IMPLEMENTATION OF VALUE STREAM MAPPING TO INCREASE PT RCI'S PRODUCTIVITY AND EFFICIENCY

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Abstract

Competition in the logistics business requires companies to develop and increase production efficiency and effectiveness. One of the companies operating in the logistics sector is PT. RCI found many problems during the warehousing service process. This hampers other processes. The problem faced by companies is not achieving production targets because there are still many non-value-added activities that are classified as waste. The research aims to eliminate waste that occurs in the Quality Control process, or checking goods at PT. RCI with a lean manufacturing approach. The lean manufacturing method used is value stream mapping (VSM) to analyze the dominant waste in the manufacturing process. Based on the results of the analysis, three recommendations for improvement were obtained, namely the use of forklifts, additional work tools, and additional changes to the layout of the goods checking location. Recommendations from the results obtained an increase in the Process Cycle Efficiency value of 29.50%.

Keywords: Value Stream Mapping (VSM), Lean Manufacturing, Production Efficiency, Waste Elimination, Process Cycle Efficiency

INTRODUCTION

This study discusses and displays the entire work process from the start of the quality process to the completion of the process using value stream mapping (VSM). Value steam mapping is a picture of production activities as a whole aimed at providing added value, identifying waste in the process, by shortening process lead times and costs (Kundgol et al., 2021), and building guidelines for network integration and implementation of lean manufacturing, for continuous improvement (Garza-Reyes et al., 2018). By identifying waste in production process activities, then reducing or eliminating waste (Gopi et al., 2019). The next process compares with current conditions, so that you can see an increase in productivity in the production process. Increasing productivity is a challenge that must be achieved in the VSM process. It is able to visualize product flow and identify waste. VSM also helps to prioritize problems to be resolved. A VSM is a form of process mapping that shows in detail material flow, information flow, operational parameters, lead time, yield, uptime, setup time, process time, overall process efficiency, etc.

The problem that occurs is that checking goods at PT RCI takes 380 minutes in 1 day, which causes the production movement process to other parts to be hampered and reduces the productivity value or output of the operational team as a whole. Carrying out field studies and literature studies is one way to see process waste that occurs and provide suggestions for improvements to the company. An alternative approach that might be used to streamline the production process is the Lean manufacturing method.

Lean manufacturing is an approach that can be used to reduce waste that occurs in a company, so that production lead times can be reduced. The tool in lean manufacturing that is generally used to map the entire flow of both information and materials and is used to identify waste is Value Stream Mapping (Gasperz, Vincent. (2015).

REVIEW OF LITERATURE

Value Steam Mapping

Value stream mapping is a visual method for mapping the production path of a product, which includes materials and information from each work station. This value stream mapping can be used as a starting point for companies to recognize waste and identify its

causes. Using a value stream means starting with the big picture in solving problems, not just in single processes, and making improvements as a whole and not just in certain processes. Value stream mapping not only visualizes the flow of materials in the production system, but also visualizes the flow of production order information in the supply chain as a whole. This information flow can be used to see whether there is information stagnation or not in a production system. Value Stream Mapping aims to identify all waste in the production stream and try to eliminate this waste (Rother and Shook, 2003) (Ravizar & Rosihin, 2018)

Lean Manufacturing

Lean manufacturing can be defined as a systemic and systematic approach to identifying and eliminating waste or non-value-adding activities through radical continuous improvement utilizing product flow. materials, work in process, output) and information using a pull system from internal and external customers to pursue excellence and perfection in the manufacturing industry. As an illustration, industries that implement Lean Manufacturing as a whole (Liker, 2004) achieve the following progress (Setiawan et al., 2023): a) Reduce manufacturing lead times: b) Increase resource availability and utility; c) Inventory control

Related Case Studies

Results of research conducted (Suryaningrat & Purnomo, 2022). This recommendation can reduce the amount of inventory carried out in the MSA for okra production by 48.39%, while the MSA lead time goes down 48.37%, then the weighing lead time goes down 66.69%. Overall, total lead time decreased by 31.66%, and production increased from 112 per shift to 202 per shift. Meanwhile, research (Fatma et al., 2022) showed that the results after improvements were made reduced the time to complete the material checking process by combining several SOPs and replacing the Acceptable Quality Level AQL 1 standard with the AQL S-3 standard to make it more effective because NGs are rarely found. The results of research (Bashori et al., 2023) show that there is an increase in the decking production process time from before repairs were carried out, the total time was 23279.9 minutes, and after repairs were made to 21589.23 minutes, which means there was an increase of 1690.7 minutes or 28,178 hours in one production process.

From the results of the implementation of value stream mapping carried out (Ravizar & Rosihin, 2018), there was a reduction in waste at each workstation with a total waste reduction of 66.97 tons/year or 18.6% for waste gel and 88.8 tons/year or 19.3% in waste powder and there was a reduction in the changeover process time of 45 minutes or 12.16% of the total changeover time before improvement. Apart from that, there was also an increase in the production process speed of 2 minutes 47 seconds or 4.52% of the lead time. The previous production process was 61 minutes 34 seconds to 58 minutes 47 seconds. Meanwhile, Baldah et al., 2021) research results show a decrease in total lead time from 82.8 hours to 61.54 hours, in the value-added (VA) category from 1.26 hours to 0.24 hours, non-value-added (NVA) from 80.9 hours to 60.72 hours, and in necessary but non-value-added (NNVA), there was no decrease. Improvements are made by combining the subassembly and packing processes into the assembly process, so that it can reduce the movement of components and processes, and reduce the amount of manpower from 38 to 34 people.

RESEARCH METHOD

The research carried out by its nature includes descriptive research. This method examines current conditions to create a mathematical and clear picture, description of the ongoing production process, which can be used to create improvement plans. In this research, the method used is a literature study is searching for and collecting information that is relevant to the topic or problem to be researched. This information can be obtained from scientific books, research reports, scientific essays, theses, encyclopedias, and others.

Field Study, namely searching for and collecting information directly from the field where the research is being conducted. To obtain more detailed data to support this research, it was carried out in several ways, namely: a) Orientation aims to get to know, understand, and document the activities contained in the section or department visited during data collection; b) Subject Observation Observation or observation of this subject aims to be able to see and find a problem that exists in a section or department

The initial step begins by mapping the current conditions and the problems that occur. The mapping is carried out for each process category, including lead time, cycle time, changeover time, number of manpower, working time, and work level.

The next process is to create a mapping for the process in ideal conditions, taking into account lean manufacturing, from the results of determining the ideal conditions to be achieved, referring to future value stream mapping. It is hoped that the results of the research will provide suggestions for improvements for companies in the quality control process to increase employee productivity and efficiency.

RESULTS AND DISCUSSION

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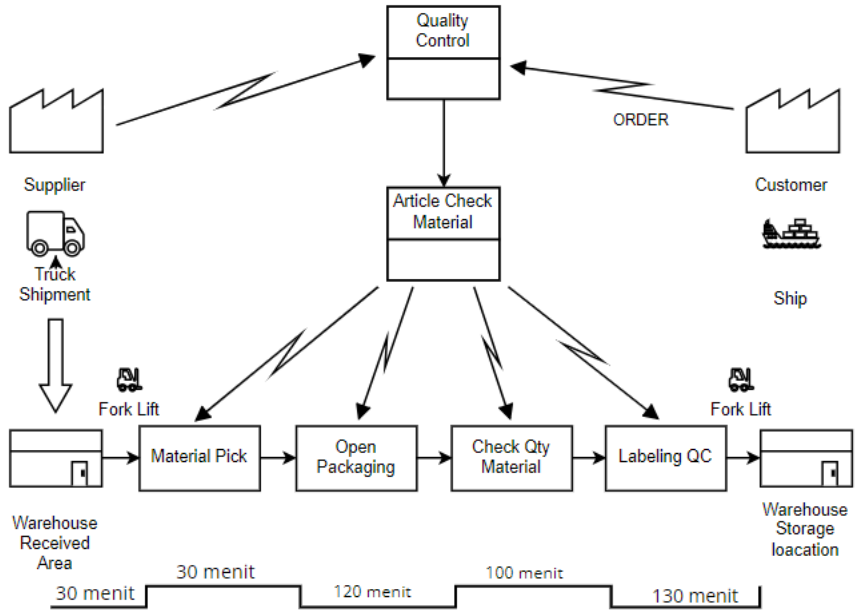
Condition Before Repair

From the results of field observations, through mapping in the form of material flow and information on current conditions, it is completely presented in the following picture:

Current Value Stream Mapping

Figure 1.
Current Value Stream Mapping



Quality work from the goods entering the Quality Control area until they are completed and moved to the warehouse area is as follows:

Table 1.
Quality work

Process	Material Pick	Open Packaging	Check Qty	Labeling QC
Time (minutes)	30	120	110	120

In this case, you can see some waste or waste of time in the open packaging, check the quantity, and the labeling processes. After observing the quality control process carried out by PT RCI in its daily operations, several indications of the causes of slow process lead times were found in this area.

The concerns about wasting time are as follows: The open packaging process with a workforce of 7 people requires additional work aids, namely: a) 4 units of hammer; b) 2 units of crowbars; c) Electric drill 2 units.

Currently, the tools provided by the PT. RCI are hammer (2 units), a Crowbar (1 unit), Electric drill (1 unit), so it requires waiting time if there are items to be dismantled, waiting for the tools to be ready. Transfers to open packaging locations use forklifts, which interfere with unloading activities and location limitations.

Introduction to the product being checked takes an average of 5 minutes per type of item, so it is necessary to provide training on product knowledge to employees who carry out the product quality process.

Future State Value Stream Mapping

Figure 2.
Future State Value Stream Mapping

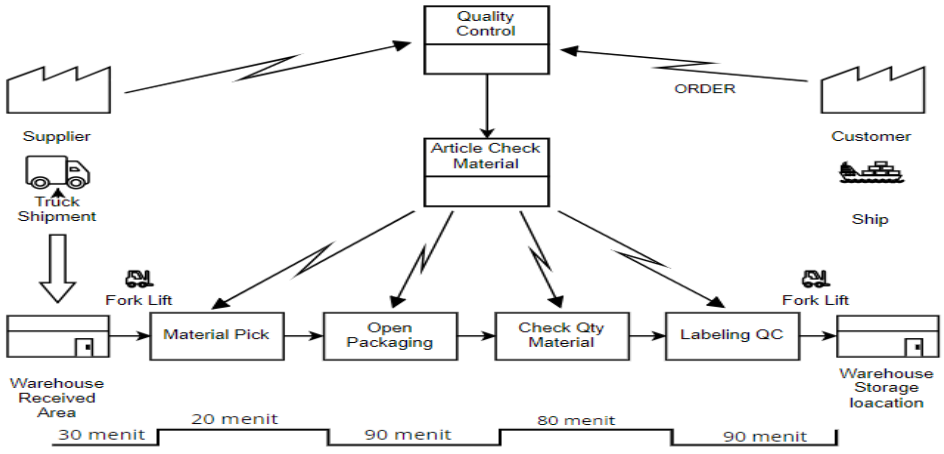


Table 2.
Future State Value Stream

Process	Material Pick	Open Packaging	Check Qty	Labeling QC
Time (minutes)	20	90	80	90

Comparison of Conditions Before and After Repair

From the Value Stream Mapping above, you can see a comparison of the conditions before and after repairs according to the table below:

Table 3.
Comparison of Conditions Before and After Repair

Process	Before Repair	After Repair	Difference	Percentage
Material Pick	30	20	10	33%
Open Packaging	120	80	40	33%
Check Qty	110	80	30	27%
Labelling	120	90	30	25%

Improvements Based on Mapping Details:

To reduce the time spent on open packaging up to Check Qty, the recommendation given is to add tools (hammers, crowbars, electric drills) and handjacks to maneuver goods in the checking location as well as dividing the group system into manpower so that they focus on the tasks and targets in question, determined.

The labeling process from the map above still takes quite a long time, so a forklift is recommended for moving to the labeling area and storage location area so that no items pile up and the labeling process is faster. Training process for employees regarding the introduction of products that will be checked to reduce the goods checking process

CONCLUSION

Research using the Value Stream Mapping method on the production system at PT RCI produces the following conclusions:

After creating the Current State Value, it was identified that the Pick process included a significant waste of time, with labeling taking up to 110 minutes. To address this, improvements were made by adding tools such as hammers, crowbars, and electric drills, which increased the speed of the Open Packaging process, reducing it to 40 minutes.

Additionally, the introduction of manual pallet handjacks for the transfer process in open packaging locations eliminated the need for a forklift, making the process viable in limited spaces. Training on product knowledge of the items being checked further streamlined operations, making the Check Qty process 30 minutes faster per day. The labeling process was also accelerated by 30 minutes by optimizing the labeling layout, placing it closer to the checking process, around 20 meters away, which shortened the movement of goods and improved overall efficiency.

Following Future Stream Mapping based on process type classification, the total reduction consists of the material pick process by 33%, Open Packaging by 33 %, Check Qty by 27%, and Labeling process by 25%.

Lead Time or quality control process time or checking goods before observation is 380 minutes per day, where there is a waste of time, so research is carried out to improve the process at PT RCI. As a correlation between the Value Stream Mapping (VSM) method research, it can result in a reduction in total lead time of 29.5%, namely an increase in labor productivity with an increase in the amount of goods checking time of 270 minutes per day.

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