PROPOSED WORK PROCESS IMPROVEMENT TO MINIMIZE WASTE WITH 8 WASTE APPROACH

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Abstract

The purpose of this study is to analyze activities that do not provide added value and provide suggestions for increased productivity in the IPC division. Research at the PQR company which is engaged in the pharmaceutical business has various wastes in the IPC division. This IPC Division often experiences problems that arise because of waste. For example, the waste that often occurs is the waiting process that often occurs in the production process. The emergence of these problems becomes material for researchers to conduct research using one of the lean manufacturing tools "8 waste". By using Lean Manufacturing, it is hoped that it can solve the problems that occur, Lean Manufacturing is a systematic approach to identify and eliminate waste through a series of improvement activities, the 8 waste method can reduce waste that occurs in the IPC division. The results of identification using the 8 waste method, there are several processes, namely overproduction, waiting for waste, transportation waste, exec processing waste, motion waste, defects, and nonutilized talent waste.

Keywords: *waste, 8 waste, lean, production*

INTRODUCTION

With the current economic conditions, it is essential to reduce waste and increase business efficiency. So to find a solution that is low in cost, accompanied by increasing value at the same time for both the customer and the company is crucial[1]. PT PQR is one of the manufacturing companies engaged in the pharmaceutical sector located in the city of Bandung. PT PQR is required to be able to produce drugs that meet the requirements of efficacy, safety, and quality in doses used for medicinal purposes. The IPC (In-Process Control) Division is one of the divisions at PT PQR that carries out the task of controlling the production process from the weighing process of raw materials to the product packaging process. Based on the results of identification in the field, some activities do not add value as shown in the table. In the opinion of Womack and Jones defines that "Waste is any human activity that uses resources but does not create added value"[2]

Based on the problems that occur, it is necessary to carry out continuous improvements to increase productivity. One of the factors that cause a decrease in the level of productivity is activities that do not add value or are known as waste. The existence of waste is a problem. One way that can be used is the lean approach. Lean is about having the right resources, in the right places to do the work that meets the customer's needs, at the best quality and at the right time. Lean examines the flow of work or tasks from design to product acceptance by consumers so that it can run smoothly and not experience layoffs or returns due to defects or[3].

Lean Manufacturing is a systematic approach to identify and eliminate waste through a series of improvement activities[4]. Lean Manufacturing offers methods, tools, and heuristics for increasing efficiency in manufacturing. Internal benchmarking is recommended for determining efficiency and tracking improvements in pharmaceutical manufacturing[5] The purpose of lean manufacturing is to eliminate waste (no value-adding) from a process so that activities along the value stream can generate value-adding. The following are activities that often occur in the production process.

1. Value-adding activity, which is an activity that according to the customer can provide added value to a product or service so that the customer is willing to pay for the activity, for example repairing a damaged car on a toll road.
2. Non-value-adding activity, which is an activity that does not add value to a product or service in the eyes of the customer. This activity is a waste that must be eliminated immediately in a production system, for example moving material from one shelf to another so that it will make the operator move around the production line.
3. Necessary non-value-adding activity, which is an activity that does not add value to the product or service in the eyes of the customer, but is required in existing procedures or operating systems. These activities cannot be eliminated in the short term but can be made more efficient. To eliminate this activity requires considerable changes to the operating system that requires a long period. For example, performing inspection activities on every product on every machine because the production uses an old machine. Another example is moving tools from one hand to another [6]

Previous research stated that by eliminating waste, the productivity value increased from 1.56 sigma to 1.99 sigma. Another study stated that by identifying waste with the 8 waste method, there was an increase in value-adding activities from 4.17% to 11.45%. In line with the purpose of this research is to analyze activities that do not provide added value or waste to increase productivity in the IPC division by using one of the tools in lean manufacturing, namely the 8 waste method.

METHODOLOGY

This research was conducted at PT PQR which is located in the city of Bandung. The research was carried out in several stages starting from field studies, identification and formulation of problems, literature studies, objectives, data collection, data processing, analysis, conclusions, and suggestions. The stages of the research will be explained as follows:

Field Study Stage

This stage is carried out at PT PQR, the IPC division. At this stage, this is done by making direct observations to PT PQR. This is done by researchers to find out the real conditions that occur in the company. By conducting field studies directly, researchers will find problems that can be investigated further

1. Phase Identification, Problem Formulation, Objectives, and Literature Study

At this stage, the researcher determines the topic to be raised based on the results of field studies at PT PQR. Then the researcher conducted several studies according to the topic to solve the waste problem. The study of literature is used by the author to be used as a reference in conducting research. Sources can be obtained from books, journals from the internet, and articles. Literature studies can help to solve and make it easier to approach solving research problems. Several theories in this study include the concept of lean, lean manufacturing, waste, and the 8 waste method.

Data Collection Stage

At this stage, the data obtained by the researcher is primary data from field studies conducted in the IPC division. Primary Data is data obtained directly from the source.

Data Processing Stage

At this stage, the data obtained is analyzed and described to identify waste in the IPC division. The tools used in lean manufacturing are the 8 waste method. 8 Waste is an identification method by grouping various wastes that appear in the manufacturing production process into 8 groups of waste, namely defects, overproduction, waiting, non-utilized talent, inventories, motion, excess processing, and transportation. In the Toyota Production System (TPS), there are eight wastes in the production process, namely as follows:

a. **Overproduction**, namely waste caused by excessive production, which means producing products that exceed consumer demand or exceed the amount needed.

b. **Waiting**, which is a waste of waiting for the next process. Waiting is the time interval when the operator does not use the time to do value-adding activity due to waiting for product flow from the previous process (upstream).

c. **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, using either a forklift or a conveyor.

d. **Excess processing** occurs when the work method or work sequence (process) used is deemed not good and flexible. This can also happen when the existing process is not standardized so that the possibility of defective products is high. There are variations in the method used by the operator.

e. **Inventories**, are less necessary supplies. The point is that there is too much material inventory, too much work in process between one process and another so it requires a lot of space to store it, the possibility of this waste is a very high buffer.

f. **Motion** is an activity/movement that is less necessary by the operator that does not add value and slows down the process so that the lead time becomes long.

g. **Defects** are products that are damaged or do not meet specifications. This will lead to an ineffective rework process, high complaints from consumers, and very high-level inspections.

h. Non-Utilized Talent, is not placing people according to their abilities, and the person is not directly involved in the production process[7].

Conclusion and Suggestion Stage

At this stage, the data obtained is analyzed and described to identify whether there is waste in the IPC division.

RESULT AND DISCUSSION

Lean manufacturing is a concept from the Toyota Production System to increase the added value of work by eliminating waste and reducing unnecessary work, lower costs, higher quality, and shorter lead times[8]. The 8 waste method is one of the tools in lean manufacturing. This method is used by researchers to analyze whether there is waste in the IPC division. The initial step of the research is to conduct a field study in the IPC division of PT PQR to collect information related to the production process, where there is a checking process that causes excess waste. Each activity in the checking process can be in the form of Value-Added Activities (VA), Non-Value-Added Activities (NVA), and Necessary but Not Value-Added Activities (NNVA).

The waste identification stage is needed to find out what kind of waste occurs from the production process. as a basis for making improvement plans. The next stage is the analysis of the causes of waste. This stage explains in more detail and detail the waste that occurs and its causes. The process of controlling the production process in general along the value stream starts from controlling the weighing of raw materials to product packaging. Details of each control activity in the production process are shown in Table 1:

Table 1

Wasteful Activities In IPC Division

No	Activity	Description	VA	NVA	NNVA
1	Weighing room readiness control ingredients	Waiting	-	20'	-
2	Customized raw material checking with batch record	Motion	-	-	15'
3	Controlling the readiness of the mixing room	Waiting	-	10'	-
4	Checking raw materials and filling materials adjusted to the batch record	Motion	-	-	15'
5	Sampling process	Waiting	-	-	20'
6	Print room readiness control	Waiting	-	10'	-
7	Checks carried out in two different rooms	Transportation	-	15'	-
8	Check the initial sample of the tablet	Waiting	-	-	25'
9	Check the dimensions and uniformity of tablet weight	Motion	-	-	30'
10	Check tablets repeatedly	Defect	-	-	15'
11	Tablet checking by operator and IPC	Defect	-	30'	
12	The number of production targets that do not match the permin	Overproduction	-	-	30'
	Total Activity		0	5	7
	Total Time		0	85'	150'
	Activity Presentation		0%	42%	58%

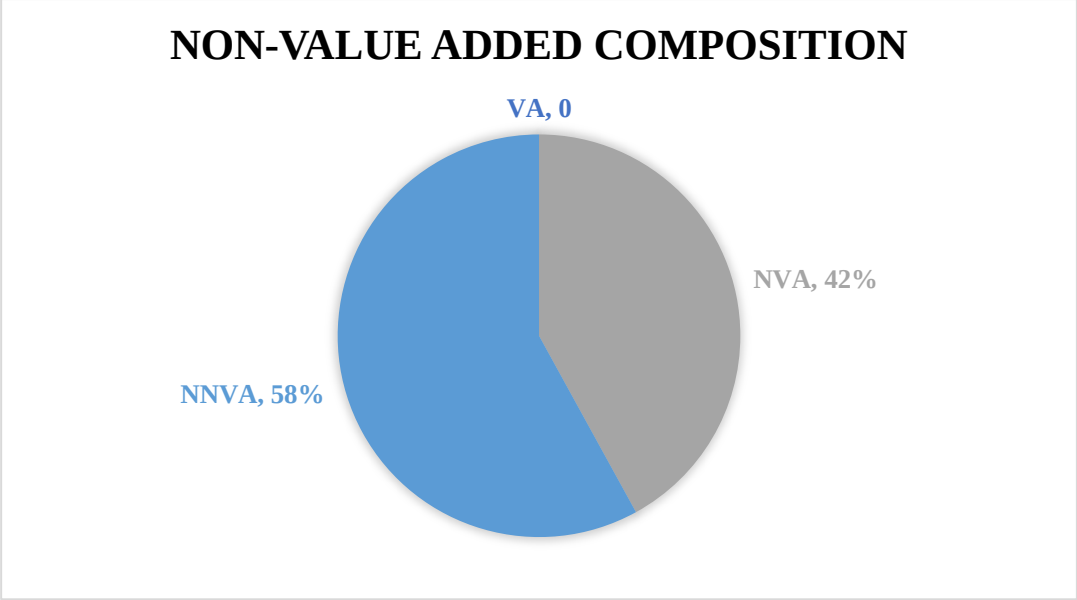

Figure 1. Non-Value Added Composition

Figure 1 shows that the activities that have added value (VA) in the checking and controlling process do not involve any activity, it means that the checking and control carried out by IPC staff do not have added value. Activities that do not have added value (NVA) in the checking and controlling process involve 5 activities that do not have added value, with a total time of 85 minutes or 42%. Necessary but non-value added activities involve 7 activities with a total time of 150 minutes or 58%. The waste identification stage is needed to find out what waste occurs from the product checking process carried out by the IPC division as a basis for making improvement plans. The next stage is the analysis of the causes of waste. This stage explains in more detail and detail the waste that occurs and its causes.

Causes of overproduction waste

The results of the research show that there is over-production, which is shown in Table 1. Activity 12 where the production target exceeds the demand targeted by the PPIC section. This is because the checking process is carried out by operators and IPC staff so that communication errors often occur regarding predetermined production targets.

Causes of waiting for waste

The results of Table 1. Activities 1,3,5,6 and 8 show the existence of waste caused by the waiting factor. Some of the activities that cause this waiting such as controlling and checking the readiness of the path to be used. Before the IPC staff checks the line, the production operator is not allowed to start the work which causes idle time, so the operator while waiting for the IPC staff to come just stays silent and does nothing.

Causes of transportation waste

The results of Table 1. Activity 7 shows the waste caused by the transportation factor. Activities that cause transportation waste are mixing samples taken in the mixing room and then given to the QC (Quality Control) section. In addition, tablet samples were brought by the operator from the printing room to the IPC room.

Causes of motion waste

In the process of checking the product, motion occurs, which is shown in Table 1. Activities 2, 4, and 9. An example is in the tablet checking process carried out by operators and IPC staff. This extends the sample processing time because the checks are carried out at different times. So that after checking is done by the operator, you have to wait for a re-check by the IPC section.

Causes of defects

Product defects found by the IPC section were caused by several factors, one of which was a defect that occurred due to machine downtime.

CONCLUSION

Based on the analysis, it is known that the main causes of waste are overproduction, waiting, transportation, excess processing, motion, defect, and non-utilized talent. Suggestions that can be given to reduce the waste that occurs are as follows:

1. Over-production: To overcome this waste, it is possible to streamline the checking process. Like checking only done by the IPC with clear documentation. Such as making a production target logbook. So that it can control whether the production target has been met or not.
2. Waiting: To overcome this waste, it is better to make a schedule regarding the time information when the IPC section must carry out these checks and must be disciplined with time. This means that there is no delay when checking the readiness of the production line. So the waiting time for operators can be reduced.
3. Transportation: To overcome this waste, it is better if the layout of the production, IPC, and QC sections can be relayed to reduce the distance between sections so that any activity or process that involves these three sections does not take long.
4. Motion: To overcome this waste, a division of tasks can be carried out so that there will be no repetitive activities.
5. Defect: To reduce this waste, maintenance can be done on the machine that will be used.

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