Consumers’ Intention to Use a Single Platform E-Payment System: A Study Among Malaysian Internet and Mobile Banking Users

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Abstract
This study seeks to explore Malaysian Internet and Mobile banking consumers’ intention to adopt a single platform E-payment system using TAM model. This research seeks to investigate whether convenience and design influence perceived ease of use and perceived usefulness. We also investigated the relationship between perceived ease of use, perceived usefulness and perceived risk with consumers’ intention to use one single platform that integrates card, internet and mobile. Respondents who used both the Internet and Mobile banking were selected to participate in the survey. AMOS version 22.0 was used to analyze the data. The empirical results suggest that convenience, design, perceived risk, perceived usefulness and perceived ease of use influence consumers’ intention to use single platform E-payment system. Therefore, convenience, design, perceived risk, perceived usefulness and perceived ease of use should be taken into consideration when designing E-payment system in order to increase the Internet and Mobile banking consumers’ intention to use.

Keywords: Banking; TAM; Single Platform E-payment; Internet and Mobile banking users; Consumers’ Intention to use

INTRODUCTION
Earlier studies have investigated E-payments separately and individually, for example payment cards (Rinaldi, 2001), smart cards (Humphrey, Kaloudis and Øwre, 2004), mobile e-wallet (Amoroso and Magnier-Watanabe, 2012). In fact, there is an increasing interest in this topic given the problems such as inconvenience, not interesting and unattractiveness of E-payment technology solutions faced by organizations to increase consumers’ intention to use E-payment systems (Lai, 2007; Geron, 2009, Wei, Shuo, Luo, Chen and Ling, 2011; Jovanovic and Organero, 2011). The lack of empirical investigations combining the determinants of the three E-payments (Card, Internet and Mobile) in one study encourages the study of the single platform E-payment system shown in Figure 1. As the future integrated E-payment instruments, single platform E-payment system is a novel system as previous researches only focused on the three systems separately (Card, Internet, Mobile).
Mohammad (2008) in his paper entitled “The Development of E-payments and Challenges in Malaysia” and Cheah (2011) from the Payment Systems Policy Department Bank Negara highlighted the importance of risk for E-payment especially the financial risk in the financial industry that needs further research. Perceived risk is associated with consumers’ feelings like anxiety, concern, discomfort, uncertainty, and cognitive dissonance that may be influenced the E-payment process. These problems present a challenge to organizations’ management providing E-payment solutions to encourage consumers’ intention to use technology-based E-payment services especially involving banking solutions.

This study focuses on the consumers-based research orientation such as consumers’ intention to use that is measureable with the adoption of Technology Acceptance Model (TAM) (Davis, Bogozzi and Warshaw, 1989) to enhance the potential of deploying an integrated single platform E-payment system with perceived risk. Therefore, this study seeks to investigate the convenience and design that influence perceived ease of use and perceived usefulness. Furthermore, this study investigate the relationship between perceived ease of use, perceived usefulness and perceived risk with consumers’ intention to use one single platform E-payment System that integrates Card, Internet and Mobile as the novelty system.

Technology Acceptance Model (TAM), Banking and Theoretical Hypothesis

Technology Acceptance Model (TAM) was introduced by Fred Davis in 1986 and specifically tailored for modeling users’ acceptance of information systems or technologies or new product acceptance. The goal of Davis (1989) TAM is to explain the general determinants of technology acceptance that lead to explaining users’ behaviour across a broad range of end-user computing technologies and user populations. In this study will based on Technology Acceptance Model that was formed by Venkatesh and Davis (1996) after the main finding of both perceived usefulness and perceived ease of use were found to have a direct influence on behaviour intention, thus eliminating the need for the attitude construct. The two significant beliefs exist in the TAM are the perceived usefulness and perceived ease of use. TAM also postulates that perceived ease of use stimuli perceived usefulness because the easier to use single platform E-payment system, the more useful users perceive the single platform E-payment system to be. There are empirical studies of the TAM include this correlation and the finding share a significant relationship between these two factors (Moon and Kim, 2001; Van der Heijden, 2003; Shih, 2004).

Banking leaders are adding to their goals as global market player by providing easy to use Internet and mobile banking. The good news with Internet and Mobile banking mean that consumers’ can access globally wherever there is Internet connection (Lai, 2010). Internet and Mobile banking are beneficial to banking consumers’ since the services can provide cost and time saving (Turban, Lee, King, and Chung, 2000; Lai, 2010). Banks are also embracing mobile banking to capitalize on the emerging opportunities and to supplement traditional off-line and phone banking (Kim, Steinfield, and Lai, 2009, Lai, 2010). Mobile banking usually refers to banking transactions that is similar to Internet banking and it provides a fast and convenient way of performing common banking transactions.
Mobile banking can be seen as a subset of electronic banking (E-banking) - a concept covering all the electronic modes of conducting banking engagements (Pousttchi and Schurig, 2004) and an extension of internet banking (Brown, Cajee, Davies, and Stroebel, 2003) with its own unique features. This research will study the single platform E-payment system as the unique features that provide convenience and novelty design to current Internet and Mobile banking consumers.

With the emergence of technology, additional variables are introduced to the TAM so to produce an extended TAM for predicting consumers’ intention to use such as perceived risk (Pavlou, 2003). Perceived risk has been shown to reduce consumer’s intention to engage Internet transactions (Jarvenpaa, Tractinsky, and Vitale, 2000) which will be the same for single platform that integrates card, internet and mobile transaction.

Perceived risk is defined as consumers’ perceived risk and their own tolerance of risk taking that influence their financial transaction decision (Chan and Lu, 2004). Perceived risk suggests the idea that consumers’ may be influenced during the E-payment process by the feelings like anxiety, concern, discomfort, uncertainty, and cognitive dissonance in this research. Mohammad (2008) in his paper entitled “The Development of E-payments and Challenges in Malaysia” and Cheah (2011) from Payment Systems Policy Department Bank Negara highlighted the importance of risk for E-payment especially the financial risk in the financial industry where E-PaySIM™ E-payment is also bound to follow Bank Negara guidelines. Therefore, perceived risk is added to the original TAM model for this study.

This study will use the underlining variables shown in Figure 1 to determine the consumers’ intention to use the single platform E-payment system. For the purpose of the study, the following hypotheses were posited:

Figure 1: Theoretical Hypothesis
H1a: Convenience is positively associated on perceived usefulness.
H1b: Convenience is positively associated on perceived ease of use.
H2a: Design is positively associated on perceived usefulness.
H2b: Design is positively associated on perceived ease of use.
H3: Perceived ease of use is positively associated perceived usefulness.
H4: Perceived usefulness is positively associated with consumers’ intention to use
H5: Perceived ease of use is positively associated with consumers’ intention to use
H6: Perceived risk is negatively associated with consumers’ intention to use.

METHODS

There are 12.4 million Internet banking and 1.73 million mobile banking users in Malaysia (March 2012, Bank Negara report). The target population in this study includes only respondents who have used either Internet or Mobile banking for last 12 months. Online survey questionnaire was used as data collection method.

A total of 638 respondents that fulfill the pre-set requirements were collected and used for this analysis. Based on Klien, (2011) using 10:1 and using non probability sampling, the minimum recommended sample size for this study is 440. The research managed to collect 638 data that being used here that provided a robust study for this research. In this study, the five-point scale Likert-type of measuring the consumers’ intention to use Single platform e-payment system like ‘strongly disagree’ to ‘strongly agree’ will be used. When responding to the survey items, participants specify their levels of agreement to a subject given. The five points scale is selected to encourage respondents to make positive or negative choices (Cooper, Schindler, and Sun 2008) in order to produce more emphatic information (Oppenheim, 1992). The Cronbach’s alphas for the variables are as follows: convenience (.94), design (.89), perceived usefulness (.96), perceived ease of use (.91) perceived risk (.88) and consumers’ intention to use (.92).

RESULTS (RESPONDENT PROFILE)

In this study, analyses have been done for each variable separately to gather a summary of respondents’ demographic profile in order to get the preliminary information and the feel of the data (Sekaran, 2003). Table 1 showed the respondents’ demographic profiles of the survey. The highest respondents’ of 38.1% are in the age range of 26-40 with male respondents of 54.1% and the marital status for single respondents at 54.1% mostly with at least college/university at 57.5% working at middle management level 33.4% in Banking/Finance/Manufacturing/ICT industry and 39.1% owning all three (3) items mobile phone, internet and card payment.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency (n=638)</th>
<th>Percent (Total 100%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>345</td>
<td>54.1</td>
</tr>
<tr>
<td>Female</td>
<td>293</td>
<td>45.9</td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>345</td>
<td>54.1</td>
</tr>
</tbody>
</table>
Married  293  45.9

<table>
<thead>
<tr>
<th>Age</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 25</td>
<td>216</td>
<td>33.9</td>
</tr>
<tr>
<td>26-40</td>
<td>243</td>
<td>38.1</td>
</tr>
<tr>
<td>41-55</td>
<td>137</td>
<td>21.5</td>
</tr>
<tr>
<td>&gt; 55</td>
<td>42</td>
<td>6.6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Education</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Secondary/High school</td>
<td>190</td>
<td>29.8</td>
</tr>
<tr>
<td>College/university</td>
<td>367</td>
<td>57.5</td>
</tr>
<tr>
<td>Graduate school</td>
<td>81</td>
<td>12.7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Job position</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Top Management</td>
<td>27</td>
<td>4.2</td>
</tr>
<tr>
<td>Middle Management</td>
<td>213</td>
<td>33.4</td>
</tr>
<tr>
<td>Junior Management</td>
<td>69</td>
<td>10.8</td>
</tr>
<tr>
<td>Professional</td>
<td>66</td>
<td>10.3</td>
</tr>
<tr>
<td>Other</td>
<td>263</td>
<td>41.2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>What industry you work in</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Education</td>
<td>230</td>
<td>36.1</td>
</tr>
<tr>
<td>Banking/Finance/Manufacturing/ICT</td>
<td>250</td>
<td>39.1</td>
</tr>
<tr>
<td>Retail/Hypermarket</td>
<td>45</td>
<td>7.1</td>
</tr>
<tr>
<td>Other</td>
<td>113</td>
<td>17.7</td>
</tr>
</tbody>
</table>

**Measurement model**

All the goodness of fit indices was good and satisfied the requirements with the validity assessment of the CFA model. Chi-Square was 522.93 at p=0.00 and df (degree of freedom) was 120. According to Tabachnick and Fidell (2007), the relative Chi-Square ($\chi^2$/df) at 4.54 is below the 5.0 required for good fit. As stated by Hair et al. (2006). In absolute fit indices, the goodness of fit index (GFI) was 0.92, well higher than 0.90 (Hair et al. 2010). Comparative fit index (CFI) was 0.97, above the 0.90 required for good fit (Hu and Bentler 1999). Root mean square error of approximation (RMSEA) was .07, below the 0.08 required for good fit (Byrne 1998). For the overall measurement model, the results indicated good fit model.

**Structural model**

Based on the results of measurement model, the structural model was examined with the theoretical links as shown in Figure 2 with all of the goodness of fit indices that indicated an acceptable model.
The overall structural model shows all paths of standardized regression weights as shown in Table 2 are statistically significant at the $p \leq 0.001$ and $p \leq 0.01$ level of significance.

**Table 2** Standardized regression weights of structural model

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Standardized Regression Weights</th>
<th>S.E.</th>
<th>C.R.</th>
<th>P</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypothesis 1a</td>
<td>EU $&lt;---$ C</td>
<td>0.03</td>
<td>9.12</td>
<td>***</td>
<td>Significant $p \leq 0.001$</td>
</tr>
<tr>
<td>Hypothesis 2a</td>
<td>EU $&lt;---$ D</td>
<td>0.03</td>
<td>17.35</td>
<td>***</td>
<td>Significant $p \leq 0.001$</td>
</tr>
<tr>
<td>Hypothesis 1b</td>
<td>U $&lt;---$ C</td>
<td>0.04</td>
<td>9.33</td>
<td>***</td>
<td>Significant $p \leq 0.001$</td>
</tr>
<tr>
<td>Hypothesis 2b</td>
<td>U $&lt;---$ D</td>
<td>0.04</td>
<td>4.67</td>
<td>***</td>
<td>Significant $p \leq 0.001$</td>
</tr>
<tr>
<td>Hypothesis 3</td>
<td>U $&lt;---$ EU</td>
<td>0.05</td>
<td>8.71</td>
<td>***</td>
<td>Significant $p \leq 0.001$</td>
</tr>
<tr>
<td>Hypothesis 4</td>
<td>CI $&lt;---$ U</td>
<td>0.06</td>
<td>5.80</td>
<td>***</td>
<td>Significant $p \leq 0.001$</td>
</tr>
<tr>
<td>Hypothesis 5</td>
<td>CI $&lt;---$ EU</td>
<td>0.07</td>
<td>2.58</td>
<td>0.01</td>
<td>Significant $p \leq 0.01$</td>
</tr>
<tr>
<td>Hypothesis 6</td>
<td>CI $&lt;---$ R</td>
<td>0.04</td>
<td>-8.47</td>
<td>***</td>
<td>Significant $p \leq 0.001$</td>
</tr>
</tbody>
</table>

**Hypothesis 1a** Convenience has relationship on Perceived Ease of use.
This hypothesis suggests that Convenience as an exogenous factor provides a significant contribution to perceived ease of use as an endogenous factor. Therefore, hypothesis 1a is supported by the data. In this case, efficiency has a significant relationship with perceived ease of use.

**Hypothesis 2a** Design has relationship on perceived ease of use.
The results showed that design has strong direct relationship with perceived usefulness with path coefficient=0.57, C.R=10.23 and $p=0.00$ ($p<0.001$) is the highest among the entire hypothesis. In this case, the higher the design support the greater the perceived usefulness of the system.

**Hypothesis 1b** Convenience has direct relationship on Perceived usefulness
This hypothesis suggests that efficiency as an exogenous factor provides a significant
contribution to perceived usefulness as an endogenous factor. Therefore, hypothesis 1b is supported by the data. In this case, convenience has a significant relationship with perceived usefulness.

**Hypothesis 2b** Design has direct relationship on Perceived usefulness.
This hypothesis suggests that design as an exogenous factor provides a significant contribution to perceived usefulness as an endogenous factor. Therefore, hypothesis 2b is supported by the data. In this case, design has a significant relationship with perceived usefulness.

**Hypothesis 3** Perceived ease of use has relationship on perceived usefulness.
The results of SEM showed that the standardized regression weight of the structural path between perceived ease of use and perceived usefulness is positive and significant, in which path coefficient=0.36, C.R=8.71 and p=0.00 (p<0.001). In this case, the higher the perceived ease of use support the greater the perceived usefulness of the system.

**Hypothesis 4** Perceived usefulness is positively associated with consumers’ intention to use.
The hypothesis showed that perceived usefulness has a significant relationship with consumers' intention to use of the system with explanatory power R² of 77.

**Hypothesis 5** Perceived ease of use is positively associated with consumers’ intention to use.
The hypothesis showed that perceived ease of use has a significant relationship with consumers’ intention to use of the system with explanatory power R² of 79.

**Hypothesis 6** Perceived risk is negatively associated with consumers’ intention to use.
The results of SEM showed that the standardized regression weight of the structural path between perceived ease of use and perceived usefulness is positive and significant, in which path coefficient= -0.29, C.R= -8.47 and p=0.00 (p<0.001). In this case, the higher the perceived risk support the lower the consumers' intention to use of the system.

**DISCUSSIONS AND CONCLUSION**
Convenience has positive relationship with perceived usefulness and perceived ease of use and also has positive direct relationship with the perceived usefulness and perceived ease of use. There isn’t much different for convenience significant relationship with perceived usefulness (β = .36) compared to perceived ease of use (β = .32) which mean convenience will contribute more towards perceived usefulness than perceived ease of use with only .04 path coefficient different. The results are in line with Lin and Hsieh (2006) that illustrated convenience constitute consumers’ expectation of E-payment service attribute in a banking industry. Therefore, convenience is an important factor to delivering both usefulness and ease of use for single platform E-payment system.
Design has positive relationship with perceived usefulness and perceived ease of use and also has positive direct relationship with the perceived usefulness and perceived ease of use. Design has a stronger significant relationship with perceived ease of use ($\beta = .60$) which is the highest in the structural model compared to perceived usefulness ($\beta = .21$). Thus, this implies that the design is a strong determinant on perceived ease of use for the case of Single Platform E-payment System. Nevertheless, design depends on both the perceived usefulness and the perceived ease of use as in previous studies (Davis, 1989; Ahn, Ryu, and Han, 2004; Lin and Hsieh, 2006). Therefore, design should be considered imperative in determining perceived usefulness and perceived ease of use.

The result of structural equation modeling (SEM) established that there is a negative and significant relationship between perceived risk and consumers’ intention to use based on the hypothesis 6 supported by the research data in which standardized regression estimate $\beta = -.29$, CR = -8.47 and $p=.00$ ($p \leq .001$). It can be suggested that the lower the risk of using single platform E-payment system, the higher the consumers’ intention to use the single platform E-payment system. Hypothesis 6 concluded and validated existing studies (Jarvenpaa et al., 2000; Pavlou, 2003) in regard to perceived risk were negatively associated with consumers’ intention to use. Thus, hypothesis 6 for single platform E-payment system is confirmed. This result further implied that perceived risk was an important element of consumers’ intention to use the single platform E-payment system, as were the perceived usefulness and perceived ease of use.

Perceived risk has been the major concern but the standard regression weight of 29% is considered medium. Thus, the management of the organizations providing single platform E-payment system need to look into providing secured solutions to reduce the risk as well. In order to reduce the perceptions of risk, single platform E-payment system suppliers can organize talk to educate consumers on how to safeguard their E-payment transactions with the additional security and privacy features. This research emphasized in providing consumers with security solutions to perform their single platform E-payment transaction. Furthermore, by reducing the perceived risk, it will increase the consumers’ trust and confidence that lead to the intention to use in single platform E-payment system.

The explanatory power $R^2$ scores of perceived usefulness by perceived ease of use, convenience and design variables are .77. The explanatory power $R^2$ scores of perceived ease of use by efficiency and design variables are .79. The explanatory power $R^2$ scores of Consumers’ intention to use by perceived usefulness, perceived ease of use and perceived risk variables are .41. According to Cohen (1998), the explanatory power $R^2$ scores was decoded as small ($\geq .01$), medium ($\geq .09$), or large ($\geq .25$). Thus, the results showed that the single platform E-payment system has very high perception of usefulness and ease of use and moderate consumers’ intention to use by the consumers’ respondents. Thus, the consumers’ intention to use is consider good with 41% to use the single platform E-payment system in this study.

Banks are on the lookout to reduce their high cost of operation (OECD, 2006, Lai, 2010). Besides core banking services, banks generate good revenue from transaction payment (e.g., Cards Payment). Nevertheless, at times banks also lose money due to fraud transactions (Mohammad, 2008; Cheah, 2011). Another challenge is to keep the
customers satisfied and loyal through innovation (e.g., to have all banking solution in one (1) single platform). Therefore, this research provides an insight of consumers’ perspective in regard to Card, Internet and Mobile Payment as well as the potential of having an innovation solution in one single platform for banking purpose.

One limitation of using online survey is reaching target audiences who have Internet access only. The data also represents Malaysian context and might not be relevant in other countries. The data was collected at one point of time and may change over time due to greater experience and advancement of E-payment technologies. Therefore, future study should be expanded to non-internet users using traditional survey method where information can assist management to target non Internet banking users. This study can be replicated in other developed or developing countries as well as a longitudinal study to examine the single platform e-payment system and consumers’ intention to use at various points of time.

In conclusion, the empirical results from the study suggest that perceived risk can lead to reduce the usage of consumers’ intention to use single platform E-payment system. Therefore, perceived risk should be taken into consideration when designing E-payment system in order to increase the consumers’ intention to use. It is noted that the constructs of the single platform E-payment system should include convenience and good design while providing security to reduce the risk that support the ease of use and usefulness of the single platform E-payment that can lead to consumers’ intention to use single platform E-payment system.

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