Antecedents of the Use of Online Banking by Students in Malaysia Extended TAM Validated Through SEM

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Abstract: The radical advances in the electronic banking technologies have inaugurated unique methods of transaction with a bank, especially using online banking medium. The main purpose of this study is to replicate an extended Technology Acceptance Model (TAM) in order to determine those factors that impact the students' intention to use online banking, in Malaysian context. The 2 main banks were selected for data collection purposes, namely, Bank Muamalat Malaysia Berhad and Bank Islam Malaysia Berhad. A self-administered questionnaire which was already developed and tested previously by various scholars have been adapted for the present study. The questionnaire was distributed through convenience sampling to 550 students of different faculties and universities in Malaysia. A total of 451 usable responses were finally selected for the data analysis purpose. First, the descriptive analysis was undertaken in order to observe the data for various trends. After descriptive analysis, data was inferentially analyzed by deploying Structural Equation Modelling (SEM). The main steps of SEM followed in this particular research were; Confirmatory Factor Analysis (CFA) and full fledge structural equation modelling which led to hypothesis testing using AMOS computer software. The results indicate that perceived usefulness, perceived enjoyment and quality of internet connection are the main antecedents of the use of online banking by students. Moreover, the information on online banking significantly affects perceived ease of use and perceived enjoyment. Furthermore, quality of internet connection statistically significantly impact perceived enjoyment and security and privacy. Descriptive statistics indicates 71.8% males and 28.2% females, 46.3% have their accounts in Bank Muamalat Malaysia Berhad and 34.6% in Bank Islam Malaysia Berhad. A total of 90.7% students were in between 15-35 years of their age. Most of them (64.5%) were the master's students of different fields with majority of them (35.9%) pursuing their MBA. The use of convenience sampling in this study weakens research objectivity and the relatively small size of the sample somewhat limits generalizations. The use of complex modelling techniques, namely; structural equation modelling is a novel attempt in validating the extended TAM. Further, this study also extends the understanding of the technology acceptance model from students' behaviour perspective. Perhaps, the model validated in the present research can be adopted by future researchers for further investigation, especially in other countries and industries.

Key words: Online banking, TAM, SEM, students behaviour, Malaysia

INTRODUCTION

The new millennium has brought with itself millions of websites with the emergence of internet (O'Connor and Galvin, 2001). Businesses around the globe have different types of websites to attract customers from every corner of the world. This information technology revolution has also forced the banking industry to adopt online banking along with the traditional banking operations, hence encouraging delivery toward using self-service channels (Pikkarainen *et al.*, 2004). Now the internet has become an integral part of everyone's daily life, especially in the developed nations (Guriting and Ndubisi, 2006). However, branch-based banking is still widely used method for banking transactions (Israil *et al.*, 2010).

Malaysia being one of the rapidly growing nations has also actively developed e-banking services, since mid-2000 (Poon, 2008). After the introduction of internet in the banking sector, Malaysian authorities encouraged the local banks to adopt online banking by giving them 18 month head start over foreign banks (Israil *et al.*, 2010). The main motive behind this step was to push the domestic banks to invest in the latest technologies in order to compete with the foreign banks. However

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Israil *et al.* (2010), noticed that despite all the efforts aimed at developing better and easier online banking system, customers did not adopt it to the fullest and were largely unnoticed and underused in spite of their availability. A support for this particular statement can also be found in the research of Robinson (2000) who found that half of the people that have tried online banking service will not become active users. Particularly in Malaysia, traditional branch-based retail banking still remains one of the most widely used methods for banking transactions (Guriting and Ndubisi, 2006).

Malaysia with the population of around 28 million gives active signals to the banking authorities to comprehend the importance of online banking system. As already mentioned, the adoption and re-use of online banking systems in the customers is not encouraging. It therefore, accentuates that there is a great need to thoroughly examine the factors influencing the acceptance of online banking in Malaysia. It also emphasizes on finding the antecedents of using online banking systems by customers. These antecedents will probably help the banking authorities to design their online banking strategies in a more efficient manner, so that customers feel comfortable to transact using the online banking systems.

The main objective of this research is also the same, that is to find those factors the influence students' acceptance of online banking system. For this purpose Technology Acceptance Model (TAM) originally developed by Davis *et al.* (1989) was adopted with its extension proposed by Pikkarainen *et al.* (2004).

Literature review: Repository of studies can be found in the literature highlighting online banking acceptance due to the introduction of new and especially devoted issues of various banking journals (Karjaluoto *et al.*, 2002; Waite and Harrison, 2002; Bradley and Stewart, 2002; Gerrard and Cunningham, 2003; Mukherjee and Nath, 2003; Guriting and Ndubisi, 2006). Further, scholars found that online banking channel is the cheapest delivery channel for banking products, once the link is established (Robinson, 2000; Sathye, 1999). Due to the availability of online banking, banks can reduce their number of branches and downsize the number of service staff which opens the ways for online banking (Israil *et al.*, 2010). It is because many customers felt that branch banking takes too much time and effort (Karjaluoto *et al.*, 2003). Many other studies, also found that time and cost savings and freedom from place have been the main reasons underlying online banking acceptance (Polatoglu and Ekin, 2001; Black *et al.*, 2002; Howcroft *et al.*, 2002). Moreover, Mols (1998), Robinson (2000) and Sheshunoff

(2000) found that online bankers are the most profitable and wealthiest segment to banks, hence attesting the importance of online banking system.

Apart from the benefits that are offered by online banking, many banks are overlooking the importance of this channel and ignoring it (Israil *et al.*, 2010). The main reason behind this denial is the lack of studies in finding out the factors that make the customers switch from traditional branch-based banking to online banking (Israil *et al.*, 2010). Further, Mols *et al.* (1999) argued that customers also feel reluctant to accept online banking because online users have to learn the service first. Moreover, Mattila *et al.* (2003) found that customers do not prefer online banking because of its laxity of social dimension, i.e., you are not served in the way you are in a face-to-face situation at branch. Finally, customers are also reported to be concerned about the issues of security when using online banking system for financial transactions (Sathye, 1999; Hamlet and Strube, 2000; Howcroft *et al.*, 2002).

The literature is ripe with studies highlighting the factor influencing consumer adoption of online banking services. For example, Kolodinsky *et al.* (2002) found that the likelihood of adoption rose with higher levels of financial assets and education. On contrary, people earlier the age bracket of 65 are found to be less influenced by internet banking, hence not attracted toward it (Ilett, 2005; Perumal and Shanmugam, 2004). Many studies (Pew, 2003; Ramsay and Smith, 1999; Thornton and White, 2001) identified convenience as another important influencing factor in the acceptance of online banking by consumers. Similarly, people with high levels of workplace internet use have also been reported to adopt online banking (Durkin, 2004). Moreover, Chung and Paynter (2002) concluded that people who have not used internet banking for any transaction will not prefer to use it for future transaction, hence attesting the importance of past experience with online banking. Interestingly, many consumer do not use online banking because they are not aware of the benefits it offer (Sathye, 1999). Furthermore, many studies (Black *et al.*, 2002; Siu and Mou, 2005) highlighted the importance of security and privacy in the acceptance of online banking by customers. Israil *et al.* (2010), Rexha *et al.* (2003) and Suh and Han (2002) also agreed to the importance of security and privacy in consumer adoption of internet banking. A number of well-established models can be found in the literature which was developed to examine and understand the factors affecting the acceptance of information systems. Among these models, Theory ofReasoned Action (TRA) has gained enough recognition and has been tested and extended by many scholars (Fishbein and Ajzen, 1975;

Ajzen and Fishbein, 1980). Other models relevant to the acceptance of information systems includes; Technology Acceptance Model (TAM) (Davis, 1989; Davis *et al.*, 1989; Moore and Benbasat, 1991; Davis and Venkatesh, 1996; Gefen and Straub, 2000; Al-Gahtani, 2001; Ndubisi and Jantan, 2003), the Theory of Planned Behavior (TPB) (Ajzen, 1991; Mathieson, 1991), the Model of PC Utilisation, the Decomposed Theory of Planned Behavior (Taylor and Todd, 1995; Tan and Teo, 2000), Innovation Diffusion Theory (Rogers, 1983; Agarwal and Prasad, 1997) and the Moguls Model of Computing (Ndubisi *et al.*, 2004). The present research, however will adopt extended TAM, as it helps in understanding Perceived Usefulness (PU) and Perceived Ease of Use (PEoU) along with other dimension like; Perceived Enjoyment (PE) and security and privacy, to name a few. The extended TAM tested by Pikkarainen *et al.* (2004) best suits the nature of the present research compared to other aforementioned competing models. The TAM has been selected because it is tested widely with different samples in different situations and proved to be valid and reliable model explaining information system acceptance and use (Davis and Venkatesh, 1996; Mathieson, 1991). The dimensions of TAM, also allow the researchers to better trace those factors which influences online banking acceptance (Davis *et al.*, 1989).

The model: The model developed and tested by Pikkarainen *et al.* (2004) has been replicated in the present research. However, it is important to note that many new linkages were tested in the research and some interesting findings also emerged. Basically in extended TAM, there are 6 main construct impacting online banking use (Fig. 1) but researcher have also tested the impact of some of these constructs on one another, e.g., information on online banking impacting perceived ease of use, information on online banking impacting perceived enjoyment, quality of internet connection impacting perceived enjoyment and quality of internet connection impacting security and privacy (Fig. 1).

It is also important to note that Pikkarainen *et al.* (2004) and Israil *et al.* (2010) devised 6 hypotheses in their research which have been adopted in the present research, as well but with the addition of some new hypotheses. This research, therefore will test the following hypotheses:

H_1: Perceived Usefulness (PU) has a positive effect on online banking use

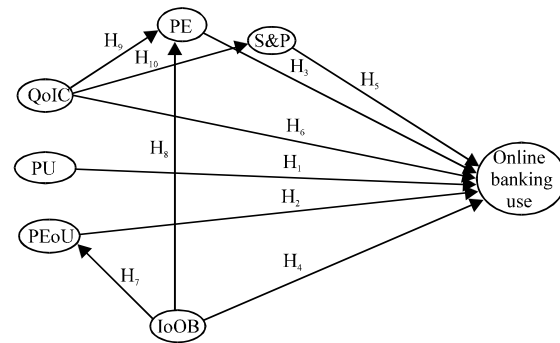H_2: Perceived Ease of Use (PEoU) has a positive effect on online banking use

Fig. 1: Model of online banking acceptence

H_3: Perceived Enjoyment (PE) has a positive effect on online banking use

H_4: Information on Online Bank (IoOB) has a positive effect on online banking use

H_5: Security and Privacy (S&P) have a positive effect on online banking use

H_6: Quality of Internet Connection (QoIC) has a positive effect on online banking use

H_7: Information on Online Banking (IoOB) has a positive effect on Perceived Ease of Use (PEoU)

H_8: Information on Online Banking (IoOB) has a positive effect on Perceived Enjoyment (PE)

H_9: Quality of Internet Connection (QoIC) has a positive effect on Perceived Enjoyment (PE)

H_{10}: Quality of Internet Connection (QoIC) has a positive effect on Security and Privacy (S&P)

MATERIALS AND METHODS

Data collection: A self-administered questionnaire, adapted from Pikkarainen *et al.* (2004) and Israil *et al.* (2010) was used to collect empirical data from students studying in Malaysia. For this purpose, convenience sampling method was used in order to obtain large number of accomplished questionnaires rapidly and efficiently.

Response rate: From the students' behaviour perspective, information concerning online banking and customer acceptance was collected from the bachelor, master and PhD students who are generally availing banking services of 2 Malaysian banks; Bank Muamalat Malaysia Berhad and Bank Islam Malaysia Berhad and also studying in higher educational institution of Malaysia. The students were requested to reply to all the questions to the best of their knowledge. A total of 550 questionnaires were distributed and 451 usable responses were finally selected for data analysis purposes. The overall response rate was

82%. This high response rate was due to presence of researchers and their appointment assistants during the process of distribution and collection of questionnaires. After the data collection, it was analysed using Statistical Package for Social Science (SPSS) and Analysis of Moment Structure (AMOS) computer software. First, the descriptive analysis was undertaken in order to observe the data for various trends. After descriptive analysis, data was inferentially analysed by deploying Structural Equation Modelling (SEM). The main steps of SEM followed in this particular research were; Confirmatory Factor Analysis (CFA) and full fledge Structural equation modelling which led to hypothesis.

RESULTS AND DISCUSSION

Demographic profile: Of the total usable responses, 71.8% males and 28.2% females, 46.3% have their accounts in Bank Muamalat Malaysia Berhad and 34.6% have accounts in Bank Islam Malaysia Berhad. A total of 90.7% students were in between 15-35 years of their age. Most of them (64.5%) were the master's students of different fields with majority of them (35.9%) pursuing their MBA.

Followed by descriptive analysis, Cronbach's alpha was calculated for the instrument to analyse the psychometric properties of the questionnaire. The results revealed Cronbach's alpha of 0.952, ensuring the stability of the instrument used.

Confirmatory factor analysis: Confirmatory Factor Analysis (hereafter, CFA) was undertaken before the full

structural modelling, hence adopting 2 stage modelling approach. In the 2 stage modelling approach, the measurement model is specified and fitted before doing the same for a full-fledged structural model. Byrne (2010) and Hair *et al.* (2010) recommended these 2 phases in structural equation modelling because of the ease and accuracy of fitting the structural model once the measurement model is successfully specified and fitted. For this purpose, AMOS software was used to perform CFA on all the measuring items. The measurement model was assessed based on the fit measures recommended by different scholars (Byrne, 2010; Hair *et al.*, 2010; Kline, 2011). These scholars recommended reporting Chi-square (χ^2) value and the associated degrees of freedom (df) along with at least one incremental index and one absolute index. Thus, reporting the χ^2 value, degrees of freedom, the Comparative Fit Index (CFI) and the Root Mean Square Error of Approximation (RMSEA) provide sufficient unique information to evaluate a model (Hair *et al.*, 2010).

In the present research, measurement model was evaluated by Chi-square (χ^2), the Comparative Fit Index (CFI) and the Root Mean Square Error of Approximation (RMSEA). However, given that the Chi-square is highly susceptible to sample size, Byrne (2010) and Hair *et al.* (2010) recommended using normed Chi-square (χ^2/df), as is the case in the present study. The threshold values for all these fit indices were considered while evaluating the measurement model. For example, cut-off value of >0.90 for CFI, <0.08 for RMSEA and <5 for χ^2/df.

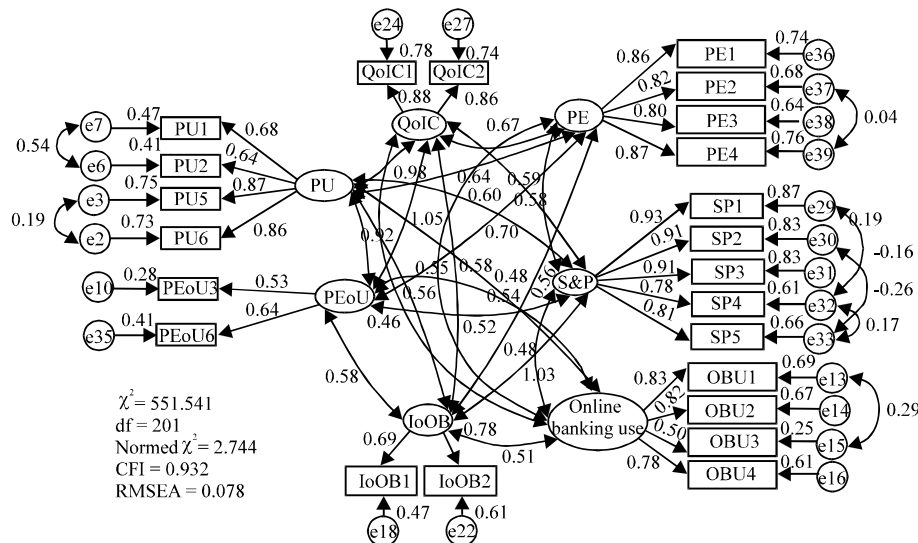A review of the measurement model (Fig. 2) shows that there are no offending estimates and the results of fit
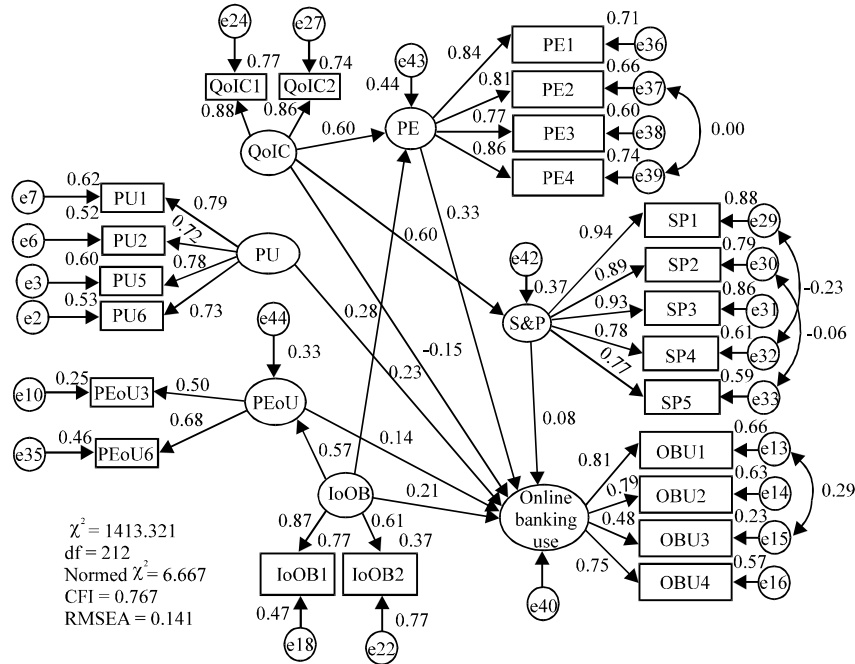

Fig. 2: Confirmatory factor analysis

Fig. 3: Baseline structural model

Table 1: Estimates of the hypothesised model

Structural path	Hypothesised relationship	Std. Reg. weight	SE	CR	p
PE←QoIC	H_9^s	0.599	0.058	9.449	***
S&P←QoIC	H_{10}^s	0.605	0.073	10.049	***
PE←IoOB	H_8^s	0.281	0.081	4.275	***
PEoU←IoOB	H_7^s	0.573	0.104	5.136	***
OBU←S&P	H_5^{ns}	0.076	0.043	0.956	0.339
OBU←PE	H_3^s	0.333	0.067	3.594	***
OBU←PU	H_1^s	0.228	0.056	3.113	0.002
OBU←PEoU	H_2^{ns}	0.143	0.110	1.235	0.217
OBU←IoOB	H_4^s	0.211	0.960	1.939	0.053
OBU←QoIC	H_6^{ns}	-0.148	0.069	-1.414	0.157

PE = Perceived Enjoyment; PU = Perceived Usefulness; PEoU = Perceived Ease of Use; QoIC = Quality of Internet Connection; IoOB = Information on Online Banking; S&P = Security and Privacy; OBU = Online Banking Use; s = Supported; ns = Not supported

indices also support the model. With a normed Chi-square (χ^2/df) value of 2.744 (χ^2 = 551.541, df = 201) which is within maximum point of 5.0, the measurement model is attested to be fit. Moreover, the baseline fit indices are also more than the 0.90 cut-off point, i.e., CFI = 0.932, indicating a good fit of the measurement model. Finally, RMSEA value of 0.078 is clearly below the cut-off value of 0.08, indicating a good fit of the measurement model.

After achieving the good fit of the measurement model, structural equation modelling with Maximum Likelihood Estimates (MLE) method was used to test the hypothesised causal relationship among the constructs of the model.

Structural equation modelling: The baseline structural model is depicted in Fig. 3. The model was assessed based on the following indices: The Chi-square test, the Comparative Fit Index (CFI) and the Root Mean Square Error of Approximation (RMSEA), as per the suggestions of many scholars (Byrne, 2010; Hair *et al.*, 2010; Kline, 2011). In addition, both for statistical significance (p<0.05) and practical significance (β>0.20) were also kept in mind. The results of this structural model did not fit the data well. In this case, the normed Chi-square value (CMIN/df) was 6.667, CFI was 0.767 and RMSEA emerged with the value 0.141 (Fig. 3).

Detailed analyses of the results of this baseline model are reported in Table 1. Based on the result of the hypothesised model, 7 out of total 10 hypotheses are supported (Table 1). Among the seven statistically significant hypotheses, namely, H_1, H_3, H_4, H_7, H_8, H_9 and H_{10}, 5 hypothesis were significant at p<0.001, one hypothesis (H_1) resulted in significance at level p<0.01, and one hypothesis (H_4) resulted in significance at level p<0.05. For the remaining hypotheses; H_2, H_5 and H_6, the results did not provide sufficient evidence to support them.

CONCLUSION

The study concludes that majority of the students are accepting online banking culture due to numerous

benefits it offers to its customers. Descriptive statistics revealed that majority of the students have accounts in Bank Muamalat Malaysia Berhad with the male respondents more inclined toward adopting online banking. The descriptive results, also show that respondents above the age of 35 are not attracted toward adopting online banking. This particular finding is in congruence with that of Ilett (2005) and Perumal and Shanmugam (2004) who found that it is difficult to attract aged people tointernet banking. Researcher also found that students in the Master's degree use online banking more frequently than that of the Bachelor's degree. Kolodinsky *et al.* (2002) found that higher levels of education increase the likelihood of adopting online banking. The inferential statistical analysis came up with some unique and invaluable findings. Researcher found that Perceived Usefulness (PU) significantly impact online banking use in Malaysia. Israil *et al.* (2010) and Pikkarainen *et al.* (2004) also came up with the similar findings. Moreover, the results support the positive significant effect of Information on Online Banking (IoOB) on the use of online banking which is totally congruent with the literature (Israil *et al.*, 2010; Pikkarainen *et al.*, 2004). Finally based on the data analysis, it seems that Perceived Ease of Use (PeoU) and Security and Privacy (S&P) do not statistically significantly affect the use of online banking. These particular findings are in line with the findings of Pikkarainen *et al.* (2004) who also found that perceived ease of use and security and privacy do not significantly affect the use of online banking. Contrary to Israil *et al.* (2010) and Pikkarainen *et al.* (2004), researcher found that Perceived Enjoyment (PE) significantly affect the use of online banking by students in Malaysia.

The more interesting and valuable findings are the positive impact of Information on Online Banking (IoOB) on Perceived Ease of Use (PEoU) and also on Perceived Enjoyment (PE). These findings are of high import for the banking sector, as it means that customer will feel at ease in using online banking when they are provided with enough information on the use of online banking. Similarly, customers will enjoy the use of online banking and would be delighted if they know what they are doing (sufficient information on online banking). Another invaluable contribution of our research is the positive link between Quality of Internet Connection (QoIC) and Perceived Enjoyment (PE). Researcher found that customers' enjoyment enhance with the good quality and speed of Internet connection. In a similar manner when customers have good quality and fast internet connection they think that they are more secure to use online banking, as in that case there are minimum chances of disconnection in the middle of a transaction.

RECOMMENDATIONS

Future researchers are encouraged to use the model of this research in different countries for further maturing these linkages. Finally, researcher recommend that researchers who wish to adopt our model should pay special attention to the new linkages researcher tested in this study (IoOB→PEoU, IoOB→PE, QoIC→PE, QoIC→S&P), as these have been ignored previously.

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