

Investigating the Adoption of Digital Payment System through an Extended Technology Acceptance Model: an Insight from the Indonesian Small and Medium Enterprises

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Abstract— Digitalization in the payment system has been promoted by the Indonesian government since the government is targeting to become the largest digital economy in Southeast Asia. However, not all companies can adopt digital payments quickly. Small and Medium Enterprises (SMEs) have many obstacles to adopt innovative technologies, mainly due to a lack of knowledge and resources. On the other hand, many consumers are getting used to digital payments and demanding SMEs to facilitate their transaction processes with digital payment systems. Therefore, the primary purpose of this study is to analyze factors affecting the digital payment system adoption in SMEs, particularly small and medium-sized restaurants. It used an extended Technology Acceptance Model (TAM) as a theoretical framework. Thus, 120 data were gathered using self-administered questionnaires from owners or managers of small and medium-sized restaurants in Bogor, Indonesia. Structural Equation Modeling with Partial Least Square (SEM-PLS) was employed to assess the hypotheses that were developed. The findings suggested that the intention to use digital payment was determined by the perceived ease of usage, perceived usefulness, attitude towards digital payment, and trust. This research approved that the applicability of TAM with the inclusion of additional variables in the model and the adoption of the digital payment system in small and medium-sized restaurants in developing countries like Indonesia. It offers valuable information for policymakers and financial institutions such as banks in understanding the critical variables influencing large scale implementation of the digital payment system in Indonesia.

Keywords— digital payment; Indonesia; small and medium restaurant; technology acceptance model.

I. INTRODUCTION

Small and medium enterprises (SMEs) play critical roles in a country's economy at both the local and national levels [1]. A vast number of SMEs can provide jobs, reduce poverty, and encourage regional growth [2]. Furthermore, in various countries, more than 75% of national products are contributed by SMEs [3]. However, SMEs are currently facing a very high competitive situation that can inhibit their growth, thereby reducing their contribution to the economy [4], [5]. In an increasingly competitive business environment, the competitiveness of SMEs, particularly in developing countries such as Indonesia, is greatly influenced by their ability to adapt to the technology [6]. Therefore, it is vital to know the adoption process and behavior of SMEs in Indonesia toward new technology.

The adoption process of a person or company to new technology can be analyzed through the technology

acceptance approaches. In the last few decades, researchers have developed several models to understand factors influencing the acceptance of technology by its users. These models have been verified by researchers in many information technology-based companies to test their effectiveness [7], [8]. However, the technology acceptance model (TAM) proposed by Davis is so far the most powerful model to explain the behavior in the new technology acceptance, especially in the digital technology adoption [9].

Many companies have adopted it to improve their competitiveness, along with the development of digital technology. At present, business people and companies are already using digital technology. In general, they use digital technology for communication with their stakeholders, such as customers and suppliers. Recently, they also use digital technology for payment system [10], [11]. On the other hand, the current developments indicate a change in society towards a cashless society where digital payments are

becoming a trend. In 2018, many developed countries used electronic money instead of paper money. In Indonesia, the government has encouraged digitalization by launching the vision of "Go Digital 2020". The Indonesian government targets to become the largest in Southeast Asia in terms of the digital economy. With annual growth of 50%, the value of the online business will be up to 130 billion US dollars [12]. Meanwhile, Bank of Indonesia (BI), as a monetary authority, has issued a Blueprint of the digital payment system 2025 in November 2019 [13]. One of the purposes of this Blueprint is to increase SME access to banks and other formal financial institutions. BI intends to use this digitalization stream to encourage the implementation of an inclusive financial system, where increasingly are involved in the formal financial system, including SMEs.

Indonesian SMEs, 63 million, are business entities that have a crucial role in the national economy [13]. The problem is that digital payment systems, as new technological innovation, are not necessarily quickly adopted by SMEs [14] compared to large enterprises with resources to adopt digital technology in their business operation [15]. Distribution of SMEs in Indonesia can be separated between Java and outside Java island. The majority of SMEs are located in Java as many as 60% and located outside Java only 40%. From those figure, merely 30-40% SMEs could utilize digital technology for developing their business.

There are a lot of research on adoption of technology conducted in developed countries such as the United States [16], the United Kingdom [17], Denmark, Australia [18], Spain [19], Italy [20] and Canada [14]. So far, those researches, especially related to the digital payment system adoption, are still rare in developing countries, such as Indonesia. Meanwhile, the diffusion of digital technology in business significantly differs between developing and developed countries [21], [22].

Therefore, it is very important to understand the factors influencing the adoption of digital payment systems among Indonesian SMEs. By identifying the factors affecting digital payment system adoption among Indonesian SMEs, the digital payment usage by SMEs can be predicted and its future growth can be measured. Possibly, the understanding of these factors may influence the success of Indonesian SMEs in adopting and implementing the digital payment system. This research aims to analyze the intention of digital payment adoption by SMEs in Indonesia, and the factors influencing the adoption of digital payment technology as an innovation in the payment system. The context of country and industry setting and by adding an important variable based on the research context make this present study more valuable and display novelty.

II. MATERIALS AND METHODS

A. Research model and hypotheses development

This research used an extended TAM approach. The TAM is a development of a previous theory, namely Theory Reason Action (TRA) developed by Davis [23]. In the concept of the TRA model, people's perception and evaluation of new technology will influence their attitude towards that new technology. Perception related to the

benefits and ease of usage of new technology is a strong motive for one to accept new technology.

TAM is a well-established and robust model in predicting the factors influencing technology acceptance [24]. TAM model suggested that a person's intention to adopt a new technology is significantly affected by usefulness perception and ease of usage perception. The perception of usefulness illustrates the ways the company's perception of the usefulness of technology improves its performance. Meanwhile, the perception of ease of usage illustrates how companies view technology adoption as a natural process [25]. Several previous studies on the TAM have revealed the consistent results in which perceived usefulness has strongly influenced the intention to use technology. TAM postulates that perception of usefulness is affected by perceived ease of usage since the easier it is to use a system; it can be the more useful [26]. Understanding the determinants of perceived ease of usage would enable intervention in the business, thereby making it possible to augment the adoption and usage of innovation. Previous research showed that perceived ease of use positively influences perceived usefulness as perceived ease of use is significantly related to intention through its impact on perceived usefulness [25].

In the TAM, the perceived usefulness variable and ease of usage variable are the two critical exogenous factors, while variable of attitude and variable of usage intention are the significant endogenous factors. Attitude variable describes a person feeling, favorable or unfavorable, toward adopting a specific technology, leading to the usage intention a certain technology, and determining the technology adoption process [27], [28]. Past studies found that variable of usefulness perceived by users and variable of perceived ease of usage positively affected variable of users' intention to accept systems [29]. However, there were other factors needed to be explored more since the result of such relationship various in the different context of culture and industry.

In order to achieve better predictive power, several studies have extended the TAM model by introducing more antecedents variable [7], [9], [27]. An extension of the TAM is generally adapted to different environmental and cultural contexts between countries. In developing countries such as Indonesia, the TAM model needs to be extended with the addition of the Trust variable. Trust variable is vital to be added since the use of the payment systems through the internet or digital technology is still perceived risky, given the number of frauds, hacker attacks, and others. Thus, the addition of the trust variable is expected to enrich the factors affecting the digital payment systems adoption in Indonesia, especially in SMEs context [30], [31].

Trust has been widely regarded as an important determinant in the assessment for the acceptance of new technology [9], [30], [31]. It can be defined as a company's confidence in new technology in the sense that users believe the services that can be provided by new technology. Regarding the digital payment systems, trust in the security of technological procedures and infrastructure will increase interest in adopting digital payment.

Based on the previous literature, the conceptual model proposed in this study can be seen in Fig. 1, while the relationship between variables can be seen in Table 1.

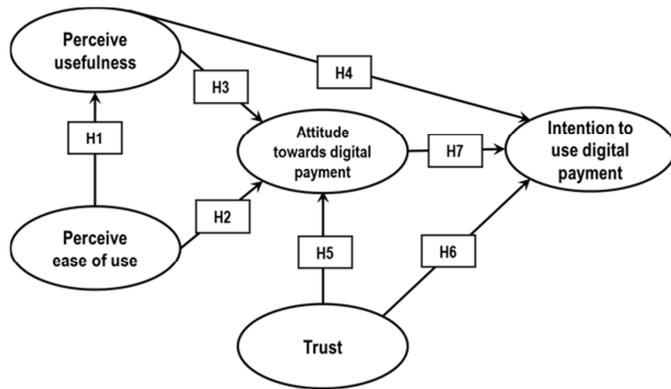


Fig. 1. Research model of adoption of digital payment by SMEs

TABLE I
LIST OF PROPOSED HYPOTHESES IN THE RESEARCH MODEL

Variable & Abbreviation	Hypothesis
Perceive ease of usage (PEU) → perceive usefulness (PU)	H1: perceive ease of usage positively influences perceived usefulness
Perceive ease of usage (PEU) → attitude towards digital payment (ATDP)	H2: perceive ease of usage positively influences attitude towards digital payment
Perceive usefulness (PU) → attitude towards digital payment (ATDP)	H3: perceive usefulness positively influences attitude towards digital payment
Perceive usefulness (PU) → intention to use digital payment (IUDP)	H4: perceive usefulness positively influences the intention to use digital payment
Trust (T) → attitude towards digital payment (ATDP)	H5: trust positively influences attitude towards digital payment
Trust (T) → intention to use digital payment (IUDP)	H6: trust positively influences the intention to use digital payment
Attitude towards digital payment (ATDP) → intention to use digital payment (IUDP)	H7: attitude toward digital payment positively influences the intention to use digital payment

B. Measurement Items

A survey was established based on previous researches and a literature review mainly on Technology Acceptance Model [25]. That is why the variable and measurement items in the present study can be considered have content validity. The model was improved by adding a variable, namely, trust (T). Three items were used to measure the PU, adapted from previous research [27]. Furthermore, the three items adopted from were used to measure the PEU [27], and the two items to measure attitude [32]. The trust variable will be measured by two items adapted from [9]. Finally, the two items adapted from [24], [33] were used to evaluate variable of intention to use. In sum, the most of the measurement items applied in this research were adopted and modified from previous relevant references. Therefore, the measurement instrument could be ensured in terms of the validity and reliability. Instrument in this study used a Likert scale to

measure all observed variable on ranging from one (strongly disagree) to five (strongly agree).

C. Data Collection

Quantitative data were collected through a survey involving 120 individual and face-to-face interviews among small and medium restaurants in Bogor city, Indonesia. Purposive sampling method was applied with the following criteria; 1) SMEs in the restaurant industry, 2) minimum operation of one year, 3) usage of digital payment, minimum 3 months. The definition of SMEs applied in this study follows that released by the Indonesian Statistic Agency (BPS). SMEs are categorized based on the workers number in which a small enterprise worker up to 20 people, and the medium enterprise workers between 21-100 people.

Further, the number of sample was decided base on the general rule of thumb for conducting SEM analysis [34]. Accordingly, the number of sample should be at least 100 respondents or a ratio of 5 to 10:1 observation per variable analyzed. The total number of questions to be used as the observed variable was 12. Therefore, the total respondent involved in this study was 120 people.

D. Data Analysis

The hypotheses of the proposed model in this research will be tested using Structural Equation Modeling-Partial Least Squares (SEM-PLS). The SEM-PLS is implemented in this study since the SEM-PLS is the most suitable analytical tools for testing the hypotheses, as the emphasis of this research is to analyze the determinant factors among the variables [34]. The PLS model primarily consists of structural and measurement models. Analysis of the structural model is carried out using measures of internal reliability and validity. Once the structural model is analyzed, the PLS algorithm utilizes t-testing and path values for hypothesis verification [34], [35]. Based on the proposed research model, this research has also utilized the PLS for analyzing the factors influencing intention to digital payment adoption in small and medium restaurants.

III. RESULT AND DISCUSSION

A. Respondent and Business Profile

The demographic profile of respondents can be seen in Table II. Male respondents represented 73.3% of the total participant. The age of respondents varied between 20-50 years. The highest number of respondents was observed in the group of 31–40 years old (33.3%), followed by the group of 41-50 years old (30%). Those ages are considered as groups who are more adapted to technological change including digital technology revolution. In terms of monthly income, most respondents (42.5%) earn about 10-20 million/month. It is considered as micro enterprises. The number of micro enterprises is dominant in the Indonesian economy. Therefore, the results of this study are in line with the structure of the Indonesian economy. The education level of respondents was observed mainly at the Senior high school (47.5%), followed by a bachelor's degree (30%). In this case, education level is probably associated with the attitude toward digital technology such as digital payment

system. Moreover, 41.7% of the respondents reported that they have 5-10 years of experience in the business.

TABLE II
CHARACTERISTIC OF RESPONDENTS

Demographic profile	Frequency	Percentage (%)
Gender :		
- Male	88	73.3
- Female	32	26.7
Age (year) :		
- 20 – 30	23	19.2
- 31 – 40	40	33.3
- 41 – 50	36	30.0
- > 50	21	17.5
Income (Indonesian Rupiah) :		
- < 10 million/month	27	22.5
- 10- 20 million/month	51	42.5
- 21-30 million/month	22	18.3
- > 30 million/month	20	16.7
Education :		
- Elementary	10	8.3
- Junior High School	17	14.2
- Senior High School	57	47.5
- Bachelor Degree	36	30.0
Business experience (years):		
- < 5	39	32.5
- 5 – 10	50	41.7
- 11 – 15	21	17.5
- > 15	10	8.3

The business profile of respondents can be seen in Table III. This study showed 38.3% of respondents have been operating business for 3-5 years and 29% of respondents have been operating business for 5-10 years. It can be said that they have enough experience in business and their business are sustainable. Furthermore, as much as 44.2% of respondents had less than 10 employees. The sales value of the majority of respondents (39.2%) was around 61-90 million/month.

Regarding the type of digital payment that they use, 75% of respondents used electronic money such as OVO, e-money, and T-cash, while 47.5% of them have been using the digital payment for 6-12 months. In Indonesia, there are many digital payment providers. Besides banks providing EDC, Credit card, and electronic money services, non-bank companies are providing electronic money such as OVO, DANA, Go-Pay, and Telkomsel T-Cash. However, the payment method based on the card is still the highest (34%) in Indonesia, followed by electronic money (20%) [36].

Regarding the reason to use digital payment by SMEs, the respondents mentioned that consumer demand (79.2%) is the highest consideration, followed by perceived benefit (65%). Other than that, respondents who use digital payment due to following current trend were 39.2%, meaning that SMEs restaurant in Indonesia have market orientation. Market orientation is important for SMEs. Previous research confirmed that market orientation influences business performance [6].

Meanwhile, the risks that they perceived from digital payment were delays in collecting money (55.8%) and fail in the transaction process (45.8%). The SMEs owners feel a delay in collecting money, probably when they use

electronic money such as Go-Pay, OVO and others. Based on the contract with such a provider, SMEs can receive their money after 8 hours of the transaction. Meanwhile, they need cash to buy raw material from the traditional market. SMEs often experience the case of failure in the transaction, probably because of an unstable digital connection since the strength of the network connection varies among places. Internet provider is also influencing the different quality of network connection since the service quality also varies among operators.

TABLE III
BUSINESS PROFILE OF RESPONDENTS

Business profile	Frequency	Percentage (%)
Length of operation (years):		
- < 3	20	16.7
- 3-5	46	38.3
- 5-10	35	29.2
- >10	19	15.8
The number of workers (person):		
- < 10	53	44.2
- 10 – 19	38	31.7
- 20 – 100	29	24.1
Sales value (Indonesian Rupiah):		
- <30 million /month	23	19.2
- 30-60 million/month	25	20.8
- 61-90 million/month	47	39.2
- > 90 million/month	25	20.8
Type of digital payment*		
- EDC	76	63.3
- Electronic money	90	75
- Credit card	18	15
Length of using digital payment		
- < 6 month	22	18.3
- 6-12 month	57	47.5
- 1-2 years	24	20
- > 2 years	17	14.2
Reasons to use digital payment*		
- Perceive benefit	78	65
- Consumer demand	95	79.2
- Input from a financial institution	39	32.5
- Third-party requirement	66	55
- Following the current trend	47	39.2
Perceive risk*		
- Difficult to set up	29	24.2
- Fail in transaction	55	45.8
- Cyber attack	17	14.2
- Delay in collecting money	67	55.8
- Costly	23	19.2

*Respondent may choose more than one option

B. Test the Outer Model

To evaluate the outer model, the validity and reliability of the instrument have been assessed. The assessment results showed that all indicators had a loading factor value of more than 0.7, meaning that no indicators are discarded because all indicators are considered in reflecting each of these observed variables accurately. Composite reliability (CR), average variance extracted (AVE), and Cronbach's Alpha was used to evaluate the reliability of the measurement instrument [34], [35]. The findings indicated that all the observed variables and the AVEs value were more significant than 0.5, providing evidence for convergent validity. In addition, the estimates of Cronbach's Alpha and

CR were more significant than 0.7, indicating reliability (see Table IV).

TABLE IV
RESULT OF THE MEASUREMENT MODEL

Variable	Factor loading	AVE	CR	Cronbach's Alpha
Perceive ease of use		0.872	0.953	0.927
PEU1 = learning to use digital payment would not be very difficult	0.935			
PEU2 = digital payment make transaction more flexible	0.932			
PEU3 = it is easy to use digital payment	0.935			
Perceive usefulness		0.896	0.963	0.942
PU1 = digital payment would improve the quality of transactions	0.939			
PU2 = digital payment would improve the accuracy of the transaction	0.936			
PU3 = digital payment reduces the time of the transaction	0.965			
Trust		0.843	0.891	0.855
T1 = transaction would be more trustworthy through the digital payment system	0.890			
T2 = transaction would be more safety using digital payment	0.902			
Attitude towards digital payment		0.954	0.977	0.952
ATDP1 = happy to use digital payment for business	0.976			
ATDP2 = Digital payment is vital to business	0.978			
Intention to use digital payment		0.889	0.941	0.878
IUDP = interested in using the digital payment for business	0.956			
IUDP2 = would gladly use the digital payment system	0.957			

C. Test of the Inner Model

Theoretically, factors affecting the digital payment adoption in SMEs can be predicted by technology acceptance model (TAM). Factor of usefulness and ease of use according to the developed model influence perception [25], which explains the behavior of digital technology adoption [26], [27].

Table V notes that the link of perceived ease of usage (PEU) on the perceived usefulness (PU) ($\beta = 0.425$, $p < 0.01$) and the attitude towards digital payment (ATDP) ($\beta = 0.327$, $p < 0.01$) is significant. Therefore, hypotheses H1 and H2 are accepted. The results of the present research are in line with those of previous research [25]-[27], who confirmed that the probability of innovation adoption might increase when SMEs owners or managers perceive adoption of innovation is easy. Perceived ease of use describes the degree to which an SMEs believes that using the new system or technology such as digital technology will be easy and perceived convenience is a process of expectation [16], [23], [25].

Therefore, these factors are significant in the Indonesian SMEs context, as has been found elsewhere. The more the people viewing the digital payment system as easy to use, the more the positive attitude towards the digital payment

system. In this case, it is important to digital technology provider such as digital payment provider to develop user-friendly product so that the SMEs owner or manager can perceive the digital payment as technology that easy to be adopted.

TABLE V
RESULT OF HYPOTHEZIED MODEL

	Hypotheses	β	SE	P-value	Result
H1	PEU \rightarrow PU	0.425	0.078	0.000	Supported
H2	PEU \rightarrow ADP	0.327	0.079	0.000	Supported
H3	PU \rightarrow ADP	0.283	0.066	0.002	Supported
H4	PU \rightarrow IUDP	0.290	0.068	0.001	Supported
H5	T \rightarrow ATDP	0.146	0.064	0.003	Supported
H6	T \rightarrow IUDP	0.211	0.072	0.001	Supported
H7	ADP \rightarrow IUDP	0.542	0.064	0.000	Supported

Furthermore, a significant relationship also occurs in the linkage between perceived usefulness (PU) and attitude towards digital payment (ATDP) ($\beta = 0.283$, $p < 0.01$), and between perceived usefulness (PU) and intention to use digital payment as well (IUDP) ($\beta = 0.290$, $p < 0.01$). Thus, hypotheses H3 and H4 are accepted. This result is in contrast with that of research conducted in Thailand SMEs [37]. In the Thailand SMEs context, perceived usefulness is not the critical predicting attitude. However, this research finding is in line with several previous researches that found perceived usefulness is essential [8], [10] [11]. Moreover, this research finding is consistent with other researches piloted in the developed countries, for instance in European countries concluding that attitudes toward information technology are affected by two focal variables, namely usefulness and ease of usage [14],[17],[19],[25].

Hypotheses H5 and H6 are supported as the effect of trust (T) on attitude towards digital payment (ATDP) ($\beta = 0.146$, $p < 0.01$) and intention to use digital payment (IUDP) ($\beta = 0.211$, $P < 0.01$) are significant. This research finding support past researches that confirming trust becomes an important variable in predicting attitude and intention toward digital payment adoption in the Indonesian context [9], [30], and [31]. Therefore, service providers of digital payment in Indonesia, such as banks and others, should work on establishing trust among users.

Finally, the effect of attitude towards digital payment (ATDP) in intention to use digital payment (IUDP) ($\beta = 0.542$, $p < 0.01$) is significant. Consequently, hypothesis H7 is accepted. This finding support prior research that highlighting the relationship between consumer attitudes and adoption intentions [7], [14], [20]. The intention of accepting new product innovation such as digital technology is primarily affected by the attitude of the user toward the digital technology itself [25]. Meanwhile personal attitudes toward digital technology are affected by two main variables, specifically variable of usefulness and ease of usage [25], [27]. To accelerate the growth of the digital payment market [38], digital payment service providers in Indonesia need to educate SMEs owners to adopt a digital payment system. They must convince SMEs as potential users that a digital payment system is useful for SMEs and easy to use. In

addition, the government can facilitate training to change the attitudes of SME owners so that they will have a positive attitude towards adoption of digital payments.

IV. CONCLUSIONS

This research developed a theoretical model based on the extended TAM model to determine the intention of SMEs to adopt the system of digital payment. This study contributes to develop a model for digital payment adoption in the Indonesian SMEs context especially SMEs restaurant, in which such studies are still rare. Moreover, it involved the trust variable, considering the business and technological environment context in Indonesia. Therefore, this study proposed a comprehensive model for digital payment adoption of SMEs as a novelty. These studies have provided important insights on technology adoption behavior particularly adoption behavior by SMEs restaurant towards digital payment system.

The findings of this research highlighted that the variable of perceived usefulness, variable of perceived ease of usage, and variable of trust are main drivers influencing the attitude and intention to use the digital payment system in the SMEs context. It can be understood because when SMEs owners feel that digital payment technology are used to provide usefulness to their businesses, both in improving the quality of transaction and accuracy, they will be happy with the system of digital payment.

However, this study found that SMEs still have perceived risk when using the digital payment system. The significant risk that they feel are delay in collecting money since they do not receive cash and fail in transaction caused by unstable digital connection. Consequently, digital infrastructure is very critical in making a digital payment system and pushing its successful adoption by SMEs in Indonesia.

Finally, using digital technology in the SMEs context was not only motivated by technology itself, such as ease to use and usefulness of the technology but also motivated by competitors' and customers' pressure. Therefore, it will be better to include the variable of competitor and customer pressures in future research to have a more comprehensive explanation about digital adoption in Indonesian SMEs. Moreover, the role of government is essential in encouraging SMEs to adopt new technology. In this case, the variable of government support is exciting to be explored in the developing countries context, like Indonesia.

ACKNOWLEDGEMENT

We would like to thank all respected SMEs owners or managers who have participated in this survey. By their participation, this paper will help researcher, practitioner as well as government to get lesson to learn related to digital adoption in SMEs.

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