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Full Length Research Paper

Electronic Transaction of Internet Banking and its Perception of Malaysian online Customers

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This paper investigates the factors determining the Malaysian banking consumers' perception on e-banking transactions. A research framework was developed to testify the statistical relationships among consumer perceptions on e-banking transaction. Factor analysis was performed to extract and decide on the number of factors underlying asset of measured variables of interest. Structural equation model (SEM) was tested to anticipate the effects of the explanatory variables. This study shows that only protected transaction, have significant impact on consumers' perception about e-banking security, followed by service quality and regulatory frame work issues. This study offers an insight into e-banking in Malaysia, which has not previously been investigated and at the same time, statistical tests significance makes this study a potential cornerstone for future research.

Key Words: Consumer Perception, e-banking, Electronic Transaction, Internet Banking, Online Customer, Malaysia

INTRODUCTION

In the wake of the internet revolution, electronic commerce emerged and allowed businesses to interact more effectively with their customers and other corporations. In this proliferated information age, banking industry has been using this new communication channel to reach its varieties of customers. Electronic commerce (e-commerce) has become a very important technological advancement for businesses by changing business practices (Brodie et al., 2007; (Gonza´lez et al., 2008; Lichtenstein and Williamson, 2006). This has experienced tremendous growth in recent years as a result of new business initiatives utilizing these technologies (Barwise and Farley, 2005). In particular, industries that are information-oriented such as banking services and securities trading sector are expected to experience the highest growths in e-commerce (Ibrahim et al. 2006; Hughes, 2002). Inevitably, this phenomenon has sparked a lot of attention in the academic literature lately (such as Gan et al., 2006; Pikkarainen et al., 2006; Shamdasani et al., 2008). Undoubtedly, electronic banking (e-banking) has experienced explosive growth and has transformed traditional practices in banking (Barwise and Farley, 2005; Gonzalez et al., 2008; Lichtenstein and Williamson, 2006). The banking industry has declared information privacy and security to be major obstacles in the development of consumer related electronic commerce. Besides that, success of banking industry depends on the capabilities of management to anticipate and react to such changes in the financial marketplace (Gan et al., 2006). Meanwhile Internet banking also allows customer to have direct access to their financial information and to undertake financial transactions with more convenient way (Rotchanakitumnuai and Speece, 2003). Since, it represents an electronic marketplace whereby consumers may conduct their transactions on a virtual

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level (Reiser, 1997; Daniel, 1999; Bradley and Stewart, 2003).

Correspondingly, the banking industry is now using the new communication media (Internet) to offer its versatile services to the customers with ease and convenience. This system of mutual interactions between the consumers and the banking industries is widely known as electronic banking (e-banking). E-banking is particularly well-practiced in Austria, Korea, the Scandinavian countries, Singapore, Spain, and Switzerland, where more than 75% of all banks offer such services. Yet the development and increasing role of the Internet as a service channel has removed the locus power from service provider to customers (Mäenpää, 2006) and also breaching geographical, industrial, and regulatory barriers, creating new products, services, market opportunities, and developing more information and system-oriented business and management processes (Liao and Cheung, 2002). To re-examine the role of traditional service quality in an e-banking environment by providing a review of how traditional service quality perceptions have evolved through the current and continuing stream of change in banking technology and the corresponding changes in the nature of how banks interact with their customers, Wong et al., (2008) investigate the important ranking of the five SERVQUAL dimensions. These have not changed until now, while large scale discrepancies have been found between customer expectations and their perceived performance of traditional banking services. These developments influence the banking industry to adopt the technological innovation, since the characteristic of banking is known as “tried and tested” process of service delivery which affected by environmental changes (Bradley and Stewart, 2003). Moreover, changing consumer behavior and needs, globalization, deregulation, disintermediation and the emergence of new financial service models are all dynamics in the financial services industry. Conversely, Internet is also having its impact (Bradley and Stewart, 2003). As prospect of E-banking depends on customers, therefore, specific understanding on customers' perceived requirements and meeting their demands and expectations is becoming an intricate challenge. With the growth of Internet and the E-Economy, the customer is in control and it is not difficult for them to move to a competitor's site (Shailey et al. 2003). The total Customer Experience (TCE) includes all stages of a customer’s interaction with an E-Commerce environment, such as the delivery of the service or product on schedule, the Web-based retail site, the back-office systems, and the post-sales support. To create value and to generate a positive TCE is important for banking environments in order to acquire customers (Shailey et al. 2003).

To explore the determinants of users’ adoption momentum of e-banking in Malaysia, Poon (2008) indicates that privacy and security are the major sources of dissatisfaction, which have momentously impacted users’ satisfaction. Meanwhile, accessibility, convenience, design and content are sources of satisfaction. Besides, the speed, product features availability, and reasonable service fees and charges, as well as the bank’s operations management factor are critical to the success of the e-banks. WAP, GPRS and 3G features from mobile devices are of no significance or influence in the adoption of e-banking services in this study. Results also reveal that privacy; security and convenience factors play an important role in determining the users’ acceptance of e-banking services with respect to different segmentation of age group, education level and income level. Moreover, the exposure of internet-banking adoption in Malaysia is relatively lower and very little research has been done to understand the key adoption determinants. Though, electronic revolution has commenced in Malaysia a long ago, but Internet banking is still in its infancy stage. So, it’s become very hard for the bank industry to design interventions that would enhance the diffusion of Internet banking (Ndubisi and Sinti, 2006). However, in the market place, this is the era of growing competition in technological arena while the Internet is the focal point as the potential customers have direct access to it. Further potential customers have wide ranges of choices as they can compare among the competitive banks through gathering Internet information. So it is becoming increasingly difficult for the banks to acquire expected number of customers. Therefore, as a condition of acquiring new customers and retaining existing customers, e-banking organizations need to be seriously concerned about the customers' value in order to build customers’ loyalty, and to reduce customer defections. From the previous research, it was found that perceived service quality strongly influence customers. Prior research also suggests that customer satisfaction also has a positive influence on the use of E-Banking. In addition, the quality of the service is crucial in acquiring customers in e-banking organizations. According to the essence of service quality is the ability to deliver what the customer needs and expects (Shailey Minocha et al. 2003). Therefore, in view of above discussions, the purpose of our study is: (a) to examine the level of consumer perception about e-payment; (b) to evaluate the level of confidence on electronic transaction; and (c) to examine the factors affecting consumer perceptions towards electronic payment.

Literature Review

The changes occurring in the banking sector can be attributed to increasing deregulation and globalization, the major stimulus for rationalization, consolidation, and an increasing focus on costs (Ibrahim et al., 2006). One offspring of this has been the rapid development and use of various new and innovative technologies by banks in the form of electronic banking services (e.g. Pikkarainen

et al., 2006; Orr, 1998). The implementation of e-banking, such as internet banking and the use of computer-based office banking software hold several obvious advantages for the banks as the outcome of revolutionary technologies. Meanwhile the importance of the Internet to users' banking needs relates to the advantages that accrue to the users of the technology in question. As adoption and the usage of the Internet banking services increases, a certain maturation point will be reached in the following years (Mäenpää, 2006). Academicians also take a different stance in the theories they adopt when exploring consumer adoption of electronic banking (Laforet and Li, 2005). More importantly most of the researchers focused on consumer behavior, innovation and acceptance of innovations (Gerrard and Cunningham, 2003; Hernandez and Mazzon, 2007), relationship marketing (Mukherjee and Nath, 2003) and also focused on the adopters versus non-adopters and systematically categorized adopters/non-adopters into active users, light and non-users (Laforet and Li, 2005). On the other hand, consumers' attitude and motivation study has been done by Akinci et al. (2004). Nonetheless, the previous consumer research lacks empirical evidences on the consumers' perception, attitude, and motivation in regard to the usage of the Internet or e-banking.

Furthermore the financial institutions have been making up their grounds to use the Internet as an effective medium in order to provide services and interact with their customers. The electronic banking is no exception. Antovski, Lj. et al. (2001) reported that to extend E-Banking, three characteristics of financial services are most important. They are: (1) High availability, (2) Scalability, and (3) Security. According to their opinion, high availability is to deliver continuous E-banking services to customers. It is the ability to provide easy and continuous services to all clients. The right network design ensures the high availability of the overall system. Availability needs to be planned through appropriate redundancies at network and server level. Yibin, MU (2003) also indicated the improvement of the system infrastructure. According to him, improvements of the system infrastructure are to: a) improve the system for credit cards and other forms of electronic transaction; b) build-up transaction reporting services; c) improve payment system; and d) improve telecommunications infrastructure. Once the infrastructure is placed properly, then banks can push customers to use new delivery channels by giving guarantee on security. Few studies regarding e-banking examined barriers such as, security, privacy, and trust of Web system (Gerrard and Cunningham, 2003; Rotchanakitumnuai et al., 2003; Rotchanakitumnuai and Speece, 2003).

To analyze the relationship between corporate image and consumer trust in the context of financial services distribution, Flavia´n et al (2005) describe that distribution through traditional channels has no significant differences exist in the intensity of the effect of the image on trust in terms of the relationship duration. Nevertheless, significant differences in the financial services distribution over the internet have been observed. Electronic security is any tool, technique, or process used to protect a system's information assets, or is a risk-management, or risk-mitigation tool (Thomas et al., 2002). Mueller (2001) stated that security deals with - how a web site ensures that hacker and others cannot access customer's information or their credit card numbers. Thomas et al. (2002) highlighted electronic security adds value to a naked network. It is composed of soft and hard infrastructure. The soft infrastructure components consist of policies, processes, protocols, and guidelines that protect the system and the data from compromise. The hard infrastructure consists of hardware and software needed to protect the system and data from threats to security from inside or outside the organization. As the Internet is a broadcasting medium, the need for security is a constant requirement of doing business over the Internet. Any lapse of security in Internet usage may likely to increase fear and anguish among the consumers' psychological state that may bar them to use the system as they may be required to key-in their valuable personal information. Thomas et al. (2002) stated that although technology opens up new dimensions of scope and timing but it creates the possibility for crimes to be committed very quickly. In the past, to steal 50,000 credit card numbers would have taken months, even years, for highly organized criminals. However, today a criminal, using tools available on the Web, can hack into a database and steal scores of identities in seconds. According to Thomas et al., (2002) these are the few reasons why e-security must be taken very seriously now. However, Raigaga (2000) pointed out that security concerns have been the most important issue facing the bankers which has delayed the expansion of this technology among banks. Ratnasingam (2002) argued that the impact of technology trust in Web services implies the use of security services such as digital signatures, encryption mechanisms, and authorization mechanisms. This paper relates to the condition of the consumers' perceptions on security issues in E-banking. Mainly consumers' perceptions are derived from the set of technologies that are customarily visible to them over the Web.

Furthermore, Chellappa (2002) argue that not all but most transactions are conducted through Web browsers that connect to merchant sites. According to them, consumer perceptions of security are developed through visibly sufficient mechanisms that are carried out through the processes of encryption, protection, verification and authentication. The mechanisms of encryption, digital authentication, protection, and verification of on-line identity influence the Internet customers' perception on information security and increase the likelihood of consumer confidence and trust. Jean Michel, (2003)

writes, Encryption is the use of encryption and decryption methodology in ensuring that the data transferred is only understood by the sender and receiver. It is defined as the process of translating information from its original form into an encoded, incomprehensible form. Karin, (2001) states in his book, the first type of protection on many web sites is encryption. When the Internet was born first, few security measures were taken. All information entered into a Web site could be transmitted in plain English. Therefore, any hacker could easily tap in and read the information that was sent or received. Nevertheless, today most Web sites use encryption method, while banks used to guarantee security for customers through the Internet by using the firewalls and the encryption. Through encryption, all data i.e. customer's account numbers, account balances etc. is converted into a series of unrecognizable numbers before they are exchanged over the Internet. This series of numbers create a mathematical lock and all banking requests are transformed into encrypted strings of data and are then sent over the Internet and back again to the original requests. Each time a new online banking session is initiated, a new lock and key combination is randomly created. Therefore, even if hackers could get into the system on consumers' information, they would have to experience a tough time in recognizing the original data and as a result, there is an extreme possibility that consumers' data are eventually protected or factually prevented from illegal invasion.

Following this Pavlou et al. (2002), protection is implemented for customers in many ways such as who is collecting the data, how it is stored, and how inaccessible it is. Internet retailers also use firewall technologies to prevent any kind of attacks. Sathye (1999) investigated the adoption of online banking by Australian consumers and argued that the intention of Internet banking in Australia is significantly influenced by variables of system insecurity, awareness of service and its benefits, ease of use, and availability of infrastructure. Other forms of security employed by banks include having an impartial third party to carry out a security assessment of the site. Martin Hepworth, who is an expert in security, found that some basic security issues were being ignored and pointed these out to the bank who were then able to take corrective measures. According to Raigaga (2000), banks need to protect their data from all kinds of security threats. Any kind of negligence has serious results and can lead to financial losses. Banks are bound to maintain confidentiality of customer's account. Otherwise their failure can cause damage to the bank and its image. Therefore, before starting to use the Internet, banking institutions should take some pragmatic actions to ensure security. As evidenced from the prior research, e-banking security is one of the most important factors and future challenges, because customers fear higher risk in using the web for financial transaction (Aladwani, 2001; Gerrard and Cunningham, 2003; Rotchanakitumnuai and Speece, 2003).

Trust is one of the variables in many research that has attracted major interest in the academic community. This is due to the fact that trust is considered as a strategic variable in current marketing (Selnes, 1998). Meanwhile, the distribution of financial services today faces new challenges, derived from the spread of new technologies and the greater intensity of competition exercised by new channels for doing business. Consequently, researchers have continuously been studying the factors that could influence purchasing decisions by the consumer of financial services. A variety of studies has made it clear that image and consumer trust can significantly affect individual behavior (e.g.Ratnasingham, 1998). The traditional literature has considered that corporate image and consumer trust are determinant factors in purchasing behavior (e.g. Ratnasingham, 1998; Rexha et al., 2003; Lehu, 2001; Ba, 2001). This fact is especially relevant in financial services distribution, given that the level of risk that the consumer associates with these types of products is higher so that Gefen et al. (2003) stated that trust is an important catalyst in many transactional relationships and it determines the nature of many businesses and the social order. The issue of trust thus arises when risk is involved. Trust is a crucial factor for the use of e-banking since the bank and customers are physically separated from each other and there is a great deal of skepticism about the security of electronic transactions over the Internet. Since, opportunities from web technology could be restricted if there is a lack of customer trust in the web system (Rotchanakitumnuai and Speece, 2003), because trust is a willingness to rely on an exchange partner with whom one has confidence (Moorman et al., 1993). Generally, customers do not trust Internet based technology for some reasons, such as, security of the system, distrust of service providers, and worries about the reliability of Internet services (Lee and Turban, 2001; Min and Galle, 1999; Rotchanakitumnuai and Speece, 2003).

On the other hand, Chellappa (2002) argues that trust would be favorably influenced with the increase in perceptions of security in EC (Electronic commerce) transactions. Moreover, customers' lack of confidence on the security is the main hindrance in the way that the e-banking is being developed further. As William Pitt, the eighteenth century British statesman once said, "confidence is a plant of slow growth". The survey of Electronic Financial Transactions Systems (E-FITS) Working Group noted that the importance of consumer confidence to promote E-Bank or e-finance is to establish the mechanisms for electronic financial transactions. Nexhmi et al. (2003) believe that trust and commitment are key "relational mediators" in the development of customers within the banking industry. According to them satisfaction will have a role in development but a more important element is to maintain close bank-customer relationship. Overall customer satisfaction with the bank

will be directly related to the level of trust within the relationship.

For off-line environments, it is common knowledge that quality of services and products is a key determinant of customer satisfaction and customer loyalty (Caruana, 2002; Cronin and Taylor, 1992; Kelley and Davis, 1994; Parasuraman et al., 1988). Recent empirical evidence shows this as a reality for the electronic service providers. The quality of services delivered through a Web site has become a more significant success factor than low prices or being the first mover in the market space (Mahajan et al., 2002; Reibstein, 2002; Shankar et al., 2003). Research by Patricio et al. (2003) goes one step further to measure service quality of various banking services through different delivery channels, including the electronic and traditional channels. They have found that perceived service quality with one delivery channel has an impact on how another channel is perceived. Similarly, Burke (2002) suggests that marketers need to understand the value consumers place on technology as part of the overall interaction process, and stress that new interactions brought about by the advancement of technology are not separate, but rather act to enhance the overall shopping experience. Moreover, Fassnacht and Ko¨se (2007) found that high electronic service quality in web-based services had an important role in building overall customer trust for the service provider.

Furthermore, Jean-Michel (2003) notes that customer is most important in designing, providing and evaluating the level of service quality. Customers' past experience with the service is one of the factors that influence them to use Electronic banking for transaction. According to Vohra (2002), electronic banking makes it easier for customers to compare banks' services and products. This can increase competition among banks and allow banks to enter into new markets by overcoming resistance and thus expand their geographical boundary. Banks operate websites through which customers are not only able to inquire about account balances, interest, and exchange rates but also conduct a range of transactions. Shailey et al. (2003) therefore notes that understanding customer' requirements and meeting their demands and expectations is becoming a challenge. With the growth in the Internet and the E-Economy, the customer is in control and it is not difficult for them to move to a competitor's site. A customer is willing to do business with an E-Banking environment only if he gets value from his exchange with it. Heikki et al. (2002) states that Internet banking provides many benefits to both banks and their customers. However, acceptance of this new technology has not yet been found to be equal in all parts of the globe indicating a lack of a common generalizability. Ramayah et al. (2002) suggest that users will eventually lose interest in using Internet banking if they feel that it is not useful to use Internet banking even though the system is rather easy to handle.

One of the most important discussions was carried out by Machauer and Morgner (2001), who defined four clusters of German bank consumers. These were "transaction oriented", "generally interested", "service oriented" and "technology opposed" groups. In another study in Singapore, Liao and Cheung (2002) found that individual expectations regarding accuracy, security, transaction speed, user-friendliness, user involvement, and convenience were the most important quality attributes in the perceived usefulness of Internet-based e-banking. Among these, the first five determined the willingness of consumers to use of Internet based banking. According to Zorayda Ruth B. Andam (2003), 42% of respondents said they had access to computers and 7% said they had access to the Internet. Therefore, it can be perceived that this large variance has been found due to security obstacle in Asia and the emerging markets. This may be one of the greatest reasons why people do not initiate online banking or open investment accounts. Then, we might draw our concerns on perceived service quality and indeed, access to high-quality services and products is another crucial concern. Apparently, there may also be a preference for personal contacts with the banks.

METHODOLOGY

Data Collection

A structured questionnaire was used to collect the primary data to answer the research questions and objectives regarding customers' perception on E-banking security in Malaysia. The survey questions consist nine specific sections and each of them contains questions to reflect different parts of the study. The time and cost constraints and difficulty to access to the potential respondents in Malaysia caused us to use the convenience sampling method. Therefore, some specific places were chosen for distributing the questionnaires. These are mainly Kuala Lumpur Klang Valley, Cyberjaya and Putra Jaya area which are comparatively densely populated having concentration of internet users. The survey was conducted generally via face-to-face interviews and also administrated through e-mails and postal services. A list of e-mail users was obtained from Telekom Malaysia which is the parent of TMNet and survey questionnaires were e-mailed only to those internet users who agreed to participate in the survey. This step was taken mainly to avoid complains from the internet users and also to increase number of respondents. Apart from the ability to reach large size of target respondents and inexpensive way to conduct the survey, the survey through e-mails enabled the respondents to provide their responses easily through open-ended questions. Therefore, the survey responses provided us with the valuable inputs to this study for better understanding the e-banking practices in Malaysia.

Total 250 questionnaires were distributed, and each of the responses received was screened properly for error, incomplete and/or missing responses. However, those responses that had more than 20% of the questions in the survey questionnaire that had been left unanswered or incorrectly answered were deducted from data analysis. After having done the appropriate screening process, 20 returned questionnaires were considered as unusable and the rest 230 responses were used which were considered as complete and valid for final analysis and hypothesis testing.

Table 1. KMO and Bartlett's test.

Kaiser-Meyer-Olkin measure of sampling adequacy.		0.887
Bartlett's test of sphericity	Approx. Chi-square	10462.89
	df	338
	Sig.	0.000

Hypotheses

From the discussion of the theoretical framework, four hypotheses were formulated to test the relationship between each of the four independent variables and dependent variable. The four hypotheses guiding this study are as follows:

H_1: To expand electronic transaction further, protected transactions with the trust of the consumers are necessary.

H_2: The increase of use of electronic system depends on improved technology and adequate mechanisms of control.

H_3: To survive in a highly competitive market, it is necessary to provide high quality service to customers.

H_4: The level of awareness about regulatory issues, which significantly influences of electronic payment system.

RESULTS AND DISCUSSION

Factor Analysis

Factor analysis was employed to explore the underlying factors associated with 16 items by using Principal Component Analysis (PCA). Generally, KMO is used to assess which variables need to drop from the model due to multicollinearity. The value of KMO varies from 0 to 1, and KMO overall should be .60 or higher to perform factor analysis. If not then it is necessary to drop the variables with lowest anti image value until KMO overall rise above .60. Result for the Bartlett's Test of Sphericity and the KMO reveal that both were highly significant and concluded that this variable was suitable for the factor analysis (Table 1).

Factor analysis was carried out on the consumers' perception toward E-banking transactions to group together the variables that are highly correlated. The process of factor analysis involves two stages: factor extraction to make an initial decision on the number of factors underlying asset of measured variables of interest and factor rotation for easy interpretability of factor extraction result and for making final decision about the underlying factors. The underlying structure of 16 items was analyzed using principal component analysis followed by varimax rotation. The factor analyses revealed four dimensions underlying consumer perception toward E-banking transaction. They are: (F1), Protected Transaction (F2), Adequate Mechanism (F3), Service Quality (F4), Regulatory issues. The total variance explained by factors is indicated in Table 2, which suggests that the four factors account for 69% of the total variance. Factor 1, which accounted for about 2% of the variation, can be considered as "secure transaction" as it is strongly associated with certain aspects of attention of security on e-banking. These include; "Lack of trust on security" (with highest factor loading of 0.984)**;** **"**Lack of trust on System's Integrity" (0.979); "Consumers are scared to use Internet" (0.977; "Confidence on PC technology limit Internet use" (0.967) and "don't mind paying extra for branded produce" (0.648)**.**

Factor matrix shows the factor loadings of different variables. The loadings of all items are observed as satisfactory for further analysis. Reliability alpha also observed as satisfactory. Thus the four factors, Security of transaction, Sufficiency of E-banking operations Mechanism, Service Quality and Regulatory Framework are yielded and used as independent variable in the analysis. All variables had positive loadings in factor 2. The sign of the loading indicates the direction of the relationship between the factor and the variable. Factor 2 which accounts for about 3.57% of the variation was named as Sufficient Mechanism factor. This factor consists of sub-variables namely: **"**E-Banking Transaction" (with factor loading of 0.968); "reduce the E-Bank Security Features" (0.970), "Bank takes Actions for Erroneous Transaction" (0.976), Bank Correct Transaction errors as soon as Possible (.973).

The third factor is Service Quality with a total variance of 4.69%, which consists of sub-variables namely: "Satisfied with E-Bank Working hrs" (with factor loading of (0.970); "Satisfied With E-Bank Service" (0.969); "Satisfied With Security Level" (0.940) and "Feeling towards Own Bank" (0.972). The fourth factor is Regulatory Framework with a total variance of 1.1%**,** which consists of sub-variables: "Legislation Provides basic Protection" (with the factor loading of 0.980); "Trust vary with development of rules and Regulation" (0.983) and "Awareness about Regulatory Framework affect trust" (0.979), Regulation is not developing with E-Bank World (.990).

Confirmatory Factor Analysis (CFA)

The Exploratory factor analysis gives us confidence to do Confirmatory Factor Analysis (CFA). Confirmatory factor analysis (CFA) can be used to assess unidimensionality. A CFA was conducted for each of the five constructs to determine whether the 20 indicators measured the construct adequately as they were assigned. Maximum likelihood estimation was employed to estimate the eight

Table 2. Factor loading matrices following oblique rotation of 4-factor solutions.

	Protected transaction	Adequate mechanism	Service quality	Regulatory issues
Protected transaction				
Lack of trust on system's integrity	0.979			
Lack of trust on security	0.984			
Confidence on PC technology limit internet use	0.967			
Consumers are scared to use internet	0.977			
Adequate mechanism				
E-Banking transaction is secure enough		0.985		
E-Bank security features should increase		0.970		
Bank takes actions for erroneous transaction		0.986		
Bank correct transaction errors as soon as possible		0.973		
Service quality				
Satisfied with e-bank working hrs			0.970	
Satisfied with e-bank service			0.969	
Satisfied with security level			0.940	
Feeling towards own bank			0.972	
Regulatory issues				
Legislation provides basic protection				0.980
Trust vary with development of rules and regulation				0.983
Awareness about regulatory framework affect trust				0.979
Regulation is not developing with e-bank world				0.990

CFA models. The SEM program AMOS was used throughout the study to conduct the analyses.
Empirical evidence in CFA (and SEM in general) is generally assessed using criteria such as the comparative fit index (CFI), the root-mean square of approximation (RMSEA), the significance of parameter estimates, and the amount of explained variance. Table 4 summarizes the results of these tests.

CFI: This index compares a proposed model with the null model assuming that there are no relationships between the measures. CFI values close to 1 are generally accepted as being indications of well-fitting models (Raykov and Marcoulides, 2000). A CFI value greater than 0.90 indicates an acceptable fit to the data (Bentler, 1992). The CFI values for the eight CFAs are displayed in Table 4. An analysis of the table reveals that all the CFI values are very high ranging from 0.94 to 1, which suggests very good model fits.

RMSEA: The RMSEA is an index used to assess the residuals. It adjusts the parsimony in the model and is relatively insensitive to sample size. According to Hu and Bentler (1999), RMSEA must be equal to or less than 0.08 for an adequate model fit. Table 4 shows that all the RMSEA values are below 0.08 and indicate adequate model fits.

GFI: The goodness of fit index, tells us what proportion of the variance in the sample variance-covariance matrix is accounted for by the model. This should exceed .9 for a good model.

AGFI: Adjusted GFI is an alternate GFI index in which the value of the index is adjusted for the number of parameters in the model. Few number of parameters in the model relative to the number of data points.
NFI: The Normed Fit Index (NFI) is simply the difference between the two models' chi-squares divided by the chi-square for the independence model. Values of .9 or higher indicate good fit.

Parameter estimates: Table 4 shows that all the parameter estimates (i.e. factor loadings) are statistically significant and range from 0.661 to 0.998.

Reliability: The degree of consistency of a measure is referred to as its reliability or internal consistency. The reliability coefficient, Cronbach's a (Cronbach, 1951), is generally used to test the reliability of a scale. a values of 0.70 or greater are deemed to be indicative of good scale reliability (O'Leary-Kelly and Vokurka, 1998). The Cronbach's a for the five factors range from 0.76 to 0.90, suggesting that they are all reliable (Table 4).

Content (internal) validity: Content validity depends on how well the researcher created measurement items

Table 3. Summary of reliability, weight and fit indices used in this research.

Name	Abbreviation	Type	Acceptable Level
Goodness of fit index	GFI	Absolute fit	Values close to 0.9 and above indicates satisfactory fit
Adjusted goodness of fit index	AGFI	Absolute fit	Values close to 0.9 and above indicates satisfactory fit
Normed fit index	NFI	Incremental fit	Values above 0.8 and close 0.9 indicate acceptable fit
Comparative fit index	CFI	Incremental fit	Values above 0.8 and close 0.9 indicate acceptable fit

Source: Developed from Baumgartner and Homburg (1996), Hair et al. (1998), Hulland, Chow and Lam (1996), Kline (1998), Holam-Smith (2002), Byrne (2001).

using the relevant literature to cover the content domain of the variable that is being measured (Bohrnstedt, 1983). The selection of items in this study was based on an extensive review of the literature, giving a strong content validity to the variables being measured.

Convergent validity: The Bentler-Bonett Normed Fit Index (NFI) obtained from CFA can be used to assess convergent validity. This index measures the extent to which different approaches to measuring a construct produces the same results (Ahire et al., 1996). According to a rule of thumb, NFI values of 0.90 or greater indicate an adequate model fit (Bentler, 1995). Table 3 shows that all the NFI values are greater than 0.90 indicating strong convergent validity.

Hypotheses Testing

The Structural equation model was used to test the relationship among constructs. Goodness-of-fit indicates for this model were Chi-square/df = .892, GFI = .989, AGFI = .969, NFI = .987, CFI = 1.00, RMSEA = .001. Figure 1 depicts the full model. Of the four paths hypothesized in the model, only the influence of sufficiency of E-banking operation was non-significant. All the paths were significant at $p<0.05$.

Sufficiency of E-banking operations Mechanism directly effects customers' perceptions of using e-banking. Our result further reports that there is no significant relationship between sufficiency and consumer perception of using e banking. Therefore H_1 is rejected at 0.5 level of significance $p>0.000$. Regarding the H_2: Protected transactions have the direct effect on customers' usage of e-banking. Our results also reveled that factor security of transaction has positive effect on consumer perception on e-banking. Therefore, this hypothesis is accepted at $p<.000$.

The result showed that service quality emerges as the important factor which affects customers' e-banking operations. The study shows the service quality has positive impact on the customers' perceptions. Therefore, H_3 is accepted as $p>0.000$. Result indicated for H_4: Regulatory issues affects customers' intention on e-banking operations and this study shows that the regulatory issues have positive impact on the customers' perceptions thus H_4 is also accepted where $p>0.002$. Among all the significant variables, from our result, security of transaction is the most important among our respondents followed by service quality and regulatory issues.

Conclusion and Implication

Based on the findings on the security of e-banking in Malaysia, the respondents managed to reveal wonderful information to understand and evaluate the opinions and suggestions. The findings from research covered the respondents' intention on e-banking. These findings can eventually stimulate the future concerted efforts of the e-banking managements to improve the e-banking facilities. From our analysis it has been found that security of transaction is the most important variable to expand and strengthen the operations of e-Banking. The result shows that the consumers' attention towards the trust and confidence on the E-Banking security system is the significant element.

Within ten items, "case sensitivity of ID and Password" is found to be significant in the dimensions of improved technology and adequate mechanism. However, the other items are found to be non-significant in correlation with consumer satisfaction. The possible reasons for this finding could be less publicity and lack of knowledge about the mechanism of security. The absence of such quality attributes might potentially contribute to the results that the items are not significant to influence customers about e-Banking and to earn their satisfaction. When observation comes from the side of service quality, the results of this study conclude that "e-Bank provides logically organized and clear information" and "Bank correct transaction error" are the two variables that

Table 4. Summary of CFA analysis.

Factor indicator	X^2	df	P value	GFI	AGFI	CFI	RMSEA	Factors loading	Cronbach alpha
Regulatory issues	4.238	2	0.120	0.992	0.958	0.997	0.067		0.9039
RF1								0.972	
RF2								0.900	
RF3								0.949	
RF4								0.953	
Protected Transaction	7.082	2	0.029	0.985	0.927	0.992	0.100		0.9133
ST1								0.802	
ST2								0.853	
ST3								0.945	
ST4								0.933	
Adequate Mechanism	2.355	2	0.308	0.995	0.976	0.999	0.0270		0.9196
SM1								0.661	
SM2								0.879	
SM3								0.952	
SM4								0.916	
Service Quality	6.023	2	0.049	0.989	0.944	0.991	0.090		0.9235
SQ1								0.664	
SQ2								0.838	
SQ3								0.776	
SQ4								0.995	
Perception e-banking transaction	4.010	2	0.135	0.992	0.960	0.997	0.063		0.8581
PS1								0.883	
PS2								0.896	
PS3								0.960	
PS4								0.998	

Source: Develop for this research.

explain the variance in service quality, while all the other service quality variables were significant in customer satisfaction. The possible reason for this finding is that the services offered by banks are generally well differentiated among the bankers that customer do not consider them to be important in determining satisfaction. In addition, there is a possibility that the service offered by banks cannot fulfill the security demands of the customers and cannot earn their perceived confidence. The result of the fourth hypothesis test shows that, the awareness of regulatory framework is the key element of customer satisfaction about e-Banking security. This variable is a significant determinant of consumer satisfaction and has positive impact on the customers' perceptions.

Implications

This article intends to propose recommendations as provided by the respondents to make E-Banking more practical and acceptable. This study also makes significant contribution to knowledge in relation to consumers' perception of the problems and prospects of e-Banking. Furthermore, it also provides an insight into the customers' needs and wants which may be essential for bankers to provide better services to customers. Banks need more publicity about the security level, and rules and regulations related to security. Non-availability or low-scale of such information to the potential customers may have intensified the psychological fear and anguish. The e-banking managements can be able

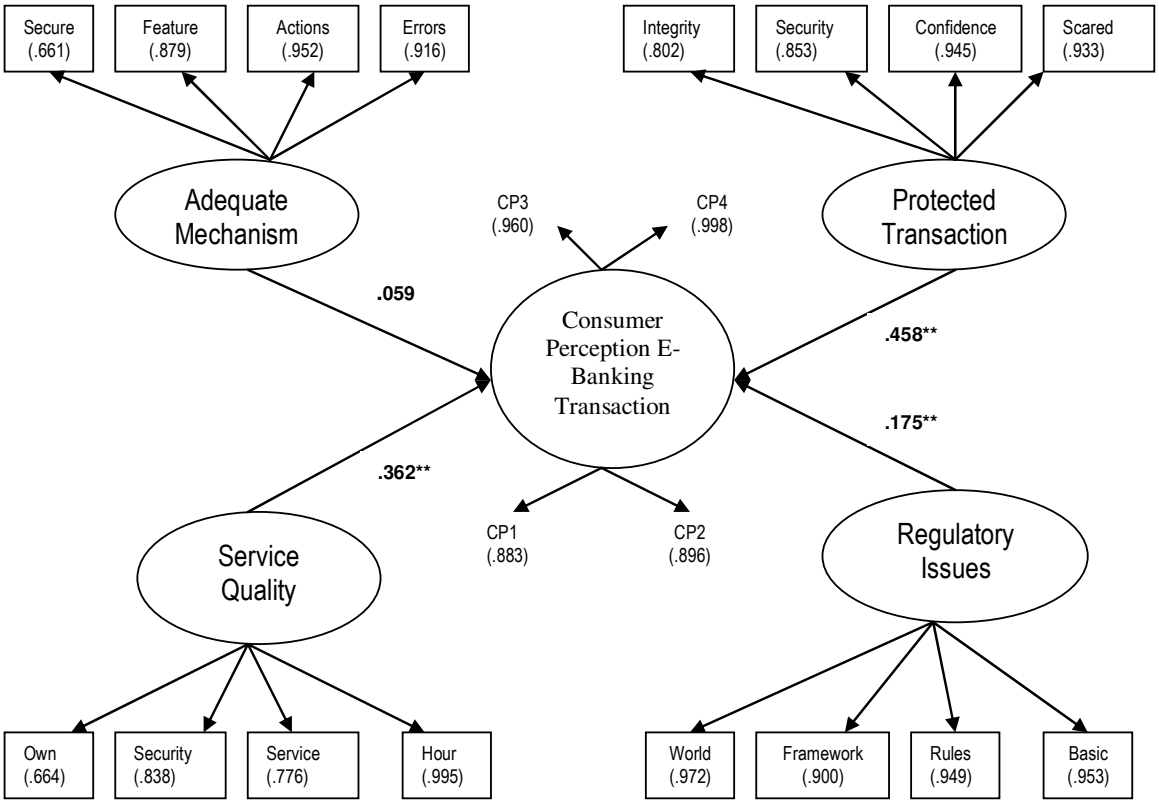

Figure 1. Testing theoretical framework.

*** significant at p < 0.05*

to fill in the gap by fostering appropriate education and publicity through the mass media channels. Respondents believe that the financial institutions can give great assurance to them by publishing e-Banking knowledge and the information on security breach to the public. The financial institutions should have certain types of mechanisms to allow the e-banking transactions in ways that ensures double-checking and verification etc. Double-checking and verification can also be done by calling the bank customers over phone or via other methods.

Banks should make their customers more aware of their service quality attributes, firm guarantee about e-banking security and the regulations governing the e-Banking. This is essential to boost the consumers' moral motivation and eliminate or reduce their fear and anguish in using e-banking services. The goals can be achieved by having regular and periodic seminars, symposiums and exhibitions to allow the customers to evaluate their new innovations, e-banking mechanisms and electronic tools to provide such services. Next, the customers' level of trust in E-Banking was found to have a significant effect on the customer's decision to adopt this innovation and for the continued use of this innovation. Banks and financial services institutions must try to earn customers' perceived trust. While there is a possibility of fraud cases to occur through the use of e-Banking, financial institutions should protect their customers by incorporating effective technology tools and motivational messages that reflect full guarantee to protect their personal information. Further protection can be in the form of investigation and appropriate compensation procedures. The bank's endurable supports would foster to earn customers' trust on E-Banking. In order to receive greater response towards e-Banking services, we recommend that the bankers should target their promotional activities towards customers. If possible, banks should not charge consumers for their online services. We further suggest the banks to invest in technology research through which greater prevention and protection tools can be innovated and e-banking practices could be a tested mechanism to ensure full security.

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