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Full Length Research Paper

Electronic transaction of internet banking and its perception of Malaysian online customers

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The purpose of this research is to find out significant factors of consumers' perception on e-banking transaction by Malaysian bank consumers. The study utilizes a combination of theoretical frameworks and quantitative techniques o testify the statistical relationships between consumer perceptions on e-banking transaction. Meanwhile factor analysis was performed to extraction and make initial decision on the number of factors underlying asset of measured variables of interest. Thereafter structural equation mode (SEM) was estimated 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 is the first that seeks to ascertain the insight into e-banking in Malaysia, which has not been previously been investigated and much statistical significance makes this study a potential cornerstone for future research. Therefore, this study thus sets an important benchmark for further research in the area.

Key words: Consumer perception, e-banking, electronic transaction, Malaysia.

INTRODUCTION

The rapid development of information technology had brought unprecedented influence on the life of millions of people around the globe. Various activities were handled electronically through the adoption of IT in the workplace or at home, for example, e-mail, e-commerce and e-government. The internet had become a significant part of daily life for both consumers and business enterprises especially in developed countries (Guriting and Ndubisi, 2006).

However research into consumer preferences, choices and adoption of new products and services is normally discussed within the framework of diffusion of innovations and has traditionally relied on 2 approaches. The first approach focuses on identifying consumer or innovator characteristics, whilst the second approach gives focus to the characteristics of innovations (products/ services). For a review of the literature refer inter alia, to Rugimbana (1999) and Black et al. (2001). Whilst both approaches have merit, consumer characteristics have tended to receive greater attention (Black et al., 2001).

This may be a result of the fact that such focus allows a more direct understanding of differing consumer behaviors (Glassman, 1996; Barczak et al., 1997; Rugimbana and Elliott, 2000). As a consequence one industry that is using this new communication channel to reach its customers is the banking industry.

Electronic commerce (e-commerce) has become a very important technological advancement for businesses in changing business practices (Brodie et al., 2007; Gonza´lez et al., 2008; Lichtenstein and Williamson, 2006). In particular, industries that are information-oriented such as the banking services and securities trading sector are expected to experience the highest growths in e-commerce (Brahmin et al., 2006; Hughes, 2002). Inevitably, this phenomenon has sparked a lot of attention in the academic literature lately (Gan et al., 2006; Pikkarainen et al., 2006; Shamdasani et al., 2008). ASLI (2002) reported that in response to increased competition, the larger banks in Malaysia had aggressively leve-

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raged the internet. Local banks were given an 18-month-head start over foreign banks to launch online banking, as the Malaysian authorities pushed domestic banks to invest in technology to compete with global players. Hong Kong and shanghai banking corporation (HSBC) was the first foreign-controlled bank to launch a fully transactional online banking service in January 2002 when regulations permitted foreign banks to do so. Despite the authorities' encouragement to adopt technology in banking, traditional branch-based retail banking still remains the most common method for conducting banking transactions in Malaysia. 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 develop-ent of consumer related electronic commerce. Besides that, success of banking industry depends on the capabiliies of management to anticipate and react to such changes in the financial marketplace (Gan et al., 2006).

The banking industry is using the new communication media to offer its services to the customers with convenience. Yet the development and increasing role of the internet as a service channel has removed the locus power from service provider to customers (Maenpaa, 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. Since, 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 specified that understanding customers' requirements and meeting their demand and expectations is becoming a 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).

Moreover, internet-banking adoption in Malaysia is relatively low and very little research has been done to understand the key adoption determinants. Though, electronic revolution has commenced in Malaysia but internet banking is still in 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 time of competition. So it is becoming difficult to acquire customers. Therefore, e-bank organizations need to be concerned about the customers' value in order to build customers' loyalty and to reduce customer defections. From researches, it was found that perceived service quality strongly influence customer. Previous researches suggested 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 (Minocha 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. Therefore, in view of above discussion the purpose of this study

a) To inspect the level of consumer perception about e-payment.
b) To assess the level of confidence on electronic transaction.
c) To scrutinize the factors affecting on consumer perception towards electronic payment.

Literature review

About a decade and half ago, internet was relatively alien to the majority population of the world. However, at the turn of the new millennium millions of web sites were found in place (O'Connor and Galvin, 2001). This is a very important strategic consideration for the retail-banking sector where the competitive terrain is intense and is changing quickly, as are consumer needs. Whilst new technological solutions have created numerous successes, there are those who believe that a technology strategy alone is inadequate, as it attempts to reach diverse customers en masse and therefore, fails to take into consideration consumer behavioural differences and preferences (Glassman, 1996; Barczak et al., 1997; Rugimbana and Elliott, 2000). The changes occurring in the banking sector can be attributed to increasing dere-

gulation 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). Internet banking innovation has diffused well in Finland and recent studies indicate that the users are very satisfied with the service (Pikkarainen et al., 2006). Already 67% of the Finns consider internet (via PC) to be the most typical way of paying their bills, leaving other payment methods like direct debit (13%), bill paying ATM (9%), branch office (3%) and telephone (1%) far behind (Federation of Finnish Financial Services, 2007). For the banks, internet banking, besides providing value added for their customers, is a means to cut costs and increase efficiency. Branch office service for such a routine action as bill payment is expensive and compared to internet banking, maintaining bill payment ATMs is also inefficient for the banks. Banks are therefore keen to find ways and strategies to get the rest of their customers, or at least part of them, to use internet banking. 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 usages of internet banking services increases, a certain maturation point will be reached in the following years (Maenpaa, 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 consumer research also lacks empirical evidence about consumer perception, attitude and motivation regarding internet or e-banking. Besides that the earlier studies on innovation diffusion have largely focused solely on adopters or the difference between the adopters and non-adopters. Dichotomous categorization has also been frequently used in the literature on internet banking (Akinci et al., 2004; Gerrard and Cunningham, 2003; Karjaluoto, 2002; Karjaluoto et al., 2002a; Ravi et al., 2006; Rotchanakitmnuai and Speece, 2003; Yiu et al., 2007).

However, it is important also to be able to identify diffeences among the non-adopters of internet banking as classification of consumers into adopters or non-adopters may be an oversimplification that reduces the potential for meaningful practical implications (Lee et al., 2005). In addition, prior studies on internet banking have frequently focused on the positive aspects but relatively little research has addressed the barriers to internet banking adoption (Rotchanakitumnuai and Speece, 2003). Furthermore the financial institutions are starting to use the Internet to provide services and interact with customers. The electronic banking is no exception. Antovski et al. (2001) reported that to extend e-banking, 3 characteristics of financial services are most important. They are:

(1) High availability,
(2) Scalability
(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 (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
d) Improve telecommunications infrastructure.

Once the infrastructure is placed properly, then banks can push customers to use new delivery channels by giving guarantee of 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).

Moreover, 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., 002). 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. 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 one criminal

using tool available on the web can hack into a database and steal that number 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 related to the condition of consumer perceptions of security in e-banking. Mainly consumers' perceptions are derived from the set of technology that is visible to them. Furthermore, Chellappa (2002) argued 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 visible 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 customer perception of information security and increase consumer confidence and trust. Encryption is the use of encryption and decryption methodology in ensuring that the data transferred is only understood by the sender and receiver, stated by Jean Michel, (2003). It is defined as the process of translating information from its original form into an encoded, incomprehensible form. 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 inse-curity, 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 actions to ensure the security. Since, for 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).

Moreover Chellappa (2002) argued that trust would be favorably influenced with the increase in perceptions of security in EC transactions. Moreover, customers' lack of confidence in the security is the main obstacle to the further development of e-banking. As William Pitt, the 18th 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. Trust is one of the variables that have attracted major interest in the academic community. This is due to the fact trust is considered a strategic variable in current marketing (Selnes, 1998). Meanwhile the distribution of financial services today faces new challenges, derived from the spread of new techno-logies and the greater intensity of competition exercised by new channels for doing business. Consequently, re-searchers have been studying the factors that could influence purchasing decisions by the consumer of finan-cial services. A variety of studies has made it clear that image and consumer trust can significantly affect indivi-dual behavior (Ratnasingham, 1998).

The traditional literature has considered that corporate image and consumer trust are determinant factors in purchasing behavior (Ratnasingham, 1998; Rexha et al., 2003; 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 in 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).

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 that, meanwhile, this holds true also for 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 for different delivery channels, including both 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 Kose (2007) found that high electronic service quality in web-based services had an important role in building overall customer trust for the service provider. Jean-Michel (2003) noted 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 to conduct a range of transactions.

Shailey et al. (2003) therefore specified that understanding customer' requirements and meeting their demand and expectations is becoming a challenge. With the growth in the internet and the e-economy, the cus-tomer 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) has stated that internet banking provides many benefits to both banks and their customers.

However, acceptance of this new technology has not been equal in all parts of the world. Ramayah et al. (2002) suggested 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.

So the chief obstacle in Asia and the emerging markets is security. This is the main reason for not opening online banking or investment accounts. Then, comes service quality.

However, access to high quality service and products is another concern. Apparently, there is also a preference for personal contact with banks.

METHODOLOGY

Data collection

A structure questionnaire was used to collect the necessary data which served as primary data to answer the research questions and objective regarding customer perception on e-banking security in Malaysia. The survey question consists 9 specific sections and each of contain question pertaining different part of the study. In view of the time and cost constraints and difficulty to access respondents in Malaysia caused to conduct convenience sampling method was used for data collection procedures.

Therefore, some specific places were chosen for distributing the questionnaires. It was mainly in Kuala Lumpur Klang valley, Cyberjaya and Putra Jaya area which is indicating highest concentration of internet users. The survey was conducted mainly via face-to-face interview and also administrated through e-mail and postage service. A list of e-mail users was obtained from Telekom Malaysia who currently registered with TMNet and survey questionnaire was only e-mailed to those internet users agreed to participate in the survey. This step was taken mainly to avoid complains from the internet user and also to increase number of respondents. Apart from ability to reach large target respondents and inexpensive way to conduct the survey, the survey through e-mail also enabled respondents to perform easily provide extensive responses to open ended questions was provided valuable input to the study for better understanding e-banking in Malaysia.

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

Hypotheses development

From the discussion of the theoretical framework, 4 hypotheses are formulated to test the relationship between each of the 4 independent variables and dependent variable. The 4 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 has been 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

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

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

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 variables that are highly correlated. The process of factor analysis involves 2 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 4 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 4 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 4 factors, security of transacttion, 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 (0.973).

The third factor is service quality with a total variance of 4.69%, which consists of sub-variables namely: “satisfied with e-bank working hours” (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 (0.990).

Confirmatory factor analysis (CFA)

This 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 5 constructs to determine whether the 20 indicators measured the construct they were assigned to adequately. Maximum likelyhood estimation was employed to estimate the 8 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 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 you what proportion of the variance in the sample variance-covariance matrix is accounted for by the model. This should exceed 0.9 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 numbers of parameters in the model relative to the number of data points.

NFI

The normed fit index (NFI) is simply the difference between the 2 models’ chi-squares divided by the chi-square for the independence model. Values of 0.9 or higher indicate good fit.

Parameter estimates

Table 4 shows that all the parameter estimates (thay is, 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 value of 0.70 or greater is 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 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

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).

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.

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

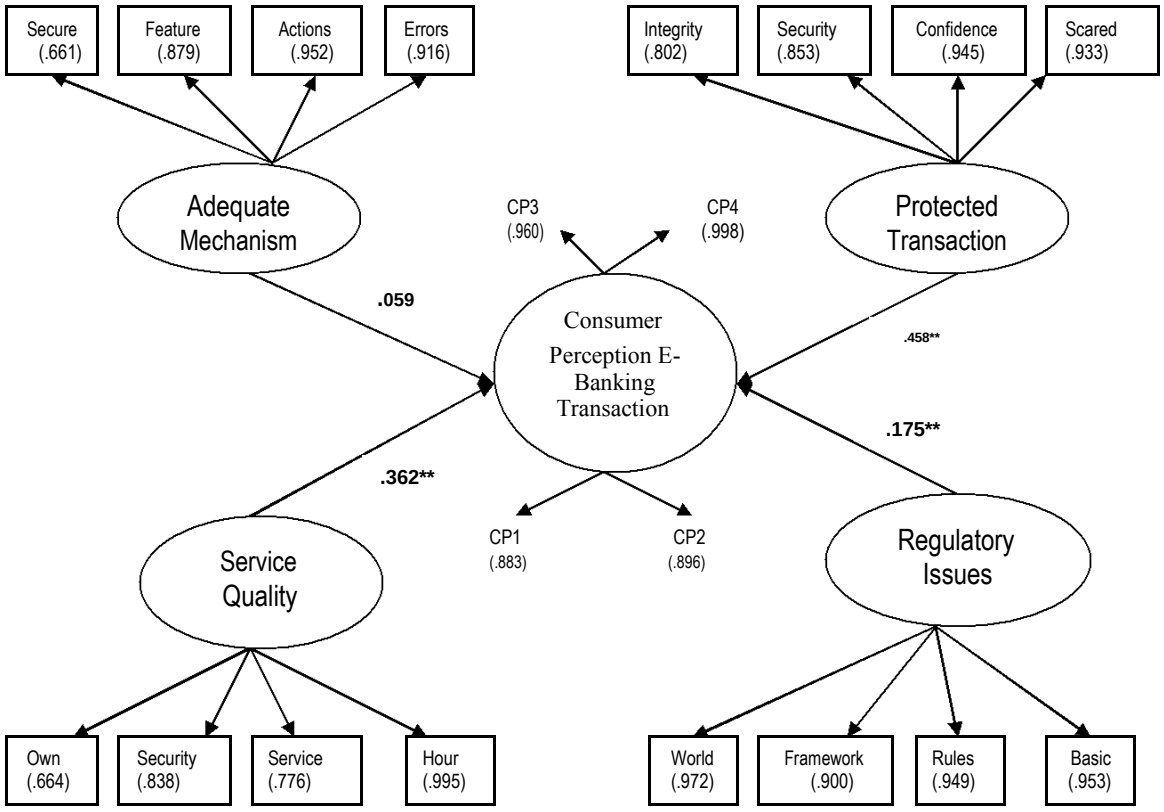

Figure 1. Testing theoretical framework.
** Significant at $p < 0.05$

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 examined to test the relationship among constructs. Goodness-of-fit indicates for this model were chi-square/df = 0.892, GFI = 0.989, AGFI = 0.969, NFI = 0.987, CFI = 1.00, RMSEA = 0.001. Figure 1 depicts the full model. Of the 4 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 $p < 0.000$.

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 the regulatory has 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 Implications

Based on the findings on the security of e-banking in Malaysia, the respondents managed to reveal tremendous information to understand and evaluate the opinions and suggestions. The findings from research covered the respondent's intention on e-banking. These findings can be an asset to improve the banking facilities. From the analysis have been found that security of transaction is the most important to expand 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 not significant in correlation with consumer satisfaction. The possible reasons for this finding would be less publicity and lack of knowledge about the mechanism of security. The absence of such things might contribute to the result 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 2 variables that explain the variance in service quality, while all the other service quality variables were significant in customer satisfaction. The possible reasons for this finding would be 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 demand of customers and cannot earn their 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 signifycant contribution to knowledge in relation to consumer’s perception of the problems and prospects of e-banking. Furthermore, it also provides an insight into the custommers’ needs and wants which may be essential for bankers in order to provide better services to customers. Banks need more publicity about the security level and rules and regulation related to security. They can do so by education and publicity through the mass media. Respondents believe that the financial institution can give great assurance by publishing e-banking knowledge and security breach to the public. The financial institutions should have certain types of mechanism to allow the banking transaction such as by double-checking and verification etc. Double-checking and verification can be done by calling the bank customer or other methods.

Banks should make their customer more aware of their service quality and the regulations governing e-banking. This can be achieved by having seminars and exhibitions to allow customers to evaluate their new innovation. 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. So, banks should try to earn customers’ trust. When fraud cases occur through the use of e-banking, financial institutions should protect the bank customers. This protection can be in the form of compensation and investigation. The bank’s support would be able to earn customers’ trust on e-banking. In order to receive grater response towards e-banking, it is recommended that bankers should target their promotional activities towards customers. If possible, banks should not charge consumers for their online services.

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