

# Application of Lean Manufacturing to Minimize Waste in the Lajiem Coffee Business Production Process

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## Abstract

**Background** - This study aims to implement the Lean Manufacturing method in the production sector in order to minimize the existence of waste in production proses of Lajiem Coffee. **Design/methodology/approach** - This type of research is qualitative research. By using the Lean Manufacturing method, the waste in the production sector of Coffee can be identified. The analysis used in this research is interactive models. **Research implication** - The results of waste identification using Timwood waste in the production sector found are Defect and Motion. Next, look for the root cause using 5-Why's in Root Cause Analysis (RCA), then assessed through Risk Analysis and mapped in a risk assessment matrix to find out the root causes of extreme risk. It is known that the extreme risks in the production sector are defects and motion. The next extreme risk is given improvement suggestions in order to minimize and reduce waste that has occurred in the production.

**Keywords:** *Lean Manufacturing; Timwood waste; 5-Why's; Root Cause Analysis; Risk Analysis; Proposed Improvements.*

## 1. Introduction

Coffee has become a way of life for the people, as evidenced by the increasing number of shops and cafes serving various drinks and most of them are derived from coffee-based ingredients. Reporting from kemenperin.go.id and CNN Indonesia (2021), domestic consumption growth increases by an average of 7% each year. Apart from that, reported by GAEKI (Indonesian Coffee Exporters Association) (2021), Indonesia also has the opportunity to export coffee to coffee connoisseur countries such as Japan, Austria, Belgium, Finland, Norway and the USA where per capita coffee consumption is far above Indonesia which is still only 1.2 kg per capita year. Judging from this phenomenon where the growth rate of coffee consumption in Indonesia is increasing,

Intense competition in the industrial world has increasingly spurred manufacturing companies to continuously improve their production results in the form of quality, price, quantity of production, and timely delivery with a more real goal of providing satisfaction to customers. The real effort in the production of goods is to reduce waste that does not have added value in various ways including the provision of raw materials, material traffic, movement of operators, movement of tools and machines, waiting processes, rework and repairs. The main idea is to achieve overall production efficiency by reducing waste (waste) from the production process to the storage of finished goods, which in turn is to increase competitiveness.

Lajiem Coffee is an UKM engaged in coffee production and has been established since 1983 and is still operating today, which is located on Jl. Dr. Wahidin SH No. 84, Sukorame, Kec. Gresik, Kab. Gresik, East Java 61121. In its production, Lajiem Coffee has a fairly long production line starting from raw coffee bean storage, screening, roasting, cooling, grinding and finally packaging. Based on the results of interviews with Mr. Lukman as the owner and manager of Lajiem Coffee, it was found that there is waste on the production line, namely product defects. The form of product defects is that the coffee is too burnt during the roasting process because during the Lajiem Coffee sieving process it still uses the manual method and the possibility of human error can occur so that the not-good beans can still pass.

The existence of waste in UKM Lajiem Coffee will certainly result in losses for UKM. As for the form of losses obtained, such as losses in terms of costs, the less than the maximum number of products produced, and

the effect on the efficiency of time used, so that the existence of this waste needs to be identified and analyzed, so that suggestions can be given for the problems that occur.

A method is needed to identify the occurrence of waste in the production system so that can save raw material resources, time and energy so that efficiency increases can occur. Lean Manufacturing is one way, Lean Manufacturing according to (Gasperz, 2011), Lean Manufacturing is a continuous effort to eliminate waste (waste) that occurs in an industrial company and increase the added value (value added) of products (goods and/or services) to provide value to customers (customer value). Lean Manufacturing has 2 goals, the first is to reduce waste and the second is to create added value for consumers. Added value for consumers can be achieved with the right distribution, in the right amount with good quality, as well as at the right time. Implementing Lean Manufacturing at Lajiem Coffee hopes to reduce the increases can occur. Lean Manufacturing is one way, Lean Manufacturing according to (Gasperz, 2011), Lean Manufacturing is a continuous effort to eliminate waste (waste) that occurs in an industrial company and increase the added value (value added) of products (goods and/or services) to provide value to customers (customer value). Lean Manufacturing has 2 goals, the first is to reduce waste and the second is to create added value for consumers. Added value for consumers can be achieved with the right distribution, in the right amount with good quality, as well as at the right time. Implementing Lean Manufacturing at Lajiem Coffee hopes to reduce the burnt beans and be able to use the burnt beans for other things.

**a. Problem Objectives**

How to apply the Lean Manufacturing strategy to the Lajiem Coffee business

**b. Purpose**

The aim of this research is to minimize waste in the production process of the Lajiem Coffee business

**c. Benefits**

The benefits obtained from the research conducted include:

- 1) For Lajiem Coffee and similar businesses, it can provide knowledge and benefits of a Lean Manufacturing strategy.
- 2) For Lajiem Coffee and similar businesses, it can be a recommendation material for businesses to consider in efforts to improve waste in order to expedite production activities.

**2. Method**

**a. Lean**

*Lean* is a method that aims to streamline an activity in production by eliminating/removing activities that have no added value and improve process performance to make it more effective and efficient, get faster results and better quality than before. According to Gasperz (2008) Lean is a continuous improvement effort to eliminate waste, increase the added value of products (goods/services) and provide value to customers (customer value).

**b. Lean Manufacturing**

*Lean Manufacturing* can be defined as an approach to identify and eliminate waste (waste) or activities that do not have added value (non-value-adding activities) through continuous radical improvement (radical continuous improvement) by flowing products (materials, work -in-process, output) and information using a pull system from internal and external customers to pursue excellence and perfection (Gasperz, 2011).

**c. Activity**

According to Hines and Taylor (2000) In the Manufacturing process there are 3 (three) types of activities, namely as follows:

- 1) Value Added (VA) is all activities in producing products or services that provide added value in the eyes of consumers. Examples of this type of activity are inspection of raw materials, monitoring the quality of raw materials and segregation of materials and waste.
- 2) Non-Value Adding (NVA) is all activities in producing products or services that do not provide added

value in the eyes of consumers. This activity is called waste which must be targeted to be eliminated immediately. Examples of this activity are waiting time, stockpiling of materials or materials, and inappropriate communication and so on.

- 3) Necessary but Non Value Added (NNVA) are all activities in producing products or services that do not provide added value in the eyes of consumers but are needed unless there has been a change in the existing process. This activity is usually difficult to get rid of in a short time. Examples of this activity are moving raw materials and transporting raw materials, cleaning warehouses.

#### **d. Seven Waste Concept**

Seven Waste is a type of waste that occurs in the manufacturing process, namely transportation, inventory, movement, waiting, redundant processes, excessive production, and damaged goods or better known in English as TIMWOOD. These seven wastes were introduced by Taiichi Ono from Japan who worked for Toyota and introduced them in a production system known as the Toyota Production System (Adrianto and Kholil, 2015).

Toyota Production System (TPS) there are seven wastes in the production process, namely as follows (Suhartono, 2007 cited by Jakfar, et al, 2014) :

- 1) Overproduction, namely waste caused by excessive production, the intention is to produce products that exceed what is needed or produce earlier than the schedule that has been made.
- 2) Waiting, namely the waste of waiting for the next process. Waiting is an interval when the operator does not use time to perform value adding activities due to waiting for product flow from the previous (upstream) process.
- 3) Transportation, transportation is an important activity but does not add value to a product. Transportation is the process of moving material or work in process (WIP) from one work station to another, either using a forklift or a conveyor.
- 4) Excess processing, occurs when the work method or sequence of work (process) used is deemed inadequate and flexible. This can also occur when the existing process is not standard so that the possibility of a defective product will be high.
- 5) Inventories, are supplies that are less necessary. The point is that there is too much material inventory between one process and another so that it requires a lot of space to store it, the possibility of this waste is a very high buffer.
- 6) Motion, is an activity or movement that is unnecessary by the operator which does not add value and slows down the process so that the lead time becomes longer.
- 7) Defects, are products that are damaged or do not comply with specifications. This will lead to an ineffective rework process, high complaints from consumers, and very high level inspections.

#### **e. Root Cause Analysis**

According to Wahyu (2014) this method is used after mapping activities that generate waste and are non-value added activities. This method is used to find out what causes cause waste to occur in an activity or process and the nature of the use of this method is to identify potential activities for waste and identify the causes from start to finish in these activities.

The simple definition of Root Cause Analysis is a process of identifying the main causes of a problem using a structured approach. In carrying out Root Cause Analysis (RCA) several implementations are required, among the implementation stages are as follows:

- 1) Defining the problem (Define the non-conformity). In this stage what must be known and clearly defined is what problem is currently happening, then explain the specific symptoms that indicate the occurrence of a problem.
- 2) Investigate the root cause of the problem (Investigate the root cause). This stage is the most important stage in RCA because when it is wrong to find the root cause of the problem, the Action plan taken will not be able to solve the problem properly so that the same problem cannot be avoided from happening again. At this stage tools or methods will be used to explore the root causes of the problem.
- 3) Submit an Action plan (Create Proposed Action Plan). At this stage a solution will be offered in the form of an action plan to prevent the problem from reappearing.
- 4) Implementing the Action plan (Implement proposed action). At this stage it will be determined who is responsible for the implementation of the Action plan, how to make the Action plan work, then the most important thing is to determine the time scales, namely the time schedule and implementation target.

- 5) Perform monitoring (verification & monitoring of effectiveness). This action is very necessary to ensure that the changes or new activities carried out are actually in accordance with the proposed Action plan. then this stage also helps to provide confidence whether the corrective steps taken are appropriate to manage the root cause of the problem or even create additional problems.

**f. Analysis Risk**

Risk analysis is a step to find out the risks that occur in an activity that has the possibility of failure and/or waste. The application of Risk Analysis has a standard reference to determine the risks that occur, the authors use one of the Risk Management standards, namely the Australian Standard (US) and New Zealand Standard (NZS) or AS/NZS 4360:2004. According to Australian Standards (AS) and New Zealand Standards (NZS) or AS/NZS 4360:2004, risk is defined as the opportunity for an uncertain event to occur that may affect the achievement of a goal.

**3. Findings and Discussion**

This research approach is a qualitative research. This research conducted in Lajiem Coffee which is located at Jl. Dr. Wahidin SH No. 84, Sukorame, Kec. Gresik, Kab. Gresik, East Java 61121. This business started from his interest in opening a business in the coffee sector. That's because in the 1980s the business in this field still had great opportunities with only a few competitors. Besides that, it is also strengthened by his ability to process coffee. To realize his interest, he and his father opened the first coffee shop in front of his own residence.

Data collection techniques in this study used participatory observation, namely by observing and being directly involved in ground coffee production activities, which occurred at Lajiem Coffee. While the interviews conducted in this study were structured interviews namely interviews conducted with instruments in the form of questions related to the production process in the fieldground coffee production that occurs in Lajiem Coffee. Interviews were conducted with research informants namely Mr. Lukman as the owner of Lajiem Coffee and Mr. Sugeng as an employee of Lajiem Coffee ground coffee production.

Presentation of data in qualitative research can be in the form of tables, graphs, phie chard, pictograms and the like. In presenting data, it can make it easier to understand the reduction process that occurred before, then plan the next process according to understanding. Presentation of data in this study uses tabular form to make it easier to understand. Following is the presentation of the data that has been obtained from the identification of waste and the root causes of waste from each production sector.

Table 1. The Root Causes of Waste Lajiem Coffee

No.	Waste type	W Code	Waste	R Code	Root cause
1.	Motion	W1	Stir the coffee while roasting	R1	No machine use
2.	Defect	W2	Burnt coffee beans cannot be reused	R2	Inaccurate employees

Risk Analysis is used to identify the most risky root causes of Waste. AS/NZS 4360:2004 Risk Analysis in finding the root causes of the most risky waste including: Likelihood, Consequence. one month, Value 2 is 5% - 25%, Value 3 is 25% -50%, Value 4 is 50% -75%. And a value of 5 above 75%.

Risk Code	The Root Cause of Waste	Likelihood (L)	Consequence (C)	Risk Rating (R=L x C)
R1	No machine use	5	2	10
R2	Inaccurate employees	4	5	20

Based on AS/NZS (2004) the right treatment is to stop activities and top management must be directly involved in dealing with it, handling is carried out immediately and quickly so that it does not have a large and repeated impact because the red zone has extreme risks. From the results of the risk value, everything needs to be repaired. In this research, the root cause with the highest value will be given a recommendation for improvement according to previously known problems. It is known that in the field of coffee production the highest risk value is found in code R2 (lack of thoroughness in employees) and then Code R1 (no machine use). The risk codes and root causes will later become suggestions for improvements in the production sector to minimize the waste that occurs in Lajiem Coffee.

In this research, the researcher wants to give proposed improvements in the production sector after knowing the root causes of the existing waste, it is hoped that the proposed improvements can help eliminate or reduce the existing waste in the production process at Lajiem Coffee SMEs. The proposed improvements to reduce defects in the coffee production process are as follows:

- a. Carry out the application of technology using machines. One of the things that can reduce waste motion is to use a machine to produce coffee. The application of technology has been widely used by businessmen due to the need for time and cost efficiency causing every business actor to apply machine technology in the work environment. According to Martono (2012) One thing that needs special attention is that every technological development always promises convenience, efficiency, and increased productivity. Indeed, at first technology was created to make it easier for humans to fulfill all their life needs. Here are some of the things that technology promises:
  - 1) Technology promises change. Every new discovery will give birth to various changes in a society. Like a subsystem, the presence of new technology as a new subsystem in society will bring consequences, other subsystems in the system inevitably have to adapt due to the presence of the technology. Technology will definitely change the pattern of individual daily activities.
  - 2) Technology promises progress. Technology is a symbol of progress. Anyone who is able to access technology, then he will experience little or much progress in one direction or another.
  - 3) Technology promises convenience. Technology was created to provide convenience for individuals.
  - 4) Technology promises to increase productivity. Many large companies use technology for reasons of efficiency and increased productivity rather than having to hire human workers who eat up a lot of budget to pay them. Technology can also increase a company's profits manifold.
  - 5) Technology promises speed. Various jobs will be completed quickly when we take advantage of technology.
  - 6) Technology promises popularity. Humans easily appear on the screen via the internet.Therefore, with the application of machine technology in terms of production, it is hoped that this waste motion can be reduced.
- b. Providing understanding to employees about the importance of process quality and product quality. Activities that need to be carried out to reduce defects are by providing special assistance or training for employees in charge of roasting coffee. According to Simamora (2015) training methods must be based on job requirements depending on various factors, namely time, cost, number of participants, basic education level of participants, participant background, and others. Meanwhile, according to the Labor Law Chapter 5, Article 9. Job training is organized and directed to equip, improve and develop work competencies in order to increase capabilities, productivity and welfare.

#### 4. Conclusion

Based on the results of the study, the researchers concluded several things, namely:

- a. From the results of the study it was found that in the production process there is a motion defect where there are activities or activities that are not needed during the production process and defects in burnt coffee beans.
- b. Factors that can cause defects in coffee products at Lajiem Coffee are humans and machines. This is due to the inaccuracy of employees when carrying out roasting activities which causes the coffee beans to burn. Besides that, Lajiem coffee does not have a roasting machine because it uses a manual process which causes waste motion.

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