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Mitigating Fraud Risk in Cash-Based Payment System via E-Payment Implementation: Case of Indonesia

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ABSTRACT
E-payment systems, also known as cashless payment systems, have gradually started to replace traditional payment systems. An e-wallet is an innovative cashless payment system that could make transactions more effective and efficient and could mitigate possible fraud risk in cash-based payment systems. This study intends to highlight the potential of e-wallets in mitigating fraud risks in payment systems. This study employs an iterative review of the literature and publications that are relevant to e-wallet and fraud mitigation in payment systems. Based on the analysis, the conclusion reached is that the e-wallet system could reduce the possible risk of fraud occurrence in cash-based payment systems.

Keywords: *E-Payment, Cash-Based Payment, Fraud, Risk, Fintech*

1. INTRODUCTION

Current advancements in technology have reached the point of providing ease and convenience for humans engaged in day-to-day activities. The evolution and achievement of technology itself has changed the way that people engage in not only daily activities but also business activities. Many business units have begun to consider acquiring technologies to support their business activities.

Another invention that forms the basis of what we know now as an information technology revolution is the Internet revolution. Leiner et al. (2009) stated that the Internet revolutionized the computer and communications world in a unique manner and gave a new perspective to prior inventions, such as the telephone, the radio, the TV, and the computer. The Internet itself has undergone a revolution from the 1960s until today, generating many more inventions that we know as the web revolution, the mobile revolution, and the digital revolution (Turban, Volonino, & Wood, 2015). The terminology includes e-commerce, mobile commerce, cloud computing, big data, digital economy, and—the last, a trending topic today—disruptive technology.

The emergence of e-commerce/mobile commerce has created other innovations in *financial technology* (fintech) for not only an official financial institution such as a bank but also other non-bank financial institutional forms. Fintech has created innovations such as Internet banking, mobile banking, and other e-payment systems—e-credit cards, e-cash, and e-wallets (Rainner & Cegielski, 2011).

2. PAYMENT SYSTEM

2.1. Traditional Payment System

Initially, payment systems in the early days were a consequence of executing transactions. In the past, until money was invented, transactions were done through a bartering system. According to Blakstad et al. (2018), money is a tool designed to make the exchange process easier than a bartering system. Up until now, money consists of coins and notes. This type of payment was known as a cash payment system/traditional payment system.

According to Dahlberg (2006), payment is defined as the transaction process through which funds are transferred from the payer (buyer, transmitter of funds) to the payee (seller, receiver of funds) directly or through an intermediary. Payment transactions are carried out using payment instruments.

2.2. E-Payment System

Along the way, the payment system was transformed into innovations, such as credit cards in the 1950s, automatic teller machines (ATM), and debit cards in the 1980s, e-commerce in the 1990s, and e-payment systems as the current innovation (Scardovi, 2017), which is included as a fintech innovation. Forms of e-payment systems include e-credit cards, e-cash, and e-wallets (Rainner & Cegielski, 2011).

This type of payment system has gradually started to replace the traditional payment system. An e-payment system is somehow known as a cashless payment system (Scardovi, 2017) in a cashless society.

3. E-PAYMENT SYSTEM IN FINTECH

As previously mentioned, fintech, which emerged in the last ten years, has become the innovation in the financial industry. According to Lee and Shin (2018), fintech has rapidly emerged, driven in part by a sharing economy, favorable regulations, and information technology.

Fintech provides new opportunities by increasing transparency, reducing costs, creating disintermediaries, and making financial information accessible (Zavolokina, Dolata, & Schwabe, 2017). This innovation was exposed to not only the banking industry but also started to involve non-banking industries. Many startup companies got involved in fintech.

Fintech consists of several types of businesses. Lee and Shin (2018) stated that typical types of fintech are *payment systems*, *wealth management*, *peer-to-peer lending*, *crowdfunding*, *capital markets*, and *insurance fintech companies*. The two largest types of fintech in Indonesia are payment systems (38%) and peer-to-peer lending (31%) (fintechnews singapore, 2018).

An e-payment system can consist of *credit cards*, *debit cards*, *Internet banking*, *mobile banking*, and *e-money/e-wallet* (Rainner & Cegielski, 2011). The first three are typically produced by the banking industry, and the last one is produced today by both the banking industry and non-banking industries. An e-wallet or digital wallet is available in a mobile phone or personal computer: "money is loaded from the bank account using a debit/credit card or Internet banking to make payments to people/merchants using the same wallet, therefore giving a comfortable cashless method" (Bagla & Sancheti, 2018).

3.1. Fraud in Payment Systems

Fraud in Information Technology

Fraud is defined as "any and all means a person uses to gain an unfair advantage over another person" (Romney and Steinbart, 2018). Fraud occurs in the form of, for example, deception, embezzlement, misappropriation, and corruption. Fraud can occur at the individual or organizational level. Fraud can also occur as an unintentional act or an intentional act (usually known as a computer crime).

Fraud from computer crime can occur because of a software error, operating system crash, hardware failure, power loss, or data transmission error—the more advanced the information technology, the greater the threat of exposure. The application's organization or vendor must have a strong risk management plan to minimize the exposure to threats and fraud. Subsequently, fraud and the threat of exposure of the traditional payment system are explained.

4. FRAUD IN TRADITIONAL PAYMENT SYSTEM

Until today, the traditional payment system in the form of a cash payment system has been threatened by exposure and fraud related to transactions.

The risk of using a cash-based payment system are as follows (Kumari, 2017; Meena, 2017):

- Risk of carrying cash. In the past, many robberies occurred when workers' salaries were still paid in cash. A person was appointed to take cash from the bank, and then took the cash to the office to distribute it to all of the workers.
- Cost of carrying cash. A safe deposit box, keys, and other tools are needed to protect the cash from being stolen.
- Exposure to money laundering, corruption, and bribery, which can happen when using cash.
- Increasing crime rate from carrying cash resulting from illegal transactions that primarily use cash, such as human trafficking, the drug trade, money laundering, and others.
- From the merchant's point of view, the cash-based payment system was somehow troublesome, inflexible, ineffective, and inefficient in terms of time.

All of the disadvantages of a cash-based payment system are mitigated by using a cashless payment system, which is further explained.

5. THE NEED FOR AN E-PAYMENT SYSTEM IN INDONESIA

As previously explained, traditional payment systems have many disadvantages. The innovation of information technology, particularly fintech, has led to the change from traditional payment systems to e-payment systems, including Internet banking, mobile banking, debit cards, credit cards, and—the most recent innovation—e-money/e-wallet, which represents fintech innovation.

Few studies aimed to identify the effect of using an e-payment system relative to a cash-based payment system/traditional payment system. The studies resulted in some findings and conclusions regarding the use of e-payment systems.

Meena (2017) explained the benefits of a cashless society that uses e-payment systems, as follows.

- Convenient mode of payment: an e-payment system is convenient for users and does not include a cost to carry, protect, and hold the funds.
- Lower risk: using an e-payment system comes with minimized risk relative to the traditional payment system/cash-based payment system because of sufficient and appropriate risk management and security from the application vendor. The traditional payment system is exposed to the risk of theft, loss, or damage.
- Decrease in the crime rate: many illegal activities, such as selling drugs, human trafficking, and money laundering, typically use a cash-based payment system.
- Transparency and monitoring: an e-payment system offers transparency of the transaction traffic within society, and the government can monitor the system to prevent illegal activities, such as tax avoidance, money laundering, and corruption. The system detects abnormal transactions.

From the merchant's point of view, the benefits of an e-payment system somehow reduce the handling of cash and queuing at stores (Clark, 2005).

Kumari (2017) stated that the following objectives of being cashless.

- Modernization of payment system: an efficient e-payment system results in the development and growth of economics.
- Efficient transactions: an e-payment system reduces the cost of the banking system and leads to the financial inclusion of unbankable citizens.
- Reduce the high cost of cash: the cost of cash includes the cost of carrying and holding cash.
- Reduce the high risk associated with cash: the cost of holding cash includes being robbed and facing other cash-related crimes.

The emergence of an e-payment system initially aimed to increase efficiency and effectiveness and reduce risk and fraud in payment transactions (Dahlberg, 2006; Hamdi, 2011; Hayashi & Bradford, 2012). At first, these objectives can be achieved through the aid of the tools/channels from ATMs, Internet banking, and mobile banking (Aishah Mohamad & Kassim, 2017).

The latest e-payment system technology is included in fintech. Fintech creates the opportunity to increase transparency, reduce costs, and make information more accessible for all users (H.-S. Ryu, 2018). Gupta and Xia (2018) also stated that fintech gives users a better customer-based banking system, reduces the risk and fraud that users face, and increases returns to all shareholders.

However, users are still becoming aware of using the current e-payment systems because they continue to worry about the security and privacy of their data. E-payment vendors are required to do their best when investing in securing user data. Vendors must strengthen their cybersecurity framework to minimize the risk of fraud (Stewart & Jürjens, 2018).

Trends in E-Payment Systems in Indonesia

For Indonesia, investments in fintech reached US$176.75 million as of 2017 (fintechnews singapore, 2018). This tremendous growth clearly reveals the future potential of the fintech market. In contrast, the banking system has put most of its IT investments (86%) into mobile banking and smartphone-based application and collaboration (46%) with fintech companies (PwC Indonesia, 2018). This collaboration occurs through the growth in payment systems from fintech companies.

Regarding statistics on e-payment systems in Indonesia, the Indonesia Central Bank website (www.bi.go.id) indicated that the number of e-wallet/e-money accounts in use was 173,825,919 as of January 2019. Assuming that every user owns at least two e-wallet/e-money accounts, the number of e-money users is approximately 86 million. In other words, given that the total population of Indonesia has reached 265.4 million (wearesocial.com, 2019), approximately 33% are e-wallet/e-money users.

The number of e-money/e-wallet transactions has increased over the years (www.bi.go.id, 2018), as illustrated in Figure 1.

Figure 1. Monetary Amount of E-Money Transactions in Indonesia during 2012-2018 *(source: www.bi.go.id)*.

In Figure. 1, the slope is steeper in 2017–2018 because of the mandatory use of e-money for highway toll payments in Indonesia.

As previously explained, debit and credit cards are included in the e-payment system. Their use is experiencing an increasing trend, similarly for e-money transactions, as indicated in Figure. 2 and 3.

Figure 2. Total Amount of Debit Card Transactions in Indonesia during 2012-2018 *(source: www.bi.go.id)*.

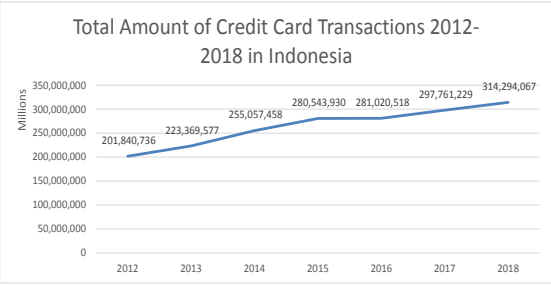

Figure 3. Total Amount of Credit Card Transactions in Indonesia during 2012-2018 *(source: www.bi.go.id)*.

Other facts that were accurate as of July 2019 are as follows. Thirty-eight e-money vendors—both card-based and application-based e-wallet/e-money vendors—received certification from the Indonesia Central Bank, and other vendors are in the process of being certified. All of these facts reflect the huge potential market for e-payment systems in Indonesia, even though the number of e-wallet/e-money users is still low. A gap exists between the supply and the demand from users, which requires an explanation. Previous studies such as from (H. S. Ryu, 2018; Stewart & Jürjens, 2018) found that potential users were still concerned with the security and risk management of this new technology.

6. DOES AN E-PAYMENT SYSTEM MITIGATE FRAUD IN TRADITIONAL PAYMENT SYSTEMS

The previous section explained that the aim of e-payment systems is to increase efficiency and effectiveness and reduce risk and fraud in payment transactions (Dahlberg, 2006; Hamdi, 2011; Hayashi & Bradford, 2012).

An indicator is needed to prove the effect of using and implementing e-payment systems, especially in Indonesia. This paper uses statistics on crimes as published by the Central Bureau of the Statistic Republic of Indonesia as a proxy for the mitigation of the fraud caused by e-payment systems. The number of crimes against rights/property in Indonesia involving violence is indicated in Fig. 4. The number of crimes against rights/property in Indonesia that did not involve violence is indicated in Figure 5.

Figure 4. Number of Crimes against Rights/Property Involving Violence in Indonesia (Source: Central Bureau of Statistics Republic of Indonesia. 2018).

Figure 5. Number of Crimes against Rights/Property Involving Violence in Indonesia (Source: Central Bureau of Statistics Republic of Indonesia. 2018)..

Figures 4 and 5, although approximate, indicate that the crime level from these two categories decreased from 2013 to 2018. These two categories were selected as a proxy because of the inclusion of robbery,

pickpocketing, and other types of crime that have the consequence of losing cash.

This study leads to the conclusion that an increase in e-payment system usage is followed by a decrease in the crime rate related to the traditional cash-based payment system. Further study is required to confirm this conclusion. The cause of the decreasing crime rate might involve other factors instead of only the increasing use of an e-payment system.

7. CONCLUSION

This section summarizes the discussion and findings on the comparison of e-payment systems and cash-based payment systems. Few previous studies mentioned the disadvantages of traditional payment systems that used cash-based payment systems, and the emerging e-payment systems aim to overcome these drawbacks and, eventually, make payment systems more efficient and effective.

This objective can be achieved given all of the support for e-payment systems, which are well prepared; users need to be convinced to use these systems. Previous studies concluded that e-payment systems are accepted.

This paper has limitations, given that only the e-payment system phenomenon in Indonesia was discussed. Further research can be conducted to confirm the premises that were concluded in this paper and previous studies.

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