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An Empirical Investigation of the Determinants of Users Acceptance of E-Banking in Singapore (A Technology Acceptance Model)

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ABSTRACT

Singapore is known as the fastest growing telecommunications nation in Asia. Presently, all the members of the Singapore banking industry use the Information and Communication Technology as a platform for effective and efficient means of conducting their financial transactions. This paper focuses on determining the level of users' acceptance of the electronic banking services and investigating the factors that determine users' behavioral intentions to use electronic banking systems in Singapore. The survey instrument employed involved design and administration of a total of 250 survey questionnaires within Singapore. An extended Technology Acceptance Model (TAM) was developed as a conceptual framework to analyze the factors influencing users' acceptance and intention to use electronic banking. The model employed Perceived Credibility (PC) and Customer Attitude (CA) as extensions to the two constructs for TAM model: Perceived Usefulness (PU), Perceived Ease of Use (PEOU) to better reflects the users' views.

Keywords: *Technology Acceptance Model (TAM), Perceived credibility, E-banking, Perceived usefulness, Perceived ease of use, Perceived credibility, Customer attitude*

INTRODUCTION

The advents of the Internet, electronic commerce, application communication technology and users' response to this technology have opened opportunities for many businesses. In the present scenario online services have become an added feature in the banking sector. Online banking or Internet banking allows customers to conduct financial transactions on a secure website. Credit goes to internet that provided ultimate ease to the customers at their door step. Online banking allows people to perform all the banking related activities such as money transfer, past transactional information, cash withdrawals and deposits, etc. with just one mouse click. Clients can easily check the account balance every day just by visiting their bank website. This provides the place and time utility to people provided that one has Internet access (Ezeoha, 2005).

Singapore ranks third, after Korea and Australia, in Internet banking usage, according to an AC Nielsen survey on customer banking habits and preferences. Singapore has one of the highest Internet penetration rates worldwide, all major Singaporean banks provide Internet banking platforms and many also provide host-to-host capabilities to link up to companies' back-office operations for file transfers. The authorities in Singapore have been proactive in recognizing the role of the Internet as a delivery channel and have strongly promoted Internet banking. Now, with the wide application of Internet banking in the run of people daily life, the focus has moved

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to enhancing the length and breadth of the scope of services offered via electronic channels. Regular reviews and active participation of Singaporean banks, regulators and other government bodies in the Internet banking issues like enhancing online security has become a major trend in the banking sector. (Lallmahamood, 2007). The banks effort and huge investment in electronic services can be regarded as measures in order to meet up with the global standard, reduce transaction cost, as well as providing better services to customers and promoting efficiency. While e-banking services are numerous in number, there is not enough evidence of its acceptance among consumers. However, it is evident that customers' acceptance and confidence in the system need to be validated as e-banking has fully gained prominence in Singapore.

This study aims at examining the factors that may influence users' acceptance of e-banking. The impact of perceived usefulness (PU), perceived ease of use (PEOU), perceived credibility (PC) and customer attitude (CA) is sought to determine the level of users' acceptance of the various e-banking services. This study adopts the Technology Acceptance Model (TAM) as the instrument to determine the factors influencing the acceptance of e-banking by customers. TAM is a theoretical model that is commonly used to evaluate the impact of various factors such as system characteristics on user acceptance (Davis 1986).

Objectives of the Study

The main objectives of the study are as follows:

i. To incorporate Technology Acceptance Model (TAM) in the analysis of the factors influencing users' acceptance of E-Banking in Singapore

ii. To study the influence of TAM model on Perceived usefulness (PU) Perceived ease of use (PEOU) Perceived credibility (PC) as well as Customer attitude (CA) as the fundamental determinants

iii. To test the identification model of the relationship between perceived usefulness (PU), perceived ease of use (PEOU), perceived credibility (PC), customer attitude (CA) and user acceptance of e-banking service

Research Questions

The theoretical contribution of the research is to be able to define the factors which affect a User's perceptions about an e-commerce application. The theoretical research, in the study, is done by investigating, which determining factors are used in the previous literature to define the antecedents for technology acceptance. In addition to the basic technology acceptance theories, also those which are expanded to cover applications operating in e-commerce and web -environments are studied in order to find the specific factors that apply in those circumstances. However, since these theories are almost always just considering some specific industry or special kind of software, some research must be done to find the factors which fit into this specific situation and condition. In order to determine to what extent the TAM and its revisions have been validated for prediction of determinants of user's acceptance of E-banking in Singapore, this study investigates the following research questions:

1. How does TAM analyse the factors that influences users' acceptance of E-Banking?
2. Which determining factors affect the customer perceptions of an e-commerce application in the light of TAM Model?
3. Is there significant relationship between Perceived Credibility (PC), Customer Attitude (CA), Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) and user acceptance of E-banking services in Singapore?

Literature Review

Technology Acceptance Model (TAM)

Technology Acceptance Model (TAM) is an information system theory that models the acceptance and use of a technology. TAM as proposed by Davis (Davis F. D., 1989) is an extension of Theory of Reasoned Action (TRA) and the Theory of Planned Behavior (TPB). The Technology Acceptance Model puts forward two theoretical constructs; perceived usefulness (PU) and perceived ease of use (PEOU) as fundamental determinants of user's acceptance of an information system.

TAM (Davis F. D., 1989) stipulates that user's acceptance of a new information system is

determined by his/her intention to use the system which in turn is determined by the two behavioral beliefs; perceived usefulness and perceived ease of use. Much research had been conducted using TAM and it has become the most widely accepted model among information system researchers (Lallmahamood, 2007).

Many research works had been conducted using TAM and introducing other variables which are validated as having impact on usefulness, ease of use, users' acceptance and intention (Pikkarainen et al., 2004). Davis stated that future research on technology acceptance should address the impact of other variables on usefulness, ease of use and user acceptance and intention.

Validity of TAM can be increased by exploring the nature and specific influences of technological and usage-context factors that may affect user's acceptance. For instance, Hanudin Amin (2007) concluded that credibility is the heart of Internet banking system and found computer self-efficacy as a major influence on perceived ease of use.

Perceived Usefulness (PU)

The importance of perceived usefulness has been widely recognised in the field of e-banking (Davis et al., 1989; Polatoglu and Ekin, 2001). According to the previous research usefulness is the subjective probability that the application of a new technology would improve the way a user could complete a given task. There is also broad research that presents evidence of the significant impact of perceived usefulness on user acceptance of e-banking (Davis et al., 1989; Venkatesh and Davis, 1996, 2000; Hu et al., 1999, Agarwal and Prasad, 1999; Venkatesh, 1999, 2000,). Davis (1989) defined perceived usefulness as "the degree to which a person believes that using a particular system would enhance his or her job performance". In the words of Davis, Bagozzi, and Warshaw (1992), perceived usefulness refers to consumers' perceptions regarding the outcome of the experience. Perceived usefulness is defined as the individual's perception that the application of the new technology will enhance or improve his or her performance (Davis, 1993).

Adams et al. (1992) and Davis et al. (1989) reported that user acceptance of computer systems is driven to a large extent by perceived usefulness. In addition, Mathwick, Rigdon, and Malhotra (2001), defined perceived usefulness as the extent to which a person deems that a particular system will boost his or her job recital. In the same way, perceived usefulness is defined as consumer's perception of functional and utilitarian dimensions (Childers, Carr, Peck, & Carson, 2001). Moreover, Pikkarainen et al., (2004) previously found that perceived usefulness had a direct effect on internet banking usage. People use online banking services because they find that using banking web sites enhances the productivity of their banking activities and that they are useful for performing financial transactions. However, according to Gerrard and Cunningham (2003), the perceived usefulness depends on the banking services such as checking bank balances, applying for a loan, paying utility bills, transferring money abroad, and obtaining information on mutual funds. Hence, this study will use Davis' definition (1993) of perceived usefulness.

There are few broad empirical research findings on the impact of the perceived usefulness on users' acceptance of e-banking (Davis et al., 1989; Agarwal and Prasad, 1999; Venkatesh, 1999, 2000). The proposed relationship between perceived usefulness and behavioural intention is based on the theoretical argument by Wang et al. (2003), and Guriting and Nelson (2006). Wang et al. (2003) discovered that perceived usefulness effect Taiwan people's intentions to adopt e-banking systems significantly. In other words, perceived usefulness has a significant relation with behavioural intention. Hence, the greater the perceived usefulness of using e-banking services, the more likely that e-banking will be accepted by users (Polatoglu and Ekin, 2001). Furthermore, TAM also supports a prior study on the consumer acceptance of technologies that showed consistent positive relationship between usefulness and the acceptance of various types of interactive technologies, ranging from computer software to email (Davis et al., 1989). Meanwhile, Venkatesh and Davis (2000) have adopted TAM to explain how perceived usefulness affect the user acceptance of e-banking systems. Additionally, Bhattacherjee (2002) claimed that one's willingness to transact with an electronic firm might be predicted by perceived usefulness. Therefore, a recent study

by Pikkarainen et al., (2004) constructed TAM in Finland and found that perceived usefulness is the main factor that influences customer acceptance of e-banking. Moutinho and Smith (2002), who studied the behaviour of established bank customers in UK, concluded that usefulness is one of the important expectations for user acceptance.

Perceived Ease of Use (PEOU)

The term "perceived ease of use" is defined as the "degree to which a person believes that using a particular system would be free of effort" (Davis, 1989). According to TAM, perceived ease of use is a major factor that affects acceptance of information system (Davis et al., 1989).Rogers (1962) has stated that perceived ease of use represents the degree to which an innovative technology is perceived not to be difficult to learn, understand and operate. Rogers (1983) defined PEOU as customer perceptions towards a new product is as better as its substitute. On the other hand, Igbaria Guimaraes and Davis (1995) believe that ease of use refers to their perceptions regarding the process leading to the final e-banking outcome. In simple terms the ease of use refers to how easy is the e-banking used (Gefen and Straub, 2000). Hence, a technology application which is perceived to be easier to use as compared to others will enhance the user acceptance.

TAM posits that perceived ease of use is one of the major determinants of IS acceptance. Consult (2002) affirmed that the drivers of growth in e-banking would be determined by the perceived ease of use which is a combination of convenience provided to those with easy internet access, the availability of secure, high standard e-banking functionality, and the necessity of banking services. Daniel (1999) pointed out the perceived ease of use as one's experience of how conveniently a technology can be used. Venkatesh (2000) stated that with increasing direct experience with the target system, individuals adjust their system-specific ease of use to reflect their interaction with the system. He added that perceived ease of use in the case of e-banking can be quoted as savings of time, money, and convenience. As a result, the current study will utilise the definition of Davis (1989) to define perceived ease of use.

Relationship between Perceived Ease of Use (PEOU) and User Acceptance of E-banking

The significant impact of perceived ease of use on usage intention from the preceding research provided evidence that it is either directly or indirectly through its effect on perceived usefulness (Davis et al., 1989; Agarwal and Prasad, 1999; Hu et al., 1999). Moon and Kim, (2001) said that perceived ease of use would have a positive effect on users' perception of credibility in their interaction with the e-banking systems. Similarly, Chin and Gopal, (1995) affirmed that higher perceived ease to use internet will favourably influence the user acceptance of e-banking. Cooper (1997) stated that ease of use as one of the three important characteristics in user acceptance of innovative service.

According to TAM, the easier a technology is to use, the most useful it can be and it will directly influence the user acceptance (Venkatesh, 2000). Earlier studies have shown that there is a positive relationship between perceived ease of use and usage intention. (Ramayah et al., 2003; Wang et al., 2003; Luarn and Lin, 2005). In particular, Guriting and Ndubisi (2006) found that perceived ease of use had a significant positive effect on user acceptance of e-banking. Ramayah et al. (2003) showed that perceived ease of use has positive influence on the willingness to accept and use e-banking. For instance, bank customers are likely to accept e-banking when they find it easy to use the technology. Bhattacherjee (2002) found that one's willingness to adopt with an electronic firm might be predicted by additional variables such as perceived ease of use. Pikkarainen et al. (2004) applied the traditional TAM in Finland and found that system use is determined by perceived ease of use, which are related to attitude and thereby to actual adaptation.

Perceived Credibility (PC)

Perceived Credibility is "the belief that the promise of another can be relied upon even under unforeseen circumstances" (Suh and Han, 2002). Particularly, perceived credibility prior to service subscription has a significant impact on customer acceptance, since customers generally stay away from a service provider whom they do not trust (Reichheld and Schefter, 2000).

According to Jacoby and Kaplan (1972), perceived credibility refers to a user feels the certainty and pleasant consequences of using an electronic application service, when there is no financial risk, physical risk, functional risk, social risk, time-loss risk, opportunity cost risk, and information risk. Besides, Wang et al. (2003) claims the security and privacy are two important dimensions in perceived credibility. Consequently, perceived credibility is used as a new construct to reveal the privacy and security concerns in the usage intention of e-banking (Ba and Pavlou, 2002). In the context of e-banking, perceived credibility refers to the security and reliability of transactions over the Internet (Goldfinger, 2001). Moreover, Ramayah and Ling (2002) found that Internet banking users 'concern about security as the use of Internet banking is limited to accounts enquiry only due to the credibility concern. Suganthi et al. (2001), Daniel (1999) discovered that security concern is an important affecting user acceptance or adoption of new innovative and interactive technology. Therefore, perceived security is defined as the extent to which one believes that the e-banking is secure for transmitting sensitive information (Moon & Kim, 2001).

Doney and Cannon (1997) ascertained the perceived credibility as trust. The perceived credibility is the extent to which one partner believes that the other partner has the required expertise to perform the job effectively and reliably (Ganesan, 1994). Zaheer, McEvily, and Perrone, (1998) stated that one's trustworthiness or credibility in an electronic bank might not be derived only from prior familiarity with the bank, but also from calculative, institutional and identification and beliefs about the bank. this study developed perceived credibility as a new TAM factor to explain the user's security, privacy and financial risk concerns in the user acceptance of e-banking using technology acceptance model (TAM) as a conceptual framework. Hence, the researcher can exploit the definition of Jacoby and Kaplan (1972) to define perceived credibility based on the previous studies on the topic.

Relationship between Perceived Credibility (PC) and User Acceptance of E-banking

According to Howcroft et al. (2002), perceived credibility was found to have a relationship with the user acceptance. It is generally recognised that perceived credibility plays a positive role in individuals' decision to adopt a new technology including e-banking (Walker et al., 2000). Specifically, Wang et al. (2003) claimed that perceived credibility had the highest significant positive effect on behavioural intention to accept and use the e-banking. Simultaneously, Pavlou (2001) also suggested that perceived credibility has the superior ability to predict and reflect the users' intention to accept and adopt e-banking. Furthermore, the previous study of Featherman and Pavlou (2002) integrates Perceived Credibility Theory and TAM (Davis et al., 1989) to identify a research model where perceived credibility has positive relation with user acceptance to e-banking.

Apart from that, the level of credibility has been identified as an important characteristic from a consumer's perspective in the acceptance of e-banking (Suh and Han, 2002). In the study of Singapore consumers, Gerrard and Cunningham (2003) found security concerns of e-banking high in both adopters and non-adopters. In addition, the positive relationship between security and privacy towards e-banking was empirically tested by Poon (2008). Furthermore, Tan and Teo (2000) and Black et al., (2002) found that credibility perception associated with transaction security is positively related to willingness to make internet adaptations. Nevertheless, Howcroft et al. (2002) found that security concerns were an obstacle to the adaptation of e-banking among Australian consumers.

Customer Attitude (CA)

It has been noted that customer's attitude towards acceptance of a new information system have a critical impact on successful information system adoption (Davis, 1989; Venkatesh and Davis, 1996). TAM has been tested and found its ability to clarify attitude towards using an information system such as e-banking (Adams et al., 1992; Davis, 1993). Attitude toward user acceptance of technology is defined as an individual's overall affective reaction (liking, enjoyment, joy, and pleasure) to use a technology (Davis, 1989; Taylor and Todd, 1995). Davis (1993) put forward that consumers' attitude towards e-banking is firstly associated with the direct possessions of relevant e-banking

features. E-banking features can be consumer's attitude of functional and utilitarian dimensions, like ease of use and usefulness (Childers et al., 2001).

Additionally, Howcroft et al. (2002) obtained a better understanding of consumer attitude towards e-banking services. More explicitly, Howcroft et al. (2002) describes that users attitude towards e-banking is the reflection of a number of factors such as technology, security, convenience, new technology experience, prior personal banking experience etc. On the contrary, Pikkarainen et al. (2004) defined that customers' attitudes can be measured by compatibility preference for self-service, technology, lifestyle as well as the bank branch services. In terms of demographic attitudes, consistent with the previous definition, Singh (2004) acknowledged that attitude towards e-banking is the characteristics of typical users, which is influenced by age and gender but not with educational level. Thus, the current study will employ the definition of Taylor and Todd (1995) to define customer attitude.

Relationship between Customer Attitude and User Acceptance of E-banking

Davis (1993) clarify that TAM suggests one's feeling or attitude towards using a technology represent the major determinants to decide whether he or she will accept and use the system. Particularly, a user's overall positive or negative feelings (it is good or bad to use a service) and feelings of joy or displeasure (the innovation makes tasks more interesting or difficult) significantly affect his or her desire to accept a new technology in the near future (Venkatesh et. al., 2003). On the other hand, Gerrard and Cunningham (2003) describes that acceptance intention is related to the level of trust, interpersonal and institutional which has positive relationship to customers' attitude.

By understanding the determinants of consumers' attitude, Bobbitt and Dabholkar (2001) concurs that this attitude has a direct and positive effect on consumers' intentions to use and to accept the new system. At the same year, Lee and Turban (2001) argued that there is a strong relationship between customers' attitude and user acceptance of e-banking. Furthermore, a research done by Laforet and Li (2005) stated that consumer attitude and behaviour were examined with regard to Chinese acceptance of new technology-based banking services. Nevertheless, factors influencing the user acceptance of new information technology are likely to differ with the technology and customers' attitude.

In a nutshell, on the basis of the Technology Acceptance Model (TAM) and e-banking studies, the present study will develop two fundamental variables perceived usefulness (PU), and perceived ease of use (PEOU) in the light of TAM along with the addition of another two variables; perceived credibility (PC) and customer attitude (CA) to investigate the factors influencing e-banking in Singapore. Specifically, this study will concur Davis (1993)'s PU definition as one's perception that using technology such as e-banking will improve in his or her performance. Besides this, the current study will also utilise Davis (1989)'s definition to claim that e-banking is perceived to be ease of use if the particular system is free of effort to use with. Meanwhile, this study will also capture the definition of Jacoby and Kaplan (1972) to declare that e-banking user will feel certainty and pleasant when there is no risk, any security and privacy concern. Furthermore, the present study will acquire Taylor and Todd's (1995) definition to claim positive attitude and feeling towards a technology that will affect the user acceptance of e-banking. So the aim of the present study is to carry out the relationship between PU, PEOU, PC, CA and the user acceptance of e-banking.

Hypothesis Formulation

Hypothesis 1

H1: Perceived usefulness (PU) has a positive effect on user acceptance of e-banking.

Hypothesis 2

H2: Perceived ease of use (PEOU) has a positive effect on user acceptance of e-banking.

Hypothesis 3

H3: Perceived credibility (PC) has a positive effect on user acceptance of e-banking.

Hypothesis 4

H4: Customer attitude (CA) has a positive effect

on user acceptance of e-banking.

RESEARCH METHOD

The present study is based on two fundamental variables; perceived usefulness (PU) and perceived ease of use (PEOU) in context of TAM. Davis (1993) definition of the PU stated that using the new technology (for instance e-banking) will improve his or her performance. PEOU is developed in this study because Cooper (1997) found that ease of use is one of the three important characteristics for user acceptance of innovative service. Additionally, this study added perceived credibility (PC) and customer attitude (CA) as another two independent variables as Ba and Pavlou (2002) claimed that perceived credibility regarding security and privacy concerns is used as a new construct to test the user acceptance of e-banking whereas Taylor and Todd (1995) found that person's attitude and feeling may affect the acceptance of the technology such as e-banking.

The independent variables of this study are perceived usefulness (PU), perceived ease of use (PEOU), perceived credibility (PC) and customer attitude (CA). These independent variables may be the determinants that influence the user acceptance of e-banking. Therefore, the dependent variable for the study is the user acceptance of e-banking. Consequently, this paper will measure and review the effect of the independent variables towards the dependent variables in the context of customers' perception on e-banking.

Sample Size and Target Respondent

The target respondent for this study is set at 250 as sample size. Educational institutions operating in Singapore were treated as the population of this study. Students are selected as the respondents because they are more exposed to e-banking usage in Singapore. Due to budget and resources constraints, Management Development Institute of Singapore (MDIS) and eight public or private universities and institutes in Singapore which includes National University of Singapore (NUS),Nanyang Technological University (NTU), Singapore Management University (SMU),SIM University , James Cook University Singapore (JCU), Curtin University Singapore (CUS), Temple University Singapore (TU) and Singapore Polytechnic (SP) have been selected for this study.

Sampling Method

Non-Probability Convenience sampling is selected as the sampling method in this research. Total 300 questionnaire were distributed and collected for this study. Out of this, 50 respondents were found disqualification in the survey after filtering. Therefore, 90 useable and qualified questionnaires were from MDIS which consists of 36%, whereas the remaining qualified questionnaires were from 20 respondents for each university/institute that represent 8% respectively. The respondents of this research were mostly targeted on MDIS as 90 of total 250 questionnaires which carried 36% of total respondents were distributed at there. The remaining of 160 questionnaires which held 64% were equally distributed to the 8 universities and institutes respectively. All the questionnaires were distributed to the respondents through self-administered approach. Questionnaires were completed anonymously by the respondents and returned back to the researcher. To be assumed, all the undergraduates that utilise e-banking services are targeted in this research.

Procedure and Measures

The questionnaire used in this research was adopted from the consumer acceptance of online banking (Pikkarainen et al., 2004). Questionnaire was slightly modified in view of the variables of the study. It had two sections, one for demographical information and the other to measure consumer acceptance of online banking. The responses for questions made use of circling answers and at the end space was given for recording their personal comments. The respondents were required to select the appropriate number given against each statement best explaining their attitude.

Demographic section was based on tick-boxes and consisting of seven questions on age, gender, qualification, job status, income level, total experience in their respective organizations and nature of the organization. To measure perceived usefulness, total of 10 items were given, for quality of the internet connection it was two, while to measure security and privacy five items were given. All the items were

measured based on five point likert scale ranging from 1. Strongly disagree, to 5.Strongly agree, developed by Renis Likert. Moreover, a five point likert scale ranging from 1.Almost never, to 5.Almost always was also used to measure acceptance of online banking on the basis of five items. These scales were also used in previous TAM related researches (Igbaria et al., 1995; Teo et al., 1999; Pikkarainen et al., 2004).

RESULTS AND DISCUSSION

Analysis of Frequency Distribution

Demographic profile of respondents for this research includes gender, age group, race, university and study field. The following table1 represents the demographic characteristics of the respondents

Table 1: Demographic characteristics

Variable	Classification of Variables	Frequency	Percentage (%)
Gender	Male	124	49.6
	Female	126	50.4
	Total	250	100
Age	18-21	108	43.2
	22-25	136	54.4
	25>	6	2.4
	Total	250	100
Race	Malay	43	17.2
	Chinese	176	70.4
	Indian	25	10.0
	Others	6	2.4
	Total	250	100
University/Institution	MDIS	90	36.0
	NUS	20	8.0
	NTU	20	8.0
	SMU	20	8.0
	SIM University	20	8.0
	James Cook University	20	8.0
	Curtin University	20	8.0
	Temple University	20	8.0
	Singapore Polytechnic	20	8.0
	Total	250	100
Study Field	Engineering	70	28.0
	Business/Accountancy	81	32.4
	Medicine/Health Science	29	11.6
	Pharmaceutical Sciences	19	7.6
	Computer Science & IT	12	4.8
	Law	5	2.0
	Music/Arts/Social Sciences/Design	26	10.4
	Others	8	3.2
	Total	250	100

Source: Analysis of data collected

Gender

Table 1 shows the frequency and percentage of gender which consists of 124 male (49.6%) and 126 female (50.4%) out of the total respondents of 250. There is very slight difference between male and female respondents which is 0.8%. It indicates that the sample consisted of an almost equal number of male and female respondents.

Age

The university/institute students are the target respondents in this study. Therefore, according to the table 1, the portion of number for three age groups includes 18-21, 22-25, and 25 above. A large pool of respondents giving a percentage of 54.4% falls in the age group between 22-25 years old followed by the age group 18-21 which consists of 43.2%. The lowest percentage of the respondents' age group is 25 above which represent 2.4%. The reason why the percentage of age group 25 above remains the lowest is because most of the university students complete their degree courses on age of 22, 23, and 24yrs. which is under age of 25yrs.

Race

Table 1 also highlights the race of the respondents that contributed to the survey. The relatively high percentage of respondents is Chinese which carries 70.4%. They are followed by Malay, Indian and others which comprises of 17.2%, 10% and 2.4% respectively.

University/Institution

Total 300 survey forms were distributed and collected for this study. Out of this, 50 respondents were found disqualification in this survey after filtering. Therefore, 90 useable and qualified questionnaires were from MDIS which consists of 36%, whereas the remaining qualified questionnaires were from 20 respondents for each university that represent 8% respectively.

Study Field

Table 1 reveals that the study field of most of the respondents was business/ accountancy which stands 32.4%, the highest among all. There are only a small number of respondents who had taken law which indicates merely 2.0% of the total sample size. Other than that, 28% of the respondents took engineering course, followed by 11.6% for medicine/health science, 10.4% for music/arts/social sciences/design, 7.6% for pharmaceutical sciences, 4.8% for computer science and IT and others remaining 3.2%.

Type of E-banking Usage

Table 2 illustrates the type of e-banking services used by the respondents. From the table, there are 128 respondents who use internet banking the most which indicates 51.2%. The next goes to the ATM usage which covers 122 respondents and consists of 48.8%. Mobile banking and other channels remain zero and this shows that the university/institute students nowadays use more on internet banking and ATM services rather than mobile banking as it is still in the baby stage in Singapore.

Table 2: Type of E-banking usage

E-banking Services	Frequency	Percentage (%)
ATM	122	48.8
Internet Banking	128	51.2
Mobile Banking	0	0
Others	0	0

Source: Analysis of data collected

Frequency of Using E-banking

In relation to the frequency of using e-banking, 112 of the total respondents or 55% access to e-banking services a few times a month, 54 respondents or 21.6% employ e-banking services about once a month, 52 respondents or 20.8% use e-banking services about a few times a week, while 26 respondents or 10.4% make use of e-banking services in a few times a year and only 6 respondents or 2.4% access to e-banking services about once a day. It shows that very tiny proportion of respondents use e-banking services on daily basis instead of several times a month (table 3).

Ensuring Reliability

The perceived attributes hypothesized to be relevant to user acceptance of e-banking services are perceived usefulness (PU), perceived ease of use (PEOU), perceived credibility (PC), and customer attitude (CA). In addition to conducting the pilot study to ensure that the respondents would understand the questions, standard scale reliability tests (Cronbach alpha coefficients) were performed for the measures used in the questionnaire. This was to ensure that each scale reflected consistently the construct it was measuring. Table 4 shows that the overall Cronbach alpha coefficients for all measures is above than the critical threshold of 0.7 as suggested by Nunnally (1978). So, the reliability test shows that independent and dependent measures demonstrated sufficient reliability in terms of the cronbach's alpha as shown in table 4.

Table 3: Frequency of using E-banking

Frequency of using Internet	Frequency	Percentage (%)
A few times a year	26	10.4
About once a month	54	21.6
A few times a month	112	44.8
A few times a week	52	20.8
About once a day	6	2.4

Source: Analysis of data collected

Table 4: Reliability results on determinants affecting E-banking acceptance

Independent Variables	Cronbach's Alpha
Perceived Usefulness (PU)	0.856
Perceived Ease of Use (PEOU)	0.898
Perceived Credibility (PC)	0.833
Customer Attitude (CA)	0.872
Dependent Variable	
User Acceptance (UA) of E-banking	0.906

Source: Analysis of data collected

Correlation Analysis

Perceived Usefulness (PU) Correlation Test

From table 5, the results signified that the Pearson Correlation r-value = 0.655 and p-value = 0.00. This implies that the independent variable, PU is significantly associated with the dependent variable, UA. Meanwhile, the strength of the associations between PU and UA is strong as r = 0.655. Similarly, the coefficient range of attribute PU1 is (r = 0.523), PU2 (r = 0.537), PU3 (r = 0.418), PU4 (r = 0.569) and PU5 (r = 0.568) indicates moderate association between perceived usefulness and user acceptance of e-banking. Pearson's correlation for all the dimensions is positively associated as the value r for all the questions are positive. Therefore, the variable perceived usefulness is significantly and positively correlated with the dependent variable user acceptance (r = 0.655, p < 0.01).

Perceived Ease of Use (PEOU) Correlation Test

Table 6 shows that the correlation coefficient between perceived ease of use and user acceptance of e-banking falls between +0.41 to +0.60 as (r = 0.579) and (p-value = 0.00), indicates that the range falls on a significant moderate association. Besides, the coefficient range of all of the five attributes also consider to be in moderate association as PEOU 1 falls on (r = 0.485), PEOU2 (r = 0.487), PEOU3 (r = 0.455), PEOU4 (r = 0.509) and PEOU5 (r = 0.505). Pearson's correlation for all the dimensions is positively associated as the value r for all the variables are positive. As a result, perceived ease of use is found significantly and positively correlated with the user acceptance (r = 0.579, p < 0.01).

Table 5: Correlation results on PU

		UA	PU	PU1	PU2	PU3	PU4	PU5
UA	Pearson Correlation	1	0.655**	0.523**	0.537**	0.418**	0.569**	0.568**
	Sign. (2-tailed)		0.000	0.000	0.000	0.000	0.000	0.000
	N	250	250	250	250	250	250	250
**. Correlation is significant at the 0.01 level (2-tailed).								

Source: Analysis of data collected

Table 6: Correlation results on PEOU

		UA	PEOU	PEOU1	PEOU2	PEOU3	PEOU4	PEOU5
UA	Pearson Correlation	1	0.579**	0.485**	0.487**	0.455**	0.509**	0.505**
	Sign. (2-tailed)		0.000	0.000	0.000	0.000	0.000	0.000
	N	250	250	250	250	250	250	250
**. Correlation is significant at the 0.01 level (2-tailed).								

Source: Analysis of data collected

Perceived Credibility (PC) Correlation Test

Based on table 7, the results signified that the Pearson Correlation r-value = 0.655 and p-value = 0.00. This implies that the independent variable (PC) is significant and moderately associated with the dependent variable (UA). However, the coefficient range of attribute PC1 is (r = 0.342), PC3 (r = 0.351), PC4 (r = 0.335), and PU5 (r = 0.365) indicates very weak association between perceived usefulness and user acceptance of e-banking. Moreover, the attribute PC2 falls on (r = 0.410) indicates a moderate association. Pearson's correlation for all the dimensions is positively associated as the value r for all the questions are positive. This analysis reveals that perceived credibility is significantly and positively correlated with the dependent variable user acceptance (r = 0.465, $p < 0.01$).

Customer Attitude (CA) Correlation Test

Table 8 depicts that the correlation coefficient between customer attitude and user acceptance of e-banking falls between +0.61 and +0.80 as (r = 0.775) and (p-value = 0.00), indicates that the range falls on a significant strong association. Besides, the coefficient range of CA2, CA4 and CA5 also considers to be in strong association as coefficient range falls on (r = 0.624), (r = 0.714), (r = 0.678) respectively. Besides, CA1 and CA3 has the coefficient range falls on +0.41 to +0.60 where (r = 0.560) and (r = 0.574) respectively, this indicates that there is a moderate association between the variables. Pearson's correlation for all the dimensions is positively associated as the value r for all the variables are positive. Therefore, customer attitude is found significantly and positively correlated with the user acceptance (r = 0.775, $p < 0.01$).

Table 7: Correlation results on PC

		UA	PC	PC1	PC2	PC3	PC4	PC5
UA	Pearson Correlation	1	0.465**	0.342**	0.410**	0.351**	0.335**	0.365**
	Sign. (2-tailed)		0.000	0.000	0.000	0.000	0.000	0.000
	N	250	250	250	250	250	250	250
****. Correlation is significant at the 0.01 level (2-tailed).**								

Source: Analysis of data collected

Table 8: Correlation Results on CA

		UA	CA	CA1	CA2	CA3	CA4	CA5
UA	Pearson Correlation	1	0.775**	0.560**	0.624**	0.574**	0.714**	0.678**
	Sign. (2-tailed)		0.000	0.000	0.000	0.000	0.000	0.000
	N	250	250	250	250	250	250	250
****. Correlation is significant at the 0.01 level (2-tailed).**								

Source: Analysis of data collected

Regression Analysis

In this study, multiple linear regression was employed to establish a set of independent variables ; perceived usefulness (PU), perceived ease of use (PEOU), perceived credibility (PC) and customer attitude (CA), which explains a proportion of the variance in a dependent variable of user acceptance of e-banking at a significant level and used for hypotheses testing. The results of the regression analysis for this study presents in Table 9.

Based on the table 9, the value of R is 0.811. The result shows the value of R^2 is 0.658, which implies that 65.8% of the variation in user acceptance of e-banking is explained by these four independent variables which are perceived usefulness (PU), perceived ease of use (PEOU), perceived credibility (PC), and customer attitude (CA). Apart from that, the results illustrates a significant F value of 117.893 being significant at p = 0.000. Thus, this implies that the entire model in this study is well fit and significant.

Results of Table 10 shows that PU, PEOU and CA are significant as ($p < 0.05$) and indicate a positive relationship as the beta value is positive. In contrast, PC is a weak predictor with ($p > 0.05$) and there is no significant association between PC and user acceptance of e-banking, thus H3 can be rejected. From the results, imply that CA is the most influential variable to the user acceptance of e-banking compare to other variables as it has recorded the highest beta value (beta =0.566) followed by PU (beta = 0.167), PEOU (beta = 0.155) and PC (beta = 0.043). All the hypotheses for variables which are significantly correlated with user acceptance of e-banking are accepted except H3 for PC, which is rejected.

Table 9: Model Summary

Model	R	R Square	Adjusted R Square	F	Sig.
1	0.811[a]	0.658	0.653	117.893	0.000[a]

Source: Analysis of data collected

Table 10: Multiple linear regressions coefficient result

Independent Variable	Standard Coefficients (Beta)	t-value	Sig. (p-value)
Perceived Usefulness (PU)	0.167	2.983	0.003
Perceived Ease of Use (PEOU)	0.155	3.043	0.003
Perceived Credibility (PC)	0.043	0.935	0.351
Customer Attitude (CA)	0.566	11.237	0.000

Notes: $R^2 = 0.658$, Adjusted $R^2 = 0.653$, F = 117.893, Significance F (p = 0.000)
Source: Analysis of data collected

CONCLUSION

Based on the research results, three hypotheses were accepted which makes the statistic to be reliable since it gave positive results. From a theoretical view, the results presented contributions to the existing literature in a number of ways. First, this study makes a contribution to e-banking literature by providing insights on the determinants that seem to influence user acceptance of e-banking service among university students. The result shows that customer attitude (CA), perceived usefulness (PU) and perceived ease of use (PEOU) are critical factors that affect the user acceptance. In depth, this study has contributed to all banking researchers about the user acceptance of e-banking of the university students nowadays. This study shows that the positive feeling and attitude of user is essential for the e-banking usage level. However, the positive feeling such as enjoyment and excitement is related to efficiency, effectiveness and convenience which falls on the variables PU and PEOU.

Apart from that, perceived credibility (PC) was found to have a relatively weak relationship with the user acceptance of e-banking service and this is inconsistent to many banking studies conducted during the past years such as Poon (2008), Yuen and Yeow (2009), Roca, Garcia and Vega (2009), as the researchers claimed that PC has a significant effect on e-banking acceptance. This can be explained with the positive attitude of a customer that may affect the trust and thus reduce perceived credibility (Cho et al. 2001). Meanwhile, this study also contributes to the technology acceptance literature as the results shows that PU and PEOU have the effect on technology acceptance (Davis, 1989). Furthermore, this study found that both PU and PEOU have the same influential level in explaining technology. Most importantly, this study reveals to all e-banking researchers that the CA is the most influential factor to determine the user acceptance. Further, this study shows that CA is in line with the PU and PEOU as Teo et al. (1999) argue that enjoyment is related to the usefulness and ease of use.

Besides, the results of the study also provide banking sector information about the planning of e-banking web sites and service selection. In the planning and development of e-banking services, software developers should pay attention in terms of the user friendliness and informative content that is above all perceived usefulness and perceived ease of use, as this will affect the customer attitude toward acceptance among university students. Finally, this study can be taken as evidence by all the researchers who are working on e-commerce, e-learning, e-shopping and etc. to adopt CA into their research framework as CA is statistically significant variable among the other variables in the model.

This study has provided an impression about the determinants that influence users' intention to use e-banking in Singapore for future. This study has developed an extension of the TAM model which is incorporating additional constructs such as perceived credibility and customer attitude.

REFERENCES

Adams, D. A., Nelson, R. R. and Todd, P. A. (1992). Perceived Usefulness Ease of Use and Usage of Information Technology: A Replication. *MIS Quarterly*, 16 (2), pp. 227-47.

Agarwal, R. and Prasad, J. (1999). Are Individual Differences Germane to the Acceptance of New Information Technologies? *Decision Sciences*, 30 (2), pp. 361-91.

Ba, S. and Pavlou, P. A. (2002). Evidence of the Effect of Trust Building Technology in Electronic Markets: Price Premiums and Buyer Behavior. *MIS Quarterly*, 26 (3), pp. 243-268.

Bhattacherjee, A. (2002). Individual Trust in Online Firms: Scale Development and Initial Test. *Journal of Management and Information Systems*, 19 (1), pp. 211-241.

Bobbitt, L. M. and Dabholkar, P. A. (2001). Integrating Attitudinal Theories to Understand and Predict Use of Technology-based Self-service: The Internet as an Illustration. *International Journal of Service Industry Management*, 12 (5), pp. 423-450.

Childers, T., Carr, C., Peck, J. and Carson, S. (2001). Hedonic and Utilitarian Motivations for Online Retail Shopping Behavior. *Journal of Retailing*, 77 (4), pp. 511-538.

Cooper, R.G. (1997). Examining Some Myths about New Products. Oxford, 2 (3), pp. 550-560. Daily Express. BCB Says More Customers Going for E-banking. Daily Express Available: http://www.dailyexpress.com.my/news.cfm?NewsID=18715 (November 7, 2009).

Chin, W. W. and Gopal, A. (1995). Adoption Intention in GSS: Relative Importance of Beliefs. *The Database for Advances in Information Systems*, 26 (3), pp. 42-63.

Daniel, E. (1999). Provision of Electronic Banking in the UK and the Republic of Ireland. *International Journal of Bank Marketing*, 17 (2), pp. 72-82.

Davis, F. D. (1986). *A Technology Acceptance Model for Empirically Testing New End-user Information Systems: Theory and Results*. Cambridge: MA: MIT Sloan School of Management.

Davis F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology, *MIS Quarterly*, 13 (3), pp. 318-39.

Davis, F. D., Bagozzi, R. P. and Warshaw, P. R. (1989). User Acceptance of Computer Technology: A Comparison of Two Theoretical Models. *Management Science*, 35 (8), pp. 982-1003.

Davis, F. D., Bagozzi, R. P. and Warshaw, P. R. (1992). Extrinsic and Intrinsic Motivation to Use Computers in the Workplace. *Journal of Applied Social Psychology*, 22 (14), pp. 1109-1130.

Doney, P. M. and Cannon, J. P. (1997). An Examination of the Nature of Trust in Buyer-seller Relationships. *Journal of Marketing Management*, 61 (2), pp. 35-51.

Ezeoha, A. E. (2005). Regulating Internet Banking In Nigeria: Problems and Challenges – Part 1. Available: http://www.arraydev.com/commerce/jibc/

Featherman, M. and Pavlou, P. (2002). Predicting E-services Adoption: A Perceived Risk Facets Perspective. *International Journal of Human-Computer Studies*, 59 (4), pp. 451-474.

Ganesan, S. (1994). Determinants of Long-term Orientation in Buyer-seller Relationships. *Journal of Marketing Management*, 58 (2), pp. 1-19.

Guriting, P. and Nelson, N. O. (2006). Borneo Online Banking: Evaluating Customer Perceptions and Behavioural Intention. *Management Research News*, 29 (1/2), pp. 6-15.

Gerrard, P. and Cunningham, B. J. (2003). The Diffusion of Internet Banking among Singapore Consumers. *International Journal of Bank Marketing*, 21 (1), pp. 16-28.

Goldfinger, C. (2001). Internet Banking Issues. *Internet Banking*, 1(March), pp. 69-82.

Hanudin A. (2007). Internet Banking Adoption among Young Intellectuals, 12 (3), Available: http://www.arraydev.com/commerce/jibc/

Howcroft, B., Hamilton, R. and Hewer, P. (2002). Consumer Attitude and the Usage and Adoption of Home-based Banking in the United Kingdom. *The International Journal of Bank Marketing*, 20 (3), pp. 111-121.

Igbaria, M., Iivari, J. and Maragahh, H. (1995).Why Do Individuals Use Computer Technology? A Finnish Case Study. *Information and Management*, 29 (5), pp. 227-38.

Igbaria, M., Guimaraes, T. and Davis, G. (1995). Testing the Determinants of Microcomputer Usage via a Structural Equation Model. *Journal of Management Information System*, 11(4), pp. 87-114.

Jacoby, J. and Kaplan, L. B. (1972). The Components of Perceived Risk. Paper Presented at the Proceedings of the 3rd Annual Conference of the Association for Consumer Research. MD: College Park.

Laforet, S. and Li, X. Y. (2005). Consumers' Attitudes towards Online and Mobile Banking in China. *International Journal of Bank Marketing*, 23 (5), pp. 362-380.

Lallmahamood, M. (2007). An Examination of Individual's Perceived Security and Privacy of the Internet in Malaysia and the Influence of This on Their Intention to Use E-Commerce: Using An Extension of the Technology Acceptance Model. *Journal of Internet Banking and Commerce*, 12 (3), Available: http://www.arraydev.com/commerce/jibc/

Luarn, P. and Lin, H. H. (2005). Toward an Understanding of the Behavioural Intention to Use Mobile Banking. *Computers in Human Behaviour*, 21 (6), pp. 873-891.

Mathwick, C., Rigdon, E. and Malhotra, N. (2001). Experiential Value: Conceptualisation, Measurement and Application in the Catalog and Internet Shopping Environment. *Journal of Retailing*, 77(1), pp. 39-53.

Moon, J. W. and Kim, Y. G. (2001). Extending the TAM for a World-wide-web Context. *Information and Management*, 38 (4), pp. 217-230.

Nunnally, J.C. (1978). Psychometric Theory. New York: McGraw-Hill.

Pavlou, P. A. (2001). Consumer Intentions to Adopt Electronic Commerce - incorporating Trust and Risk in the Technology Acceptance Model. Paper presented at the Proceedings of the Diffusion Interest Group in Information Technology Conference (DIGIT2001), New Orleans, LA.

Pikkarainen, T., Pikkarainen, K., Karjaluoto, H. and Pahnila, S. (2004). Consumer Acceptance of Online Banking: An Extension of the Technology Acceptance Model, *Internet Research*, 14 (3), pp. 224–235.

Polatoglu, V. N. and Ekin, S. (2001). An Empirical Investigation of the Turkish Consumers' Acceptance of Internet Banking Services. *International Journal of Bank Marketing*, 19 (4), pp. 156-165.

Pikkarainen, T., Pikkarainen, K., Karjaluoto, H. and Pahnila, S. (2004).Consumer Acceptance of Online Banking: An Extension of the Technology Acceptance Model. *Internet Research*, 14 (3), pp. 224–235.

Poon, W. C. (2008). Users' Adoption of E-banking Services: The Malaysian Perspective. *Journal of Business and Industrial Marketing*, 23 (1), pp. 59–69.

Ramayah, T. and Ling, K. P. (2002). *An exploratory study of Internet banking in Malaysia*. The Proceedings of the Third International Conference on Management of Innovation and Technology, Hangzhou City, China, 25-27 October 2002.

Ramayah, T., Jantan, M., Noor, M. N. M. and Ling, K. P. (2003). Receptiveness Internet Banking by Malaysian consumers. *Asian Academy of Management Journal*, 8 (2), pp. 1-29.

Reichheld, F. and Schefter, P. (2003). E-Loyalty-Your Secret Weapon on the Web. *Harvard Business Review*, pp. 105–113.

Rogers, E. M. (1962). Diffusion of Innovations, 1st ed. New York, NY: Free Press.

Rogers, E. M. (1983). Diffusion of Innovations, 4th ed. New York, NY: The Free Press.

Singh, A. M. (2004). The effectiveness of Internet marketing: A management and consumer perspective. Unpublished doctoral thesis, University of Durban-Westville, Durban.

Suganthi, B. (2001). Internet Banking Patronage: An Empirical Investigation of Malaysia. *Journal of Banking and Commerce*, 6 (1), pp. 20-32.

Suh, B. and Han, I. (2002). Effect of Trust on Customer Acceptance of Internet Banking. *Electronic Commerce Research and Applications*, 1 (3/4), pp. 247–263.

Tan, M. and Teo, T. S. H. (2000). Factors Influencing the Adoption of Internet Banking. *Journal of the Association for Information Systems*, 1 (5), pp. 22-38.

Teo, T. S. H., Lim, V. K. G. and Lai, R. Y. C. (1999). Intrinsic and Extrinsic Motivation in Internet Usage. *Omega International Journal of Management Science*, 27 (1), pp. 25-37.

Turban, E., Lee, J., King, D. and Chung, H. M. (2000). *Electronic Commerce: A Managerial Perspective*. USA: Prentice Hall.

Venkatesh, V. (1999). Creation of Favorable User Perceptions: Exploring the Role of Intrinsic Motivation. *MIS Quarterly*, 23 (2), pp. 239-60.

Venkatesh, V. (2000). Determinants of Perceived Ease of Use: Integrating Control, Intrinsic Motivation, and Emotion into the Technology Acceptance Model. *Information Systems Research*, 11 (4), pp. 342-65.

Venkatesh, V. and Davis, F. D. (1996). A Model of the Antecedents of Perceived Ease of Use: Development and Test. *Decision Sciences*, 27 (3), pp. 451-81.

Venkatesh, V. and Davis, F. D. (2000). A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. *Management Science*, 46 (2), pp. 186-204.

Walker, R. H., Craig-Lees, M., Hecker, R. and Kent, H. (2000). An Investigation of Reasons Affecting Customer Adoption and Rejection of Technologically-facilitated Means of Service Delivery: Research Methodology and Preliminary Findings. Paper presented at the ANZMAC Visionary Marketing for the 21st Century, Facing Challenge.

Wang, Y. S., Wang, Y. M., Lin, H. H. and Tang, T. I. (2003). Determinants of User Acceptance of Internet Banking: An Empirical Study. *International Journal of Service Industry Management*, 14 (5), pp. 501-519.

Zaheer, A., McEvily, B. and Perrone, V. (1998). Does Trust Matter? Exploring the Effects of Inter-organizational and Interpersonal Trust of Performance. *Organization Science*, 9 (2), pp. 141-159.