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| **EMPIRICAL EVIDENCE ON CUSTOMER PERCEPTION OF E-COMMERCE: MEDIATING EFFECT OF ELECTRONIC PAYMENT SECURITY**  M. Noor Ardiansah1, Anis Chariri1, Indira Januarti1  1Diponegoro University  Jl. Prof. Sudharto, S.H. Tembalang Semarang  +628122821603/m.noorardiansah@gmail.com | | |
| Abstract  This research aims to give empirical evidence for customer perception of e-commerce that mediated by the e-payment security was used college students in Semarang as millennia’s generation. This study using structural equation modeling, which used Smart PLS. The analysis stages consist test of measurement, structural, goodness of fit model and hypothesis testing. Findings showed that there are mediating effects of perceived usefulness on relationship perceived ease of use to purchase intention and perceived ease of use to e-payment security. These results indicated that perception on ease of use and usefulness are highly influencing consumer perception to purchase, without mediated by the security of payment.  Abstrak  Riset ini bertujuan memberikan bukti empiris persepsi pelanggan terhadap e-commerce yang dimediasi oleh keamanan pembayaran elektronik pada mahasiswa di Semarang sebagai generasi milenial. Penelitian ini menggunakan analisis model persamaan struktural dengan memakai aplikasi Smart PLS. Tahapan analisis meliputi evalusi model pengukuran, struktural, uji kecocokan dan pengujian hipotesis. Temuan menunjukkan terdapat efek mediasi dari kegunaan yang dirasakan terhadap hubungan kemudahan penggunaan yang dirasa terhadap niatan membeli, serta hubungan kemudahan yang dirasa terhadap penggunaan keamanan pembayaran elektronik. Hasil ini menunjukkan bahwa kemudahan penggunaan dan kegunaan sangat berpengaruh terhadap persepsi konsumen untuk beli, tanpa dimediasi oleh keamanan pembayaran.  Keywords: e-commerce, e-payment security, purchase intention, TAM | | | |

# INTRODUCTION

Security is one important issue being raised in digital economic (Tapscott, 1996; Solms and Niekerk, 2013). This increasing use of digital economy allows access to information and facilitates knowledge transfer across borders to different people (Tapscott, 1996). Online transaction, commonly electronic commerce (e-commerce) is one of the digital economic platforms that have been used to trade for easiness and convenience purposes (Kim, Tao, Shin & Kim, 2010). The utilization of e-commerce cannot be separated from the existence of electronic payment, for an efficient and effective benefit (Asokan, Schunter & Waidner, 1996). Massive utilization of e-commerce from millennia's generation carries security risks and privacy. Al-ma'aitah and Shatat (2011) argue that payment technology needs to provide sufficient safeguards mechanisms, to ensure the validity of financial transactions and protecting all customers' information.

Prior studies results were inconsistent findings concerning the effect of online security on consumer's perception. Salisbury, Pearson, Pearson, & Miller (2001) and Kim et al. (2010) support existence of security factors on consumer perceptions of e-commerce. However, Mitnick and Simon (2002) found that information securities are not affected toward consumer perception because it was not a product or a technology, but a process. Jarvenpa and Todd (1997) also found that personal risk is not relevant to the risk of shopping experience. Instead, Salisbury et al. (2001)revealed that shopping experience, which is perceived with ease and usability did not affect the intention to buy, but also influenced by perceived security on the transaction. Based on these lacks, this research aims to give empirical evidence for customer perception of e-commerce that mediated by the e-payment security mechanism in online transactions. Practically, the final result is expected use by Internet users to complete the online transaction using electronic payment securely. This study also can be used as additional literature in electronic commerce and electronic payment security studies.

E-commerce is an electronic process of buying and selling products, by consumers and from a company to another with a business intermediaries transactions like Internet (Laudon & Loudan, 2002; Liang & Turban, 2011). E-commerce activities involve manufacture, service provider, and trader, and consumer using the Internet. Payments into e-commerce’s electronic form, making security and reliability of electronic money exchange are important and essential (Kalakota & Whinston, 1997). E-payment is an integrated with e-commerce and it most critical aspects of security issues (Zhang et al., 2012; Kim, Kim & Kim, 2019). All transactions are done online, so this idea has cut traditional ties and able to make effective and efficient. As indicated earlier, there is no attention among researcher either about the weaknesses of e-commerce and electronic payment. Guttmann (2003), Laudon and Traver, (2002) and O'Mahony, Peirce, & Tewari (2002) confirm that online payment mechanisms and infrastructure are the main restricting factors of e-commerce growth. It can conclude that any form of offline transactions forced to change to be online; it does not guarantee its eligible mechanism as the original online transaction such as electronic payment (Kim et al., 2019). Thus, this study intends to contribute in this area.

Electronic payment security is concepts, tools, approach, action, and best practice that applied to secure environment within institutional and user's assets (Kim et al., 2010). Assets include computing devices, personal, infrastructures, an application, telecommunication systems, and all transmitted and or stored information (Reid & Niekerk, 2014; Buch, Ganda, Kalola and Borad, 2017). Electronic security makes sure that three main processes in a system; input, process, and output are done securely. Besides protecting system itself, it also protects the entity and assets belonging organization and users. Al-ma'aita and Shatat (2011) found that authorization and encryption features are important mechanisms, which practiced in e-finance transactions. McCloskey (2018) investigated how the technology acceptance of electronic commerce for older consumers in Pennsylvania. He used ease of use, usefulness, and trust as an intervening variable, age as an independent variable, and e-commerce participation as the dependent variable. The research had concluded that perceived ease to use does not appear to be a factor that contributes to the electronic commerce participation.

Another studies by Chellappa and Pavlou (2002) were using five variables, namely: 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. Result implies that perceived of financial risk is not a sufficient predictor to trust in electronic commerce. Kim et al. (2010) studies showed that both technical protections and security statements are significant improving consumers' perceived security. Ratnasingham (1998) introduces a concept of trust and its influence in both the risks and controls as proposed a new electronic data interchange model. Result can be concluded that both trust and security is needed in the new model of electronic data interchange security (Kim et al., 2019).

Davis (1989) argued that technology acceptance model-TAM, adapted from Theory Reasoned Action (TRA) as appropriate theories for building a theoretical framework of e-commerce implementation. TAM has being used to rate the behavior of technology user based on certain variables and the relationship between each variable. TAM gives a strong and simple explanation in accepting technology and user behavior (Davis, 1989). Users of technology will determine the behavior in using it when they feel that technology is beneficial to the users and can be used continuously. Furthermore, Venkatesh and Davis (1996) expanded the TAM after finding of both perceived usefulness and ease to use were a direct influence on behavior intention, eliminating the attitude construct (Lai, 2017). Prior research proposes two important determinants; first, Perceived of Usefulness (PU) that user will use an application because they believe it will help perform their job better. Eventually, the potential users convinced that it means useful, but at the same moment, they also convinced that system use is too difficult (Davis, 1989). The effort using the application outweighs the facts of usage performance benefits. Second, Perceived Ease to Use was determinant and theorized to the degree, which a person convinced using a particular system would be free to effort (Davis, 1989).

Salisbury et al. (2001) proposed model from a prior study by Davis (1989) with new causal linkage investigates the influence of perceived web security on web purchase intention. Based on the new proposed model by Salisbury et al. (2001), it can be found that increased levels of perceived web security will lead 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, usefulness, web security (alter into e-payment security), and purchase intention. Perceived of usefulness defines as a degree to which an individual believes that a certain system would increase their job performance (Davis, 1989). That describes the role of technology for job performance, the level of job within an organization. A system with higher perceived usefulness is believed to have positive use in job performance. Perceived usefulness is fundamental and distinct constructs that are influential in decisions to use information technology (Davis, 1989). Perceived usefulness have an impact based on the work on system utilization (Schultz & Slevin, 1975; Robey, 1979). 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 purchased products on the Web mediated by perceived e-payment security. The first hypothesis is as follows:

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

Perceived ease of use extends to a belief if using a certain system, would not be charged with the amount of work (Davis, 1989). Here, work means the ability that a person put on a matter to which they held responsibly. So, users more likely accept it fair to say that perceived ease to use. Perceived ease to use is connected positively to perceived security because authentication is one of the forms of the security system. When authentication applied in e-finance system, it will make the system positively secure (McCloseky, 2018). So that it can influence consumer security perceptions. In previous research conducted by Chellappa and Pavlou (2002), it is concluded that consumer trust in e-commerce transaction involves risks other than monetary, even though authentication security certificates are rarely view but it explained the moderate support for authentication as an antecedent of perceived security. The hypothesis developed as follows:

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

E-payment security affected intention of customers to buy products on the e-payment platform is positively related to perceived security. This extent proved that e-payment must be secure for transmitting sensitive information (e.g. credit card or social security number). Actual system use is the real condition of system use. Someone will be satisfied by the use of a system if they believe that the ease of use is earned and when a system could help increase their performance and productivity that usually in the real conditions of use (Viehland & Leong, 2007). The hypothesis is as follows:

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

Behavioral intention explains how someone's intention to use the technology system in various decision-makings, between the required efforts employing and the accuracy of the resulting decision. Behavior and action toward technology lead a significant role in predicting the use. Systems that can prove reliability, clear off the effort that employed and give high accuracy from decision-making. By resulting optimal performance will be able to satisfy the system's user. It is shown by user behavior that supports the system and willing to use (Davis, 1989). The hypothesis developed 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, it can be illustrated in the following figure:

PEU

PU

EPS

PI

H4

H1

H2

H3

Figure 1. Theoritical Model

Sources: Salisbury et al. (2001),

# METHODS

The population was college students in Semarang as millennia’s generation, who have and use Go-Pay account as an electronic payment method. Probability random sampling used without gives attention to the level that exist in that population. Amount of the sample taken is determined by the formula (Riduwan, 2012):

N = 96,04

The confidence level in this study is determined at 95%, and then the value of Z/2 is 1.96. Sampling rate error (d) is determined at 10% and a standard deviation () of 0.5. The Minimal sample that could use was 96 observations.

Primary data is obtained directly from the college students in Semarang by online questionnaires. Five-point Likert scale’s 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 to 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 consumer’s propensity to purchase goods (Arifani and Haryanto, 2018). According to Ika, Diallo & Thuillier (2012), purchase intention is measured use four indicators; planning, budgeting, 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 of Usefulness (PU) defines as a degree to which an individual believes that a certain system would increase their job performance (Davis, 1989). The concept of Perceived Ease to Use extented using certain system would not be charged 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 modeling, which analysis tool used is Smart Partial Least Square (Smart PLS). The analysis stages consist of measurement (outer), structural (inner), goodness of fit evaluation and hypothesis testing.

# RESULTS AND DISCUSSION

The description of the results will explain descriptive statistics from the sample, test the validity and reliability data, test the goodness of fit and test the hypothesis. This study describes the descriptive findings of the respondents, which are presented in the following table 1:

**Table 1. Descriptive Statistic**

|  |  |  |  |
| --- | --- | --- | --- |
| Description | | Amount | Percentage |
| Sex | Male | 29 | 27,6% |
|  | Female | 76 | 72,4% |
| Using | < 6 month | 22 | 21,0% |
| E-Commerce | 6 – 12 month | 43 | 41,0% |
|  | > 12 month | 40 | 38,0% |
|  |  |  |  |
| Balance of E-Payment |  |  |  |
| per mounth (IDR) |  |  |  |
|  | < 50.000 | 33 | 31,4% |
|  | 50.000 – 100.000 | 54 | 51,5% |
|  | > 100.000 | 18 | 17,1% |
| N= 105 |  |  |  |

Sources: processed primarly data ( 2019)

Table 1 explains that respondents consisted of 76 women (72.4%) and 29 men (26.6%), with 79% of respondents cumulatively using e-commerce over the past six months. Most of the respondents, accumulated reached 82.9% having a Go-Pay account balance below Rp. 100,000.00 per month.

Evaluation of the reflective measurement model (outer model) is done by convergent validity, 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 (Latan & Ghozali, 2012). This is supported by the AVE value of each construct of the latent variable more than 0.5 so that it can be concluded that the valid latent variable is explained by the variant of the indicator. Table 2 Panel B shows divergent validity test give valid conclusion because the cross-loading factor of each indicator is higher than the AVE value. Reflective validity above is supported by formative measurements indicated by the weight indicator value of more than 0.2 or significant as the reliability formative indicator. Evaluation of the CR and Cronbach Alpha for each variable is more than 0.8 so it is concluded that the latent variables are reliable.

The structural model (inner model) evaluated by 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 PI is classified as substantial (0.564), PU is classified moderate (0.444) and PEU is classified moderate (0.471), as well as the adjusted R2 values, even though the value is lower. These results indicate that the model is structurally good. Furthermore, the goodness of fit model will also be examined on Table 2 Panel D. Comparing the values of SRMR, d\_ULS, and d\_G between the saturated and estimation model, determine the goodness of fit between the estimation model and model that can be optimally obtained. The SRMR estimation model is the same as the saturation model of 0.075 less than 0.1 so the model is well specified. The finding is supported by the Euclidean distance (d\_ULS) value of more than 0.95 and Geodesic distance (d\_G) more than 0.5. The above results indicated no error specification in models and fit for use.

**Table 2. Validity, Reability Test & Goodness of Fit Model**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Panel A. Convergent Validity Test | | | | | |
| Indicators | Outer Loading Factor | | | | |
| Purchase Intention | Perceived Ease of Use | Perceived Usefullnes | 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. Reability Test | | | | | |
| Composite Reability | 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 Usefullnes | | E-Payment Security | |
| R2 Value  Adjusted R2 Value | 0,564  0,555 | -  - | 0,444  0,438 | | 0,471  0,468 | |
| SRMR | | | Saturated | | 0,075 | |
| Estimation | | 0,075 | |
| d\_ULS | | | Saturated | | 0,959 | |
| Estimation | | 0,959 | |
| d\_G | | | Saturated | | 0,609 | |
| Estimation | | 0,609 | |

Sources: processed primarly 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. Table 3 Panel A shows that all direct effect coefficient between variables is significant at the 5% level so that the first condition is fulfilled. The total effect coefficient is significant at the level of 5% so that the second condition is fulfilled, and the indirect effect coefficient proves to be significant at the 5% level only for the influence of PEU towards PU through EPS (0,630; p = 0,000) and the effect of PEU on PI through PU (0,833; p =0,000). These indirect coefficients above decreases when compared to the total coefficients so that it indicated there are mediating effect. Results showed that H3 and H4 supported. Otherwise, the coefficient influence of PU towards PI through EPS was not significant (0,084; p = 0,078) and the effect of PEU on PI through PU (0,090; p =0,074). These results showed that H1 and H2 not supported.

Furthermore, evaluation of the types of mediation effect is 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 PEU on PI is partially mediated by PU, with VAF of 40.0% and the effect of PEU on EPS is partially mediated by Perceived Usefulness, with VAF of 38.4%. The effect of PEU on PI through EPS and PU to PI through EPS shows that both do not have a mediating relationship.

**Table 3. Direct, Total Effect & VAF Calculation**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | | | | | | | | | | | | | | Direct / (Indirect) Effect | | | Total Effect | | VAF |
|  | |  | |  | |  | | |  | | |  | |  | Coefficient | p | | Coefficient | 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 | 0,384 |
| PEU | | 🡪 | EPS | | 🡪 | | PI | | |  | |  | | | (0,090) | 0,074 | | 0,199 | 0,000 | 0,452 |
| PU | | 🡪 | EPS | | 🡪 | | PI | | |  | |  | | | (0,084) | 0,078 | | 0,584 | 0,000 | 0,144 |
| PEU | | 🡪 | PU | | 🡪 | | EPS | | | 🡪 | | PI | | | (0,056) | 0,065 | | 0,556 | 0,000 | 0,101 |
| PEU | | 🡪 | PU | | 🡪 | | PI | | |  | |  | | | (0,333) | 0,000 | | 0,833 | 0,000 | 0,400 |
| Sources: processed primarly data (2019) | | | | | | | | | | | | | | | | |  | |  | |

Empirical finding presents that perceived usefulness, perceived ease for use and e-payment security directly have a significant positive effect on purchase intention. This was a different finding from the initial model from Salisbury et al. (2001)), which only found that e-payment security perceptions had a significant effect on purchase intention. This finding supports the study of Jahangir & Begum (2008) and Yulihasni, Islan & David (2011) that Perceived Usefulness and Perceived Ease of Use simultaneously influence customer attitude (purchase intention) as 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, another results showed that Perceived Usefulness indirectly mediates the relationship of Perceived Ease of Use on Purchase Intention. It means that Perceived Ease to Use on customer attitudes, Purchase Intention will have a more significant impact if mediated by Perceived Usefulness. This research was supported by 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 can have a direct effect on purchase intention, the relationship will be stronger when consumer understanding is equipped with perceived ease. A more completes understanding both in terms of convenience and usability will further determine the decision to buy in e-commerce. This is in line with the research of Hossain & Zhou (2018) that the attitude to use e-commerce is more likely to be influenced strongly when understanding will be perceived that ease of use on e-commerce is understood in terms of 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. These is a different effect if users who understand the ease of use are accompanied by an understanding of the usefulness of e-commerce, and likely to be more transaction (Lau et al., 2019).

# CONCLUSIONS

This research has proven that usefulness, ease of use, and e-payment security are perceived to affect purchase intention in the context of college student. Furthermore, perceived ease of use was influence to purchase intention, mediated by perceived usefulness. The relationship perceived ease to use was mediated by perceived usefulness to e-payment security. These results indicate that consumers purchase intention strongly influenced by an understanding of ease of use and usefulness, without association with the security aspects of payment. Limitations of these research considering the respondents not reflecting regional proportionality, higher education institutions, and study programs. These aspects are able to reflect preferences for research variables, especially security aspects in e-commerce. Future research can use data collection techniques that further correct these weaknesses. In addition to also adding various types of study programs, but with a clear classification so that the results can be mapped. 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 other model.

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