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Examining the Security Issues of Automated Teller Machine Based on Revised Technical Acceptance Model

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Abstract

Trust of using automated teller machine (ATM) is a daunting task for many Indonesians, where the security issues associated with it, still haunting them. The paper examines the collaborative issues related to the ATM security such as: perceived usefulness and ease of use, perceived security, trust, intention to use and actual system use, by using revised technical acceptance model (TAM) according to the banking purposes. The study takes customer samples of major leading banks in Indonesia and expected to present the current situation faced by many Indonesians when dealing with the ATM security. The outcome will be valuable inputs for the policy makers of the banks to establish further strategy to cope with integrated security issues related to ATM use.

Keywords*: Revised Technology Acceptance Model (TAM), Perceived Security and Trust, ATM use, Leading banks customers*

1. Introduction

Nowadays, many banks have offered ATM access for their customers. ATM provides easy and convenience transactions for withdrawals, transfers, payments, check balances, and major kinds of financial transactions. The use of ATMs has been considered as competitive advantages for the banks to win the customers [1]. Due to their large acceptances, the use of ATM has increased the security awareness for many Indonesians, where they put their full trust on the ATM and the banks. Putting trust on the banks also increases the risks associated with it. The financial crimes associated with the ATM use have increased significantly from the last few decades [2], such as malicious acts around the ATM area, unauthorized ATM access, fraudulence transactions, payment transfer does not reach the destination, frequent malfunctions and run out money, amount deduction on the account, etc. The security issues have received the highest priority for the customers to use the ATM or other banking applications [3].

Besides the security issues, Titin [4] found that customers' behavior especially dealing with the ATM and security issues are also important [4]. Customer behavior may vary from one to another [10], and they may deliver impact to creating perceived of usefulness of the ATM access [5]. Therefore, it is important to study the links between behavior and security related to the ATM access. The study takes the well-established Technology Acceptance Model (TAM) and links it with the security issues to capture the perception of customers using the ATM. TAM has advantages to identify the behavioral issues related to the technology use. Combining the TAM with perceived security and trust are the mandatory issues that needs to be considered when applying the technology in the banking and financial institutions [6, 8].

The study is important since many Indonesians are still developing unpleasant behavior associated with the ATM or other internet banking applications [7, 9]. The outcome of the study can be used by the policy makers of the banks to develop further strategy to win the customer's trust and perceived security of using ATM.

2. Proposed Model

Developing study model for the banking and financial institutions is not an easy task, since it relates highly with trust and prudence [11-12]. For this purpose, the paper selects the SEM-PLS method as analysis model, and well-established TAM, as its framework. The revised TAM is selected to comply with the strict financial policy in trust and prudence. The SEM- PLS or known as PLS, is a methodology of multivariate data analysis that allows modeling complex cause-effect relationships that involves latent and observed variables. The SEM-PLS method has been widely used in business and proven as effective simulation and prediction tools dealing with relative small samples. The revised TAM comprises of important variables such as: perceived usefulness, perceived ease of use and behavior intentions, which are the main components of the TAM, that influences the users' perception and behavior to use a technology-based system [13-14], [16-17]. Additional perceived security and trust are added to examine the positive behavior of using banking technology. Figure 1 Revised Technology Acceptance Model illustrates the relationships between behavioral issues related to the technology use.
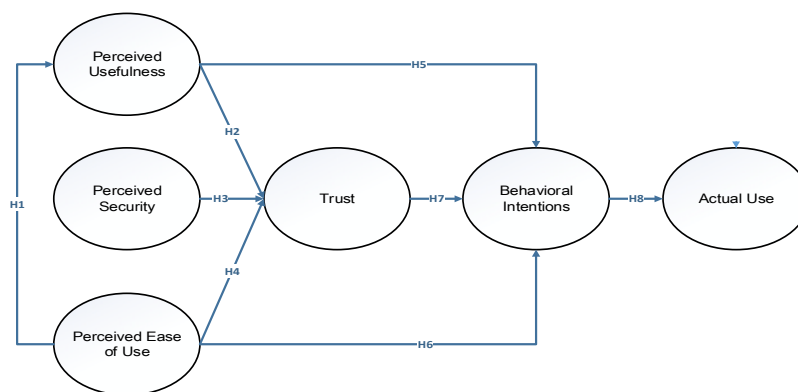

Figure 1. Revised Technology Acceptance Model (adapted from [14])

Figure 1 above takes the perceived security is as important as the perceived usefulness and perceived ease of use, from the original Technology Acceptance Model. Three of them are considered as important independent variables to the Trust. Perceived ease of use links to the perceived usefulness is still maintained as in the original model. Inserting the Trust in the banking industries is important to determine the behavioral intentions to use ATM, and the results can be seen in the variable Actual Use. All indicators to the variables above are shown in the Table 1 Indicator Variables with Trust.

Table 1. Indicator Variables with Trust

Variable	Indicator	Description
Usefulness [15]	Speed	Accessing bank services quickly
	Efficiency	More efficient time and expense without visiting bank directly
	Effectiveness	Improve the effectiveness doing bank transactions.
	Financial	ATM services useful for the needs of the financial/banking.
	Accuracy	Company (bank) apply the rules of good security enough to protect customers while using ATM.
Security [17-18]	Identity Verification	ATM machines have the ability to verify the user's identity for security purposes.
	Security Support	Company (bank) when providing an ATM, equipped with the security support to each transaction at the ATM
	Satisfaction	Customers feel safe doing electronic payments with ATM
Ease of Use [15]	Usability	Easy to operate, interaction and access to the ATM machine
	Existence	ATMs can be found anywhere outside of the city.
Trust [19-20]; [16]	Advisability	Credible, the bank keeping promises of each commitment in the provision of ATM.
Behavioral Intention [21]	Utilization	Customer will use ATM for transaction banking.
Actual Use [20]	Intensity of Use	How frequently users utilizing ATM services.

In order to acquire accurate inputs, the paper adopts the questionnaire design with the Likert scale that comprised of 7 scales, ranging from totally disagrees to totally agree.

Figure 1 summarizes the formulation of the hypothesis into eight hypotheses (H1 to H8) as follows:

H1: there is a positive and significant relationship between perceived ease of use and perceived usefulness.

H2: there is a positive and significant relationship between perceived usefulness and trust

H3: there is a positive and significant relationship between perceived security and trust.

H4: there is a positive and significant relationship between perceived ease of use and trust.

H5: perceived usefulness will give a positive and significant impact on the behavioral intention.

H6: perceived ease of use will give a positive and significant impact on the behavioral intention.

H7: trust will drive a positive and significant impact on the behavioral intention.

H8: behavioral intention will drive a significant and positive impact on the actual use.

Table 2. Demographics Respondents

	Category	Frequency	Percentage
	<20	9	6.9
Age	20-25	120	91.6
	>25	2	1.5
Gender	Male	70	53.4
	Female	61	46.6
	High School	32	24.4
	Diploma	39	29.8
Education	Bachelor	52	39.7
	Master	5	3.8
	Doctoral	3	2.3
Using ATM	Yes	131	100.0
	No	0	0.0
	<1 year	11	8.4
The duration of ATM use	1-2 years	36	27.5
	2-5 years	68	51.9
	5-10 years	16	12.2
Have a bank account	Yes	131	100.0
	No	0	0.0

3. Research Method

The data collection was performed using an online questionnaires survey method by using Google forms, and distributed randomly to several customers of the leading banks in Indonesia, such as: BNI, BCA, Mandiri, BRI, BII, Mega Bank, and others. The data collection was conducted from March to April 2015, with total questionnaires received 146 out of 150 distributed. From the total 146 questionnaires, the 52s of them were collected from online survey and 94s came from direct survey. Validation had made to those 146 questionnaires, and 131s of them were valid for further analysis. Table 2 Demographic Respondents illustrates a detail description of the respondents based on demographic classification. The range of the respondents' age is between 20-25 years. It comprises of: 53.4% male and 46.6% female, with latest education are 39.7% diploma, 39.7% undergraduate, 3.8% master, and 2.3% doctoral. All respondents have been involved with the ATM access for 2-5 years in average.

4. Results and Analysis

Based on the SEM-PLS calculation, the Composite Reliability (CR) > 0.7, and Average Variance Extracted (AVE>0.5), and loading factors > 0.70. It can be concluded all parameters complied with criterion [22-23], and each construct fits with discriminant validity [23]. Table 3 shows the relationship between perceived ease of use and trust are positive with the significant value of $\beta=0.309$ (t-value=2.289; $p <0.05$). Meanwhile, the relation between the perceived usefulness and behavioral intention is significant and positive with $\beta=0.191$ (t-value=2.145; $p <0.05$), but unfortunately was not statistically strong and significant influence with trust. Lastly behavioral intention had a positive and significant influence on actual use i.e. $\beta=0.283$ (t-value=3.180; $p <0.05$).

All variables except the actual use proportionally explain the feasibility of the model with 30.9% on perceived usefulness, 43.3% on trust, and 43.9% on behavioral intention. In addition, there are 2 (two) variables that has no positive effect and no strong relationship which is perceived usefulness to trust formation, with a value of β=0.004 (t-value=0.420). Similarly, the influence between trust on behavioral intention was rejected with value of β=0.103 (t-value=0.822).

Figure 2. Results of the Study
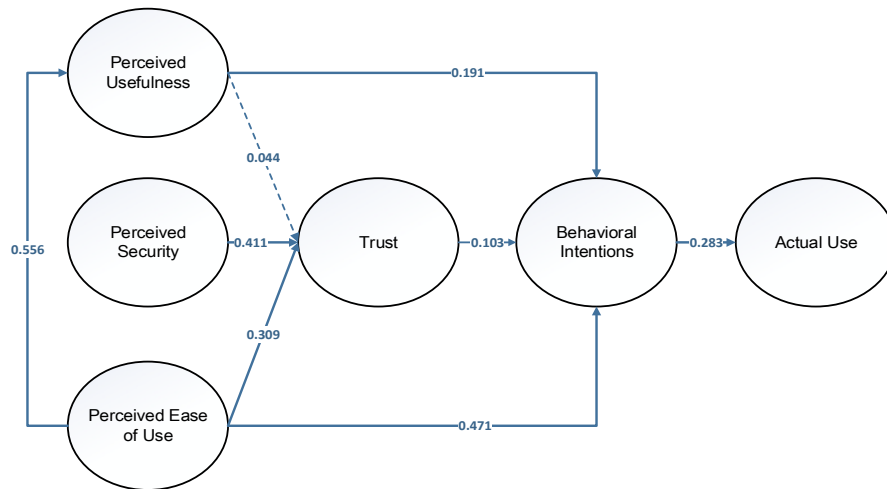
Table 3. Results of Research Model Testing

	Hypotesis	Path coeff.	t-value	p-value	Result
H1	Perceived Ease of Use → Perceived Usefulness	0.556**	6.259	0.000	Accepted
H2	Perceived Usefulness → Trust	0.044	0.420	0.674	Rejected
H3	Perceived Security → Trust	0.411*	2.208	0.028	Accepted
H4	Perceived Ease of Use → Trust	0.309*	2.289	0.023	Accepted
H5	Perceived Usefulness → Behavioral Intention	0.191*	2.145	0.032	Accepted
H6	Perceived Ease of Use → Behavioral Intention	0.471**	4.553	0.000	Accepted
H7	Trust → Behavioral Intention	0.103	0.822	0.411	Rejected
H8	Behavioral Intention → Actual Use	0.283**	3.180	0.001	Accepted

Note: * p < .05; ** p < .001

There are interesting findings from the Table 3 above, where H2 and H7 are rejected from the hypotheses. H2 infers that although major customers perceive the usefulness of ATM, but they still do not develop sufficient trust on the ATM. The security issues around ATM are still the major concerns for them. Many factors may involve contributing these issues such as: the security around the ATM area [13], loop-holes of security measures [6], awareness of customer services [17], awareness of customer [4], etc.

H2 addresses the importance of (Bank) policy maker to develop appropriate strategy to the perceived usefulness of the customers related to ATM, to create trust levels. It can be understood, since many of Indonesian customers are quite worried with banking technology, such as internet banking, e-payment, etc. They may get benefits of the technology; however, on the other hand, they are reluctant to trust the technology. External factors such as: government regulation, weak law enforcement, slow response dealing with fraud, etc., may contribute to the trust factor [10-13].

H7 infers that although the customers do not have sufficient trust, they still show high intention to use the ATM. ATM is perceived already as basic needs for major Indonesian customers. This finding is quite interesting, since it seems contradicts with the original TAM

assumption [15], where the usefulness has direct impact to the behavioral intention, however with the missing trust factor. The trust factor is considered as an irony part of behavior intention to use ATM. It infers that many issues related to ATM or other electronic based security has yet taken seriously by the banks and law enforcement [7].

The other findings comply with the hypotheses such as: (H1) perceived ease of ATM use has direct links to the perceived usefulness [24]. It infers the more familiarity of customers with the ATM will guide them to use ATM more frequently; (H3) perceived security has direct links to trust; (H4) is similar to (H3), states that the perceived ease of use has direct links to the trust; (H5) perceived usefulness has direct links to the behavioral intention; (H6) perceived ease of ATM use has direct links to the (ATM) behavioral intention, and (H8) the (ATM) behavioral intention has delivered benefits for (ATM) actual use. The study shows that perceived security and trust is the most important issues need to be taken by banking institution and law enforcement in order to deliver higher level of usefulness and ease of use.

4. Conclusion

This study proposes a revised Technology Acceptance Model (TAM) that adapts with the needs of the banking customers such as perceived security and trust. The model comprises of: perceived usefulness, and perceived ease of use, with additional variables: perceived security and trust to investigate the continuation of perception and the impact that may occur on the use of ATM services. The study shows the relationships between (H1) perceived ease of use of ATM to the perceived usefulness; however, the (H2) perceived usefulness of ATM does not link with the trust issues for the customers. It infers that customers may not trust the ATM, but they still use it; The (H3) perceived security of the ATM contributes to the trust of customers; The (H4) perceived ease of use has direct links with creating trust. The (H5) perceived usefulness has direct impact to the creating behavioral intention; however, the (H7) trust factor does not correlate with the behavioral intention. It infers regardless of trust issues, customers will still use the ATM; the (H8) customer behavioral intention determines the use of ATM.

The study concludes that the factor of trust and security in the use of ATM are important elements which should be maintained and enhanced by the banks in order to maintain the continuity technology based financial services. Therefore, banks in Indonesia must develop strong relationships with their customers through maintaining technological innovation, improve system performance, increasing the speed of banking services, and enhancing security to meet with the customers needs. Banks can also continue to maintain and increase customer trust in order to continue using banking services through improvements and development of features and technical attributes of the services [25]. Developing effective project management is also another factor that should get serious attention when dealing with the security issues [26].

Our recommendation for future research in this domain is to analyze the correlation between perceived security and trust on users' acceptance of e-payment system in Indonesia. Then, these findings encourage needs of further research to explore existing models with additional variables in order to become more powerful and valid such as customer satisfaction and loyalty.

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