INTERNET AND DATA SECURITY –
UNDERSTANDING CUSTOMER PERCEPTION ON TRUSTING
VIRTUAL BANKING SECURITY IN MALAYSIA

Jacquline Tham[i], Mohd Shukri Ab Yazid,
Abdol Ali Khatibi, S. M. Ferdous Azam
Faculty of Business Management and Professional Studies,
Management and Science University (MSU),
Section 13, 40100 Shah Alam, Selangor, Malaysia

Abstract:

Trust, security, and privacy have been factors in many studies, were tested, and do significantly affect the adoption of virtual banking. However, studies with regards to customer perceive trust in relation to virtual banking adoption in Malaysia is limited. Due to low customers' adoption of the internet and mobile banking in Malaysia, this study was conducted to evaluate customers' perception of trusting internet and data security in adopting virtual banking. In this study, 402 samples were collected from local and foreign bank customers and were analyzed using SPSS and AMOS. Sample selection was based on convenience sampling technique, and quantitative method has been applied to evaluate the study objectives. Through the descriptive analysis and research findings, it has been evaluated that customer perception on Privacy (Pr) does not significantly and positively influence virtual banking adoption in Malaysia. And, the analysis in this study has also proven the hypothesis on Privacy (Pr) to be not valid. However, Privacy (Pr) is found significantly important in many studies. Further analysis showed weak agreement on customers perception with regards to their privacy protection in its' virtual banking platform. However, various study previously conducted have proven Privacy (Pr) to be significant in influencing adoption of virtual banking services. Therefore, perhaps Malaysian local banks should also focus on improving its' virtual banking strategy with regards to Privacy (Pr). The results obtained in this study are limited to questionnaires distributed within the Klang Valley.

[i] Correspondence: email jacquelinetham82@gmail.com

Future researchers may expand its boundary by taking a diverse sample and including qualitative approach.

Keywords: the Internet and data security; customer perception; trusting virtual banking security

1. Introduction

The wave of innovation and revolution in open-architecture designs, widening use of cloud based solution and falling prices of computer technologies, are giving ways to market participants the ability to control the whole market space, and have immensely changed the ways businesses meet customers need, which is now speed oriented. These innovation has fundamentally transforming banks not only meeting customers needs but have also compel banks to invest enormous sum in meeting international regulations.

The importance of security in virtual banking has been the attention to many studies (Islam, 2014; Daud et al., 2011; Shanmugam and Savarimuthu, 2014; Marsek, Uril & Kahirudin, 2012; Markal, 2015) due to the rising of technology issues. The theoretical reviews of this study will look into several theories which have been previously addressed by researchers in the area of virtual banking study.

A number of studies have focused on the adoption factors of virtual banking. These studies have been based primarily on the Technology Acceptance Model (TAM), a well-recognized model used to explain information system adoption behaviour. According to TAM, adoption behaviour is determined by the intention to utilize a particular system, which is, in turn, determined by the perceived usefulness and the perceived ease of use of the system (Chuttur, 2009, Ma & Liu, 2004; Hussain, 2013; Tan & Lau (2016), Jefferis, Chigumira & Chipumho, 2013; Sujeet et.al., 2017;Bijith et. al, 2017) One major benefit of using the Technology Acceptance Model (TAM) is that it provides a framework by which the effect of external variables on system usage can be assessed (Yan & Yang, 2015; Ilham et. al., 2016; Sharma, Govindaluri & Al-Balushi, 2015).

Theory of planned behaviour is a theory that links beliefs and behaviour. The concept was proposed by Ajzen (1980) to improve the predictive power of the Theory of Reasoned Action by including perceived behavioural control. It is one of the most predictive persuasion theory. The Theory of Planned Behaviour (TPB) of Icek Ajzen helps to understand how we can change the behaviour of people. The Theory of Planned Behaviour (TPB) is a theory which predicts deliberate behaviour because behaviour can be deliberative and planned. It has been applied to studies of the

relations among beliefs, attitudes, behavioural intentions and behaviours in various fields such as advertising, public relations, advertising campaigns, and healthcare. Theory of planned behaviour (TPB) and TAM, were among models been used in many studies to assess the intention to use new technology and systems (Abloelmaged & Gebba, 2013; Armitage & Conner, 2001; Venkatesh & Davis, 2000; lSoufi & Ali, 2014). TRA is conceived as a general structure designed to explain almost all human behaviour and is based on the importance of an individual's beliefs for the prediction of his or her behaviour (Ajzen & Fishbein, 1980). However, according to TRA, behavioural intention to exhibit a particular behaviour is formed based on the individual's attitude toward the behaviour and on the perceived subjective norm. The first determinant, attitude toward the behaviour, reflects a person's beliefs that the behaviour leads to certain outcomes and the person's evaluation of those outcomes, favourable or unfavourable.

Fishbein and Ajzen's Theory of Reason Action was developed to predict behaviours and attitude. This theory looks at behavioural intentions rather than attitude as the main predictor of behaviours with the purpose to predict and understand motivational influences on behaviour, which is not under the individual's volitional control. The purpose of this theory is to identify how and where to target strategies for changing behaviour and to explain virtually any human behaviour such as why a person engages a certain behaviour (Alavi, 2015). Theory of Reasoned Actions provides a framework to study attitudes toward behaviours. According to this theory, the most important determinant of a person's behaviour is behaviour intent whereby the individual's attitude toward the behaviour includes, behavioural belief, evaluations of the behavioural outcome, subjective norm, normative beliefs and the motivation to comply (Alavi, 2015). The assumptions of this theory include; human beings are rational and make systematic use of information available to them and people consider the implications of their actions before they decide to engage or not to engage in certain behaviour.

Hamza et al. (2011) and Nyeko (2014) agreed that the considerable amount of research on mobile financial services has emerged with the overall majority of studies derived from this theory, applying research models and frameworks traditionally used within the literature such as the Technology Acceptance Model together with Theory of Reasoned Action. Yan and Yang (2015) stated that Theory of Reasoned Action is very general in nature and attempts to explain almost any human behaviour. According to Theory of Reasoned Action, a person's performance of a specified behaviour is determined by his or her behavioural intention to perform the behaviour, and

behavioural intention is jointly determined by the person's attitude and subjective norm concerning the behaviour in question.

Despite various studies being carried out locally and abroad to understand factors affecting customers intention to adopt new technology, and to understand customers behavior, virtual banking adoption in Malaysia remain low with a penetration rate of less than 20% of the total mobile or internet subscriber (Bank Negara Malaysia report, Mar 2015). A study by Kaspersky Consumer Security Risks survey (2013) revealed almost one-third of virtual banking users do not feel safe making e-payments via their smartphones or tablets and 27% of smartphone users are concerned about entering financial information from their gadgets despite after many years of virtual banking introduction in Malaysia. The level of trust in security features available for virtual banking platform remains low. Thus, this study provides an insight of customers virtual banking perception in the contexts of trust, privacy, and security which were acknowledged by many researchers on its importance. Additional constructs adapted for the study of virtual banking such as security, cost, mobility, use situation, expressiveness, convenience, speed of transaction, social reference groups, facilitating condition, the attractiveness of alternatives, privacy, system quality, and technology anxiety but few paper examine user perception from the security perspective (Yan & Yang, 2015; Mansour, Eljelly & Abdullah, 2016).

By understanding customers perception, it will provide local banks a comprehensive knowledge of what customers perceive to proper strategize their future virtual banking approaches. This study will also assist future researchers in the area of understanding customers preferences and level of confidence in accepting new technology concerning virtual banking.

2. Review Of Literature Studies

2.1 Trust
Studies previously conducted by researchers such as Yan and Yang (2015), Masrek, Uzir and Khairuddin (2012), finds security concern among virtual banking users as a major concern in various studies, either Malaysia or abroad and studies have addressed the need for banks to invest in infrastructure to continuously improve data securities. However, despite investment in data security, virtual banking adoption rate remains low compared to total mobile and internet subscribers in the country and trust in the virtual banking platform remains a concern due to the high degree of uncertainties and risks involved, and due to its significant role, trust has received considerable attention in information systems and thus it is important to determine factors affecting bank

customers decision to choose virtual banking as their preferred banking choice and understanding customers perception in trusting virtual banking platform. Thus, this forms the 1st hypotheses in this study.

Hypothesis 1: There is a relationship between trust in virtual banking security and customer virtual banking perception in adopting virtual banking.

2.2 Security

Premalatha and Sundaram (2012), argues that customers want multiple factors under banking services, but security and safety of their money remain the most important factor. Khan (2010) in his study stated that convenient and secure location affects customer satisfaction. Nyeko (2014) stated that challenges in terms of security and trusts become the main issue with using the public network to perform transactions.

Manoj (2011), in his study, stated that privacy and security are key issues in discontent with the use of mobile banking and internet banking with some of the risk associated are the possibility of losing money to fraud. As a result, the lower the perception of risk involved in using mobile banking, the more likely that it will be adopted. Shoriful (2014) in his study stated that from consumers' perspective, security and standardization of services are the critical issues and challenges in mobile banking today which need to be addressed.

To date, security concern among mobile banking users has been found among studies in Malaysia and other countries, as a majoring issue. Banks are aware of the need for data security and studies being done by banks to increase data security. To study the approaches to be taken by the local bank in prioritizing its web security to increase confidence among its customers to effectively use virtual banking as a banking choice. Since the advancement in technology is not able to find a solution to totally eliminate cyber-crimes, approaches should be taken by local banks in Malaysia to understand to customers confidence level and perceptions of virtual banking security to overcome security concern in using mobile banking apps.

Hypothesis 2: There is relationship between security in customer virtual banking perception and virtual banking adoption

2.3 Privacy

The interaction between customers and financial institution give ways for financial institutions to access customers information such as purchasing habits, needs, details, and customers account information, size of transactions as well as movements of the transactions. Many of these data reflect customers' privacy which banks should hold in

strict confidence. This Privacy Policy as stated by Khraim et al., (2011) is to hold customers information in strict confidence to avoid privacy infringement.

Aisya and Muthumani (2015) in their studies find security and privacy to be a matter of major concern for virtual banking users. Hence, develop risk mitigating strategies to overcome this barrier and to build confidence and trust among users is no longer a choice. With this realization, this study will analyze the effectiveness of the strategies implemented by the local banks in Malaysia and to understand whether the information is used without infringing customers' privacy. Yan and Yang (2015) and Masrek, Uzir and Khairuddin (2012) identified that infringement customers privacy when using virtual banking platform around the globe. Thus, hypotheses 3 is formulated as there is a statistical relationship between customers perception on privacy in virtual banking security and virtual banking adoption.

Hypothesis 3: There is a relationship between customers perception of privacy (Pr) in virtual banking security and virtual banking adoption.

Summary of independent and dependent variables for the hypotheses formed in this study is illustrated in Table 1.

Table 1: Research framework
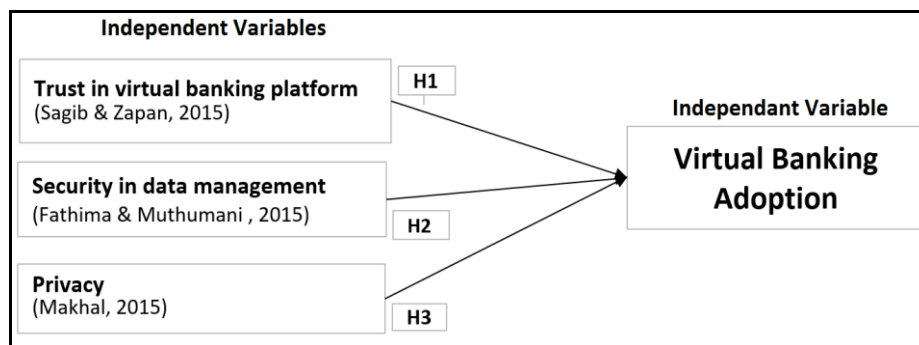
3. Methodology

The research designed will be done in several methods to ensure the validity of the data from the sample set. The development of concepts, theories, and conceptual framework is facilitated by a greater focus via focused and selective observation. The target population of this study is the local bank's customers in Malaysia.The specific detail of total account holders held by the local banks in Malaysia is not available. Hence it is difficult to establish a sample size frame for this study. However, even if the total number of account holders are known, it is impossible to select the account holders that held multiple accounts with other local banks in Malaysia. Given this limitation, a

convenience sampling technique was adopted in designing the questionnaires in this study. Convenience sampling techniques allow the collection of data from the members of a sample population which is easily available.

The survey instrument of the present study is a questionnaire administrated personally by an allocated data collection team. This has enabled completed responses collected within the allocated time period. It also enabled the respondents to clarify any doubts at the same time if there was any. The survey instrument was divided into three sections. Section one establishes the visitor profile based on the demographic and customers' banking characteristics. This section consisted of questions to gather bank customers' information. Section two is aimed at identifying the psychological motivation factors influence the bank's customers' decision to choose virtual banking and level of customers' satisfaction in the platform chosen. This included mainly three questions where the 3rd question had 10 attributes on the psychological factors. Section three identified the pull motivation factors that affected the customers use of mobile banking.

Data collection was done within a time span of three months from August, September and October 2016 in Selangor and the federal territory of Kuala Lumpur. Therefore, with the demographic and personal information required in the survey, it ensures that the selected samples are representative of the population by matching the respondent profile. For example, the country of origin, demographic characteristics and customers' behavior characteristics based on the observation. With the given justifications and ensuring the sample representation, the main criticism of convenience sampling can be avoided in this study.

Primarily, the data purifying was done by examining the extreme values, outliers and the distribution of data on the variables intended to measure. SPSS was used to perform these procedures. Factor Analysis was then carried out to analyse the variables. Exploratory factor analysis (EFA) is a statistical method used to uncover the underlying structure of a relatively large set of variables.

4. Findings

Table 2 indicates the demographic summary of respondents in this study. It was found in this study that female and male respondents were proportionately split where 52.49% of the respondents are males whereas 47.51% are females aged between 20 to 40 years old. However, in this study, it was found that younger customers form the highest percentage of virtual banking users in Malaysia. In terms of the breakdown in education among the 402 respondents, 62% of the respondents are degree holders with

full-time employment (75%), earning between RM2,001 to RM6,000 per month; 56% of the respondents perform both the internet and mobile banking where only 5% of the total respondents perform only mobile banking. Most of the respondents in this study are using Maybank and CIMB bank's virtual banking platform (28% and 30% respectively) and only 17% of total respondents using virtual banking platform offered by foreign banks in this study.

Table 2: Demographic Summary of 402 Samples in This Study

		Frequency	Percent			Frequency	Percent
Gender	Female	191	47.51%	Profession	Full time employment	300	75%
	Male	211	52.49%		Part time employment	30	7%
	Total	402	100.00%		Student	14	3%
					Self-employed	38	9%
Age	20 to 30 years old	147	37%		Retiree	20	5%
	31 to 40 years old	129	32%		Total	402	100%
	41 to 50 years old	78	19%				
	51 years old and above	48	12%	Types Virtual Banking	Internet Banking	157	39%
	Total	402	100%		Mobile Banking	20	5%
					Both	225	56%
Education Level	Diploma and below	85	21%				
	Degree	250	62%		Maybank	111	28%
	Masters and PhD	67	17%		Cimb Bank	122	30%
	Total	402	100%		Public Bank Berhad	37	9%
					Hong Leong Bank Berhad	29	7%
	Less than RM2,000	62	15%		RHB Bank	33	8%
	RM2,001 to RM4,000	97	24%	Virtual Bank Used	Citibank	25	6%
Monthly Income	RM4,001 to RM6,000	106	26%		Standard Chartered Bank	19	5%
	RM6,001 to RM8,000	49	12%		OCBC Bank	13	3%
	RM8,001 to R10,000	26	6%		HSBC Bank	11	3%
	More than RM10,000	62	15%		UOB	2	0%
	Total	402	100%		Total	402	100%

4.1 Assessing the Measurement Model for Trust (Tr)

Trust is the 1st factor for this study. The Cronbach's alpha coefficient for this factor is excellent at 0.892 as referred to Table 3 indicates that the variable is a good measurement for trust. Results indicate that all standardized regression weight for each of the variables for trust was greater than 0.5. That is, standardized regression weight and variable reliability indicated a reasonably good measurement of trust and provide evidence of convergent validity.

Table 3: Reliability for 402 respondents

Reliability for 402 respondents	
Variable	Cronbach's Alpha
Privacy	0.870
Security	0.891
Trust	0.892

As presented in Figure 1, in determining the fitness of the measurement model, Normed Chi-Square is 5.848 which is above 5, CFI is 0.978 which is more than 0.9 and

RMSEA is 0.110 which is more than 0.08. This, therefore, calls for model modification. The MI value between e4 and e5 is 12.103. Therefore, there is a need for a modification to be "free parameter estimate" is necessary. This can be done through applying double-headed arrow to e4 and e5 and re-specify the model (Byrne, 2010; Zainudin, 2012) and this is, however, theoretically and methodologically justified.

Figure 1: Initial Measurement Model of Trust (Tr)
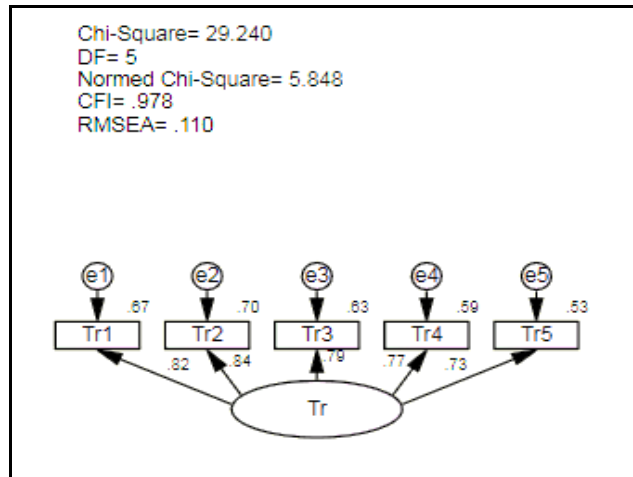
The initial measurement model of Trust (Tr) shown in Figure 1 has been modified based on the modification indices and factor loadings as displayed in the initial AMOS output. Having put the earrings on item e4 and e5, the measurement model has significantly improved with all fit indices meeting the threshold values as observed in a modified model of Trust (Tr) as shown in Figure 2. Normed Chi-Square has improved from 5.848 to 3.742 which is below 5, CFI has improved from 0.978 to 0.990 and RMSEA improved from 0.110 to 0.083 which meets the requirement of a fit model. Summary of the model fit is illustrated in Table 1.

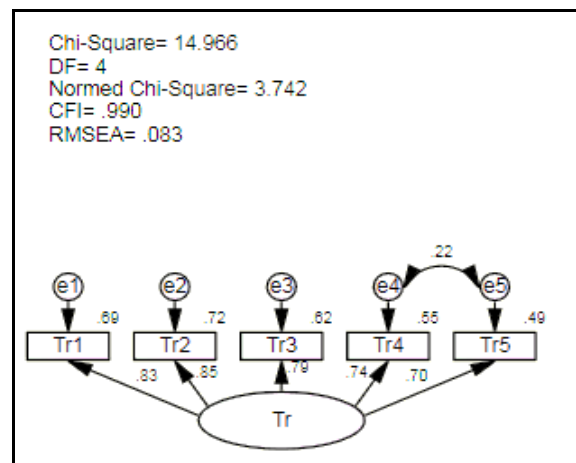**Figure 2:** Modified Measurement Model of Trust (Tr)

Table 4: CFA result for Trust (Tr)

Goodness-of fit statistics	Initial Model	Modified Model	Threshold values for the fit indices	Comments
Normed-Chi Square	5.848	3.742	< 5.0	The required level is achieved in the modified model
CFI	0.978	0.990	> 0.9	The required level is achieved in the initial model
RMSEA	0.110	0.083	< 0.08	The required level is achieved in the modified model

Table 4 illustrates the CFA results for Trust (Tr) with the threshold values of fit indices before and after modification which show required level is achieved after modification of the initial model.

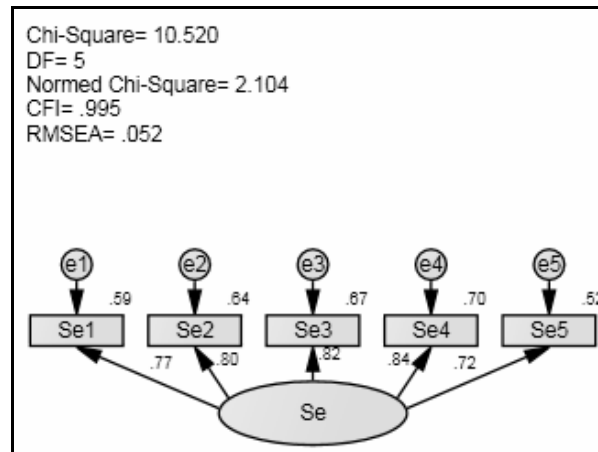## 4.2 Assessing the Measurement Model for Security (Se)

Security (Se) is the 2nd independent factor in this study measured by five constructs. The initial measurement model of Financial Cost (Fc) consists of 5 indicators. The initial measurement estimation of Security (Se) and reveals that all regression weights in this construct were greater than 0.50, therefore, it can be expected that loadings for all factors tested for Security (Se) have been attained. The coefficient alpha for reliability CFA model is 0.891 indicate that constructs were measured adequately.

Initial Measurement Model of Security (Se) and results revealed that all five constructs for Security have very high loading coefficient. Normed Chi-Square of 2.104 which is less than 5, CFI of 0.995 which is more than 0.90 and RMSEA of 0.052 which is not more than 0.08. Since all there fit indices meet the stipulated values, therefore no modification for this model is required. Therefore, it can be concluded that these five constructs represent and measure Security effectively. Table 5 illustrates the CFA results for Security (Se) with the threshold values of fit indices before and after modification (in this case, no modification required)

Table 5: CFA results for Security (Se)

Goodness-of fit statistics	Initial Model	Modified Model	Threshold values for the fit indices	Comments
Normed-Chi Square	2.104	No Modification	< 5.0	The required level is achieved in the initial model
CFI	0.995	No Modification	> 0.9	The required level is achieved in the initial model
RMSEA	0.052	No Modification	< 0.08	The required level is achieved in the initial model

Figure 3: Initial Measurement Model of Security (Se)

## 4.3 Assessing the Measurement Model for Privacy (Pr)

Privacy is the third independent variable for this study. Table 4 illustrates the results of this model, initial and modified CFA of Privacy (Pr) with the threshold values for the fit indices. However, there is no modification required for this model. Results revealed high coefficient alpha (0.870), indicated good reliability as shown in Table 1. All five constructs had very high standardized regression weight with critical ratios for all five constructs indicated good model fit. Furthermore, the goodness of fit indices concludes that the data are well fitted in the model, with all goodness fit indicators minimum requirement were met. Therefore, it can be concluded that these five constructs represent and measure privacy effectively.

Initial Measurement Model of Privacy (Pr) and results revealed that all five constructs for Privacy have very high loading coefficient. Normed Chi-Square of 1.964 which is less than 5, CFI of 0.995 which is more than 0.90 and RMSEA of 0.049 which is not more than 0.08. Since all there fit indices meet the stipulated values, therefore no modification for this model is required. Therefore, it can be concluded that these five constructs represent and measure Privacy effectively as summarised in Table 6.

Table 6: CFA results for Privacy (Pr)

Goodness-of fit statistics	Initial Model	Modified Model	Threshold values for the fit indices	Comments
Normed-Chi Square	1.964	No Modification	< 5.0	The required level is achieved in the initial model
CFI	0.995	No Modification	> 0.9	The required level is achieved in the initial model
RMSEA	0.049	No Modification	< 0.08	The required level is achieved in the initial model

Figure 4: Initial Measurement Model of Privacy (Pr)
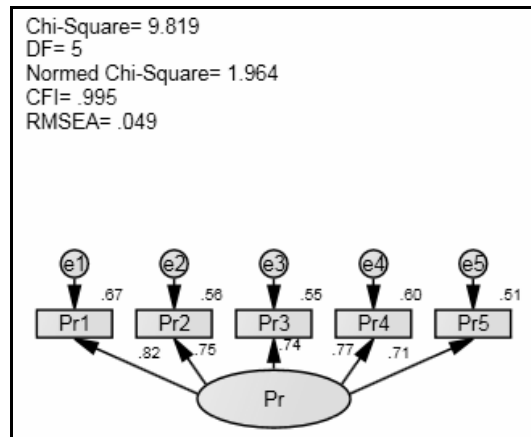
In determining the relationship between customers perception of Trust (Tr) and virtual banking adoption in this study, the C.R value is 9.228 and P is significant, therefore the hypotheses 1 is proven valid. As such, it can be concluded that the regression weight for Financial Cost (Fc) in achieving customer satisfaction and loyalty through virtual banking strategy (VBS) is significantly different from zero at 0.001 level (two-tailed).

There is a significant coefficient between customers perception of Trust (Tr) and Virtual Banking Adoption. The path coefficient between these two variables was 0.415. This, therefore, indicates that Trust (Tr) has a significant positive influence on virtual banking adoption in Malaysia. The above findings are supported by previous literature where many authors Yan and Yang (2015) and Masrek, Uzir and Khairuddin (2012) concludes in their studies that trust determines an individual's willingness to adopt a new technology and Masrek, Uzir and Khairuddin (2012) further stated in their study that initial trust which refers to trust building through first impression rather than repeated interaction is an important factor that will affect customers' decision on making virtual banking as a banking choice in future. Therefore, this can conclude that Trust (Tr) plays an important role in defining virtual banking adoption among the local banks in Malaysia. Thus, H1 is supported.

In this study, the C.R value between customer perception in virtual banking security and virtual banking adoption was 8.037 and P is significant, therefore the hypotheses are proven valid. As such, it can be concluded that the regression weight for Financial Cost (Fc) in achieving customer satisfaction and loyalty through virtual banking strategy (VBS) is significantly different from zero at 0.001 level (two-tailed). Further illustration finds that there is a significant coefficient between customer perception in security and virtual banking adoption. The path coefficient between these two variables was 0.320. This, therefore, indicates that Security (Se) has a significant positive influence on virtual banking adoption in Malaysia.

These findings are supported by previous literature whereby, Premalatha and Sundaram, (2012) stated the most important factor in banking services is the safety of customers' deposits with the banks. Khan (2010). Aggarwal and Kaur (2012), Pienaar (2010), Norudin, Mansur and Ahmad Faisal,(2010), Manoj (2011) and Nyeko (2014) in their study stated that the major concern for virtual banking customers through their study is security and privacy related to mobile banking which forms one of the major factors in influencing virtual banking users to choose virtual banking as a preferred service for their banking option. As a result, the lower the perception of risk involved in using mobile banking, the more likely that it will be adopted. Shoriful (2014) in his study stated that from consumers' perspective, security and standardization of services are the critical issues and challenges in mobile banking today which need to be addressed. Therefore, it can be concluded that security is an important factor to be considered in forming virtual banking strategy to achieve customer satisfaction. Thus, H2 is supported.

The relationship between customer perception on Privacy (Pr) and virtual banking adoption in this study, it was found that the C.R value is -1.59 which is lesser than 1.96 and P value of 0.112 which is not significant, therefore the hypotheses are proven not valid. As such, it can be concluded that the regression weight for Privacy (Pr) in achieving customer satisfaction and loyalty through virtual banking strategy (VBS) is not significantly different from zero at the 0.05 level (two-tailed). The path coefficient between these two variables was -0.052. This, therefore, indicates that customer perception of Privacy (Pr) does not have any significant positive influence on virtual banking adoption among the in Malaysia.

Trust plays an important role in a virtual banking context as transactions performed through the internet involves a high degree of uncertainty. As such, Yan and Yang (2015) focused on trust in information systems research Website-based, user-based, company-based determinants are factors identified to affect online trust and similar to any form of web-based transaction, great risk is involved. As such, building trust within users are critical (Yan & Yang, 2015). Masrek, Uzir and Khairuddin (2012) stated that trust building through the first impression is more important than trust built after a repeated interaction. This will affect customer's decision to adopt virtual banking in the future. It was found in this study that there is an adequate relationship between customer perception of Trust (Tr) and Virtual banking adoption. It was further concluded that the regression weight for Trust (Tr) and virtual banking adoption is significant. The hypothesis is therefore proven valid. The above findings are supported by the findings of previous researchers such as Yan & Yang (2015) and Masrek, Uzir and Khairuddin (2012). It is concluded that customer perception on Trust (Tr) really

does play an important role in defining virtual banking adoption in achieving customer satisfaction and loyalty.

In this study, the respondents agree that they will continuously use virtual banking as their preferred banking choice, they would recommend their bank to a friend for its virtual banking features and characterize their bank as honest and is truthful in its dealings with them genuinely and sincerely. The respondents agree that their bank is competent, capable and is a proficient service provider. The respondents also trust the bank in protecting their banking information and the bank will use their banking information only for their benefits. However, only 41% of the respondents in agree to this statement while the remaining 59% of the respondents disagree with regards to their trust on virtual banking services provided by their bank. The 41% of the respondents who trusted the bank were in the 20 to 40 years age group, had a degree, were full-time employees and earned RM 6000 and below every month. It is concluded that banks need to review their strategy in increasing trust in their virtual banking services.

This finding is similar to that of Premalatha and Sundaram (2012), who stated that safety of customers' deposits with the banks in the banking service. In another study, Aggarwal & Kaur (2012) mentioned that security and privacy related to mobile banking is one of the major factors in influencing virtual banking users to choose virtual banking as a preferred service for their banking option. Further studies also support that security plays an important role in influencing the establishment of adoption in technology (Pienaar, 2010; Norudin, Mansur and Ahmad Faisal, 2010; Nyeko 2014; Manoj, 2011; Shoriful 2014). Therefore, it can be concluded that security is an important factor to be considered in forming virtual banking strategy in achieving customer satisfaction.

However, only 40% of the respondents agree, in a doubtful transaction, the bank will not proceed with such transaction before obtaining their confirmation. It was also found that respondents are not worried about security issues when performing online/ mobile banking because customers are confident that their confidentiality is assured. In addition, the respondents of this study do believe it is not possible to stop hackers in this technology era but customers believe that the banks are doing their best to protect their privacy and financial information and customers believe that the bank is constantly updating them with new security features when it comes available. Interestingly, the respondents stated that they felt secured using public WIFI to access the banks' website when performing virtual banking transactions, anytime, anywhere.

In this study, it was found that 40% of the respondents agreed that they felt secured using public WIFI. While the remaining 60% of the respondents had a neutral

stance on using public WIFI or felt it was not safe to use public WIFI to do their banking transactions. The 40% respondents they agreed on using public WIFI were males, aged between 20 to 40, had a degree, were working full time and earned RM 6000 or less per month

Aisya and Muthumani (2015) stated that Security and Privacy was a major concern for virtual banking users and the banks have to develop risk mitigating strategies to overcome this barrier. Hence, building confidence and trust with regards to an assurance of customers' privacy when performing virtual banking transaction is a must. Privacy Policy abides banks to hold customers personal information in strict confidence to avoid infringement of customer's privacy to a third party (Khraim et al., 2011).

There were a total of five questions in the questionnaire that were designed to understand customer' perception on their trust in the bank's strategy in protecting their privacy when performing virtual banking transactions. The finding of the study revealed that only 42% of the respondents agree that their personal banking information is kept safe by the bank and the bank's personnel will call them for personal verification and confirmation to assure a genuine change to their banking information or if there are any queries pertaining to their banking information. However, the respondents agree that they are able to set a biometric password on their virtual banking inquiries and they are very sure that the bank will not disclose their personal information to a third party. The balance 58% of the respondents remained neutral or disagrees with the privacy of virtual banking. 42%% of respondents who agreed with the privacy of virtual banking were males, aged between 20 to 40, had degrees, were working full time and earned RM 6000 and below every month.Therefore, banks need to review their strategy in increasing trust with regards to customers' privacy protection in virtual banking services.

Maximum Likelihood Estimates that determined the relationship between customer perception on Privacy (Pr) in virtual banking and virtual banking adoption indicated no adequate relationship. Thus, this hypothesis is not valid. An additional analysis was performed, and the results of the coefficient of Privacy (Pr) and virtual banking adoption shows there is no significant coefficient between these two variables. Therefore indicates that customer perception on Privacy (Pr) does not significantly and positively influence virtual banking adoption in Malaysia.

The implication of this study, privacy (Pr) is also found significantly important in many studies. However, in this study, the hypothesis on Privacy is not valid. Furthermore, weak agreement on customers perception their privacy protection in its' virtual banking platform. Though the hypotheses are not supported in this study, the

various study has proven it as significant in influencing adoption of virtual banking services, perhaps banks should also focus on improving its' strategy with regards to privacy of its virtual banking in Malaysia.

Despite being able to demonstrate the relationship between the independent and dependent variables, this study is subject to some limitations. A major limitation is that the results of this study are based on analysis using cross-sectional data due to the time and cost constraint. Therefore, the effects between research variables in the research model cannot be examined thoroughly. A longitudinal study approach is suggested for future research projects. Secondly, the sample could not generalize to the actual population of Malaysia; the study was limited to Klang Valley using a convenience sampling method where the sample consisted mainly of postgraduate students and white-collar workers that limit the generalization of this study. In addition, the current study did not include all possible variables which affect customer loyalty towards Internet banking websites.

The model serves as a basic overview of the customer perception which can be further analysed its relationship in achieving customers loyalty and satisfaction. The concept emphasizes the direct effect of the variables on customer perception of trust, security, and privacy. It needs to be further enhanced with other possible independent variables which significantly influence customer satisfaction to adopt virtual banking services provided by the Malaysian local banks and for banks to critically strategize their banking strategies. Therefore, for future research, the model should be enhanced by adding variables that can improve the ability to accurately predict customer loyalty towards virtual banking strategies in Malaysia.

5. Conclusion and Implication

This final section in this study serves as a guideline for Malaysian banks with regards to customers' preferences, perception, and adoption level, in response to existing virtual banking marketing strategy implemented by Malaysian local banks. Few suggestions as appended in the following section of this study which includes building a stronger personal interaction with customers that would create a stronger initiative in confidently use virtual banking as customers preferred banking platform. This suggestion was supported as the result of the findings in the study of determinants of mobile banking adoption by Cudjoe and Anim (2015), building a simplified application and functions in the virtual banking platform to promote customer experience, thus increase customers' confidence in performing virtual banking transaction. This suggestion is also supported as the result of the findings in the study of customer

experience by Zhang and Xie (2015). In this study, it was found that though there is an agreement in terms of virtual banking security, customers' trust, the standard deviation suggested a low agreement. Therefore, banks need to assist customers in breaking barriers in digital transformation introduced by the banking industries. However, customers' trust and security in performing virtual banking transactions need to the first priority in designing a new virtual banking service.

The customer experience in virtual banking should be "immediate satisfaction" where virtual banking should creatively embed customer loyalty and affinity in a fun way to engage younger customers. This study has proven that majority customer's use either internet banking, mobile banking or both are between the ages of 20 to 40 years old, understanding that digital creativity has become part of an important way of life especially among the millennial.

This study tried to overcome all types of limitations by following scientific research process. And, this research had some unsolved limitation regarding time, cost, and sample. Getting quality information from respondents in this study was one of the major limitations in this study. It was not a simple task to get customers to fill up the questionnaires. It was also difficult to get information from bankers as they are reluctant to provide information with regards to the bank's strategy.

Another important drawback of this study was the process of drawing sample. Samples were only collected from Selangor, Kuala Lumpur which is mainly Klang Valley. Therefore, generalizing the perception of Malaysian customers who adopt virtual banking may not be appropriate. It provides an area for further research with more sample size from each and every state of Malaysia. Similarly, with this result, it is not appropriate to draw conclusions for theory as this results only measure a certain area in Malaysia. In this relation, it is suggested to conduct research on virtual banking strategy by from by Malaysian local banks which reside outside Malaysia.

Another important limitation of this research is virtual banking services as a whole is considered as virtual banking in general. Therefore, there may be misinterpreted among consumers. Therefore, it is worth to conduct research on any specific virtual banking services which was not included in this research. The questionnaires were only distributed in the Klang Valley. The reason for this there are many mobile users in the Klang Valley and these uses represent the whole population in Malaysia. However, the use of random sampling method of the whole population might represent a different result if stratified sampling method is to be used for this research.

In spite of few limitations, this study provides an empirical view toward virtual banking adoption and banks future strategy. This study was one of the studies that

examine quantitatively, assessing factors that would provide insights to local banks in Malaysia on a better virtual banking approach. The aims of this study were to measure customer perception with regards to virtual banking services offered by the bank in terms of the trust, privacy, and security. It is also believed that different demographic attributes indirectly towards achieving customers loyalty through the adoption of virtual banking usage.

Results provided significant insight about virtual banking from consumers' point of view. Based on this research findings, it is found that privacy does not have a direct relationship with virtual banking adoption. This study also suggests banks relook into the marketing strategy to increase customers' satisfaction and loyalty in adopting virtual banking as their preferred banking platform.

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