CHAPTER 1   INTRODUCTION

1.1 Background

Internet of Thing (IoT) is a concept in which several objects are connected in a network and communicated to each other which enable the objects to transfer and exchange data without human intervention (Hong *et al.*, 2014). This concept was introduced by Kevin Ashton, the initial implementation was conducted to devices identification and tracking then stored its information (Asthon, 2010). Now the implementation of IoT has expanded to various aspects of human life, such as in the field of industry with the 4.0 industrial revolution and then in the field of agriculture with smart agriculture and in various smart concepts that are developing now such as smart home, smart city, etc.

In the other hand, IoT has an ability to integrate with various technology including financial technology which supports cashless transaction method (Suseendran *et al.*, 2020). This integration has a good potentials at how the volume and nominal growth of cashless transactions, especially in Indonesia. In 2014, the volume of electronic money transaction was 203 million transactions and increased each year to 4.2 billion transactions in 2019 (BI, 2019) as shown in figure 1.1.
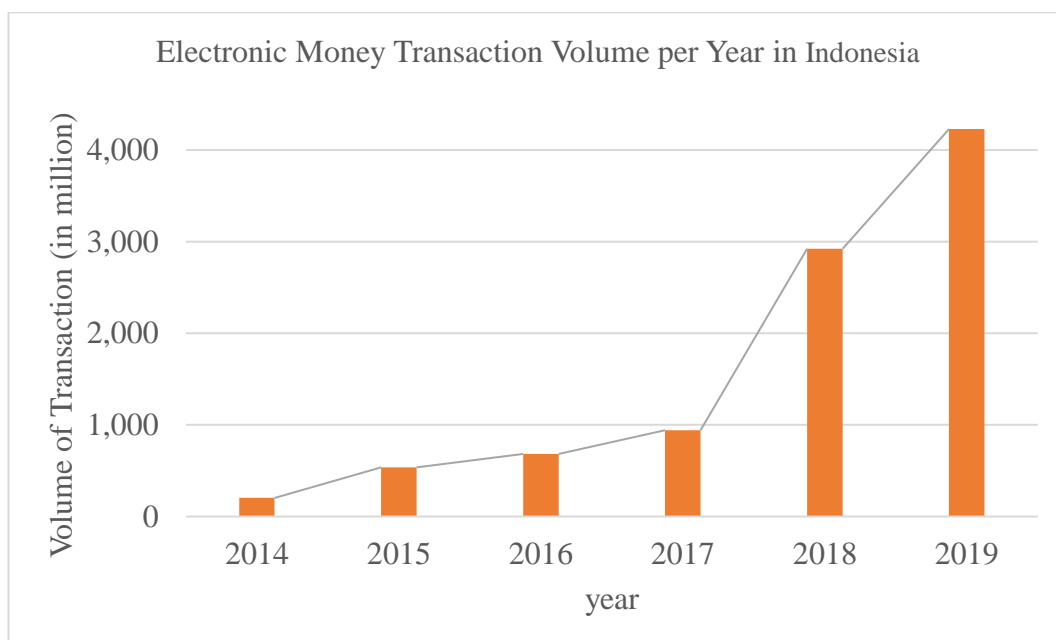

Figure 1.1 Electronic money transaction volume per year in Indonesia (BI, 2019)

In addition to the increased volume, the nominal transactions of electronic money users also increase each year, in 2014 the nominal of electronic money transactions was 3.3 trillion rupiahs and increased yearly to 128.2 trillion rupiahs in 2019 (BI, 2019) as shown in figure 1.2.
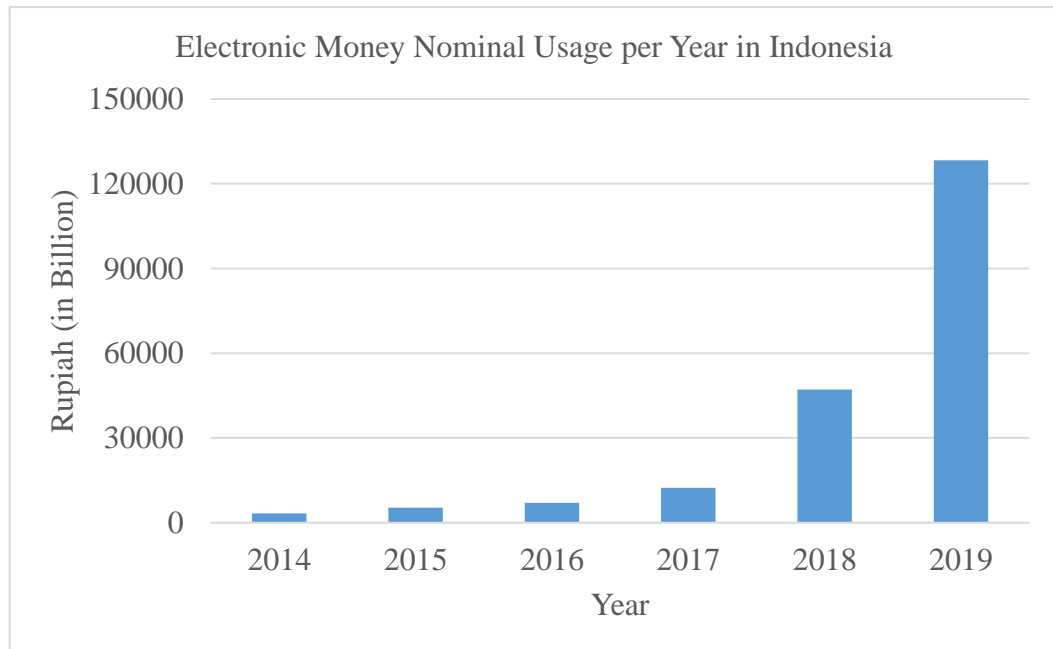

Figure 1.2 Electronic money nominal usage per year in Indonesia (BI, 2019)

Regarding the state of increasing use and nominal use of electronic money and as research advances on IoT research, making an integration of cashless system and IoT system is expected to help human life, especially in Indonesia.

Therefore, there are various kinds of problems in Indonesia that need attention, one of which is the problem of waste, especially plastic waste. This proved by the fact that every year there are 65.2 million tons of heap waste in Indonesia and 16% of it or 10 millions came from plastic waste in 2016 (Kemenkeu, 2019). Therefore for solving this problem the government supports a movement called "Gerakan Indonesia Bersih" which aims to reduce waste including plastic waste (Winata, 2019). In order to supports the commitment, there are many programs or campaingns hold up by the government or society and one of the campaign is to reduce disposal water bottle usage and replace it with a reusable bottle like tumbler. This campaign supported by the government which proved by a program called "One million tumbler" that initiated by the Ministry of Communication and

Information of the Republic of Indonesia in several cities in Indonesia, they are Jakarta, Lampung, Medan, Surabaya, Semarang, Yogyakarta, Pontianak, Makassar, West Papua and many more (Setiyawan, 2019). Besides the tumbler campaign initiated by the government, there are many campaigns held by academics and society. Institut Teknologi Sepuluh November (ITS) recommends their whole staff and students to bring instead of buying disposal bottles (Yunelia, 2019) and the 1000 tumbler campaign held by people in Jogjakarta (Susanto, 2019). By supporting this campaign, it can reduce the use of plastic bottles which are considered cause for concern. Because based on Beverage Marketing Corporation & International Bottled Water Association data, Indonesia has used 4.82 billions bottles in 2015 (Illsley, 2017).

However, despite having good responses by the people, there are several obstacles in order to sustain and develop this campaign such as the support facilities like dispenser or vending machine which provide refill water for the people.

That statement can be proved by looking at some public facility area or campus in Indonesia. An example of this situation can be observed in Telkom University in Bandung especially in the building of Industrial Engineering faculty which has no dispenser or vending machine which provides students to refill water. Therefore, in order to reduce plastic waste in terms of helping the tumbler campaign, the IoT system for dispenser will be developed also it will provide cashless payment which makes it easier to use and monitor.

Afterward, the methodology used for building the proposed IoT system is the V-Model approach. The reason for using this methodology is the urgency for the processes to be done step by step and this methodology accommodate this urgency by its feature, those are structured, systematic, progresses on an individual and separate phase, and easy to understand (Frank *et al*, 2019). This methodology proved to be a good approach for building several IoT systems such as an autonomous vehicle (Kharade *et al.*, 2016), real time diagnostics for automotive industry (Vrachkov and Todorov, 2018), and smart traffic density control (Frank *et al*, 2019). Thereafter, an IoT system will be built in dispenser called "Dispenser Isi

Ulang (Disilang)" by using V-model software development for accommodating the reduce plastic campaign by using tumblers.

1.2 Problem Definition

According to the problem stated in the background, the problem definition as below:

1. How to design the Internet of Thing (IoT) system embedded in the dispenser?
2. How to build the Internet of Thing (IoT) using V-Model approach?

1.3 Research Purpose

According to the problem definition, this research purposes are as below:

1. Design Internet of Thing (IoT) system embedded in the dispenser.
2. Build the Internet of Thing (IoT) using the V-Model software development.

1.4 Research Limitation

Based on the problem explained above, the research limitations are:

1. The developed dispenser only providing water with room temperature.
2. The payment system for application still using an internal variable.
3. The monitoring and replacing gallons still manually operated.
4. The V-model approach in this research doesn`t conduct the maintenance and operation process.
5. Feasibility study doesn`t include in this research.
6. The amount of poured water still not consistent due to gravitational force.
7. There is no registered voucher within application.

1.5 Research Benefit

By implementing the output of this research. there are:

1. The IoT system will help in providing water for tumbler user with fast and cashless process.
2. Helpful to support the reducing of disposal bottle usage program.
3. Help the development of Internet of Things (IoT) research especially in the public facility field.

4. To know the current importance of the Internet of Things.

1.6 Writing System

Chapter I   **Introduction**

This chapter explains the introduction of the research that consists of background of research, problem formulation, objective of research, limitations of research, and benefits of research.

Chapter II   **Literature Review**

This chapter consists of relevant literature for helping the research for solving the underlying problems.

Chapter III   **Research Method**

This chapter explained the detailed steps of the research including the problem definitions, then the problem solving systematic that will lead a conclusion for current research.

Chapter IV   **System Design**

This chapter will explain the requirement for building Disilang system based on used methodology.

Chapter V   **Testing and Analyzing of System Design Result**

This chapter will explain the testimg analysis of Disilang system both for hardware and software system

Chapter VI   **Conclusion and Suggestion**

This chapter will explain the conclusion of this research and suggestion for the next research.