CHAPTER I
INTRODUCTION

This chapter includes research background, problem formulation, research objectives, research scopes, and outline of report.

1.1 Background

The manufacturing industry is an industry with main activity of processing or converting raw materials into finished goods or semi-finished goods to increase the added value of a product. Production activities are the main activities of the manufacturing industry to add use value in meeting human needs. The manufacturing industry plays an important role in the Indonesian economy because of its ability to produce tradable products and also create jobs. One of the fast-growing manufacturing industries in Indonesia is bakery. The bakery industry is part of the food industry by utilizing wheat flour as the main ingredient in the production process. Indonesia people mostly have consumed bakery for breakfast and food in between busy times. Bakery are considered more practical and nutritious. Not only that, but bakery also vary in shape, taste, and texture. Bakery has now ranked third after rice and noodles as the staple food of Indonesians. The bakery and cake business actors in Indonesia are currently dominated by the small-scale bakery industry around 60%, large industries 20%, and the rest are medium industries (Berliana, 2022).

The rapid development in the bakery industry requires companies to be able to compete in the market. This is due to the large number of similar bakerys produced by competing companies. Therefore, companies must always be able to improve quality and productivity in their business. With a lean manufacturing approach, companies can identify and eliminate existing waste through continuous improvement so as to improve quality, productivity, profit, and market competitiveness.

Taiichi Ohno created the Toyota Production System which is the basis of lean manufacturing. Toyota has turned its operational advantages into strategic weapons. This operational excellence is partly based on the quality improvement tools and methods Toyota introduced to the manufacturing world, such as just in time, kaizen, one-piece flow, jidoka, and heijunka. The concept known as the Toyota Production System until now has become an example and role model for the industry to realize lean manufacturing in the company (Rinaldi et al., 2016). Lean manufacturing is a suitable method used by companies to identify waste levels so that they are able to suppress and reduce non-value added activities (Ravizar & Rosihin, 2018). Previous studies have found that the implementation of lean manufacturing in the food and beverage industry has succeeded in reducing waste by 25%-30%. (Kezia et al., 2017).

Yanna Bakery is one of manufacturing industry in Padang that produces bakery. Yanna Bakery was founded in 2007 by Mr. Suryanna which is located in Dadok Tunggul Hitam, Koto Tangah District, Padang City, West Sumatra. Yanna Bakery produces two types of bakeries, namely chocolate fried bakery and donut bakery. The main product of Yanna Bakery is chocolate fried bakery and also this product has a higher demand than donut bakery. Yanna Bakery starts its operating from Monday - Friday at 08.00 WIB - 17.00 WIB, with a break from 12.00 WIB – 13.00 WIB. Currently, Yanna Bakery have 8 employees with a daily production up to 5,000 pcs of bakery and a monthly turnover of up to IDR 250,000,000. Yanna Bakery produces 9-10 batches of production per day with the number of bakery produced in 1 batch is 350 bakery. The storage period of bakery is a maximum of seven days from the day of production. Yanna Bakery has several machines to support the production process which can be seen in **Figure 1.1.**

Figure 1.1 Production Machinery

Based on **Figure 1.1** Yanna Bakery has several machines in carrying out its production process. A horizontal mixer machine for mixing bakery raw materials into coarse dough, a spiral mixer for stirring bakery dough so that the ingredients are mixed evenly, a press machine for smoothing bakery dough, and a bakery frying machine. Flow Process Chart of the bakery production process at Yanna Bakery can be seen in **Table 1.1** to **Table 1.3**.

Table 1.1 Flow Process Chart of Bakery Production Process at Yanna Bakery

FLOW PROCESS CHART																						

SUMMARY / **ACTIVITIES** : Bakery Production at Yanna Bakery

ACTIVITIES	NOW		PROPOSED		DIFFERENT	
	Total	Time	Total	Time	Total	Time
◯ OPERATION	39	276,72				
☐ INSPECTION	3	19,52				
⇨ TRANSPORTATION	18	21				
D DELAY	1	2,34				
▽ STORAGE	1	3,18				
TOTAL DISTANCE	76,09					

MAP NUMBER : 01
PERSON [V] MATERIAL [ ]
NOW [V] PROPOSED [ ]
MAPPED BY : Muhammad Fauzan Syahputra
MAPPED DATE : 17 February 2023

DESCRIPTION OF ACTIVITIES	SYMBOL					DISTANCE (m)	TIME (min)	ANALYZES					NOTE	ACTION		UBAH			
	◯	☐	⇨	D	▽			WHAT	WHERE	WHEN	WHO	HOW		ROOM	MERGE	ORDER	PLACE	PERSO	REPAIR
Taking scales and containers	●						1,32												
Picking up raw materials to weighing work station			●			1	2,05												
Weighing materials	●						7,48												
Putting the weighing material in the container	●						2,02												
The materials are transferred to the horizontal mixer machine work station			●			2	1,28												
Set up horizontal mixer machine	●						2,01												
The material is waiting to be stirred in the horizontal mixer machine				●			2,34												
The material is put into the horizontal mixing machine	●						0,07												
Stirring bread dough ingredients	●						6,32												
The operator goes to the raw material warehouse			●			2	0,36												
Picking up a bucket in the raw material warehouse	●						0,13												
Filling the bucket with water	●						0,35												
The operator goes to the work station of the horizontal mixer machine			●			2	0,59												
Putting water and others material such as milk powder, sugar, and eggs in a bucket into a horizontal mixing machine	●						0,06												
The process of stirring bread dough into coarse dough	●						5,17												
Set up spiral mixing machine	●						2,19												
Transfer of coarse dough to the working station of the spiral mixing machine			●			1	0,05												

Table 1.2 Flow Process Chart of Bakery Production Process at Yanna Bakery (cont.)

Activity	Distance	Time
Putting coarse dough into a spiral mixing machine		0,06
The operator goes to the raw material warehouse	3	0,45
Searching for containers in the raw material warehouse		0,12
Picking up butter and salt in the raw material warehouse		0,09
Weighing butter and salt		1,13
Putting butter and salt in a container		0,05
The operator goes to the work station of the spiral mixing machine	3	0,45
Putting butter in a container to a spiral mixing machine and last salt		0,04
The process of stirring bread dough		6,51
Transfer of dough to press machine	1,3	0,09
Set up press machine		1,25
Dough in the press in the press machine		5,44
The dough is transferred to the cutting dough work station	4,18	0,19
Inspect bread dough		1,47
Rework bread dough		29,31
The operator goes to the storage area	2,51	0,27
The operator takes a round baking sheet, rectangular baking sheet, scales and knife		3,12
The operator goes to the bread forming work station	2,51	0,57
Weighing the dough		1,14
Reaching out to oil already in bread forming workstations		0,05
Grease a round baking sheet with oil		2,08
Inserting and jerking the round baking sheet-shaped dough		2,11
Transfer of a round baking sheet containing dough to a cutting work station	0,68	0,29
Cutting the dough on a round baking sheet into pieces		4,26
Operator to bread forming workstation	0,68	0,29
Laying the cut dough		1,06
Carrying out the process of forming and giving bread fillings		18,31
The formed dough is put into a baking sheet		2,5
Operator to proofing room	6,19	4,27
Operator to storage area to pick up tarpaulin	11,1	1,08
Operator to proofing room	11,1	1,12
Covering the baking sheet with a tarp		0,21
The process of proofing		120
Inspection of the dough whether it rises or not		9,05

Activity	○	→	□	D	▽	Distance	Time
Transfer of dough that has risen to the fryer work station		●				14,52	4,13
The dough is put in the frying machine	●						2,13
Frying Process	●						18,11
Putting cooked bread onto a baking sheet	●						4,08
Bakery cooling process	●						9,21
Bakery Inspection			●				9
Moving bakery to a packaging workstation		●				4,9	3,16
Bread packing process	●						12,08
Putting packaged bread in the basket	●						3,04
Transfer of bakery baskets to the storage area of finished products		●				2,42	2,37
Product storage					●		3,18

Based on the Flow Process Chart in **Table 1.1** to **Table 1.3**, the stages of bakery production at Yanna Bakery begins with weighing the ingredients to make bakery dough. After the ingredients are weighed, the ingredients are mixed by inserting in a horizontal mixer machine to produce a coarse dough. After the coarse dough is formed, the next step is to stir the coarse dough on the spiral mixer machine so the whole ingredients can be mixed evenly. Next, dough processing is carried out on a press so that the dough becomes smooth and soft. After the bakery dough is formed, the next step is the cutting of the dough. In chocolate-stuffed fried bakery, chocolate filling is carried out in bakery, after that proofing process is carried out in a room measuring 3.7 m x 2.54 m for 2 hours. After the bakery dough is proofing, the frying process is carried out. After the bakery is baked, the cooling process is carried out and bakery ready to pack.

Based on the Flow Process Chart in **Table 1.1** to **Table 1.3**, it can be known the flow of activities carried out during the bakery production process, the time of each activity, and the distance for 1 batch of production. The bakery production process at Yanna Bakery requires 39 operating activities with a total time of 276.72 minutes, 3 inspection activity with a total time of 19.52 minutes, 18 transportation activities with a total time of 21 minutes, 1 delay activities with a total time of 2.34, and 1 storage activity with a total time of 3.18 minutes, and a total distance of 76.09 meters. From the results of the Flow Process Chart, it can be seen that there are still non-value added activities such as ingredients waiting to be stirred in a horizontal

mixer machine, looking for work tools, preparing tools and set up machine, and layout of the production floor at Yanna Bakery does not pay attention to the relationship between work stations, especially forming, proofing, frying, and packaging work stations.
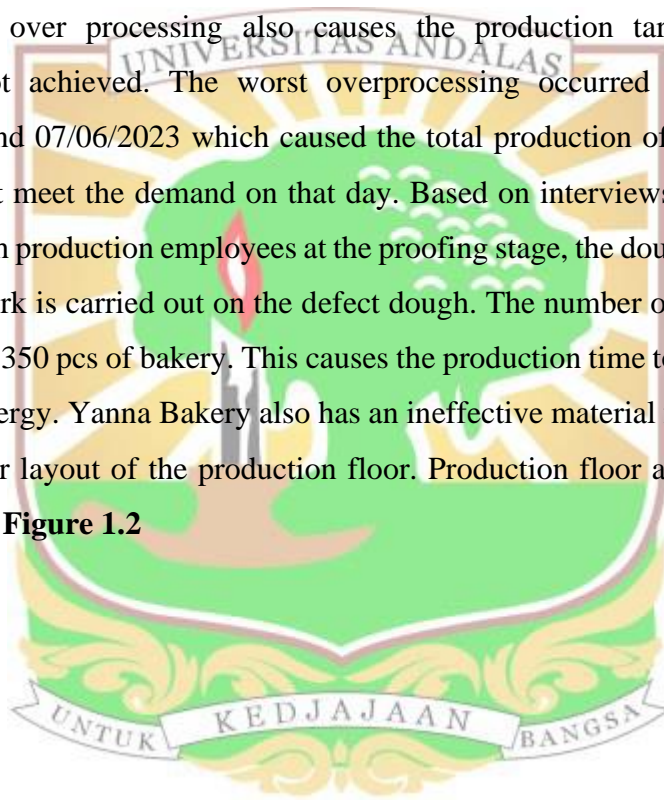
The problem experienced by Yanna Bakery is the existence of waste over processing during the production process. This happens because production employees do work on certain processes more than indicated because there is no clear procedure and work instructions. Comparison of ideal time and actual time of bakery production process can be seen in **Table 1.4**

Table 1.4 Comparison of Ideal Time and Actual Time of Bakery Production Process

No.	Date	Batch per Day	Ideal Production Process Time (min)	Actual Production Process Time (min)
1	29/05/2023	Batch 2	264	294,31
2		Batch 3	264	296,12
3		Batch 4	264	321,08
4		Batch 5	264	314,56
5		Batch 6	264	298,43
6	30/05/2023	Batch 4	264	291,11
7		Batch 5	264	305,41
8		Batch 6	264	295,42
9		Batch 7	264	465,39
10	31/05/2023	Batch 3	264	289,19
11		Batch 4	264	297,21
12		Batch 5	264	295,44
13		Batch 6	264	290,06
14		Batch 7	264	312,55
15		Batch 8	264	301,19
16	05/06/2023	Batch 2	264	304,31
17		Batch 3	264	298,29
18		Batch 4	264	295,14
19		Batch 5	264	462,11
20		Batch 6	264	287,49
21		Batch 7	264	291,51
22	06/06/2023	Batch 4	264	303,33
23		Batch 5	264	298,48
24		Batch 6	264	291,35
25		Batch 7	264	306,44
26		Batch 8	264	294,21
27	07/06/2023	Batch 3	264	306,48
28		Batch 4	264	301,08
29		Batch 5	264	467,55
30		Batch 6	264	287,34

Based on **Table 1.4**, it can be seen that each batch in the bakery production process has waste overprocessing so that the production time becomes longer. Waste overprocessing often occurs in the process of weighing materials, mixing dough in horizontal and spiral machine and also pressing process. As a result of waste over processing, the amount of bakery production per day is less than optimal, Yanna Bakery, which should be able to produce 11-12 batches per day, is actually only able to produce 9-10 batches per day because of waste over processing which results in longer production time.

Waste over processing also causes the production target per day is sometimes not achieved. The worst overprocessing occurred on 30/05/2023, 05/06/2023, and 07/06/2023 which caused the total production of chocolate fried bakery did not meet the demand on that day. Based on interviews that have been conducted with production employees at the proofing stage, the dough does not rise. So that a rework is carried out on the defect dough. The number of rework bakery dough is up to 350 pcs of bakery. This causes the production time to become longer and wasted energy. Yanna Bakery also has an ineffective material flow pattern due to the irregular layout of the production floor. Production floor at Yanna Bakery can be seen in **Figure 1.2**
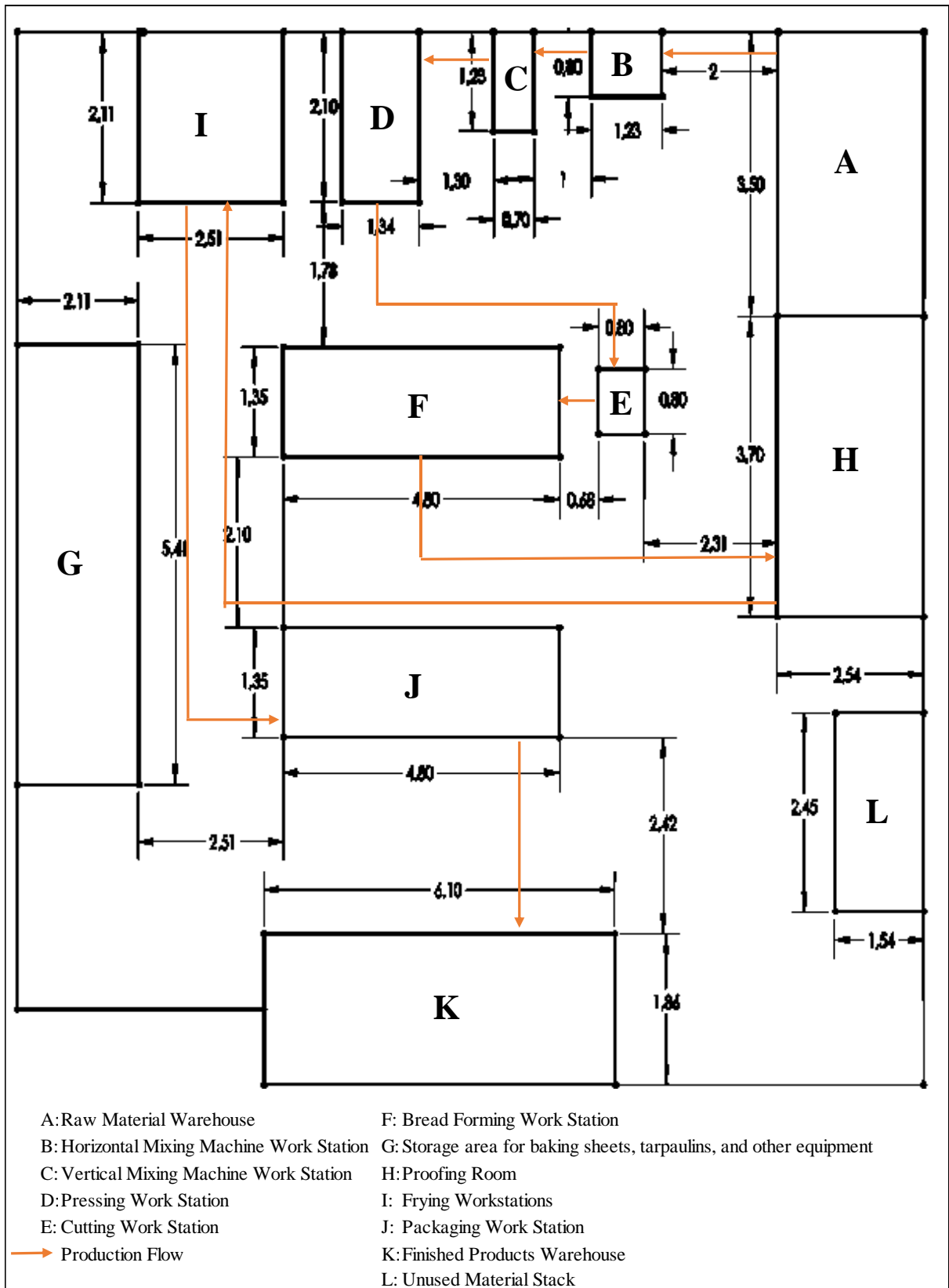
Figure 1.2 Production Floor at Yanna Bakery

A: Raw Material Warehouse
B: Horizontal Mixing Machine Work Station
C: Vertical Mixing Machine Work Station
D: Pressing Work Station
E: Cutting Work Station
→ Production Flow

F: Bread Forming Work Station
G: Storage area for baking sheets, tarpaulins, and other equipment
H: Proofing Room
I: Frying Workstations
J: Packaging Work Station
K: Finished Products Warehouse
L: Unused Material Stack

Based on **Figure 1.2** from results of observations to the production floor, the layout of the production floor at Yanna Bakery does not pay attention to the relationship between work stations so there is a lot of bypassing and backtracking movement especially, forming, proofing, frying, and packaging work stations. Hence, that distance and transportation time are getting longer which causes the production leadtime to also be longer. For example, after the dough is formed into bakery and placed in a baking sheet, the production employee must pass through the bakery forming and cutting work station to get to the proofing place. After the dough is proofing and ready to fry, the production employees must pass through the dough cutting and bakery forming work station to arrive at the bakery frying work station. After the bakery is fried and cooled for packaging, the production employee must pass through the bakery forming work station to get to the packaging station. The ineffective material flow condition causes production time to be longer and wasted unnecessary labor.

Based on the problems experienced by Yanna Bakery, a method is needed to identify and reduce the occurrence of waste in the production process and identify whether there are other wastes that occur outside the waste indicated at the beginning. This is so that the company can save resources and costs so that there is an increase in the efficiency and effectiveness of existing processes. One of the approaches used to eliminate waste is lean manufacturing. The method in lean manufacturing that is used to map the entire stream of both information and materials and is used to identify waste is Value Stream Mapping (VSM). Value Stream Mapping is a mapping process that serves to identify the flow of materials and information in the production process from materials to finished products (Rahman, 2021). Value Stream Mapping can be used as a starting point for companies to recognize waste and identify the cause.

The mapping goal of Value Stream Mapping (VSM) is to identify all types of waste in all production processes so that they can make improvements in an effort to reduce waste (Damanik et al., 2017). A lean manufacturing approach with Value Stream Mapping (VSM) is considered the most optimal for solving existing

problems. This approach can map the flow of production and the flow of information to a product at the total production level, so that it can provide benefits for improving business processes as a whole which has implications for improving the efficiency and effectiveness of existing processes (Ahmad & Aditya, 2019).

Analysis of criteria to determine the relationship between waste is carried out with the Waste Relationship Matrix (WRM). WRM consists of columns and rows where each row sees the effect of waste on other waste, while the column shows waste that is affected by other waste. In creating WRM, researchers had to disseminate questionnaires to Yanna Bakery. After the questionnaire was filled, researchers weighted the questionnaire to find out the relationship between waste. Validate the relationship between waste using the Waste Assessment Questionnaire (WAQ) method. Based on the WAQ method, the highest rank of waste will be obtained which is the most influential in the production process. The proposed production improvement is an effort made in the hope of minimizing the waste that occurs in the production process. The improvement efforts made in the production process depend on the most dominant waste. It is hoped that this research can help Yanna Bakery to minimize existing waste with recommendations for improvements provided to be able to save resources and costs so that there is an increase in the efficiency and effectiveness of existing processes.

1.2   Problem Formulation

Based on the research background, the formulation of this research is how to identify wastes and provide suggestions for improvements to eliminate waste contained in the bakery production process at Yanna Bakery?

1.3   Research Objectives

The objective of this research is to identify wastes and provide proposed improvements to eliminate waste contained in the bakery production process at Yanna Bakery.

1.4 Research Scopes

The scopes in this research are:

1. The type of bakery observed in this study is chocolate fried bakery because it is the main product of Yanna Bakery as well as bakery with the highest demand.

2. Proposed improvements will be implemented if obtained permission from Yanna Bakery

3. Improvement recommendations are given to waste with the highest percentage

1.5 Outline of Report

The outline of this final project report as follows:

CHAPTER I INTRODUCTION

This chapter consists of background, problem formulation, research objectives, research scopes, and outline of the report.

CHAPTER II LITERATURE REVIEW

This chapter contains theories from various sources related to the problems discussed in this study

CHAPTER III RESEARCH METHODOLOGY

This chapter contains the flow that the author uses in conducting research. The research methodology contains the stages or steps carried out so that the research can run systematically and purposefully.

CHAPTER IV DATA COLLECTING AND DATA PROCESSING

This chapter contains the data collected during the research process as well as the results of the data processing that will be used and needed in the analysis and interpretation chapter.

CHAPTER V ANALYSIS

This chapter contains an analysis of the discussion based on the results of data collection and processing that has been carried out previously, which is adjusted to the research objectives and produces a recommendation for Yanna Bakery

CHAPTER VI CONCLUSIONS AND SUGGESTIONS

This chapter outlines the conclusions that can be formed based on data analysis and interpretation, as well as inputs supplied based on the study outcomes and for the enhancement of the next final project research.