PERFORMANCE JUST IN TIME METHOD IN THE PRODUCTION PROCESS TO IMPROVE EFFICIENCY IN THE COMPANY

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ABSTRACT

The production system must be supported by appropriate production strategy so that the company's performance running optimally and efficiently. The production system that supports the achievement of optimization and efficiency is Just In Time, because JIT system is apply the system that all forms of waste must be eliminated. This company produces lamps, but in the process of production is still using traditional methods that often there were the waste, especially excess of production so that the product inventory are piling up of warehouses. The purpose of this study to find out how the role of JIT system in the production process in order to improve the company efficiency. The conclusion of this study are: (i) the implementation of JIT systems will improve production systems; (ii) the production process are more efficient because the company only did the production process based on consumer demand so o minimize inventory and inventory costs (iii) it provides production processes efficiency which proven by the reduction of non-value added activities by 0.08%.

Keywords: Just in Time, Efficiency, Production, Process

1. Introduction

Nowadays, the development of industry is growing rapidly, in the world of industry the businessmen are required to give full attention for their products. At present, the consumers are very selective of products that they are needed, in terms of benefits and costs. A quality product at a low price and timeliness in accordance with the demand absolutely must be met when a company wants to survive in the market competition.

The success or failure of a company is generally characterized by the ability of management to see the possibilities and opportunities to the future, both short and long terms. The main activities of management in the planning of the production process are the making-decision in the selection of various alternatives and policy formulation in to use of the methods that to carry out the production activities.

One of the best alternatives for the company to maintain the continuity and level of expected income is to apply a method which can reduce the costs of production. The method is known by Just In Time (JIT) method.

Management of production is a branch of management that regulates their activities in order to create and add to the close of certain goods and services. To regulate this some activity, decisions to be made related achieve the goal of keeping the goods and services produced in accordance with what was planned. Thus, management of production involves decision-making

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related to the production process to achieve the goals of organization or company. Management is the art and the science of planning, organizing, arranging, directing, and controlling of resources to achieve the goals decided [1, 2]. Production is an activity to increase or create benefits consisting of the addition of benefits of forms, benefit of time, and benefits of place or the combines of them.

In general, the production process is an activity to create or add an item or service using the existing factors such as labor, machinery, raw materials and funds to be more beneficial for human needs.

The production process using the traditional system which uses push approach is "when a workstation complete the ration processing on a group of products, the majority products that recently were completed will be driven to the next station, regardless of whether the work station are ready or not to receive further inputs of intermediate goods earlier. As appeared results are the buildup of unwanted inventories of semi-finished goods that may not be hold for several days or even several weeks." [8]

The high inventories of raw materials and finished goods are resulting in increased risk of damage and obsolescence as well as storage fees, insurance, financing, and handling of raw materials and finished goods earlier. Inspecting of raw materials, components, and finished goods became expensive anyway. In addition, the prices of product will soar to cover these cost increasing.

In a push system approach, inventories of finished goods production are needed as a buffer, because less than the required market. This system with push approach results in finished goods inventory levels was significantly higher.

The process of production that we use, namely Just in Time system, which takes the pull approach, is: "A production process with multiple flows of manufacturing activity that illustrated by arrows descending from stage one to stage three. Even though so, the signal that triggers production activities in every stage of the production comes from the next stage." [8]

1. Experimental

1.1 Manufacturing Cycle Effectiveness (MCE)

Manufacturing Cycle Effectiveness is: "An analysis tool of the activities carried out by the company in conducting the production process. MCE is a measure to indicate the percentage of value added activity contained in an activity that is used by companies to generate value for consumers. By MCE it can be measured how much activity is not value adding are reduced and eliminated from the process of making the product. Price of effectiveness is a measure of how effective the organization's resources used to carry out activities in a value addition to produce output that is used to meet the needs of consumers. " [3]

The formula used to calculate the MCE is as follows:

\[
\text{Manufacturing Cycle Effectiveness (MCE)} = \frac{\text{Processing time}}{\text{Cycle time}}
\]

Cycle time = processing time + inspection time + queuing time

The following are the explanation of these elements:

1. Processing time
   Processing time is the overall time required of each stage taken by raw materials, in-process products to become finished goods.

2. Inspection time
   Inspection time is the total time consumed by activities that aim to keep all the processed products may be produced in accordance with the standards set.

3. Transporting time
   Transporting time is an activity that uses the time and resources to move raw materials, in-process products, and finished products from one department to another.

4. Storing time
   Storing time is an activity that uses time and resources, as the products and raw materials are stored as inventory. This is due to the storage time of the storage process both the raw
materials before starting the production process or finished goods stored in the warehouse inventory.

In the MCE analysis, the decision was made as a measurement to reduce production costs. Ideal production process will generate the effectiveness of the round at 100%, then the non value-adding activity can be removed in the processing of products, so that customers of these products are not burdened with the costs of non value adding activities. Conversely, if the product manufacturing process produces the effectiveness of the rotation is less than 100%, it meaning the processing of the product still contains non value adding activities for consumers. [13]

1.2 Conceptual Framework

Just in time (JIT) is a management method of production that produces only when there are the demands. A production process will produce if only hinted by the next process of the amount requested. The goal is to improve profits and competitive positions of the company are achieved through improvements in quality, cost control and timely distribution improvements. [10]

With the addition of quality resources, the expertise of employees and suppliers that enhance the corporate image, increase the competitiveness of company, reduces of labor costs and operational, efficiency distribution and reduced wastage result of damaged or defective products are detected quickly from the source of production. [12]

We have based on the background and purpose of the research that has been stated, that Just-in-Time methods in the production process is to improve efficiency and reduce the waste of products. The conceptual framework of this study is presented in the following figure:

**Figure 1 : Conceptual Framework**

1.3 Analysis of Manufacturing Cycle Effectiveness

Based on the theoretical basis described above, the analysis of MCE element of the company is as follows: [9]

1. Processing Time
   If in one week there were 40 hours then in a month there will be 160 hours (40 hours per week \( \times \) 4 weeks = 160 hours per month)

2. Transporting Time
   Based on the results of research conducted by the company, the transporting time which is required in the production process approximately 25% of the time required for the production process. So that the transporting times are 40 hours of work per month (of total production time 160 hours per month).

3. Storing Time
   Based on the description, the storing time is divided into two parts, namely the storage time of raw material inventory from turnover times and storage time of finished goods inventory from turnover.
   a. Storage time of raw material inventory is two days or 16 hours cycle time.
   b. Storage time of finished goods inventory is two weeks or 80 hours cycle time.

4. Inspection Time
   The company has inspection activities to check the quality of production done by the QC (Quality Control). Inspection time that required is 2 hours or 120 minutes for each production in day, resulting in one month is needed 2400 minutes inspection time or 40 hours inspection time (2 hours \( \times \) 5 days \( \times \) 4 weeks).

Calculation formula of MCE (Manufacturing Cycle Effectiveness)

\[
\text{MCE} = \frac{\text{Processing Time} + \text{Transporting Time} + \text{Storing Time} + \text{Inspection Time}}{\text{Total Production Time}}
\]

\[
\text{MCE} = \frac{160 + 40 + (2 \times 16) + (2 \times 80) + 2400}{160 + 40} = 0.48\%
\]

The value MCE equal to 0.48% indicates that there is still non-value added amounted to 0.52% in the production process at the company.
1.4 Production of Full Systems

The company’s production process will be determined from the consumer or customer demand. The demand from consumer is the trigger for the previous process, when the consumer demand coming, the final section of production that is the packaging section will give a sign to the previous section. By the end of the sorting section is sending a number of raw materials needed in the section. The back section will send the signal to the back section it again to send semi-finished goods according to the needs. The explanation of how the pull system of production method can be applied in the production process in the company [5], are given in following figure:

![Diagram of Production Process]

Source: Processed company data

Figure 2: Just In Time Approach for Order Flow

Thus, if there is an interruption in every stage of the production process there is no inventory between stages of the production process. Because information flows from the forward production process and then back to backwards. This it indicates the amount of production at each stage are based on the request at a later stage. [6]

1.5 Maintenance of Total Production

The company has scheduled maintenance of production machinery routinely and tools as well as equipments. This type of maintenance is divided into by two parts, which are the mild maintenance and heavy maintenance. Mild maintenance to machinery and equipment carried out every day by employees by cleaning and tidying machinery and equipment before and after use so that it will create a work environment that is orderly, clean, and comfortable. The heavy maintenance is done by the technical unit to perform periodic maintenance and make repairs is there, any defects of machines. The maintenance is done once a month with checking all the components contained in the machine, if there is a damage or require replacement spare part and then immediately do the repair and replacement of new spare parts for a smooth production process. The tests do once a month is quite effective for the production machinery to process materials that have a high enough degree of difficulty. When heavy maintenance is done in a period of more than one month, it is feared damage to the machine components caused by too much dirt section intricate machine parts that are difficult to clean and have to take a long time for cleaning up. By applying the good method of machine and equipment maintenance that can support machine maintenance in the Just In Time method that are regular inspection and maintenance models that keep the engine running smoothly automatically. [7]
2. Results and Discussion

2.1 Calculation of Manufacturing Cycle Effectiveness (MCE)

Based on the analysis of JIT method application on the company whether it is able to reduce non-value added.

1. If in one week there were 40 hours and then in a month there will be 160 hours (40 hours per week x 4 weeks = 160 hours of work per month)

2. Transporting Time

Based on the company's application of the JIT method, there are some changes of transporting time required in the production process. This is because the layout changes that happened in final assembly process. In JIT implementation, the existing storage time approximately to 10% of the time required for the production process, so that the transporting time are 16 hours (of total production time of 160 hours per month)

3. Storing Time

Storing time is divided by two parts, these are the storage time of raw material inventory from turnaround times and storage time of finished goods inventory from turnover.

a. Turnaround time of inventory raw material storage is one day storage time which was originally two-day or 16 hours of work can be reduced to a one day or 8 hours

b. Turnaround time of inventory finished goods storage is no change that is two weeks or 80 hours cycle time.

c. The total storage time is 88 hours.

4. Inspection Time

Time of inspection on the company can be minimized, given on the application of JIT the company will put the QC (Quality Control) staff to perform quality control at each stage of production. In addition each worker is also responsible for the quality of the goods they were doing, so the quality of products in the JIT system will be monitored throughout the process. With the placement of Quality Control at each stage of production will reduce and speed up the time of the inspection which was originally only on the section of the procurement process and the final sorting. It is assumed by this method will decrease inspection time by 50%. So that in a month it takes 1,200 minutes (2,400 (2.400x50%)) or 20 hours of inspection time.

Calculation formula of MCE (Manufacturing Cycle Effectiveness)

\[
\text{MCE} = \frac{\text{Processing time}}{\text{Cycle time}} = \frac{160 \text{ Hours} / \text{month}}{(160 + 88 + 16 + 20)} = 0.56\%
\]

MCE 0.56% indicates that there is still non-value added by 0.44% in the production process at the company.

2.2 Comparison of Traditional Production Method and Just In Time (JIT) Method

We conducted a comparison between the traditional method and JIT method that used by the company. Based on the results of the comparison, we obtained that the implementation of JIT methods will improve production efficiency. In flexible resource, the employees have multiple abilities to operate two areas of the production process. This areas are the initial assembly process and final assembly process. Moreover, the employee will perform minor repairs on the machines such as basting oil lubrication on the wheel machine and cleaning of residual sludge in the machine, so that machines can run smoothly. By applying the JIT method, the production process will be more efficient. It is because the company only conducts the production processes based on their consumer demands so minimizing inventory and inventory costs, supported by the implementation of the elements contained in JIT, such as spatial restructuring of the production process. So it can accelerate the production process, and can reduce the transportation of raw materials in the production process.
3. Conclusion

Application of Just In Time method in the company provide efficiencies in the production process, it is proven by the reduction of non-value added activities amounted to 0.08% which is calculated by analysis formula of MCE (Manufacturing Cycle Effectiveness). The type of activities, that is not value adding on the output product, be able to overcome the problem of excessive production in the warehouse. There still exists a defective product, excessive workers with limited abilities, as well as their waste production costs caused by the time efficiency in the production process. By applying the JIT method, the form of waste or non-value add can be reduced. There is no inventory of the products that accumulate in warehouse because it implements a production pull system. The defects product can be eliminated because the company puts Quality Control staff at every stage of production to monitor product quality during the process, as well as employees are fully responsible for the quality of the goods they produced.

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