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Empirical Study on Customer Perception of E-Commerce: Mediating Effect of Electronic Payment Security

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Abstract
This research aims to give empirical evidence in the mediating role of e-payment security on e-commerce's customer purchase intention. This study involved millennia's generation in Semarang, which used structural equation modelling to analyze the model. The analysis stages consist of evaluating measurement, structural, the goodness of fit model, and hypothesis testing. The finding showed that there is a mediating effect of perceived usefulness in the relationship perceived ease of use to purchase intention, and also the relationship perceived ease to use on e-payment security perception. These results indicated that consumer's purchase intention strongly influenced of ease of use and usefulness understanding, without directly associated with the payment security aspects.

Keywords: *e-commerce;, e-payment security; perceived usefulness; perceived ease to use; purchase intention; TAM*

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INTRODUCTION

The security issue is one critical aspect of the increasing information and communication technology use in digital economics (Von Solms & Van Niekerk, 2013). Internet penetration in the digital economy allows access to online information and facilitates knowledge transfer across borders through every people (Tapscott, 1996). Online trading, commonly called electronic commerce (e-commerce), is one of the digital business platforms that used for easiness and convenience trading's purposes (C. Kim, Tao, Shin, & Kim, 2010). E-commerce utilization cannot separate from the existence of electronic payment for an efficient and effective benefit (Asokan, Schunter, & Waidner, 1996). Enormous e-commerce using of millennia's generation carries on security risks and privacy problems. The study of (Al-ma'aitah & Shatat, 2011) explained that electronic payment technology needed to provide sufficient safeguards mechanisms, ensuring the validity of financial transactions and protect all customers' information.

The previous studies' results were inconsistent findings concerning the effects of security on online consumer's perception. For example, (Salisbury, Pearson, Pearson, & Miller, 2001)

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and Kim et al. (2010) stated that there are effects of security aspects on e-commerce's consumer perceptions; otherwise, Raut, Priyadarshinee, & Jha (2017) explained that no mediating effects toward consumer perception because it is clear that information security is not a product or a technology, but a process. Crisp, Jarvenpaa, & Todd (1997), also found that personal risk is not relevant to the risk of shopping experience. Salisbury et al. (2001) revealed that trading experience, which articulated with perceived ease and usability, did not affect the intention to buy, but also influenced by perceived security on the transaction. Based on these gaps, this research aims to give empirical evidence for e-commerce's customer perception that mediated by the e-payment security mechanism. Practically, the result expected use for Internet users to complete the online transaction using electronic payment securely and as additional literature in electronic commerce and electronic payment security studies.

Electronic commerce (e-commerce) defines a process buying and selling products electronically, by consumers and from a company to another with the computer as an intermediary of business transactions (Liang & Turban, 2011). E-commerce activities involve consumers, manufacturers, service providers, and traders using the Internet, and making security and reliability aspects in transaction paying become important (Kalakota, R., & Whinston, 1997)). Electronic payments are an integrated financial part of e-commerce that gives the most critical aspects of security (Wang, Wang, Yu, & Zhang, 2019). All transactions are doing online, and it has to cut some traditional business connections and enabling transaction more effective and efficient at any time, people, and place. The growth of e-commerce and electronic payment make the weaknesses of credit, debit cards, and cheques are becoming more apparent. The lack of adequate payment mechanisms and infrastructure is one of the main restricting factors that hold back the growth of e-commerce (Laudon, K. C., & Traver, 2002)). That can conclude that any offline transactions forced to change to be online; it does not guarantee its mechanism as eligible as the original online transaction such as electronic payment (S. Kim & Garrison, 2009).

Electronic payment security is not just concepts, tools, approach, action, but it was a best practice that applied to secure the electronic environment within the organization and ensure user's confidential assets (C. Kim et al., 2010). These important assets include connected computing devices, personal, infrastructures, applications, services, telecommunication systems, and the totality of transmitted and or stored information in the electronic environment (Reid & Carcello, 2017). Electronic security makes specific three main processes in a system; input, process, and output were doing securely. Besides protecting the system itself, it also protects the entity and assets belonging organization and users. Al-ma'aitah & Shatat (2011)found empirically that security features such as authorization and encryption are essential mechanisms to be present and practised during electronic transactions. McCloskey (2018)investigated how the technology acceptance of electronic commerce for older consumers in Pennsylvania, that used the ease of use, usefulness, and trust as an intervening variable, age as an independent variable, e-commerce participation as the dependent variable. The research had concluded that ease of use does not appear to be a factor that contributes to the level of electronic commerce participation.

Other studies by Chellappa & Pavlou (2002) were using five variables; encryption, protection, verification, authentication, and limited financial liability, perceived security as moderating variable, reputation as a control variable, and trust in e-commerce transactions as the dependent variable. The result implies that the absorption of financial risk by third parties is not a sufficient predictor of trust in electronic commerce transactions. C. Kim et al. (2010) studies showed that both technical protections and security statements are significant factors in improving consumers' perceived security. Ratnasingham (1998)proposed a new electronic data interchange model by introduces the concept of trust and its influence in both the risks and controls in electronic commerce. The result concluded that both trust and security are needed to add in the new model of electronic data interchange security (S. Kim & Garrison, 2009).

Study of Davis (1989) proposed the beginning technology acceptance model (TAM), which adapted from Theory Reasoned Action (TRA) by Fishbein & Ajzen (1975). TAM is being used

to rate the technology user's behaviour based on determined variables and their relationship. TAM gives a reliable and simple explanation for accepting technology and how user behaviour for acceptance (Chuttur, Venkatesh, & Davis, 2000; Davis, 1989). Technology acceptance determines user behaviour when they feel that technology is beneficial and continuously could be used. After several years, Chuttur et al. (2000) suggested the latest TAM after both perceived usefulness and perceived ease of use were found a direct influence on behaviour intention, thus eliminating the needs for the attitude construct (Lai, 2017). Among the many variables that might have an impact on system use, prior research proposes two crucial determinants. First, Perceived Usefulness (PU) that people perceptions tend to use an application that they believe will help perform a better achievement. Eventually, if the potential users convinced that it is useful, at the same moment, they also convinced that the system is too difficult to use (Davis, 1989). Those facts showed that the effort of using the application outweighs the benefits. Summarized the second determinant that is used and theorized to be Perceived Ease of Use (Viswanath Venkatesh & Bala, 2008). Perceived usefulness defined as the degree perception to which a person convinced that a particular system would heighten job performance. On the contrary side, Perceived Ease of Use (PEU) refers to the degree to which a person convinced that using a particular system would be free of effort.

Salisbury et al. (2001)at the beginning proposed a development model from a previous Technology Acceptance Model (TAM) studies by (Davis, 1989) with an addition of new causal linkage investigates the influence of perceived web security on web purchase intention. Based on the model by Salisbury et al. (2001), found that increased levels of perceived web security will lead to greater intention to purchase products on the web. The proposed model research is adopted from Salisbury et al. (2001), that found proposed variables are perceived ease of navigation, perceived usefulness, web security (alter into e-payment security), and purchase intention. Venkatesh, Morris, Davis, & Davis (2003) defined perceived usefulness as a degree to which an individual believes that a particular system would increase their job performance. The concept describes the role of technology for job performance, the level of job performance within an organization. For example, are commonly strengthened by the number of paychecks received, promotions, incentive, and other prizes. A system with higher perceived usefulness is believed to have positive use in job performance. Perceived usefulness indicated as fundamental and distinct constructs that are influential in decisions to use information technology (Li, 2010). Perceived usefulness does have an impact on system utilization based on the work (Markus & Robey, 2008). A system with higher perceived usefulness is one for which a user believes in the existence of a positive use performance relationship. Salisbury et al. (2001)concluded that perceived usefulness influence in purchasing products on the web mediated by perceived security perception. The hypothesis proposed follows:

H1: Perceived usefulness influence positive indirectly to purchase intention, mediated by the existence of e-payment security.

The perceived ease of use extends to a belief if a particular system using would not be charged with the amount of work to do (Davis, 1989). Here, the work means when a person's ability to do their responsibility. So, it fair to said that a system or application perceived to be more comfortable is more likely to be accepted by users. Perceived ease of use is connected positively to perceived security because authentication is one of the forms of the security system. When authentication applied in the e-finance system, it will make the system positively secure (McCloskey, 2018). Thus, it can influence consumer security perceptions. In previous research conducted by Chellappa & Pavlou (2002), it concluded that consumer trust in e-commerce transactions involves risks other than monetary, even though authentication security certificates are rarely view, but this may explain the moderate support for authentication as an antecedent of perceived security. The hypothesis proposed as follows:

H2: Perceived ease of use positive influence indirectly to purchase intention, mediated by the existence of e-payment security.

E-payment security influence the customer's intention to purchase in the electronic transaction platform and positively related to perceived security. This extending model proved that e-payment would increase a secure's mechanism for sensitive information transmitting (e.g., credit card or social security number) in the real condition of system use. Someone will be satisfied using a system if they believe that the ease of use earned and when a system could help increase their performance and productivity than usually (Viehland & Leong, 2007). The hypothesis proposed as follows:

H3: Perceived ease of use influence positive indirectly to e-payment security, mediated by the existence of perceived usefulness.

Behavioural intention to technology using explains how someone planned to use the technology system between various decision-makings that required effort to employ and the accuracy of the resulting decision. Behaviour and action toward technology systems play a significant role in predicting the use of technology systems. Systems that can prove reliability and validity that employed and giving high accuracy from decision-making by optimization performance resulting will satisfy the system's user. It is shown in the system supporting and willing to system use (V. Venkatesh, Davis, & Morris, 2007). The hypothesis proposed as follows:

H4: Perceived ease of use influence positive indirectly to e-payment security, mediated by the existence of perceived usefulness

Based on the description above, the theoretical model from Salisbury et al. (2001) could be illustrated in the following figure:

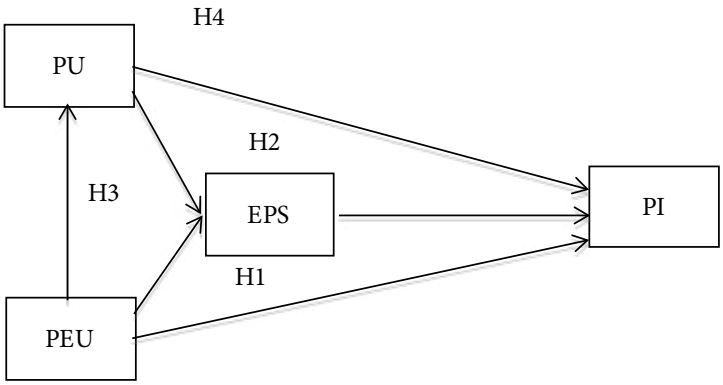

Figure 1. Theoretical Model

METHODS

The population was college students as millennial's generation representatives from many colleges, universities, polytechnic, academy, and other higher institutions in Semarang. Semarang is one of high e-commerce growth cities in Indonesia, showing the importance of beyond millennial generation preferences. The sample chosen is who has and uses the Go-Pay account as a frequently electronic payment method. Probability random sampling used without paying attention to the level that exists in that population. The formula from Saifuddin Ahmed (2009) determines the amount of the minimal sample taken was 96 observations. Primary data obtained directly from the college students in Semarang by online questionnaires shared the snowballing method among them. A five-point Likert scale was used to measure respondent perception about variables. Respondents were asked to choose a circle containing showed "strongly disagree" (number 1) or "strongly agree" (number 5) with the questions listed earlier. The Likert scale used in this study refers to Kim et al. (2010) research with variables from Salisbury et al. (2001) as follow: Perceived Usefulness (PU), Perceived Ease of Use (PEU), E-Payment Security EPS), and Purchase Intention (PI).

The endogenous variables in this study are purchase intention and electronic payment security (EPS). Purchase Intention (PI) is the propensity of consumers to purchase goods or and services (Arifani & Haryanto, 2018). According to works of Brown, Pope, & Voges (2003), purchase intention is measured by using four indicators, planning to buy, having budgeted money to buy, considering buying, and having a tendency to buy. Electronic Payment Security is a collection of system's securities used by Go-Pay application for its payment method. The exogenous variables in this study are perceived usefulness and perceived ease of use. Perceived Usefulness (PU) defines as a degree to which an individual believes that a particular system would increase their job performance (Davis, 1989). The concept of Perceived Ease of Use extent to a belief if using a specific system would not charge with the amount of work (Davis, 1989). The Perceived Ease of Use (PEU) on electronic payment security can be seen based on the customer side. This study using structural equation modelling, which analysis tool used is Smart Partial Least Square (Smart PLS). The analysis steps consist evaluation of measurement (outer model), structural (inner model), the goodness of fit model and hypothesis testing (Ghozali & Latan, 2017).

RESULTS AND DISCUSSIONS

The description of the results will explain descriptive statistics from the sample, the validity and reliability evaluation, the goodness of fit model evaluation and the hypothesis testing. This study describes the descriptive findings of the respondents, which presented in the following table:

Table 1. Descriptive Statistic

Description		Amount	Percentage
Sex	Male	29	30.2%
	Female	67	69.8%
Using	< 6 month	22	22.9%
E-Commerce	6 – 12 month	43	44.8%
	> 12 month	31	32.3%
Balance of EPS per month (IDR)			
	< 50,000	24	25.0%
	50,000 – 100,000	54	56.3%
	> 100,000	18	18.7%
N= 96			

Sources: processed primary data (2019)

Table 1 explains that respondents consisted of 67 women (69.8%) and 29 men (30.2%), and cumulatively 77.1% respondents using e-commerce over the six months. Most of the respondents accumulated reached 81.3% having a Go-Pay account balance below Rp. 100,000.00 per month. This information explains that millennial generation in Semarang using e-commerce transaction intensively.

Evaluation of the reflective measurement model (outer model) shown by convergent validity values, includes (1) individual reliability through standardized loading factor and (2) average variance extracted (AVE) value. Table 2 Panel A shows that the loading factor of each indicator is more than 0.7 so that the indicator is valid in measuring the variable construct (Ghozali & Latan, 2017). The AVE value of each latent variable's construct more than 0.5 and that supports the conclusion that the indictors are valid for explaining the variable. Table 2 Panel B shows divergent validity tests give a valid conclusion because the cross-loading factor of each indicator is higher than the AVE value. Formative measurements supported the reflective validity indicating that the weight indicator value more than 0.2 or significant as the formative reliability.

Evaluation of the CR and Cronbach Alpha for each variable is more than 0.8, so it concluded that the latent variables are reliable.

The structural model (inner model) evaluated considering the path coefficient and R2 value. Table 3 Panel B shows the significant path coefficient between variables at the level 5%, except for coefficients of perceived usefulness to purchase intention (0.109; p = 0.244). The R2 value of the variable indicates that the purchase intention classified as substantial variation (0.564), Perceived Usefulness classified as moderate variation (0.444) and Perceived Ease of Use classified as moderate variation (0.471), as well as the adjusted R2 values, even though the value is lower than the R2 value. These results indicate that the model is a fit structurally. Furthermore, Table 2 Panel D also examined the goodness of fit model. Comparing the values of SRMR, d_ULS, and d_G between the saturated and estimation model, to determine the goodness of fit model between the estimation model and the model that optimally obtained. The SRMR estimation model is the same as the saturation model of 0.075 less than 0.1, and the model is well specified. The Euclidean distance (d_ULS) value of more than 0.95 and Geodesic distance (d_G) more than 0.5 supported the research finding. The above results indicated no error specification in models and fit for use.

Table 2. The validity, Reliability Test & Goodness of Fit Model

Panel A. Convergent Validity Test				
Indicators	Outer Loading Factor			
	Purchase Intention	Perceived Ease of Use	Perceived Usefulness	E-Payment Security
X1	0.852	0.801	0.887	0.805
X2	0.847	0.898	0.922	0.713
X3	0.890	0.929	0.888	0.879
X4	0.858	0.829	0.874	0.804
X5	-	0.911	-	0.891
AVE	0.743	0.766	0.797	0.674
Panel B. Divergent Validity Test				
X1	0.852	0.801	0.887	0.805
X2	0.847	0.898	0.922	0.713
X3	0.890	0.929	0.888	0.879
X4	0.858	0.829	0.874	0.804
X5	-	0.911	-	0.891
Panel C. Reliability Test				
Composite Reliability	0.920	0.942	0.940	0.911
Cronbach Alfa	0.885	0.923	0.915	0.878
Panel D. Goodnes of Fit Model				
	Purchase Intention	Perceived Ease of Use	Perceived Usefulness	E-Payment Security
R^2	0.564	-	0.444	0.471
Adjusted R^2	0.555	-	0.438	0.468
SRMR			Saturated	0.075
			Estimation	0.075
Euclidean distance (d_ULS)			Saturated	0.959
			Estimation	0.959
Geodesic distance (d_G)			Saturated	0.609
			Estimation	0.609

Sources: processed primary data (2019)

The testing of the mediating effects of electronic payment security is carried out with the following conditions: (1) significant direct effect coefficients between variables, (2) significant total effect coefficients between variables, and (3) significant indirect effect coefficients and lower of total effect values (Ghozali & Latan, 2017).

Table 3 Panel A shows that all direct effect coefficient between variables is significant at the 5% level and indicating that the first mediating condition fulfilled. The total effect coefficient is significant at the level of 5% and shown that the second mediating condition fulfilled, and the indirect effect coefficient proved to be significant at the 5% level only for the influence of Perceived Ease of Use towards Perceived Usefulness through E-Payment Security (0.630; p = 0.000) and the effect of Perceived Ease of Use on Purchase Intention through Perceived Usefulness (0.833; p =0.000). These indirect coefficients above decrease when compared to the total coefficients and indicating that there are mediating effects. The results showed that H3 and H4 supported. Otherwise, the coefficient influence of Perceived Usefulness towards PI through E-Payment Security was not significant (0.084; p = 0.078) and the effect of Perceived Ease of Use on Purchase Intention through Perceived Usefulness (0.090; p =0.074). These results showed that H1 and H2 not supported.

Furthermore, evaluation of the types of mediation effect determined on the level of variance accounted for (VAF) calculation of the coefficient of indirect effects on direct effects. The results show that the effect of Perceived Ease of Use on PI is partially mediated by Perceived Usefulness, with VAF of 40.0% and the effect of Perceived Ease of Use on EPS is partially mediated by Perceived Usefulness, with VAF of 38.4%. Effect of Perceived Ease of Use on Purchase Intention through E-Payment Security and Perceived Usefulness to PI through E-Payment Security shows that both do not have a mediating relationship.

Table 3. Direct, Total Effect & VAF Calculation

				Direct/ (Indirect) Effect		Total Effect		VAF
				Coeffi	p	Coeff	p	
EPS	→ PI			0.232	0.012			
PU	→ PI			0.109	0.244			
PEU	→ PI			0.388	0.000			
PEU	→ PU			0.500	0.000			
PU	→ EPS			0.666	0.000			
PEU	→ EPS			0.364	0.001			
PEU	→ PU	→ EPS		(0.242)	0.002	0.630	0.000	38.4%
PEU	→ EPS	→ PI		(0.090)	0.074	0.199	0.000	45.2%
PU	→ EPS	→ PI		(0.084)	0.078	0.584	0.000	14.4%
PEU	→ PU	→ EPS	→ PI	(0.056)	0.065	0.556	0.000	10.1%
PEU	→ PU	→ PI		(0.333)	0.000	0.833	0.000	40.0%

Sources: processed primary data (2019)

This empirical finding presents that perceived ease for use, and e-payment security perception directly has a significant positive effect on purchase intention. This result was a different finding from the initial model of Salbury et al. (2013), which only found that e-payment security perceptions had a significant effect on purchase intention. This finding supports the studies of Jahangir & Begum (2008) and Darwis (2013)that Perceived Usefulness and Perceived Ease of Use simultaneously influence purchase intention in TAM's model from Davis (1989). Furthermore, testing of mediating effects on e-payment security perception on perceived usefulness, perceived ease for use to purchase intention found that there was no mediating effect of e-payment security to purchase intention, both from understanding the use and ease of use. However, other results

showed that Perceived Usefulness indirectly mediates the influence of Perceived Ease of Use on Purchase Intention. It means that the influence of Perceived Ease of Use on customer attitudes, Purchase Intention will have a more significant impact if mediated by Perceived Usefulness. This research supported the research of Hossain & Zhou (2018) and Bedi, Kaur, & Lal (2017), which confirms that customer perception of customer attitudes, namely purchase intention, is very determined by their perception of usability.

Although the perceived ease of use on e-commerce has a direct effect on purchase intention, the relationship will be stronger when consumer understanding completed with perceived ease of use. A more completes understanding, both in terms of convenience and usability, will further determine the decision to purchase using e-commerce. This result following the research of Hossain & Zhou (2018) that e-commerce use attitude more likely influence when perceived on e-commerce's ease of use understanding in refers to usability on e-commerce. E-commerce users who only understand the ease of use and or use partially will be more likely to be less e-commerce. There would be a different effect if users who understand the ease of use accompanied an understanding of the usefulness of e-commerce (Lau, Lam, Cheung, & Leung, 2019). The empirical findings confirm that college students, as a millennial generation in the Semarang, using e-commerce are influenced directly by the ease of use perceptions and then formalize perceptions of usability and payment security aspects. They tend to view e-commerce technology, initially in refer to ease-ability and later pay attention to usability and security. All of the e-commerce users and management must consider these findings by increasing the risk awareness in e-payment security transactions. Next, other future research must consider more attention to security risk on e-commerce, especially to e-payment, although in different pathways model to explain whether any better variables were influencing the user purchase decision. Another important aspect is the information systems design in e-commerce, which explains the accounting function that must consider the security and privacy in the financial transactions processing. E-commerce system design that considers the importance of security and privacy aspects would be shaping consumer behaviour, which supports the effectiveness and efficiency of the digital economic system.

CONCLUSIONS

This research has proven that perceived usefulness, perceived ease of use; e-payment security is variables that affect e-commerce's purchase intention in the millennial context. Furthermore, there is a mediating effect of perceived usefulness on the relationship perceived ease of use to purchase intention, as well as the relationship perceived ease to use of e-payment security. These results indicate that consumer' purchase intentions strongly influenced by an understanding of ease of use and usefulness without association with the security aspects of payment. This study has limitations, considering the respondents not reflecting regional proportionality, higher education institutions, and study programs. These aspects can reflect preferences for research variables, especially security aspects in e-commerce. Future research can use data collection techniques that further correct these limitations. Additional various types of study programs with a precise classification could be mapping the characteristics behaviour. This research is still limited to the variable intention to buy, not until the actual action. Further research to be the actual action in e-commerce transactions, follows the Unified Theory of Acceptance and Use of Technology (UTAUT) model.

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