Impact of perceived reflexive M-commerce on adoption intention in China

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Reflexive modernization influences consumers' adoption of innovations. It is a practical problem that mobile commerce is being confronted with obstacles such as rejection, postponement, and opposition from consumers in China. This study focuses on the perspective of perceived reflexive M-commerce and constructs a research model to explore which factors influence consumers' M-commerce adoption intention based on theory of planned behavior and theory of reflexive modernization. Data was collected from 327 subjects by web-based survey in China. Through empirical research, our results indicate that consumers’ attitude, subjective norms and perceived behavioral control have positive effects on M-commerce adoption intention. On the other hand, perceived reflexive M-commerce influences M-commerce adoption intention not only directly but indirectly through attitude and perceived behavioral control as well. Finally, subjective norms have negative impacts on perceived reflexive M-commerce. According to the conclusions, we propose the suggestions on how to reduce consumers' perceived reflexive M-commerce.

Key words: Adoption intention, perceived reflexive M-commerce, attitude, subjective norms, perceived behavioral control.

INTRODUCTION

Technology brings about wealth, convenience and development for human beings, but meanwhile, it causes complexity, confusion and insecurity as well. Beck et al. (1994) initially defined these negative effects as ‘reflexive modernization’. They argued that in the development of modern industry, disadvantages such as environment deterioration and life risks always walk along with the advantages generated by new technologies. These unexpected side-effects are breaking the order and tradition of the previous modernization and cause a new and different modernization development path: Reflexive modernization. In the process of reflexive modernization, including modernization self-confrontation, self change, self harm, and self end, progress could be transformed into self-destruction in a sense. The further modernization a society comes to, the more accidental side effects will be generated. As the technology development has given rise to the formation of risk society (Beck et al., 2003), perceived reflexive innovations is influencing consumers' adoption intention.

Mobile commerce, as an innovation and emerging E-commerce model, has the characteristics of reflexive modernization. Anup and Tara (2001) proposed that the more services the mobile device provides, the more problems it causes, such as risks of information security and privacy, hackers malicious attacks, false and deceiving trade information, etc. These risks and uncertainties amplify consumers’ perceived risks, which proliferates in the society and results in decrease in adoption intention or even resistance of M-Commerce. As a new business model, mobile commerce has a huge market potential, and especially with the 3G network developing, it will eventually become an important driving force for modern service and economic growth in the future. But China mobile commerce is being confronted with obstacles such as rejection, postponement, and opposition from most consumers, which hinder the
development of M-commerce in China electronic market. Thus, in this paper, we focus on the perspective of perceived reflexive M-commerce based on theory of planned behavior and theory of reflexive modernization, and conduct an empirical research with the data collected in China to investigate the impact factors on M-commerce adoption intention. The study organizes the rest of the paper as follows. First, it reviews the theory of planned behavior and theory of reflexive modernization, develops a series of hypotheses, and constructs the conceptual model. Next, the paper describes the research method and data used in the study. Then we present our empirical findings and discuss the results. Finally, we propose the suggestions for the related firms and discuss the research limitations and prospects of future research.

LITERATURE REVIEW AND DEVELOPMENT OF HYPOTHESES

Our research model is based on theory of planned behavior which is an information theory that models how users come to accept and use a new technology. It has been applied to studies of the relations among beliefs, attitudes, intentions and behaviors in various fields. The model suggests that when users are presented with a new technology, a number of factors influence their decisions whether and when they will use it. According to the theory of planned behavior, behavioral attention depends on attitude, subjective norms, and perceived behavioral control (Ajzen, 1989). Attitude toward the behavior refers to the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question (Ajzen, 1991). Attitude towards an innovation is a positive or negative evaluation on the consequence of adoption. The more positive attitude towards an innovation consumers have, the stronger adoption intention they will hold. Conversely, the more negative attitude leads to the stronger negative intention such as delay, rejection, and opposition (Taylor and Todd, 1995; Morris and Dillion, 1996).

Subjective norms refer to the perceived social pressure to perform or not to perform the behavior (Ajzen, 1991). It explains that an individual will act according to the collective beliefs and expectations because of the perceived pressure from group or wish to follow the important persons in a group. Subjective norms have positive effects on adoption intention (Taylor and Todd, 1995). Subjective norms influence an individual’s intention to accept or reject an innovation such as M-commerce (Khalifa and Shen, 2008). Perceived behavioral control refers to the perceived ease or difficulty of performing the behavior and it is assumed to reflect past experience as well as anticipated impediments and obstacles (Ajzen, 1991).

In the light of theory of planned behavior, perceived behavioral control includes the belief whether the necessary resources (learning cost, economic cost, time cost etc.) is accessible to complete a task and perceived self-efficacy to deal with an innovation (Per Pedersen, 2005). The greater the perceived behavioral control, the stronger should be an individual’s intention to perform the behavior under consideration (Ajzen, 1991).

Accordingly, this paper proposes the following hypotheses:

H1: Attitude towards M-Commerce has positive effects on adoption intention.
H2: Subjective norms towards M-Commerce have positive effect on adoption intention.
H3: Perceived behavioral control towards M-Commerce has positive effect on adoption intention.

Mobile commerce or M-commerce is a new E-commerce model that allows transactions to be conducted at any time and location over a wireless telecommunication network (Ngai and Gunasekaran, 2007). Some examples of M-commerce applications include mobile auctions, video on demand, mobile payments, M-banking, M-entertainment and other information-oriented services. The original purpose of M-commerce is to improve individuals’ free communications; however, in fact, most users become addicted to online talking with people far away rather than communicating with person next to him. This overuse leads to personal relationship and family alienation (Ofir and Alexander, 2010).

M-commerce is supposed to help people facilitate the transaction and life, but most of them find that they have to spend much time and effort to learn how to use the complicated device and service (Jarvenapa et al., 2003). Consumers’ initial hope to obtain information efficiently by using M-commerce has been turned into the worry about security of privacy and the feeling lost in overwhelming information (Anup and Tara, 2001).

In summary, M-commerce possesses the features of reflexive modernization. The perceived reflexive M-commerce contains the following dimensions: perceived uncertainty, perceived risk and perceived cost. Consumers prefer to keep enjoying familiar product or service due to inertia, thus, most of them typically reject a new way for they have to adjust their well-established cognitive systems and behavior patterns for trying a new adoption (Mirella et al., 2009). In terms of M-commerce, absence of observation, communication, and feel in the real world, consumers will feel a strong uncertainty which can reduce the adoption intention (Keng and Zixing, 2003).

Risk aversion is a common human nature. In decision-making, people are more inclined to avoid risk rather than maximizing benefits (Mitchell, 1992). Perceived risk such as information security and privacy, hacker’s malicious attacks, false and deceiving trade information, etc. in M-commerce will give rise to the negative evaluation for the M-commerce (Anup and Tara, 2001).
These hypotheses are summarized in Figure 1.

**Reliability and validity**

To ensure the internal consistency and stability of the measurements, construct reliability was measured by Cronbach's α value. Table 1 shows that the Cronbach's α values of the research constructs range from 0.757 to 0.883 above the acceptable value of 0.7 and therefore suggest reasonable reliability of measurements.

Additionally, we employed factor analysis to verify the construct validity. The premise of factor analysis is that different variables have correlations. If variables are orthogonal each other, factor analysis will lose significance. Thus, we used KMO and Bartlett's test to examine whether the measurements are suitable for factor analysis. Table 2 indicates KMO value >0.7 and Sig. is close to zero, which means correlation matrix have a common factor and meet requirements of factor analysis. In the process of exploratory factor analysis, we used principal component analysis and method of Varimax.

The result of principal component analysis shows characteristic roots of six factors are more than 1 and account for 61.616% of the total variance altogether (Table 3). The result of Varimax (rotation converged in 7 iterations) shows except item PBC5, all the load values of the observed variables in a same latent variable are high (more than 0.5) in a same common factor and low at the others. Item PBC5, however, as a single factor, should be deleted (Table 4). After deletion, load values of the all measured items are more than 0.5, which indicates construct validity of the refined scale can be accepted.

Following exploratory factor analysis, LISREL8.70 was used for confirmatory factor analysis. Table 5 presents that item PR3 (Factor loading <0.5) should be deleted and other measured variables (>0.5) are significant. Table 6 shows the SEM analysis has a good fit, as seen from the goodness-of-fit indices (GFI=0.8; AGFI=0.85; NNFI=0.91; GFI=0.93; RMSEA=0.086), and the chi-square index is significant (χ²=1750.76; df=622; χ²/df=2.815). The results indicate that the research model exhibited a satisfactory overall fit to the collected data.

Finally, we tested our hypotheses by using LISREL8.70. The results show attitude (the path coefficient was 0.34, t value was 3.24, p<0.01), subjective norms (the path coefficient was 0.29, t value was 3.29, p<0.01) and perceived behavioral control (the path coefficient was 0.47, t value was 3.1, p<0.01) had a significant impact on M-commerce adoption intention, thus the hypotheses H3, H5 and H6 were supported. Perceived reflexivity M-commerce had a significant negative impact on adoption intention (the path coefficient was -0.58, t value was -3.96, p<0.01). Here, attitude is an intermediary between perceived reflexive M-commerce and adoption intention. So we hypothesize as follows:

**H4:** Perceived reflexive M-commerce has negative effect on adoption intention.

**H5:** Perceived reflexive M-commerce has negative effect on attitude.

**H6:** Perceived reflexive M-commerce has negative effect on perceived behavioral control.

According to the definition for mediating variable (Baron and Kenny, 1986), if H3 and H5 are supported, attitude is an intermediary between perceived reflexivity and adoption intention; if H5 and H6 are supported, perceived behavioral control is an intermediary between perceived reflexivity and adoption intention. So we hypothesize as follows:

**H7a:** Attitude plays a mediating role. Perceived reflexive M-commerce influences adoption intention not only directly but indirectly through attitude as well.

**H7b:** Perceived behavioral control plays a mediating role. Perceived reflexive M-commerce influences adoption intention not only directly but indirectly through perceived behavioral control as well.

Subjective norms depend on how individuals perceive and meet the expectation of a group. Individuals are influenced by the pressure from society or influential people in a group (Fishbein and Ajzen, 1975). According to the theory of fashion, perceived reflexive M-commerce will decrease when people are talking about the disadvantages of M-commerce and few person use it (Hexmoor et al., 2006). In a word, subjective norms about an innovation make consumers put more importance on or ignore the reflexivity. So we hypothesize as follows:

**H8:** Subjective norms influence perceived reflexive M-commerce.

These hypotheses are summarized in Figure 1.

**METHODOLOGY**

**Samples and survey**

The subjects of this study were college students and office workers in China with prior experiences with M-commerce, for they have a greater understanding of M-commerce and have the basic knowledge to answer our questions. The main method of data collection for this study was survey. Due to lower costs and convenience of delivery and without time and space constrains, we used an online questionnaire placed on the web.

Based on previously related literatures and comments gathered from interviews, each item was measured on a seven-point Likert Scale from disagree to agree. The initial version of the survey instrument was refined through extensive pre-testing with three researchers with significant expertise in the study of information management. The instrument was further pilot-tested with 40 consumers having M-commerce experiences in China. There were 350 samples with 23 screened out because of missing value, leaving 327 valid samples.
between perceived reflexivity and adoption intention; if H₃ and H₆ are supported, perceived behavioral control is an intermediary between perceived reflexivity and adoption intention. Thus, H₇ₐ and H₇ₐ were supported. Subjective norms (the path coefficient was -0.42, t value was -3.79, p<0.01) had a significant negative impact on perceived reflexivity M-commerce. According to the importance of these impact factors on the M-Commerce adoption intention, the sequence was perceived reflexivity (-0.8369=-0.58+(-0.41)*0.34+(-0.25)*0.47), perceived behavioral control (0.47), attitude (0.34) and subjective norms (0.29). These results are shown in Figure 2.

### RESULTS AND DISCUSSION

This study investigated M-commerce adoption intention among Chinese users. We introduced the concept of perceived reflexive M-commerce into the theory of planned behavior, which improves the predictability of the theory model. Furthermore, our research on M-commerce provides the capability to do what Merton (1968) and Gregor (2006) have called middle range theory development. This approach enables researchers to focus on a specific phenomenon through a combination of theory and empirical research, moving away from more broad-based empiricism that may be difficult to implement (Pinder and Moore, 1980).

Kauffman et al. (2010) and Levine and Rossmore (1994) offer several examples of this style of research in different research contexts. Our exploration of theory, though it is achieved through an experimental research design here, has been to understand some of the specific elements of how initiators engender perceived reflexive M-commerce in acceptance of M-commerce setting.

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**Table 1.** Reliability of research constructs.

<table>
<thead>
<tr>
<th>Latent variable</th>
<th>Number of items</th>
<th>Cronbach’s α</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitude</td>
<td>5</td>
<td>0.757</td>
</tr>
<tr>
<td>Subjective norms</td>
<td>5</td>
<td>0.805</td>
</tr>
<tr>
<td>Perceived behavioral control</td>
<td>6</td>
<td>0.785</td>
</tr>
<tr>
<td>Perceived reflexivity</td>
<td>8</td>
<td>0.883</td>
</tr>
<tr>
<td>Adoption intention</td>
<td>3</td>
<td>0.787</td>
</tr>
</tbody>
</table>

**Table 2.** KMO and Bartlett’s test.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>KMO</td>
<td>0.732</td>
</tr>
<tr>
<td>Bartlett's Test (Chi-Square)</td>
<td>1991.740</td>
</tr>
<tr>
<td>df</td>
<td>378</td>
</tr>
<tr>
<td>Sig.</td>
<td>0.000</td>
</tr>
</tbody>
</table>
The results indicate that perceived reflexive M-commerce has the most significant negative impact on M-commerce adoption intention. Next are the factors of perceived behavioral control and attitude. And the last is the factor of subjective norms.

On the other hand, perceived reflexive M-commerce...
Table 5. Confirmatory factor analysis.

<table>
<thead>
<tr>
<th>Latent variables</th>
<th>Measured items</th>
<th>Factor loading</th>
<th>Latent variables</th>
<th>Measured items</th>
<th>Factor loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitude</td>
<td>A1 0.68</td>
<td></td>
<td>Perceived control</td>
<td>PBC1 0.67</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A2 0.64</td>
<td></td>
<td></td>
<td>PBC2 0.68</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A3 0.69</td>
<td></td>
<td></td>
<td>PBC3 0.65</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A4 0.63</td>
<td></td>
<td></td>
<td>PBC4 0.71</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A5 0.62</td>
<td></td>
<td></td>
<td>PBC5 Deleted</td>
<td></td>
</tr>
<tr>
<td>Subjective norms</td>
<td>SN1 0.72</td>
<td></td>
<td></td>
<td>PBC6 0.71</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SN2 0.71</td>
<td></td>
<td></td>
<td>PBC7 0.76</td>
<td></td>
</tr>
<tr>
<td>Adoption intention</td>
<td>BI1 0.67</td>
<td></td>
<td>Perceived reflexivity</td>
<td>PR1 0.72</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BI2 0.84</td>
<td></td>
<td></td>
<td>PR2 0.75</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BI3 0.78</td>
<td></td>
<td></td>
<td>PR3 Deleted</td>
<td></td>
</tr>
</tbody>
</table>

Table 6. Overall fit index indices of the CFA model.

<table>
<thead>
<tr>
<th>Fit index</th>
<th>$\chi^2$</th>
<th>df</th>
<th>$\chi^2$/df</th>
<th>GFI</th>
<th>AGFI</th>
<th>NNFI</th>
<th>CFI</th>
<th>RMESA</th>
</tr>
</thead>
<tbody>
<tr>
<td>value</td>
<td>1750.76</td>
<td>622</td>
<td>2.815</td>
<td>0.80</td>
<td>0.85</td>
<td>0.91</td>
<td>0.93</td>
<td>0.086</td>
</tr>
</tbody>
</table>

Figure 2. Results of SEM analysis.

influences consumers’ M-commerce adoption intention not only directly but indirectly through attitude and perceived behavioral control. It is worth noting that subjective norms have negative impact on perceived reflexive M-commerce.

According to the study, there are some suggestions for the M-commerce providers. In order to increase the adoption rate of M-commerce, firms should give priority to reducing perceived reflexive M-commerce. First, firms should improve the group intention of M-commerce by make full use of demonstrate effect of leader users, opinion leaders, and the target consumers’ favorite public figures, for in the process of decision-making, individuals usually conform to the reference group and influential people. Second, firms ought to focus on controlling and reducing the risks by technological improvement to
decrease consumers’ perceived risk. Third, firms should make full use of the social media to strengthen communication with public and lead positive comments on M-commerce to decrease perceived uncertainty. Last but not the least, our results show if consumers consider it easy to use M-commerce, adoption intention will be stronger and therefore, providers should simplify the operation and reduce the cost of M-commerce to improve perceived control.

There are some limitations with this study that should be acknowledged. We focused on the impact of perceived reflexive M-Commerce on adoption intention. For the other innovations, however, the model need to be further examined. Second, this study only collects Chinese data and therefore, the results might not be generalized to the other countries and districts due to the different cultures. Finally, it is always possible that some degree of common method bias may exist given the nature of perceptual data using a single source of information. To mitigate this problem, additional data should be collected from different sources.

REFERENCES
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