CHAPTER I
INTRODUCTION

This chapter contains the background, problem formulation, objectives, research scopes, and the final project report outline.

1.1 Background

In the globalization era, every industry faces complex challenges along with the development of technology. Especially in the industry 4.0 era, every industry is competing using any method to increase the value and competitiveness of the business. Based on the Ministry of Industry data, there are five priority industrial sectors towards 4.0, including the food and beverage industry, the automotive industry, the chemical industry, the electronics industry, the textile and apparel industry. In the third quarter of 2021, the food and beverage industry contributed 38.91% to the GDP growth of the non-oil and gas processing industry (Ministry of Industry, 2021).

The food and beverage industry should have the ability to produce their products on time, have a good quality of products, and have competitive prices to increase competitiveness. One of the keys that can support the industry's competitive ability is the quality of the entire production process. A high-quality production process will only obtain if the process runs well as planned. The production process will run well if it has an excellent strategy to improve productivity. There are two ways to achieve productivity improvement (Gunaki, 2015):

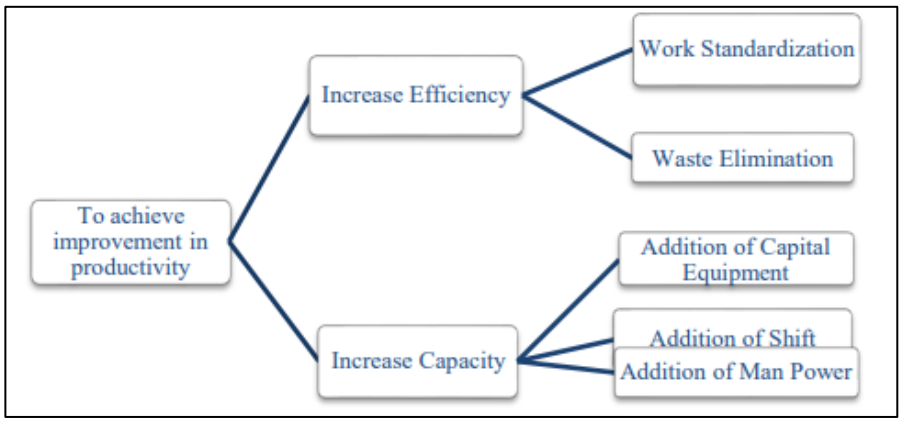

Figure 1.1 Ways to improve productivity

To conduct a more in-depth study to improve productivity, one of the methods is the Lean Manufacturing method. Lean manufacturing is one of the tools that can increase productivity by improving efficiency. Lean manufacturing is aimed to identify the seven wastes in manufacturing process: excessive transportation, unnecessary inventory, unnecessary motion, waiting, overproduction, inappropriate processing, and defect. Lean is a concept to identify and reduce all kinds of waste (zero waste). Lean manufacturing is a method adopted from Toyota Production System (TPS). Lean is a concept developed by Taiichi Ohno. The principle of Lean is to minimize waste and increase the flow and quality of products (Setiawan, 2021). Every industry succeeding in implementing a lean manufacturing system constantly invests time and resources to know the information and material flow in the production process.

UD Tani Mulia is a food and beverage industry that produces noodles and red crackers. UD Tani Mulia located in Pampangan Nan XX, Lubuk Begalung, Padang City, West Sumatra. UD Tani Mulia makes noodles with the "Rumah Adat" brand. The level of competition in the noodle business in West Sumatra is getting more challenging, requiring UD Tani Mulia noodle businesses to develop their business to compete in the market. UD Tani Mulia has obtained an Industrial Business License (IUI), PIRT, and Halal certification as a written guarantee from the government for

business production results that have met specific safety requirements and standards in the distribution of food products.

UD Tani Mulia has a high demand. However, production at UD Tani Mulia can't meet all customer demands. Stockout often occurs in noodles products. Noodles that were supposed to be sent today by the sales team had to be delayed because the stock of noodles available did not meet the capacity of the customer's needs. This happens because the production in UD Tani Mulia is highly depends on the weather and the availability of flour. Production is carried out if the raw materials are sufficient and the weather is favorable. In addition, UD Tani Mulia has a limited production capacity. Production will not be carried out if the drying area is still full of noodles.

There are 4 types of noodles that produce in UD Tani Mulia: big, small, big flat, and small flat noodles. There are seven processes of making noodles in UD Tani Mulia: mixing, flattening, cutting, steaming, rolling, drying, and packaging. Every product has the same production process, the difference is only on the blade in the cutting process.

Figure 1.2 Mixing

Figure 1.3 Flattening

Figure 1.4 Cutting

Figure 1.5 Steaming

Figure 1.6 Rolling

Figure 1.7 Drying

Figure 1.8 Packaging

The raw materials for noodles are flour, water, soda, and food dye. At UD Tani Mulia, production is carried out using a batch production system. One batch of production is equivalent to 10 sacks of flour (250 kg), 18 Liters of water, one dipper of salt, and 0.5 ounces of soda. Production area in UD Tani Mulia is not well organized, the workstations is not close each other. This condition causes UD Tani Mulia can't achieve the most efficient level of production. The work order of each operator has a

high necessity but not added value activity (NNVA). The classification of NNVA at UD Tani Mulia can be seen in **Table 1.1.**

Table 1.1 NNVA Activities

No.	Activities	Waste	Time (Second)
1.	Go back and forth when adding flour and water to the mixer	Transportation	12 x 5 = 60
2.	Go back and forth from the cutting machine to the streamer when putting the noodles into the steamer		14 x 18 = 252
3.	Back and forth from the streamer to the rolling workstation to put the steamed noodles		30 x 18 = 540
4.	Back and forth from rolling to drying workstation		81 x 8 = 648
5.	Back and forth to pick up the drying container.		7 x 16 = 112

Table 1.1 is the time required for each activity in one production batch. When going to the mixing machine to add flour and return to the operator's initial position, the operator time is 12 seconds. Because the capacity of mixing machine is only 2 sacks of flour and the capacity of steamer is 10 sacks of flour, the operator performs back and forth five times, so the total time for the 1st activity is 12 × 5 = 60 seconds.

The operator time to move the cut noodles into the steamer is 14 seconds and to move the steamed noodles to the rolling workstation is 30 seconds. In the noodle production process, there are 18 cutting containers used to transfer noodles to the steamer and rolling workstation. So, the time for each activity is multiplied by 18. Because of that, the total time for operator to move the cut noodles into the steamer is 252 seconds and to move the steamed noodles to the rolling workstation is 540 seconds.

Meanwhile, to bring noodles from the rolling workstation to the drying workstation, the operators bring four drying containers for one trip. Thus, the operator's frequency is 32 divided by 4, 8 times. The time it takes for one take is 81 seconds. 81 times 8 makes 648 seconds. Therefore, the total time required for the operator to deliver noodles from and to the drying workstation is 648 seconds.

One batch production of noodles used 32 drying containers. Rolling operators will take the drying container themselves, and for one go, they take two drying containers. So, they went back and forth 16 times. The time for one shot is 7 seconds, then multiplied by 16. Because of that, to take the drying container for one batch, the operator takes time 112 seconds.

UD Tani Mulia has two mixings, flattening and cutting machines, and two steamers. Both engines are handled by two operators only. It causes two mixings, flattening, and cutting machines can’t operate simultaneously. The process of mixing, flattening, and cutting is done using one machine. The mixing capacity of the machine is 2 sacks of flour, each weighing 25 kg. While the steamer used has an ability of 10 sacks of flour. Thus, it is necessary to do 5 times of mixing to meet the capacity of the steamer. This causes waiting time in the steamer during the mixing, flattening, and cutting processes. Another activity that indicates waste is UD Tani Mulia still uses a manual drying process with sun heat. So, it takes a long time to dry the noodles. Based on the interview with the operator, if they put the noodle in the drying area today at 1

p.m., the noodle will be dried tomorrow at 1 p.m. So, there is waiting time when the sun is not rising in the night.

In the noodles production process, there are two kind of material handling, cutting and drying container. **Figure 1.9** and **Figure 1.10** shows the cutting and drying container.

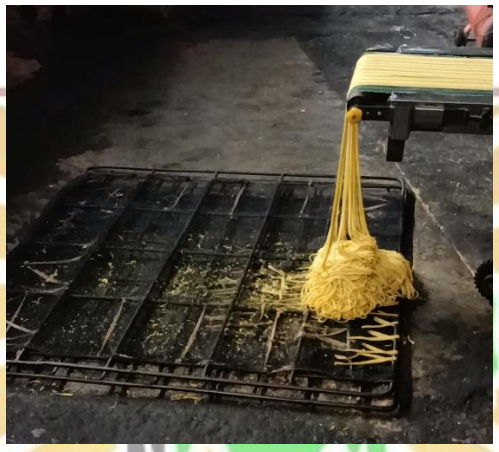

Figure 1.9 Cutting Container

Figure 1.10 Drying Container

Both of material handling are used to move the WIP product between workstations. Material handling is operated manually so that sometimes it causes noodles to fall to the production floor, causing defect product.

Based on the observation, the need for improvement efforts to reduce waste is essential. One way that can reduce waste is the principles of Lean Manufacturing. With the improvement, UD Tani Mulia can produce noodles effectively and efficiently to minimize the manufacturing lead time. Previous research related to Waste and Lean Manufacturing was also conducted by Setiawan (2011). This research aims to get a current mapping process in the production process in manufacturing to be used as a basis for making the proposed mapping by implementing a lean management system that can increase added value for customers. The following research has also been carried out by Ramadhani (2021) to know the importance of Manufacturing Lead Time and the value of Process Cycle Efficiency in the production process using the Value Stream Mapping (VSM) method on the CV Karya Cipta Lestari and knowing efforts to minimize waste in the production process of Decorative Plant Pots, using the Cause and Effect Diagram method on the CV Karya Cipta Lestari. Lvyi (2020) also conducted the same research to find the causes of production waste, get suggestions for improving waste reduction, and get the production process time to be more efficient. Based on previous research and observations, it is necessary to do a Waste Analysis with a Lean Manufacturing approach to increase the productivity level and minimize the production lead time at UD Tani Mulia.

1.2 Problem Formulation

The problem formulations of this research are as follows.

1. What kind of waste has a significant impact on the production line of UD Tani Mulia?
2. What are the root causes of the waste that happens?

3. How to reduce waste and maximize productivity in the production line of UD Tani Mulia?

1.3 Research Objectives

The objectives of this research are as follows.

1. Identify the waste that has a significant impact on the production line of UD Tani Mulia.
2. Identify the root causes that affect the waste in the production line of UD Tani Mulia.
3. Reduce waste and maximize productivity in the production line of UD Tani Mulia.

1.4 Research Scopes

The scopes of this research are as follows.

1. This research was conducted in the line production noodles of UD Tani Mulia.
2. The research uses a value stream mapping approach to identify the waste and analyze the space for improvements in the production line of UD Tani Mulia.

1.5 Outline of Report

The outline of the final project report contains six chapters as follows.

CHAPTER I INTRODUCTION

This chapter contains the background, problem formulation, objectives, research scopes, and the final project report outline.

This chapter will capture the problem that happens in UD Tani Mulia.

CHAPTER II LITERATURE REVIEW

This chapter contains all the literature used in the research to identify and reduce the waste in the production line of UD Tani Mulia. The literature related to lean manufacturing, waste assessment model, and value stream analysis tools. In this chapter, there is also the result of a literature review from any sources like journals, thesis, etc.

CHAPTER III RESEARCH METHODOLOGY

This chapter contains the methodology that used in the research. The methodology is preliminary studies, literature studies, problem identification, problem formulation, data collection, data processing, analysis, conclusions, and suggestions.