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## **RECEPTIVENESS OF INTERNET BANKING BY MALAYSIAN CONSUMERS: THE CASE OF PENANG**

*T. Ramayah, Muhamad Jantan, Mohd Nasser Mohd Noor, Koay Pei Ling*  
Universiti Sains Malaysia

*Razli Che Razak*  
Universiti Utara Malaysia

### **ABSTRACT**

*This is a study about Internet banking acceptance in Malaysia. Due to the impending liberalization, Malaysian banks are desperately embracing this new distribution channel to prepare themselves for the competition which is looming in the near future. Although the awareness level is high, this has not translated into actual use as only 23% have had some Internet banking experience. Security, availability of infrastructure and complexity of technology were main concerns reported by the respondents which is hindering the migration from traditional banking to Internet banking. In terms of external variables only prior experience and external pressure has been found to influence the intention to use. Perceived ease of use and perceived usefulness has been found to be significantly related to intention and perceived usefulness has been found to be a better predictor of intention to use compared to ease of use. In short it can be concluded that perceived usefulness is the driver of the intention to use Internet banking. The implications of this research is further explored.*

### **INTRODUCTION**

The changing landscape of business in Malaysia is very much affected by two phenomena – trade liberalization (globalization) and the rapid advancement of technology. This is especially true of the financial industry. The threat of competition from global players in the banking industry has forced the government to issue directives to local banks to enhance their competitiveness through merger exercises. Another trend that we are seeing is the greater use of technology, particularly Internet technology, as a means of not only to enhance cost efficiency but also for greater outreach and customer friendly services.

The advent of the Internet has transformed the traditional financial services provided by banks. The advantages of Internet banking can be enormous such as 24-hour access, funds transfer and settlement of bills at the convenience of the banks' patrons. It is believed that online transactions increase with greater accessibility and web security. With the growing penetration of computers in the local population, the strategic implications of Internet banking cannot be denied.

The uptake of Internet banking in the Malaysian banking industry is still in its infancy. It was only in June 1, 2000, that the Malaysian Central Bank provided the first legal framework for locally owned commercial banks to offer Internet banking services. Foreign owned banks were barred from engaging in Internet banking until January 1, 2002. Maybank, the largest locally owned commercial bank, launched its own portal ([www.maybank2U.com](http://www.maybank2U.com)) on June 15, 2000. It has emerged as the first domestic bank to offer a comprehensive list of banking services through the Internet, including customer enquiries, fund transfer, payment of bills, credit card payment, checking services, fixed deposits and summary of accounts transaction. A review of the Malaysian banking websites on the Internet revealed that other banks such as Hong Leong Bank, RHB Bank, Public Bank, Ambank, Bumiputera Commerce Bank, Southern Bank, Alliance Bank, Citibank and HSBC are following suit in offering online banking services.

However, the uptake among consumers has yet to be determined. There is little empirical research conducted in Malaysia to assess the popularity of Internet banking amongst patrons. How popular is Internet banking in Malaysia? What factors inhibit or encourage consumers to use the banking services provided over the Internet? Understanding individual attitudes and behaviour towards Internet banking is critical if local banks are to encourage their patrons to use these services and therefore reap the benefits to remain competitive. These are two major issues that this study seeks to address.

## **CONCEPTUAL FOUNDATION**

The Technology Acceptance Model (TAM) model (Davis, 1989) adapted from the Theory of Reasoned Action (TRA) (Ajzen & Fishbein, 1975) offers a powerful explanation for user acceptance and usage behaviour of information technology. TRA and Theory of Planned Behaviour (TPB) its successor, have been widely used in the study of specific behaviours (Ajzen & Fishbein, 1980). In general, these theories (TRA, TPB and TAM) theorizes that behaviour is determined by intention to perform the behaviour. Intention to perform a particular behaviour and actual behaviour has been found to be highly correlated.

The TRA proposes that behaviour results from the formation of specific intentions to behave (Ajzen & Fishbein, 1980). According to the TRA model, two major factors determine behavioural intentions namely: first, a person's attitude towards the behaviour, and second, the subjective norm.

Attitude towards the behaviour refers to the person's judgment that performing the behaviour is good or bad. The subjective norm reflects the person's perception of social pressures put on him to perform or not to perform the behaviour in question.

According to the theory, attitudes are a function of beliefs. In general, a person who believes that performing a given behaviour will lead to positive outcomes will hold a favourable attitude towards performing the behaviour. Similarly, a person who believes that performing a given behaviour will lead to negative outcomes will hold an unfavourable attitude towards performing that behaviour. According to the TRA model, attitude towards the behaviour is determined by the beliefs that the behaviour leads to certain outcomes, and by the person's evaluation of these outcomes.

Additionally, subjective norms are a function of normative beliefs. In other words, a person who believes that most referents with which he/she is motivated to comply with think he/she should perform the behaviour will perceive social pressure to do so. Conversely, a person who believes that most referents with whom he/she is motivated to comply with think he/she should not perform the behaviour will perceive social pressure to avoid performing the behaviour. According to the TRA model, the general subjective norm is determined by the perceived expectation of specific referent individuals or groups, and by the person's motivation to comply with those expectations.

An offshoot of the TRA is the Theory of Planned Behaviour, this theory expands the TRA model by including another construct, perceived behavioural control, to measure and account for the extent to which users have complete control over their behaviour, i.e. the extent to which the behaviour is truly at the discretion of the user. In TPB, behavioural control directly affects intention to perform a behaviour, and may directly affect behaviour in situations where the user intends to perform the behaviour, but is prevented from doing so (Ajzen, 1985).

For Information Technology (IT) usage, behavioural control has had limited importance (Dishaw & Strong, 1999). A comparison of TAM and TPB have largely concluded that TAM's ability to account for variance in intention to use or actual use is about the same as TPB's (Mathieson, 1991; Taylor & Todd, 1995).

Dishaw and Strong (1999) have summarized that TAM represents the tailoring of a well developed social psychology theory, the TRA, to the specific behaviour of using IT. TAM theorizes that an individual's behavioural intention to adopt a system is determined by two beliefs, perceived usefulness and perceived ease of use. Perceived usefulness is defined as "the degree to which an individual believes that using a particular system would enhance his or her productivity" while perceived ease of use is defined as "the degree an individual believes that using a particular system would be free of effort" (Davis, 1989). Between the two, perceived ease of use has a direct effect on both perceived usefulness and technology usage (Adams, Nelson & Todd, 1992; Davis, 1989).

Davis (1989) has also found that there is a relationship between users' beliefs about a technology's usefulness, and the attitude and intention to use the technology. However, the perceived usefulness exhibited a stronger and more consistent relationship with usage than did other variables reported in the literature. In addition, an individual may adopt a technology if he or she perceives it as convenient, useful and socially important even though they do not enjoy using the technology (Saga & Zmud, 1994). Thus, there might be a possibility of a direct relationship between beliefs and intentions. Furthermore, it is suggested that there are external variables that affect both perceived ease of use and perceived usefulness (Davis et al., 1989).

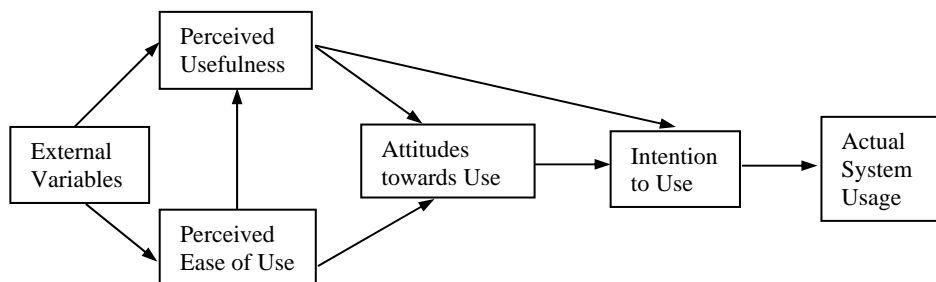


Figure 1. Technology Acceptance Model (TAM)

Many previous researches have adopted and expanded TAM which has empirically proven to have high validity in investigating a wide range of issues pertaining to user acceptance of technology (Davis, 1989; Adams, Nelson & Todd, 1992; Igbaria, Guimaraes & Davis, 1995; Igbaria, Parasuraman & Baroudi, 1996; Igbaria, Zinatelli, Cragg & Cavaye, 1997; Jantan, Ramayah & Chin, 2001; Ramayah, Siron, Dahlan & Mohamad, 2002).

Recent research by Ndubisi, Jantan and Richardson (2001) had further extended the TAM application to the technology adoption of Malaysian entrepreneurs. In their findings, IT usage was influenced directly by perceived usefulness and indirectly (via usefulness) by perceived ease of use. However, they found that there is no direct relationship between perceived ease of use and usage. Ramayah, Siron, Dahlan and Mohamad (2002) used the TAM model to predict technology usage among owners/managers in Malaysian SMEs and found that perceived ease of use and perceived usefulness influenced technology usage among owners/managers of SME's.

With the extensive technology innovation and telecommunications, we have seen new financial distribution channels increasing rapidly both in numbers and form, from ATMs, telephone banking, PC banking to Internet banking. A broad range of financial distribution channels must be available to deliver varying service needs of consumer segments (Easingwood & Storey, 1996). Developing alternative distribution channels is not only important in terms of reducing costs and improving

competitiveness but also in terms of a financial institution's ability to retain the existing customer base (Kimball & Gregor, 1995) as well as to further attract new customers.

It was reported by IDC (*The Star*, 2002) that Malaysian Internet users are expected to reach 6.7 million by end of 2005, following a compounded annual growth rate of 14.6% between 2000 and 2005. As consumers and companies become more familiar and comfortable with making purchases online, this increase in knowledge and comfort level will benefit banks by bringing more retail and commercial consumers to their virtual branches. Subsequently, as reported by Guru, Vaithilingam and Prasad (2001), most Malaysian consumers will patronize the bank branches and also find human interaction with tellers as important. It also indicated that the PC-based channels of banking have not realized its full potential in Malaysia.

In addition to the above, Sathye (1999) proposed a model for Internet banking adoption, which argued that the intention of Internet banking in Australia is significantly influenced by variables of system insecurity, ease of use, awareness of service and its benefits, reasonable price, availability of infrastructure and resistance to change.

One of the objectives of this study is to examine the external factors influencing the individual's intention to use Internet banking. A research model based on the refined TAM model (Venkatesh, 1996) was developed using the two main constructs: perceived usefulness and perceived ease of use with the external variables added to the model.

Past research by Black, Lockett, Winklhofer and Ennew (2001) has investigated a wide variety of factors influencing the adoption of Internet financial services in United Kingdom. Recent research by Ndubisi et al. (2001) has examined various external factors that affect technology acceptance among Malaysian entrepreneurs. Among the variables, prior experience, volume of transaction, training, and external pressure are external factors that are used in this study. Nevertheless, perceived product value, banking experience and perceived risks are used to measure perceived usefulness in this study. Besides, the services provided by the banks should be innovative with high quality and user friendly to meet the individual's expectations. Internet banking must also be able to provide a wide range of financial services that meet customer demands.

Banking experience refers to the level of banking experience such as reliability and accessibility of using Internet banking. In Turkey, Polatoglu and Ekin (2001), reported that individuals who use Internet banking were significantly more satisfied in terms of reliability and accessibility of the Internet banking system.

Howard and Moore (1982), reported that consumers must be aware of the new brand before adoption. Therefore, it is important that banks create awareness of Internet banking to the consumers. Adoption means acceptance and continued use of a product, service and idea. Consumers go through a process of knowledge, persuasion, decision and confirmation before they adopt the product or services. Also, according to Polatoglu and Ekin (2001), as more and more banks in Turkey offer Internet banking, the greater is the awareness level among consumers and therefore the higher will be Internet banking adoption.

As for the perceived risks, O'Connell (1996) discovered that security concern is an important reason for slow growth of Internet banking in Australia. Lockett and Littler (1997) reported that perceived risks of the innovation were inversely related to adoption in telephone based direct banking services. According to Stewart (1999), the failure of the Internet as a retail distribution channel has been attributed to the lack of trust customers have in the electronic channel and in the web merchants. Sathye (1999) confirmed security concerns as a burning issue for financial transactions done over the Internet.

### Research Model

TAM is one of the most influential and widely used model in predicting the acceptance of new technologies. TAM is also acclaimed for its parsimony and predictive power (Mathieson, 1991) which makes it easy to apply to different situations. As, Internet banking is one type of the technology, it is feasible to adopt TAM to further investigate the various factors associated with Internet banking adoption.

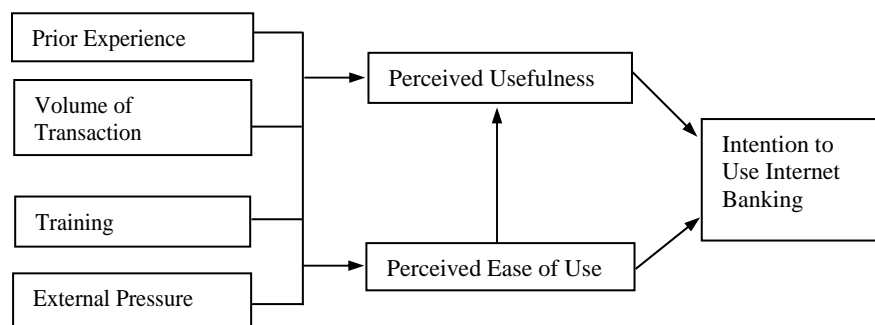


Figure 2. Research model for intention to use Internet banking by the individual

As mentioned earlier the framework is an adaptation of the TAM model, the only change made to the said model is that this study only measures the individual's intention to use Internet banking rather than the actual usage. This is due to the

consideration that Internet banking is still relatively new in Malaysia. Therefore, the percentage of individuals using Internet banking is still very low. Besides, the external variables used in this study were adapted to suit the study in Internet banking. Davis et al.'s (1989) list of external variables includes objective system design characteristics, training, computer self-efficacy, user involvement in design and the nature of the implementation process.

## **RESEARCH HYPOTHESES**

The following hypotheses are developed based on the theoretical framework and literature review discussed.

Perceived usefulness and perceived ease of use influence the level of intention toward the usage of the technology (Davis et al., 1989). Adam et al. (1992) and Davis et al. (1989) reported that perceived usefulness has strong relationship with system usage.

Therefore, the following hypothesis is proposed:

H<sub>1</sub>: Perceived usefulness has a direct positive effect on intention to use Internet banking.

Davis et al. (1989) identified ease of use as an important determinant of system usage through perceived usefulness. Similar findings by Mathieson (1991) reported that perceived ease of use explains the significant amount of variance in perceived usefulness. According to Jantan et al. (2001), perceived usefulness and perceived ease of use have a direct effect on system usage.

Cooper (1997) argued that ease of adoption is one of the important characteristics in technological adoption from the customer's perspectives. The degree to which an innovation is complicated and difficult to understand was one of the reasons for failure of home banking in United States (Dover, 1988). In addition, Daniel (1999), identified ease of use as one main factor for customer acceptance of Internet banking in the United Kingdom and Ireland.

Ndubisi et al. (2001) and Ramayah et al. (2002) identified that there is an indirect positive relationship between perceived ease of use and usage via perceived usefulness. In addition, Ndubisi et al.'s (2001) study also proved that external factors have indirect influence on usage via perceived ease of use.

Thus, the hypotheses developed are as follows:

- H<sub>2</sub>: Perceived ease of use has a direct positive effect on intention to use Internet banking.
- H<sub>3</sub>: Perceived ease of use has an indirect positive relationship (via usefulness) on intention to use Internet banking.
- H<sub>4</sub>: Perceived ease of use has a direct positive effect on perceived usefulness.
- H<sub>5</sub>: External factors have an indirect relationship (via ease of use) on perceived usefulness.

The various factors include prior experience, data intensity, staff support, computer training, technical support and external influence were used as drivers to investigate whether or not the technology acceptance model is valid for entrepreneurs by Ndubisi et al. (2001).

In this study, external factors consisting of prior experience, volume of transactions, training and external pressures are used to investigate its impact on intention to use Internet banking by individuals, mediated by perceived usefulness and perceived ease of use.

Prior experience in using the computer and Internet is the key element that shapes an individual's beliefs in terms of using Internet banking. TAM (Venkatesh, 1996) suggests that an external factor such as computer experience, has direct effect on perceived usefulness and perceived ease of use in terms of technology usage.

Black et al. (2001) found that previous experience with the computer or Internet is one of the strongest influencing factors that affect Internet banking adoption. Taylor and Todd (1995) discovered that experienced users with similar systems will have greater intention to use the system. Therefore it is believed that an individual's prior experience in computer and Internet usage has a positive impact on perceived usefulness and perceived ease of use of Internet banking.

Daniel (1999), observed that lack of access to computers or the Internet as one of the possible factors for slow adoption of Internet banking. According to The Wallis Report (1997), households will conduct their financial transactions over the Internet as the Internet becomes more widely accessible. It is believed that individual with access to the Internet or computer will find Internet banking useful and easy to use.

- H<sub>6a</sub>: Prior experience has a direct positive effect on perceived usefulness.
- H<sub>6b</sub>: Prior experience has a direct positive effect on perceived ease of use.

The volume of banking transaction involves an individual may increase the intention to use Internet banking. Thong and Yap (1995), reported that large amount of data or



transactions will have significant effect for the organization to adopt the technology as this can ease the workload and streamline the whole operation. Generally, a large volume of transaction is more cumbersome to handle if compared to a low volume, all other things being equal. Current studies indicate that the more the banking transactions an individual has to handle, the greater will be the perceived usefulness of Internet banking but the less will be the ease of use perception.

H<sub>7a</sub>: The greater the volume of transaction, the more Internet banking is perceived to be useful.

H<sub>7b</sub>: The greater the volume of transaction, the less Internet banking is perceived to be easy to use.

Training refers to the amount of computer and Internet-related training an individual receives from other users or computer specialists within or outside the organization. Personal computer training has a significant positive effect on perception and technology acceptance (Igarria et al., 1995, 1997; Raymond & Bergeron, 1992). Current research expects training to have a positive impact on using Internet banking as knowledge about computer and their operations gained through training may be beneficial in enhancing computer skills and reducing barriers to technology acceptance. Thus, the individual finds the computer useful and easy to use.

H<sub>8a</sub>: Training has a direct positive effect on perceived usefulness.

H<sub>8b</sub>: Training has a direct positive effect on perceived ease of use.

External pressure is the extent to which members of a social network influence one another's behaviour (Rice, Grant, Schmitz & Torobin, 1990). Individuals will conform to the accepted social norm in using computerized systems because of their belief that they will be perceived as being technologically sophisticated by those whom they consider important to their future well-being (Anandarajan, Igarria & Anakwe, 2000; Igarria, Parasuraman & Baroudi, 1996). Thus, we can expect individuals' intention to use Internet banking, characterized as normative orientation to be influenced by the views of others, such as friends and family members.

H<sub>9a</sub>: External pressure has a direct positive effect on perceived usefulness.

H<sub>9b</sub>: External pressure has a direct positive effect on perceived ease of use.

TAM is one of the most influential and widely used model in predicting the acceptance of new technologies. Davis's (1989) and Ndubisi et al. (2001) findings that external variables influence behavioural intention to use, and actual usage, indirectly through their influence on perceived usefulness and perceived ease of use. Therefore, hypothesis 10 was developed.

H<sub>10</sub>: The relationship between external factors (prior experience, volume, training and pressure) and intention to use Internet banking will be mediated by perceived usefulness and perceived ease of use.

**METHODOLOGY**

Data was collected through a questionnaire based on researches conducted by Davis, Bagozzi and Warshaw (1989), Basyir (2000), Ndubisi et al., (2001) and Polatoglu et al. (2001). The questionnaire was modified to better reflect the intention towards the use of Internet banking.

There are 44 items measuring 4 independent variables, two intervening variables and one dependent variable. There are 7 questions that measures the respondents' profile, 7 items to gather information on Internet usage experience, 1 item for measuring volume of transaction, 1 item for external pressure, 4 items measuring Intention to use Internet banking, 11 items for measuring perceived usefulness, 8 items for measuring perceived ease of use and 3 items to gather additional information.

TABLE 1  
DESCRIPTION OF QUESTIONNAIRE USED

Variable	Item	Sample Question	Source
Intention	4	In the next 6 months, how likely are you going to continue using Internet banking to perform banking transactions?	Davis et al. (1989)
Perceived Usefulness Perceived product value	3	I find Internet banking useful	Davis et al. (1989)
Banking Experience	6	I can get instant feedback for my transactions through Internet banking	Polatoglu et al. (2001)
Perceived risks	2	Internet banking services are secure	Polatoglu et al. (2001)
Perceived Ease of Use	8	Using Internet banking does not require a lot of mental effort	Davis et al. (1989) Basyir (2000)
Prior Experience	4	How long have you been using computer or Internet?	Basyir (2000)
Volume of Transaction	1	I handle large volume of banking transactions	Ndubisi et al. (2001)
Training	2	I have attended Internet related training from the organization	Ndubisi et al. (2001)
External Pressure	1	My peers think I should use the Internet banking	Ndubisi et al. (2001)
Additional Information	3	In your opinion what are the main concerns when adopting Internet banking?	Polatoglu et al. (2001)

Respondents were asked to rate their opinion using the 5-point Likert scale with 1 = Strongly disagree, 2 = Disagree, 3 = Neither disagree nor disagree, 4 = Agree and

5 = Strongly agree on most of the questions. Nevertheless, questions measuring intention to use Internet banking used a 5-point Likert scale with 1 = Very Unlikely, 2 = Unlikely, 3 = Neither unlikely nor likely, 4 = Likely and 5 = Very Likely. Further, questions were included to collect data about gender, age, occupation and educational level. We also included 2 questions on the concerns that the respondents have about Internet banking and what are the services they would use most. These 2 questions required the respondents to rank the most important to the least important. These questions will be analyzed using the Friedman non-parametric test to see whether the respondents rank them differently.

The unit of analysis for this study is individuals selected through convenience sampling. The justification for this sampling method is two pronged: (1) it is impossible to get a list of banking customers from the banks and (2) since it is against the Banking and Financial Institution Act (BAFIA) to obtain a list of customer's contact numbers and addresses from financial institutions. As such respondents comprise individuals from both the Island and mainland of the state of Penang, Malaysia. The number of questionnaires distributed was 230. The method of distributing the questionnaires was through intercept survey.

## **RESEARCH FINDINGS**

A total of 194 questionnaires were collected out of the total 230 questionnaires distributed. There were 14 incomplete questionnaires that were discarded. Therefore, only 180 questionnaires were used for data analysis, thereby giving a response rate of 78.26%.

The respondents comprised 85 males (47.2%) and 95 females (52.8%). The profile of the respondents is shown in Table 2. 53.3% of the respondents were between 21–30 years old, followed by 31.7% with age between 31–40 years old. In total, 50.0% of the respondents were first degree holders. In terms of total annual personal income and family income, most of the respondents earned between RM25,000–RM49,999 (38.9%) and RM50,000–RM74,999 (27.8%), respectively.

Among the respondents, there were only 3 respondents who had no access to Internet and 6 who did not use the Internet or did not have Internet experience. 81.7% respondents had used the Internet for more than 2 years and 58.3% used the Internet everyday.

TABLE 2  
PROFILE OF THE RESPONDENTS

Demographic		Frequency	Percentage
Gender	Male	85	47.2
	Female	95	52.8
Age	< 20 years	5	2.8
	21–30 years	96	53.3
	31–40 years	57	31.7
	41–50 years	17	9.4
	> 50 years	5	2.8
Education Level	Master Degree	24	13.3
	Bachelor Degree	90	50.0
	Diploma	30	16.7
	High School or Lower	36	20.0
Total Personal Income Per Annum	Student/Unemployed	7	3.9
	< RM10,000	9	5.0
	RM10,000–RM24,999	47	26.1
	RM25,000–RM49,999	70	38.9
	RM50,000–RM74,999	25	13.9
	RM75,000–RM99,999	14	7.8
	RM100,000–RM149,999	6	3.3
	> RM150,000	2	1.1
Positions	Executive/Top Management	39	21.7
	Middle Management	56	31.1
	Supervisory	21	11.7
	Administrative/Clerical	22	12.2
	Technical	21	11.7
	Others	21	11.7
Marital Status	Single	95	52.8
	Married	83	46.1
	Divorced	2	1.1

The first multiple regression was run to determine the relationships between perceived usefulness (PU) and perceived ease of use (PEU) towards intention to use Internet banking (Intent). This regression analysis was conducted to test hypothesis 1 and hypothesis 2.

TABLE 3  
RESULTS OF MULTIPLE REGRESSION 1

Selected variables	Beta coefficients	t-value
Perceived Usefulness	0.452	6.536**
Perceived Ease of Use	0.145	2.090*
R <sup>2</sup>		0.270
Adjusted R <sup>2</sup>		0.262
Durbin Watson		2.00
F Value		32.03**

\*\* p < 0.01

\* p < 0.05

The coefficient of determination (R<sup>2</sup>) is 0.270 indicating that this model is significant whereby 27% of the variance in the intention to use Internet banking is explained by perceived usefulness and perceived ease of use. The Beta value of perceived usefulness ( $\beta = 0.452$ ) and perceived ease of use ( $\beta = 0.145$ ) are positive and significant on intention to use Internet banking. Therefore, H<sub>1</sub> and H<sub>2</sub> are accepted. Perceived usefulness has a greater impact on intention to use Internet banking than perceived ease of use. This result provided support for the hypothesis of the study.

The second multiple regression was carried out to test whether or not perceived ease of use has an indirect relationship (via perceived usefulness) on intention to use Internet banking.

Hierarchical Multiple Regression Model was run to determine the relationship between perceived ease of use and intention to use Internet banking via perceived usefulness.

According to Baron and Kenney (1986), a variable functions as a mediator when it meets the following conditions: (a) variations in levels of the independent variable significantly account for variations in the presumed mediator, (b) variations in the mediator significantly account for variations in the dependent variable, (c) when a and b are controlled, then a previously significant relationship between the independent and dependent variables is no longer significant or it is significantly decreased. For a more detailed discussion refer to Ndubisi et al. (2001).

TABLE 4  
RESULTS OF MULTIPLE REGRESSION 2

Selected variables	Beta coefficients without perceived usefulness (Model 1)	Beta coefficients with perceived usefulness (Model 2)
Perceived Ease of Use	0.300**	0.145*
Perceived Usefulness		0.452**
R <sup>2</sup>	0.090	0.270
Adjusted R <sup>2</sup>	0.085	0.262
R <sup>2</sup> Change		0.180
Durbin Watson	2.00	2.00
F Value	17.198**	32.023**
F Change		42.725**

\*\* p < 0.01

\* p < 0.05

From the results, the coefficient of determination (R<sup>2</sup>) increased from 0.09 to 0.270, indicating that 27% of the variance can be explained by the combination of these variables. The change in R<sup>2</sup> is significant, indicating that the inclusion of the mediator or intervening variable of perceived usefulness has significantly improved the explanatory power of perceived ease of use on intention to use Internet banking. The relationship between perceived ease of use and intention to use Internet banking is significant. The Beta value of perceived ease of use is higher ( $\beta = 0.300$ ,  $p < 0.01$ ) before inclusion of perceived usefulness as mediator. Perceived usefulness is a partial mediator as the beta value of perceived ease of use has reduced after inclusion of perceived usefulness but it is still significant. Therefore, H<sub>3</sub> is accepted.

The third regression was conducted to test the relationship between external factors (prior experience, volume of transaction, training and external pressures) on perceived usefulness, mediated by perceived ease of use. Similar to the second regression, this regression model was also run hierarchically. The results of the analysis are presented in Table 5.

The coefficient of determination (R<sup>2</sup>) increased from 0.262 to 0.366. In Model 1, the coefficient of determination (R<sup>2</sup>) is 26.2% indicating that 26.2% of the variation in dependent variable (perceived usefulness) is explained by the independent variables (prior experience, volume of transactions, training and external pressure). Prior experience, volume and external pressure show a significant positive relationship with perceived usefulness. Therefore, H<sub>6a</sub>, H<sub>7a</sub> and H<sub>9a</sub> are accepted. There was no evidence to support the impact of training on perceived usefulness. Thus, the findings prompted the rejection of H<sub>8a</sub>.

TABLE 5  
RESULTS OF MULTIPLE REGRESSION 3

Selected variables	Beta coefficients without ease of use (Model 1)	Bets coefficients with ease of use (Model 2)
Prior experience	0.202**	0.128*
Volume	0.310**	0.268**
Training	-0.071	-0.031
External Pressure	0.250**	0.237**
Perceived Ease of Use		0.336**
R <sup>2</sup>	0.262	0.366
Adjusted R <sup>2</sup>	0.244	0.347
R <sup>2</sup> Change		0.104
Durbin Watson	1.99	1.99
F Value	14.539**	18.854**
F Change		26.920**

\*\* p < 0.01

\* p < 0.05

The analysis from Model 2 also shows that perceived ease of use has a direct positive relationship ( $\beta = 0.336$ ,  $p < 0.01$ ) on perceived usefulness. Thus,  $H_4$  is accepted.

Prior experience ( $\beta = 0.202$ ,  $p < 0.01$ ), volume of transaction ( $\beta = 0.310$ ,  $p < 0.01$ ) and external pressure ( $\beta = 0.250$ ,  $p < 0.01$ ) are found to have a direct impact on perceived usefulness. However, training has been found not to influence perceived usefulness. When perceived ease of use was added to the model, the incremental  $R^2$  was 10.4% and the  $R^2$  change statistics was significant (F Change = 26.920,  $p < 0.01$ ). The beta values of prior experience, volume of transaction and external pressure were reduced to 0.128, 0.268 and 0.237, respectively. This indicates that there was a partial mediation effect. So we can conclude that there is only partial support for  $H_5$ .

The fourth regression was conducted to determine the relationship between external factors (prior experience, volume, training and external pressures) on perceived ease of use.

From the results, only prior experience ( $\beta = 0.190$ ,  $p < 0.05$ ) was found to have the most significant impact on perceived ease of use. The  $R^2$  of 0.087 indicates that 8.7% of the variance in the perceived ease of use can be explained by prior experience. Therefore,  $H_{6b}$  is accepted. Hypothesis  $H_{7b}$ ,  $H_{8b}$  and  $H_{9b}$  have to be rejected as the results show no statistical evidence to substantiate the hypothesis that volume of transaction, training and external pressure has direct impact on perceived ease of use.

TABLE 6  
RESULTS OF MULTIPLE REGRESSION 4

Selected variables	Beta coefficients
Prior Experience	0.190*
Volume	0.127
Training	-0.124
External Pressure	0.134
R <sup>2</sup>	0.087
Adjusted R <sup>2</sup>	0.065
Durbin Watson	1.755
F Value	4.012**

\*\* p < 0.01

\* p < 0.05

Hierarchical regression was run to determine the relationships between the independent variables (prior experience, volume of transaction, training and external pressure), intervening variables (perceived usefulness and perceived ease of use) and the dependent variable (intention to use Internet banking). This regression model provides a comprehensive explanation of the theoretical framework.

With the inclusion of perceived ease of use and perceived usefulness as intervening variables, the coefficient of determination (R<sup>2</sup>) increased from 0.240 to 0.363. The model is able to explain 36.3% of the variance of the intention to use Internet banking. These variables collectively added 12.3% more to the explained variance.

Prior experience ( $\beta = 0.209$ ,  $p < 0.01$ ) and external pressure ( $\beta = 0.366$ ,  $p < 0.01$ ) are found to have direct impact on intention to use Internet banking. However, the other external factors (volume and training) have been found not influencing intention to use Internet banking. When perceived usefulness and perceived ease of use was added to the model the incremental R<sup>2</sup> was 12.3% and the R<sup>2</sup> change statistics was significant (F Change = 16.280,  $p < 0.01$ ), the beta values of both prior experience and external pressure were reduced to 0.132 and 0.267 respectively, this indicates that there was a partial mediation effect. So we can conclude that there is only partial support for H<sub>10</sub>.



TABLE 7  
RESULTS OF MULTIPLE REGRESSION 5

Selected variables	Beta coefficients without intervening variables (Model 1)	Beta coefficients with ease of use and usefulness (Model 2)
Prior experience	0.209**	0.132*
Volume	0.117	0.033
Training	-0.035	0.034
External Pressure	0.366**	0.267**
Perceived Ease of Use		0.135*
Perceived Usefulness		0.322**
R <sup>2</sup>	0.240	0.363
Adjusted R <sup>2</sup>	0.222	0.340
R <sup>2</sup> Change		0.123
Durbin Watson	1.92	1.92
F Value	13.491**	16.028**
F Change		16.280**

\*\* p < 0.01  
\* p < 0.05

### Additional Analysis

Two additional analysis were carried out using Non-Parametric Tests. The purpose of the first analysis as shown in Table 8 is to investigate consumers' concern in terms of Internet banking adoption. Individuals ranked security as the major concern in terms of Internet banking adoption. This is followed by availability of infrastructure, complexity of the technology, awareness of Internet banking and price. The Friedman Test is significant ( $\chi^2 = 283.05$ ,  $p < 0.01$ ).

The second additional analysis as shown in Table 9 was carried out to find out the most preferred transactions using Internet banking among the consumers. The test shows account enquiry as the most popular, followed by payment of bills, funds transfer, cheque services, applying for new services and fixed deposits. The statistical results show that the test is significant ( $\chi^2 = 380.98$ ,  $p < 0.01$ ).

TABLE 8  
RESULTS OF NON PARAMETRIC TEST 1

Variables	Mean rank	Ranking
Security	1.35	1
Complexity of the technology	3.20	3
Awareness of Internet banking	3.77	4
Price	3.78	5
Availability of infrastructure	2.90	2

TABLE 9  
RESULTS OF NON PARAMETRIC TEST 2

Variables	Mean Rank	Ranking
Account enquiry	2.05	1
Funds transfer	3.14	3
Payments	2.27	2
Cheque services	3.87	4
Fixed deposits	4.84	6
Applying for new services	4.83	5

## DISCUSSION

The objective of this study is to investigate factors that influence individuals' intention to use Internet banking in Penang. The study examined the impact of the external factors on individual's beliefs, which lead to the intention to use Internet banking. At the same time, the study also examined the impact of the intervening variables of perceived usefulness and perceived ease of use that affect the intention to use Internet banking.

The study found that perceived usefulness has direct positive effect on the intention to use Internet banking. The result supports the earlier findings by Davis (1989), Ndubisi et al. (2001) and Ramayah et al. (2002). This can be explained by the notion that individuals will use Internet banking that enable them to increase their productivity in terms of time saving and costs, ability to transact banking transaction on-line at all times without having to perform banking transaction at banks physically.

In addition, perceived ease of use has also proven to have significant impact on intention to use Internet banking. The result corroborates the findings by Adam (1992), Davis et al. (1989) and Ramayah et al. (2002). Individuals that perceived Internet banking as easy to use, feel that they need less effort to operate the system and will use the service. They may also have experienced user friendliness of the Internet banking system offered by banks.

It is observed that perceived usefulness is an important determinant of intention to use Internet banking if compared to perceived ease of use. Thus, it may suggest that users will abandon Internet banking usage in the long run if it is solely based on ease of use rather than usefulness. Individuals will lose interest in using Internet banking eventually if it is not useful even though the system is rather easy to handle.

From the descriptive statistics, this study demonstrates the mean values of perceived usefulness and perceived ease of use are 3.39 and 3.46, respectively. Based on the

5-Likert Scale, these readings are on the medium scale. This implies that individuals might not be ready to use Internet banking at the moment. In fact, Internet banking is still relatively new in Malaysia and is at its infancy stage. Therefore, most of the individuals are reluctant to use Internet banking as they have major concerns over security and privacy issues. Furthermore, individual may find dealing with bank tellers more enjoyable and important than using Internet banking. This supports the findings by Guru, Vaithilingam and Prasad (2001), which found that Malaysian consumers find human interaction with tellers important and they will still patronize the bank.

The study also shows that perceived ease of use has a significant impact on intention to use Internet banking via perceived usefulness. Perceived usefulness has partially mediated the relationship between perceived ease of use and intention to use Internet banking. This finding is consistent with recent research done by Ndubisi et al. (2001). Perceived ease of use has direct and indirect impact (via perceived usefulness) on intention to use Internet banking. Therefore, it is important for the banks' policy makers to understand that though perceived usefulness is a major determinant in technology usage, it is equally important to emphasize different approaches and measures to improve perceived ease of use. The effort to improve perceived ease of use should have a strong impact on intention to use Internet banking. For instance, banks might be interested to develop a simpler system that is user friendly to cater for individuals from all levels.

This study also shows that external factors have direct and indirect (via ease of use) impact on perceived usefulness. Volume of transaction has the greatest impact on perceived usefulness, followed by external pressure and prior experience in using computer and Internet.

The results of volume of transaction has significant effect on the perceived usefulness is consistent with the findings from Thong and Yap (1995). Based on the 5-Likert Scale, the mean volume of 2.61 is at the low scale. This may suggest that the majority of the individual do not handle large volumes of banking transactions. An individual normally maintains a current account, a saving account and a housing loan account with the bank. Therefore, banks may offer more financial services online to encourage higher volume of banking transactions engaged by individuals. An individual may increase the volume of transaction if banks are able to offer a broader range of financial services online. For instance, an individual may choose to pay all his bills using the Internet banking system if the websites provide various types of bills payment, unit trust, online share trading and insurance.

External pressure is also an important determinant in perceived usefulness. The result corroborates the findings by Anandarajan et al. (2000) and Igarria et al. (1996) that users find using Internet banking useful because of the external pressures coming

from supervisors, peers and subordinates. Users of Internet banking will be perceived as technologically competent. In addition, users believe that it is important that the users' social group believe that they should perform banking transactions using Internet banking. This is important as a basis of identification and distinguishes the users from others. This may suggest that individuals are influenced by low individualism culture. Anandarajan et al. (2001) reported that social pressure is a strong determinant in microcomputer usage. Individuals from countries that is dominated by low individualism culture tend to be influenced by others.

As proposed, prior experience in using computer or Internet is also important to encourage the individual's intention to use Internet banking. Computer and Internet experience influences the individuals' belief directly on perceived usefulness. Experienced users will have greater intention to use Internet banking as they perceive Internet banking to be useful. This is consistent with the results from Black et al. (2001), Daniel (1999), Taylor et al. (1995) and Igarria (1995). However, it is observed that prior experience has the least impact on perceived usefulness. This may suggest that the majority of the respondents have prior experience in terms of computer and Internet usage. Therefore the impact is less on perceived usefulness, if compared to volume of transaction and external pressure.

It is also found that perceived ease of use is partially mediating the relationship between external factors and perceived usefulness. In addition, perceived ease of use was found to have a direct positive effect on perceived usefulness. The result supports the findings by Adams et al. (1992), Davis et al. (1989) and Ramayah et al. (2002). This may suggest that individuals who perceive Internet banking easy to use will tend to believe the Internet banking system is useful. Thus, it will lead to intention to use Internet banking.

It should be noted that 8.7% of the variation in perceived ease of use is explained by prior experience. This may suggest that an individual's perceived Internet banking system is easy to use based on personal past experience in user friendliness of Internet application. A large percentage of the perceived ease of use variance remains unexplained. Hence, banks should not only focus on only these few variables but also incorporate potential unmeasured variables. Important among these variables that have impact on perceived ease of use are consumer hardware, computer technology, and user interference in Internet banking system.

Contrary to the findings by Igarria et al. (1995, 1997) and Raymond and Bergeron (1992), training has no significant impact on perceived usefulness, perceived ease of use and intention to use Internet banking. This may suggest that the individuals might be attending training that is not related to Internet banking. The internal and external training were probably highly correlated with their tasks in the firm. There is hardly any relevant training on how to operate Internet banking. Therefore, the user might

not be comfortable with Internet banking system due to lack of proper training and therefore create a barrier to intention to use Internet banking.

The study confirms that the individuals' beliefs of perceived ease of use and perceived usefulness of using the Internet banking act as the intervening variables between the external factors and intention to use Internet banking. The external factors explained 24.0% of variation in intention to use Internet banking. However, the inclusion of perceived usefulness and perceived ease of use has increased the explanatory power to 36.3%. Therefore, the present study is significant and has presented convincing evidence in using the TAM model to predict the individual's beliefs on intention to use Internet banking.

## **IMPLICATIONS**

This research bears key implications for practice. As observed from this study, a majority of the respondents have no experience in using Internet banking. Therefore, banks should take the opportunity and look at long-term benefits of Internet banking to establish a wider customer base without actually having to open new branches. At the same time, Internet penetration has increased rapidly and local banks should look aggressively into the future and understand the trend and needs of customers. Banks may also need to advertise and promote usefulness and ease of use of their Internet banking websites to create awareness among the users. For instance, Maybank and Citibank are aggressively advertising and promoting usefulness and ease of use of its full-fledged Internet banking services to their customers and public.

With increasingly techno-savvy and IT talented customers who are perceived to be more demanding and discerning of IT, banks have to make their sites customer friendly and provide a range of services for one-stop banking.

In order to increase the volume that an individual transacts, banks need to be more responsive and adopt a strategy of bundling products to fit individual preferences. For instance, banks have to strategize and offer consumers more than the ability to check daily balances, transfer funds or bills payments. Some of the more creative solutions will develop from banks penetrating with Internet retailer and non-financial companies. For instance, Maybank's Internet financial portal Maybank2u.com has enabled users to pay more than 179 types of bills besides performing the other banking activities. Thus, this will also increase the perceived usefulness of Internet banking that leads to greater intention to use Internet banking system. In this regard, banks will probably be able to increase fee revenue from services like online bill payment and profits from collections of credit cards, home loans, insurance and online share trading.

The findings of this study also imply that users are very concerned about security and the majority of them are using Internet banking for accounts enquiry. According to the recent report released by Ripstech's (*The Star*, 2002) on Internet Security Threat, Malaysia was among the top 10 attack sources in terms of the number of attacks per 10,000 Internet users in the country. The study also reported that companies involved in financial services were among the favourite targets of attacks originating from Asian countries. Therefore, banks should ensure that safety measures such as firewalls, intrusion detection and other security related measures are properly developed and enforced.

On the legislative side, the government has developed IT governance to further protect the users to obtain assurance and security and controls of IT services provided by internal or third parties. In addition, Budget 2002 (*Sunbiz*, 2001) contained components that reflect the country's aggressive approach in encouraging the adoption of e-business. Therefore, banks should emphasize the usefulness of Internet banking systems in line with the government's effort to develop IT applications in government, business and industry.

With the increasing security threats from the Internet, Bank Negara Malaysia has imposed the *Computer Crimes Act 1997* that came into effect on June 1, 2000. Subsequently, Bank Negara Malaysia announced that laws to protect personal data are being drafted. Local enforcement authorities are also steadily building up their expertise in computer crime.

Most of the respondents also indicated that they think Internet banking will be the primary transaction medium in Malaysian banking industries in 5 years time. In order to increase the number of Internet banking users, the Malaysian government plays an important role in preparing Malaysia for positive Internet usage as a way of propagating the knowledge-based economy. In this regard, The Energy, Communications and Multimedia Ministry launched its Internet Desa programme 2001 (*The Star*, 2001) whereby 100 cyber centers will be established in rural areas by 2002. This programme enables rural and low-income Malaysians to surf the Net for free. Besides, the government also launched the PC ownership campaign to allow citizens to withdraw RM3,500 from Account II of their Employees Provident Fund (EPF) contributions to purchase a personal computer for home use. It is hoped that Internet penetration in the country will grow tremendously with support from the government and financial institutions.

## **LIMITATIONS AND SUGGESTIONS FOR FUTURE RESEARCH**

Time constraints has resulted in a small sample size collected for this study. In addition, the current responses collected are mainly from the 21–30 years old and

most of them are bachelor degree holders. Furthermore, the scope of this study is only confined to the Penang State. Therefore, the sample may not be a true representation of the beliefs and intention of the Malaysian population towards using Internet banking. As Internet banking is still at its infancy stage in Malaysia and most of the respondents have no prior experience in Internet banking, this again may not be a true representation of the entire population.

The various external factors used in this study were adopted from literature review. As Internet banking is a new phenomenon to emerge in banking industries, it is possible that some of the important determinants in intention to use Internet banking were left out in this research.

Since there are very few similar researches done, this study provides a guideline for future research to better understand Internet banking. Future researches can be performed in the similar area of interest to understand Internet banking adoption covering wider geographical areas. Alternatively, researches can be conducted to examine users satisfaction in using Internet banking compared to traditional banking. Banks expect to see a surge in Internet banking usage in the year 2002 when all foreign banks are allowed to offer full-fledged Internet banking systems. Therefore, it is definitely worthwhile to conduct and intensify future research in this area.

## **CONCLUSION**

As Internet banking is still relatively new in Malaysian, the understanding of the determinants of intention to use Internet banking is still very limited. The findings are encouraging and provide some theoretical and practical insights to identify factors and beliefs that influence intention to use Internet banking.

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