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Perceived Risk As An Extension To TAM Model: Consumers' Intention To Use A Single Platform E-Payment

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ABSTRACT

This study seeks to explore Malaysian consumers' in adopting a single platform E-payment system with an extended perceived risk to TAM model. This research investigates the efficiency and design that influence perceived ease of use and perceived usefulness. Furthermore, the researcher is interested to investigate the relationship between perceived ease of use, perceived usefulness and perceived risk with consumers' intention to use one single platform that integrates card, internet and mobile. Using online survey method, respondents were selected based on the criteria of owning at least one of the following items (e.g: mobile phone, card payment, Internet). The results of the structural equation modeling (SEM) analyses suggest that perceived risk can lead to reduction in consumers' intention to use single platform E-payment system. Therefore, perceived risk should be taken into consideration when designing E-payment system in order to increase the consumers' intention to use.

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INTRODUCTION

Earlier studies have investigated E-payments separately and individually for example payment cards (Rinaldi, 2001), smart cards (Humphrey, Kaloudis and Øwre, 2004), mobile e-wallet (Amoroso and Magnier-Watanabe, 2012). In fact, there is an increasing interest in this topic due to problems such as inconvenience, unproductive, not interesting and unattractiveness of chip card technology E-payment solutions faced by organizations to increase consumers' intention to use E-payment systems. (Lai, 2007; Geron, 2009, Lai, 2010; Wei, Shuo, Luo, Chen and Ling, 2011; Jovanovic and Organero, 2011). The lack of empirical investigations combining the determinants of the three E-payments (Card, Internet and Mobile) in one study encourages the present researchers to study the single platform system known as E-PaySIM™ as shown in Figure 1 that combined card, Internet and Mobile payment on a single platform. As the future integrated E-payment instruments, single platform system is a novel system as previous researches only focused on the three systems separately (Card, Internet, Mobile).



Fig. 1:

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Mohammad (2008) in his paper entitled "The Development of E-payments and Challenges in Malaysia" and Cheah (2011) from the Payment Systems Policy Department Bank Negara highlighted the importance of risk for E-payment especially the financial risk in the financial industry that needs further research. Perceived risk is associated with consumers' feelings like anxiety, concern, discomfort, uncertainty, and cognitive dissonance that may be influenced the E-payment process. These problems present a challenge to organizations' management providing E-payment solutions to encourage consumers' intention to use technology-based E-payment services.

This study focuses on the consumers-based research orientation such as consumers' intention to use that is measurable with the adoption of Technology Acceptance Model (TAM) (Davis, Bagozzi and Warshaw, 1989) to enhance the potential of deploying an integrated E-payment single platform system with perceived risk. There have been increased interest in the area of perceived risk in previous studies (Santana and Loureiro, 2010; Kailani and Kumar, 2011; Cheah, 2011; Zheng et al, 2012, Wiedemann, et al, 2013) that encourages this study in regard to perceived risk focused on E-PaySIM™. Therefore, this study seeks to investigate the efficiency and design (external variable in TAM) that influence perceived ease of use and perceived usefulness. Furthermore, this study investigates the relationship between perceived ease of use, perceived usefulness and perceived risk with consumers' intention to use one single platform that integrates Card, Internet and Mobile as the novelty system.

Technology Acceptance Model (TAM), Perceived Risk and Theoretical Framework:

Technology Acceptance Model (TAM) was introduced by Fred Davis in 1986 and specifically tailored for modelling users' acceptance of information systems or technologies or new product acceptance. The goal of Davis' (1989) TAM is to explain the general determinants of technology acceptance that lead to explaining users' behaviour across a broad range of end-user computing technologies and user populations. The belief of the person towards a system might be influenced by other factors referred to as external variables in TAM. The present study was based on Technology Acceptance Model that was formed by Venkatesh and Davis (1996) who found that both perceived usefulness and perceived ease of use have a direct influence on behaviour intention, thus eliminating the need for the attitude construct. The two significant beliefs in the TAM are the perceived usefulness and perceived ease of use and that TAM postulates that perceived ease of use stimulates perceived usefulness. Hence, in the context of this study on the single platform e-payment system, the more users perceive the system as easy to use, the more the system will be perceived as useful by the users. There are empirical studies of the TAM that suggest this correlation and found significant relationship between these two factors (Moon and Kim, 2001; Van der Heijden, 2003; Shih, 2004).

With the emergence of technology, additional variables are introduced to the TAM so as to produce an extended TAM for predicting consumers' intention to use. These variables include product involvement (Koufaris, 2002), cost (Shih, 2004) and perceived risk (Pavlou, 2003). Perceived risk has been shown to reduce consumer's intention to engage Internet transactions (Jarvenpaa, Tractinsky, and Vitale, 2000) which will be the same for single platform that integrates card, internet and mobile transaction. Perceived risk is defined as consumers' perceived risk and their own tolerance of risk taking that influence their financial transaction decision (Chan and Lu, 2004).

Perceived risk suggests the idea that consumers' may be influenced during the E-payment process by the feelings like anxiety, concern, discomfort, uncertainty, and cognitive dissonance in this research. Mohammad (2008) and Cheah (2011) highlighted the importance of risk for E-payment especially the financial risk in the financial industry where the E-PaySIM™ E-payment is also bound by the Bank Negara guidelines. Consumers view relationships with banking based on trust and how they perceived risk as the banking is acting for their favor (Al-alak and Alnawas, 2010). Therefore, perceived risk is added to the original TAM model in this study. Therefore, this study will utilize the variables shown in Figure 2 to determine the consumers' intention to use the single platform E-payment system. For the purpose of the study, the following hypotheses were posited:

H1a: Efficiency is positively associated on perceived usefulness.

H1b: Efficiency is positively associated on perceived ease of use.

H2a: Design is positively associated on perceived usefulness.

H2b: Design is positively associated on perceived ease of use.

H3: Perceived ease of use is positively associated perceived usefulness.

H4: Perceived usefulness is positively associated with consumers' intention to use

H5: Perceived ease of use is positively associated with consumers' intention to use

H6: Perceived risk is negatively associated with consumers' intention to use.

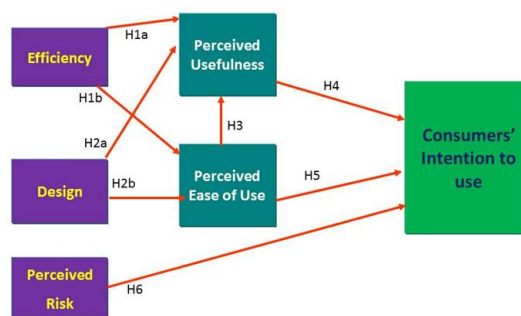


Fig. 2: Theoretical Framework.

Methods:

Given the Malaysian population of 28.3 million (Malaysian Statistic report 2010), the population in this study included only respondents who have used either mobile phone or card or internet for the last 12 months. Online survey questionnaire was used as data collection method. Responses from a total of 520 respondents that fulfilled the pre-set requirements were collected and used for this analysis. Using non probability sampling, 384 samples were required according to Krejcie and Morgan (1970) which is more than 200 samples recommended for models in SEM studies (Hair, Black, Babin, Anderson and Tatham, 2006; Klien, 2011). Perceived ease of use and Perceived usefulness was measured using Maran, Lawrence, Fazilah, Kishna and Ng (2011) and Davis (1989), perceived risks was based on Jarvenpaa, Tractinsky, and Vitale (2000); Ndubisi and Sinti (2006), design was based on Asgarkhani (2005); Lin and Hsieh (2006); Szymanski and Hise (2000), efficiency was measured using Arend, (1992) , Devaraj, Fan, and Kohli (2002), Phan and Diam (2011) and consumers' intention to use was based on Amin (2007) and Davis (1989). In this study, a five-point scale Likert-type ('strongly disagree' to 'strongly agree') was used to measure the consumers' intention to use single platform e-payment system. The five points scale was selected to encourage respondents to make positive or negative choices (Cooper, Schindler, and Sun, 2008) in order to produce more emphatic information (Oppenheim, 1992). The Cronbach's alphas for the variables are as follows: efficiency (.95), design (.91), perceived usefulness (.96), perceived ease of use (.92) perceived risk (.89) and consumers' intention to use (.91).

Results (Respondent Profile):

Table 1: Respondents profile.

Variable	Frequency (n=520)	Percent (Total 100%)
Gender		
Male	288	55.4
Female	232	44.6
Marital Status		
Single	277	53.3
Married	243	46.7
Age		
< 25	86	22.1
26-40	176	45.2
41-55	105	27.0
> 55	22	5.7
Education		
Secondary/High school	120	23.1
College/university	339	65.2
Graduate school	61	11.7
Job position		
Top Management	24	4.6
Middle Management	200	38.5
Junior Management	61	11.7
Professional	50	9.6
Other	185	35.6
What industry you work in		
Education	165	31.7
Banking/Finance	42	8.1
Retail/Hypermarket	36	6.9
Manufacturing/ICT	179	34.4
Other	98	18.8
Owning		
1 item (Mobile/Internet/Card)	4	.8
2 items(Mobile+Card/ Mobile+Internet/ Card+Internet)	167	32.1
3 items (Mobile, Internet & Card)	349	67.1

In this study, analyses were done for each variable separately to gather a summary of respondents' demographic profile in order to get the preliminary information and the feel of the data (Sekaran, 2003). Table 1 shows the respondents' demographic profiles of the survey. The highest respondents' of 45.2% are in the age range of 26-40 with male respondents of 55.4% and the marital status for single respondents at 53.3% mostly with at least college/university at 65.2% working at middle management level 38.5% in Manufacturing/ICT industry and 67.1% owning all three (3) items mobile phone, internet and card payment.

Measurement Model:

All the goodness of fit indices was good and satisfied the requirements with the validity assessment of the CFA model. Chi-Square was 310.79 at $p=0.00$ and df (degree of freedom) was 75. According to Tabachnick and Fidell (2007), the relative Chi-Square (χ^2/df) at 4.14 is below the 5.0 required for good fit. As stated by Hair et al. (2006), p -value is sensitive to the sample size and it may occur significant if using large sample size (Hair et al. 2006). In absolute fit indices, the goodness of fit index (GFI) was 0.92, well higher than 0.90 (Hair et al. 2010). Comparative fit index (CFI) was 0.97, above the 0.90 required for good fit (Hu and Bentler 1999). Root mean square error of approximation (RMSEA) was 0.07, below the 0.08 required for good fit (Byrne 1998). For the overall measurement model, the results indicated good fit model.

Structural Model:

Based on the results of measurement model, the structural model was examined with the theoretical links as shown in Figure 3 with all of the goodness of fit indices that indicated an acceptable model.

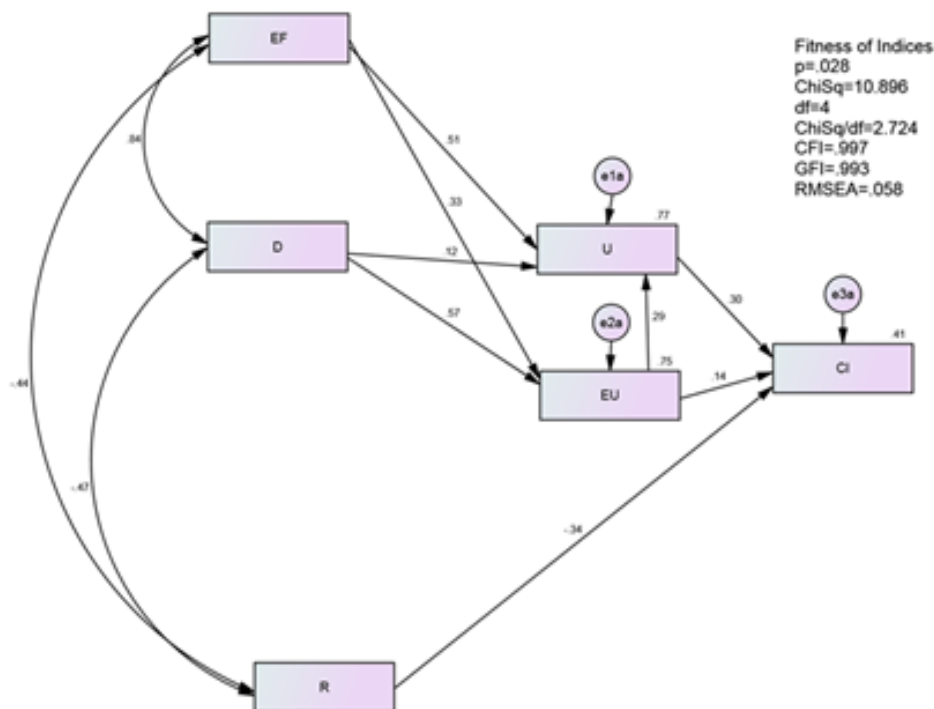


Fig. 3: Structural Model.

The overall structural model shows all paths of standardized regression weights as shown in Table 2 are statistically significant at the $p \leq 0.001$ and $p \leq 0.005$ level of significance.

Hypothesis 1a Efficiency has relationship on Perceived Ease of use.

This hypothesis suggests that efficiency as an exogenous factor provides a significant contribution to perceived ease of use as an endogenous factor. Therefore, hypothesis 1a is supported by the data. In this case, efficiency has a significant relationship with perceived ease of use.

Hypothesis 2a Design has relationship on perceived ease of use.

The results showed that design has strong direct relationship with perceived usefulness with path coefficient=0.57, $C.R.=10.23$ and $p=0.00$ ($p < 0.001$) is the highest among the entire hypothesis. In this case, the higher the design support the greater the perceived usefulness of the system.

Table 2: Standardized regression weights of structural model.

Hypothesis	Standardized Regression Weights			S.E.	C.R.	P	Results
Hypothesis 1a	EU	←	EF	.036	5.62	.000	Significant $p \leq 0.001$
Hypothesis 2a	EU	←	D	.045	11.21	.000	Significant $p \leq 0.001$
Hypothesis 1b	U	←	EF	.057	10.23	.000	Significant $p \leq 0.001$
Hypothesis 2b	U	←	D	.100	2.38	.017	Significant $p \leq 0.05$
Hypothesis 3	U	←	EU	.052	13.07	.000	Significant $p \leq 0.001$
Hypothesis 4	CI	←	U	.087	2.05	.041	Significant $p \leq 0.05$
Hypothesis 5	CI	←	EU	.074	2.35	.019	Significant $p \leq 0.05$
Hypothesis 6	CI	←	R	.043	-9.18	.000	Significant $p \leq 0.001$

Hypothesis 1b Efficiency has direct relationship on Perceived usefulness

This hypothesis suggests that efficiency as an exogenous factor provides a significant contribution to perceived usefulness as an endogenous factor. Therefore, hypothesis 1b is supported by the data. In this case, efficiency has a significant relationship with perceived usefulness.

Hypothesis 2b Design has direct relationship on Perceived usefulness.

This hypothesis suggests that design as an exogenous factor provides a significant contribution to perceived usefulness as an endogenous factor. Therefore, hypothesis 2b is supported by the data. In this case, design has a significant relationship with perceived usefulness.

Hypothesis 3 Perceived ease of use has relationship on perceived usefulness.

The results of SEM showed that the standardized regression weight of the structural path between perceived ease of use and perceived usefulness is positive and significant, in which path coefficient=0.29, C.R.=13.07 and $p=0.00$ ($p<0.001$). In this case, the higher the perceived ease of use support the greater the perceived usefulness of the system.

Hypothesis 4 Perceived usefulness is positively associated with consumers' intention to use.

The hypothesis showed that perceived usefulness has a significant relationship with consumers' intention to use of the system with explanatory power R^2 of 77.

Hypothesis 5 Perceived ease of use is positively associated with consumers' intention to use.

The hypothesis showed that perceived ease of use has a significant relationship with consumers' intention to use of the system with explanatory power R^2 of 75.

Hypothesis 6 Perceived risk is negatively associated with consumers' intention to use.

The results of SEM showed that the standardized regression weight of the structural path between perceived ease of use and perceived usefulness is positive and significant, in which path coefficient=0.34, C.R.= -9.18 and $p=0.00$ ($p<0.001$). In this case, the higher the perceived risk support the lower the consumers' intention to use of the system.

Discussions, Management Implication and Conclusion:

Efficiency has positive relationship with perceived usefulness and perceived ease of use and also has positive direct relationship with the perceived usefulness and perceived ease of use. Efficiency has a stronger significant relationship with perceived usefulness ($\beta = .51$) compared to perceived ease of use ($\beta = .33$) which mean efficiency will contribute more towards perceived usefulness than perceived ease of use. Laukkanen and Mika (2007) noted that efficiency is vital for mobile banking. So were Laukkanen and Lauronen (2005) for services consumption like location-free access and the ability to react immediately to the services. Anckar and D'Incau (2002) indicated efficiency needs (e.g. productivity) is required for m-commerce to deliver special customer value to consumers. Therefore, efficiency is an important factor to delivering both usefulness and ease of use for single platform E-payment system (E-PaySIM™).

Design has positive relationship with perceived usefulness and perceived ease of use and also has positive direct relationship with the perceived usefulness and perceived ease of use. Design has a stronger significant relationship with perceived ease of use ($\beta = .57$) which is the highest in the structural model compared to perceived usefulness ($\beta = .12$). Thus, this implies that the design is a strong determinant on perceived ease of use for the case of E-PaySIM™. Nevertheless, design depends on both the perceived usefulness and the perceived ease of use as in previous studies (Davis, 1989; Ahn, Ryu, and Han, 2004; Lin and Hsieh, 2006). Therefore, design should be considered imperative in determining perceived usefulness and perceived ease of use.

The result of structural equation modeling (SEM) established that there is a negative and significant relationship between perceived risk and consumers' intention to use based on the hypothesis 6 supported by the research data in which standardized regression estimate $\beta = -.34$, CR = -9.18 and $p=.00$ ($p \leq .001$). It can be suggested that the lower the risk of using E-PaySIM™ system, the higher the consumers' intention to use the E-PaySIM™ system. Hypothesis 6 concluded and validated existing studies (Jarvenpaa et al., 2000; Pavlou, 2003) in regard to perceived risk were negatively associated with consumers' intention to use. Thus, hypothesis 6 for

single platform E-payment system (E-PaySIM™) is confirmed. This result further implied that perceived risk was as important element of consumers' intention to use the single platform E-payment system, as were the perceived usefulness and perceived ease of use. Perceived risk has been the major concern but the standard regression weight of 34% is considered medium. Thus, the management of the organizations providing single platform E-payment system need to look into providing secured solutions to reduce the risk as well. In order to reduce the perceptions of risk, single platform E-payment system suppliers can organize talk to educate consumers on how to safeguard their E-payment transactions with the additional security and privacy features. This support Lu, Wang and Linda's (2012) suggestion to enhance user technology readiness in terms of optimism through innovation and reduce customers' technology concern in terms of insecurity and discomfort at the same time. This research emphasized in providing consumers with security solutions to perform their single platform E-payment transaction. Furthermore, by reducing the perceived risk, it will increase the consumers' trust and confidence that lead to the intention to use in single platform E-payment system.

The explanatory power R^2 scores of perceived usefulness by perceived ease of use, efficiency and design variables is .77. The explanatory power R^2 scores of perceived ease of use by efficiency and design variables is .75. The explanatory power R^2 scores of Consumers' intention to use by perceived usefulness, perceived ease of use and perceived risk variables is .41. According to Cohen (1998), the explanatory power R^2 scores was decoded as small ($\geq .01$), medium ($\geq .09$), or large ($\geq .25$). Thus, the results showed that the single platform E-payment system has very high perception of usefulness and ease of use and moderate consumers' intention to use by the consumers' respondents. Thus, the consumers' intention to use is consider good with 41% to use the single platform E-payment system in this study.

There have been increasing studies of the factors influencing technology acceptance especially in the area of Card, Internet and Mobile lately but focused on individual element like payment cards (Rinaldi, 2001), smart cards (Humphrey, et al., 2004), mobile e-wallet (Amoroso and Magnier-Watanabe, 2012). Specifically, as far as the researcher is aware, variables contribute to the finding in accepting single platform E-payment system (E-PaySIM™) has not yet enticed the interest of the research community. Thus, this study breaks new ground within technology acceptance literature because this study validated the variables of the well-established theories in this context is the major contribution to the body of knowledge. This study added perceived risk as an extension to the usual TAM model that was also confirmed by the result in regard to perceived risk had negative relationship with consumers' intention to use the single platform E-payment system is another contribution to the body of knowledge.

Consumers are concerned with carrying cash that exposes them to theft and loss as well as too many "cards" to carry and manage (Sockalingam et al., 2006; Maran et al., 2011). This study provided consumers' feedbacks (e.g., safe transaction), perceived risk, efficiency, user friendly as well as their interest with easy to change SIM rather than phone for payment (E-PaySIM™). By understanding consumers' preference, technology solution providers will be able to design the solution focused on consumers' needs and wants (Lai, 2010). The management of the organizations providing single platform E-payment system need to look into providing secured solutions to "reduce the risk" as well. In order to reduce the perceptions of risk, E-PaySIM™ suppliers can organise talk to educate consumers on how to safeguard their E-payment transactions with the additional security and privacy features. This study emphasized in providing consumers with security solutions to perform their single platform E-payment transaction. Furthermore, by reducing the perceived risk, it will increase the consumers' trust and confidence that lead to the intention to use in single platform E-payment system.

One limitation of using online survey is reaching target audiences who have Internet access in Malaysia only. The data also represents Malaysian context and might not be relevant to other countries. The data was collected at one point of time and may change over time due to greater experience and advancement of E-payment technologies. Therefore, future study should be expanded to non-internet users using traditional survey method. This study can be replicated in other developed or developing countries as well as a longitudinal study to examine the single platform e-payment system and consumers' intention to use at various points of time.

In conclusion, the empirical results from the study suggest that perceived risk can lead to reduce the usage of consumers' intention to use single platform E-payment system. Therefore, perceived risk should be taken into consideration when designing E-payment system in order to increase the consumers' intention to use. It is noted that the constructs of the single platform E-payment system should include efficiency and good design while providing security to reduce the risk that support the ease of use and usefulness of the single platform e-payment that can lead to consumers' intention to use single platform e-payment system.

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