CHAPTER II

LITERATURE REVIEW

2.1   Review of Current Situation

Payment system is defined as a system that makes it easier to carry out payment orders based on an agreement reached between system participants, on the common rules established by this Act, and in accordance with the common rules and procedures issued by the payment system operator for the operation of the payment system (hereinafter referred to as "rules of the payment system"). A payment system verifies the formal correctness and completeness of the information supplied in conjunction with a payments transfer.

The three main forces that are driving the evolution of the payment system are technology innovation and business models, local customs, and governmental regulations. Initially, bartering between the items being traded served as the primary form of payment. Problems only emerge when one party does not actually require the item to be swapped or when the value of the exchange is not agreed upon by both parties.

The payment system is essentially split into two categories: the cash payment system and the non-cash payment system. The tools used make a significant difference. Currency (notes and coins) is used in the cash payment system as a form of payment. While under the non-cash payment system, electronic

money, cheques, giro bills, debit notes, and card payment devices are all used (card based and server based). The two different sorts of transactions that fall under the purview of the non-cash payment system are wholesale transactions and retail transactions.

Therefore, innovation from these technologies must also be taught to early childhood. The hope is that children can get used to using the non-cash payment system. The cash payment system makes it difficult for parents to monitor their child's daily expenses at school. With cashless transactions, it is easier for parents to monitor the pocket money given to their children. Hadley (2011) said that giving pocket money is a way for parents to educate or teach their children about the value of money so that they can be responsible for what they have done with the money. With limited money, they increase their ability and understanding of the priority scale between needs and wants (Saravanan & Devakinandini, 2014). In fact, most children are unable to be responsible for their money. As a result, most of them become out of control and become extravagant individuals. It was identified that this was dominated by a lack of ability in managing pocket money (Vhalery, Aimon, & Yulhendri, 2018; Vhalery, Leksono, & Moh. Irvan, 2018).

The adoption of a cashless system has grown in society, which helps both actors and the government in a number of ways. Cashless transactions are incredibly practical and convenient for people. People no longer required to bother carrying a lot of cash to reduce danger. Due to the fact that most international transactions employ a cashless payment method, being cashless also enables to conduct

transactions while travelling abroad. Additionally, the cashless system gives access to a transaction history. People can gain from controlling the finances in this way.

2.2   Review of Related Literature
2.2.1   Smart Card Technology

A smart card is a card which contains a microprocessor and a memory chip or contains a memory chip that cannot be programmed logically. This microprocessor card can add, delete and edit the information on the card, while the memory chip card can only be handled at the start of manufacture (eg prepaid telephone cards).

The first smart card was invented in 1974 by a researcher named Roland Moreno. Now smart cards have spread throughout the world, both developed and developing countries. With a growth rate of about 15 percent per year.

SmartCard is different from Magnetic Card which is also quite widely used in attendance card applications in offices and so on, but has several advantages in terms of reliability, the ability to store hundreds of times more information, more difficult to counterfeit. Smartcards are quite easy to program, so it is possible to develop further on the application side. However, the hardware technology itself is not rapidly evolving and tends to be static.

2.2.2   RFID Technology

RFID (radio frequency identification) is a standard, specifically a protocol, that defines how a network uses radio signals to communicate with a label placed on an object, animal, or person. This label, called a transponder, consists of an

antenna and a memory chip that contains the information to be transmitted via radio waves. Through the antenna, the RFID reader, which is also called a transceiver, reads the radio signal and transfers the information to a computer or a device. Reading devices can be hand-held or embedded in objects, such as entrances (Harsono et al. 2009).

RFID labels can be passive or active. Active RFID tags contain a battery that runs the circuit from the chip and transmits a signal to the RFID reading device. Passive RFID tags do not contain a battery, therefore they cannot transmit signals until the RFID reader activates the antenna of the label by sending electromagnetic waves (Assa'idah 2013; Harsono et al. 2009).

RFID is the process of identifying radio frequency waves. RFID uses radio frequency to read information from a device called a tag. An RFID system consists of an RFID reader and an RFID tag. RFID readers and RFID tags are available in various types, specifically for RFID tags, each card has different ASCII data. The general function of the RFID Reader is as a radio wave (RF) receiver, while the general function of the RFID tag is as a radio wave (RF) transmitter. RFID readers can only capture customized RFID tag data (Roberti 2012; Assa'idah 2013; Harsono et al. 2009). RFID is an identification technology that is flexible, easy to use and very suitable for automated operations. RFID combines advantages not available in other identification technologies. RFID can be provided in devices that can only be read (Read Only) or read and written (Read/Write), do not require direct contact or light paths to operate, and provide a high level of data integrity. In addition, because this technology is difficult to counterfeit, RFID can provide a high level of security.

In an RFID system, generally a tag is affixed to an object (Harsono et al. 2009). When this tag passes through the electric field generated by the appropriate RFID reader, the tag will transmit the information contained in the tag to the RFID reader, so that the identification process can be carried out. RFID consists of three components, including (Assa'idah 2013; Harsono et al. 2009).

2.2.3 RFID Smart Card

RFID (Radio Frequency Identification) smart card is a contactless card that transmits and receives data using RFID technology. They last longer than contact cards since they don't need to be swiped, which reduces wear and tear. Contrarily, contactless smart cards come in a variety of forms, from straightforward memory cards with low security and non-volatile memory to high security crypto-processor cards and cards with Native operating systems. The use of RFID smart cards has spread to every country. They are becoming more and more common because of how quick and convenient they are, which makes them ideal for the education, identification, retail, and transportation industries. A growing number of payment systems incorporate contactless technology, as it offers additional benefits in terms of flexibility and convenience over its contact- based counterpart. With the recent trend towards issuing contactless smartcards in large companies, universities and government entities, a number of privacy- and security-related concerns have been raised (Kasper, T., Silbermann, M., & Paar, C., 2010).
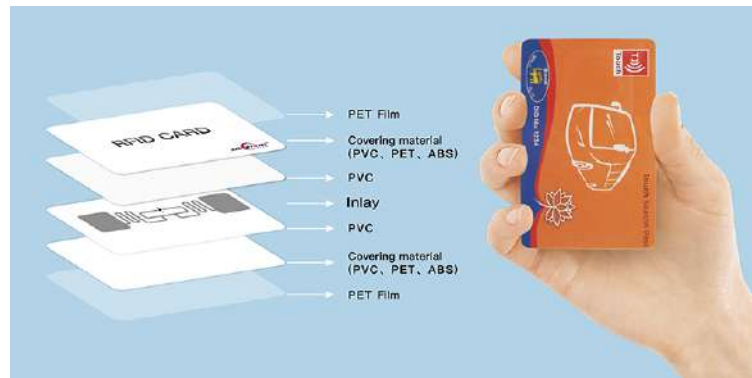
Figure 2. 1 RFID Card

2.3   Review of Related Products

2.3.1   Touch N Go

Figure 2. 2 Touch 'n Go Card

Touch 'n Go or TnG smart card is a contactless smart card that pioneered the launch of the Visa Wave credit card and PayPass MasterCard in Malaysia. It is also the first non-touch smart card based electronic payment system. The SmartTAG system, a supplementary in-vehicle and vehicle electronic payment system, can also be utilised in conjunction with the oni card.

Additionally, Touch 'n Go can be used everywhere to display the Touch 'n Go brand and is a nationwide e-wallet with a national credit card for the transportation industry. This card paved the way for the Malaysian government to establish an integrated electronic payment system and a single ticketing system for parking fees, amusement park entrance fees, and road tolls. The Touch 'n Go system was introduced formally in March 1997.

In order to reduce traffic jams at toll plazas, Touch 'n Go is a system that can process up to 800 vehicles per hour. When combined with SmartTAG (a non-stop electronic toll collection system), it can process up to 1,200 vehicles per hour.

2.3.2 E-money Mandiri

Figure 2. 3 e-Money Mandiri

e-Money Mandiri is an e-Money product issued by Bank Mandiri in the form of a card to serve the needs of digital transactions in Indonesia. By using Mandiri e-Money, you can make digital transactions as a substitute for cash transactions. e-money Mandiri supports RFID (Radio Frequency Identification)

technology which allows users or card owners to make transactions via touch in seconds.

General Features of Mandiri e-money:

a. Easy

Shopping transactions quickly simply by attaching the card to the reader.

b. Fast Service

Process your payment transactions in just a few seconds through the balance stored on the card chip.

c. Safe

Payment transactions are guaranteed safe because they do not involve cash, use digital encryption (Radio Frequency Identification) RFID, and cannot be used for any other purpose than transactions.

d. Free to Own

e-money Mandiri can be owned by customers or non-customers of Bank Mandiri.

e. Can be used by anyone

Mandiri e-money can be transferred and used by anyone to make payments or digital transactions.

2.3.3 Jak Lingko Card

Figure 2. 4 Jak Lingko Card

The Jak Lingko Card/Ticket is a transformation of the OK-Otrip Card which is an integrated transportation system (route integration, management integration, and payment integration) in DKI Jakarta. This integration of public transportation services does not only involve integration between large buses, medium buses, and small buses in Transjakarta but will also involve rail-based transportation owned by collaboration with the provincial government of DKI Jakarta and the Bodetabek area such as; MRT, LRT, Transjakarta, KRL Commuter Line, and Airport KAI as well as toll road payments in the Jabodetabek area managed by Jasa Marga, Hutama Karya and Citra Marga Nusaphala Persada (specifically for the TapCash, BRIZZI and Mandiri e-money variants). This payment system is managed by PT Jaklingko Indonesia.

The JakLingko transportation card and super application is one of the payment solutions for Jabodetabek public transportation implemented by PT JakLingko Indonesia; includes an integration system for payment of tickets, fares,

and routes that will help people move anywhere using intermodal public transportation in the Greater Jakarta area.

2.4 Comparison Between Related Product

Table 2. 1 Table Comparison Between Related Product

Product Comparison				
Features	**Touch N Go**	**e-Money Mandiri**	**Jak Lingko**	**Primary School Student Payment System**
Smart Cashless	Yes,	Yes	Yes	Yes
Payment Transaction	Yes, Touch N Go can be used to make payment transactions using the e-wallet feature.	Yes, e-money Mandiri can be used to make payment transactions using the e-wallet feature.	No	Yes, the system can be used to make payment transaction by using the credit in the smart card system.
Payment Transportation	Yes, Touch N Go compatible for transportation payments such as KRL, MRL, LRT, Toll, Bus, etc.	Yes, e-Money Mandiri compatible for transportation payments such as KRL, MRL, LRT, Toll, Bus, etc.	Yes, Jak Lingko just compatible for transportation payments such as KRL, MRL, LRT, Toll, Bus, etc.	No