

Lean Production Analysis to Reduce Waste in The Cpo Production Process

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ABSTRACT

Oil palm mills in North Sumatra are one of the plantation industries that serve CPO and KPO production. As a plantation company, it will determine that it will continue to strive to increase productivity, in order to obtain greater profits. One business that can be done by a company is to improve its performance. Based on the foregoing researchers aim to conduct research with the aim of how to improve performance by implementing Lean Production to increase the cpo production process. This study tries to identify activities that include waste. In this research, waste is obtained in the category of waiting (19.24%) and transportation (19.24%). From the results of Big Picture Mapping, it is obtained the production process time of 283 minutes, operator 19 people, lead time of 68 minutes, and distance of 99 meters. The Process Activity Mapping obtained as much as 37.88% is the value adding activity, 36.70% is a non value adding activity, and 25.42% is a necessary non value adding activity.

Keywords: Palm Oil Mills, Lean Production, Waste, Process Activity Mapping.

1. INTRODUCTION

Palm oil mills are factories that produce Crude Palm Oil and Kernel Palm Oil. Palm oil mills in the era of competition and free trade are now required to be able to manage their resources effectively and efficiently, in order to increase competitive advantage so as to win the competition. This palm oil mill is also inseparable from the problem of non value added activities or often called waste which can harm the company. One concept to minimize waste in the production process is to implement a lean production approach that serves as an effort to increase in production by identifying waste¹. Lean is one concept that can be used by companies to eliminate waste. Because waste is a non-value-added activity. Lean is an effort to reduce waste continuously to provide added value to consumers².

Activities in equipment, materials, parts and labor are activities that have added value, besides that is called waste³. Types of waste as follows⁴:

i. Over production

A "just in case" mindset can often lead to over production or storing of extra products, which wastes storage space and production time and energy. You also have a problem if the customer decides later that they don't want the item anymore, or there are ordering delays and the product spoils before delivery.

ii. Unnecessary inventory

This is the other side of the "overproduction" coin. If you order extra raw materials so they're available "just in case," that's also wasteful. The order specs may change, food products may get wasted, or again, the customer may not want the product anymore.

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iii. Defects

Defects and broken products can lead to customer dissatisfaction, and you spend extra time and money solving the problem, reworking the items, or paying for the customer to dispose of the waste. Shipping damage is also considered a defect.

iv. Processing

Also called over-processing, this is where companies expend more energy to produce their items through wasted movement and time. This could be a result of extra/unnecessary manufacturing steps, using older and outdated methods, or not having standard work plans.

v. Unnecessary motion

Unnecessary motion can happen as a result of an inefficient process, a lack of standardized procedures, or even a lack of training for employees. Wasted motion is a hidden cost because it's not something we can easily see, but only through careful observation and communicating with the workers.

vi. Excessive transport

The thing we see the most, since it's our job, is shipping damage. But this muda is much more than that. It includes pallets not being properly stretch wrapped (wasted material), or a truck is not loaded to use floor space efficiently. Even in handling, it can be something as simple as forklift drivers who need to climb off and on the forklifts to set up or fix a stretch wrapping machine or using a pallet jack to hand deliver pallets to the stretch wrapping machine—all wasted motion.

vii. Waiting

These are bottlenecks in time, usually due to broken machinery, lack of trained staff, shortages of materials, inefficient planning, or as a result of the six other mudas. At their worst, they can lead to slowed production, delayed shipments, and even missed deadlines. At the very least, this is time that is paid for but unproductive; you're paying people to sit and wait.

Lean production can be defined as a systemic approach and systematic to identify and eliminate waste or activities that are not value-added through the continuous improvement radically by flowing the product (material, work in process, output) and information using pull system of internal and external customers for the pursuit of excellence and perfection in the manufacturing industry¹. Lean production refers to a manufacturing paradigm based on the fundamental goal of continuously minimizing waste to maximize flow⁵. Lean production is evidenced as a model where the persons assume a role of thinkers and their involvement promotes the continuous improvement and gives companies the agility they need to face the market demands and environment changes of today and tomorrow⁶.

2. RESEARCH METHODOLOGY

The object of this research is North Sumatra Plantation Company. The scope of the object under study is the production trajectory of identifying waste in the production process in the production of Crude Palm Oil. The tools used to help identify or eliminate waste and help identify problems that occur in machines/equipment that hinder the smooth production of inefficiencies are the Big Picture Mapping.

The Lean Production method used in this study, as for the steps, first makes the Big picture mapping is used to describe the production system (starting from the way to order to the finished goods as a whole) along with the value stream contained in the company, so that later

obtained an overview of the information flow and physical flow of the existing system, identify where the occurrence of waste. both identify the waste that occurs from the process activity mapping at this stage, weighting added value occurs in production activities. To give weight to added value, the researchers discuss with the parties involved in the implementation of the production and related in it.

3. RESULTS AND DISCUSSION

3.1 Analysis of Waste

Based on the results of interviews obtained, it can be known the waste sequence that occurs most often in the process of producing crude palm oil (CPO) as shown in Table 1.

Table1 Ranking of waste on CPO production.

Type of waste	Average Weight	Ranking	Percentage (%)	Cumulative Percentage (%)
Waiting	2,5	0,1924	19,24	19,24
Transportation	2,5	0,1924	19,24	38,48
Defect	2	0,1538	15,38	53,86
Inappropriate processing	2	0,1538	15,38	69,24
Motion	1,5	0,1153	11,53	80,77
Inventory	1,5	0,1153	11,53	92,30
Overproduction	1	0,770	7,70	100
Total	13	1	100	

Interviews are conducted with "production assistants" who understand and are competent in all activities and production processes to produce crude palm oil (CPO). The consideration is expected that the data and information obtained will be more accurate.

Based on the results of the waste ranking in the CPO production process, the graph results show that the type of waste that predominantly affects the production of CPO on the production floor is waiting (19.24%) and transportation (19.24%).

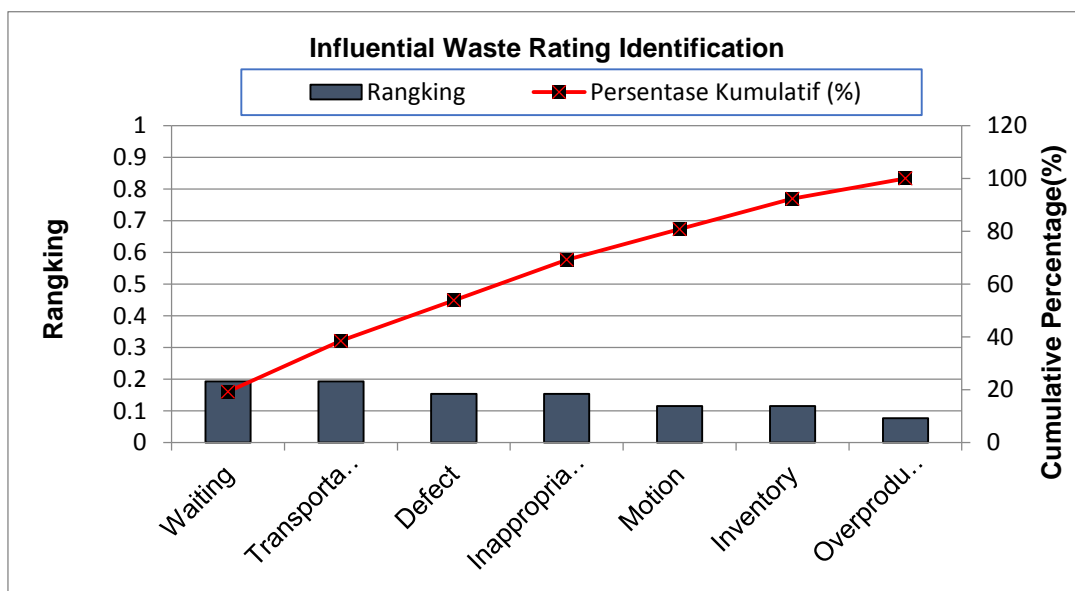


Figure 1. Waste identification chart that influences the CPO production process.

3.2 Big Picture Mapping

Big Picture Mapping is a tool used to describe the whole system and the value stream in it. This tool can also be used to identify where to waste, and to know the relationship between information and material flow⁷.

A big picture mapping in the picture how processes are currently being carried out. The process is carried out based on the flow the production process flow in fact¹¹. The description of the big picture mapping in this study is shown in Figure 2.

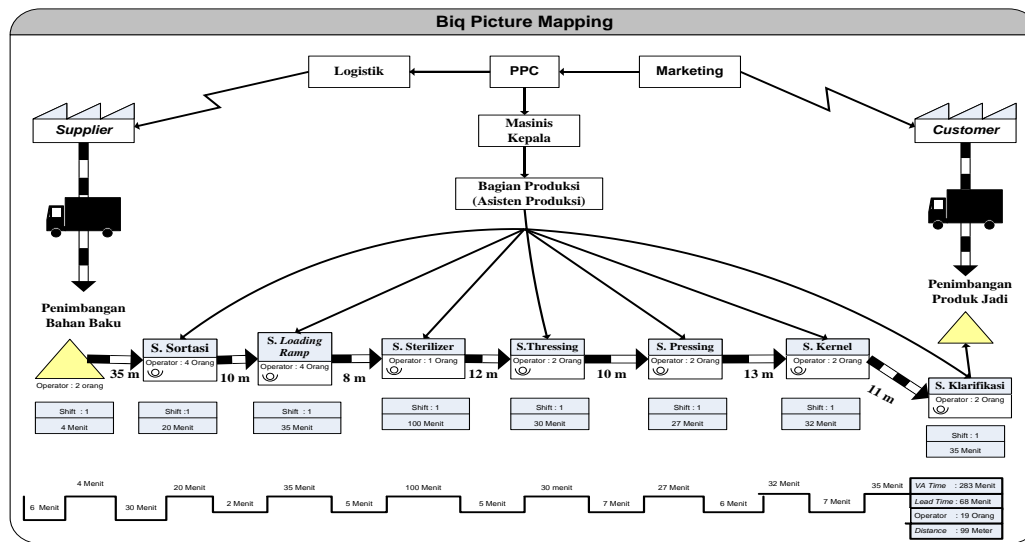


Figure 2. Big picture mapping.

3.3 Process Activity Mapping

Process activity mapping will provide an overview of physical flow and information, time needed for each activity, distance traveled and product inventory level at each stage of production. In the identification of activities classified five types, namely: first operation, second transportation, third inspection, fourth storage, fifth delay.

Based on data on CPO process activities starting from the hoarding, sorting, ramp loading, sterilizer, pressing, pressing, kernel, and clarification stations, a adding value of 37.88%, non-value adding 36.70, necessary but non value adding 25.42 was obtained.

3.4 Lean Production

The efficiency and speed of results are better than the previous one. Time can be saved as much as 27.02 hours than before. So, as for the calculation of the efficiency and speed of the new process as below:

Efficiency of the process cycle

$$PCE = (\text{Value Added Time}) / (\text{Total Lead Time}) \times 100\%$$

$$PCE = 98.55\%$$

So, the efficiency of the process cycle is 98.55%.

Process Speed (Velocity Process)

$$VP = (\text{Lead Time}) / (\text{Number of activities in the process})$$

$$VP = 16.038 \text{ minutes/stages}$$

For value calculation (VSP) before the process activities are eliminated, they are:

VSP = Speed of process x Number of activities in the process

VSP = 449.064 minutes

Having eliminated activities that do not provide added value are:

VSP = Speed of process x Number of activities contained in the process

VSP = 176.418 minutes

So, the difference between value stream process (VSP) before and after that is:

VSP = 449.064 minutes - 176.418 minutes = 272.646 minutes

VSP = 4.54 hours

4. CONCLUSIONS

- i. The results of the identification and analysis of waste indicate that the most influential or dominant waste in the CPO processing production process is waiting to have a weight of 19.24% and also transportation has a weight of 19.24%.
- ii. Big picture mapping The production process time is 283 minutes with the total number of operators 19 people, while the lead time is 68 minutes with a distance of 99 meters.
- iii. Process activity mapping for all production activities carried out obtained as much as 37.88% is the value adding activity, 36.70% is a non value adding activity, and 25.42% is a necessary non value adding activity.
- iv. The concept of lean production for the elimination of elements of activity or activity, the process streamlining is obtained from 595.52 hours to 568.50 hours with a time savings of 27.02 hours. With the process stages as many as 25 stages.

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