	1.000	-27.25	26.97
		21-25	-1.023*	.217	.000	-1.67	-.37
		31-50	.107	.302	1.000	-1.18	1.40
		>50	-.310	.688	1.000	-7.92	7.30
	31-50	0-20	-.250	.559	1.000	-14.97	14.47
		21-25	-1.130	.285	.100	-2.48	.22
		26-30	-.107	.302	1.000	-1.40	1.18
		>50	-.417	.712	1.000	-6.88	6.04
	>50	0-20	.167	.833	1.000	-6.02	6.35
		21-25	-.713	.680	.994	-8.82	7.40
		26-30	.310	.688	1.000	-7.30	7.92
		31-50	.417	.712	1.000	-6.04	6.88

*. The mean difference is significant at the .05 level.

CONCLUSION

The adaption of m-commerce has increased both for developed and developing countries. The development of the new technology has brought opportunities and challenges to the m-commerce implementations. It is important to understand the impact of the technology on m-commerce development. This study focused on the user's perceptions of the m-commerce development; it looked into different factors that could influence m-commerce consumers' perceptions on mobile commerce development, particularly on whether certain business intelligent and information systems technologies would help increase the business efficiency. The data analysis of this study showed that part of the research model is supported. It also tested five research hypotheses, and three of them are supported:

H1 is partially supported. People from different age groups have different perceptions for m-commerce development. This is especially true for some new technologies.

H3 is partially supported. Users with different backgrounds might view m-commerce development differently. Depending on people's background in specific expertise areas, they might have experienced some BI and IS applications in m-commerce, but not others.

H4 is partially supported. Users' economic level has impact on their exposure to advanced m-commerce development and applications. People with higher economic status tend to have more opportunity to use more advanced m-commerce applications, probably because these advanced applications are normally more expensive.

H2 and H5 are rejected. The research data shows that gender and education level have no significant impact on users' perceptions of m-commerce development. This is an interesting finding that might need to be further investigated and tested on other aspects of m-commerce development.

The research framework developed in the study could help to aid the understanding of consumers' perspective of mobile commerce development in China. The study used survey data to exam the validity of the research model and found that three of the five proposed factors have impact on consumers' perceptions. Those three factors are age, background, and economic level. Study results showed interesting findings as discussed in the paper that hopefully will help m-commerce research and practices in developing countries.

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