

Reducing waste order production process more efficient approach effective and lean manufacturing (Journal Review)

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Abstract. Competition in the world of business goods industries such as the furniture / furniture are increasingly stringent and evolving demands of companies to always make improvements and increased performance so as to develop better and compete with other competitors. Companies should employ Lean Manufacturing approach to produce efficient products to reduce production costs through efficiencies. Wastage contained in Lean manufacturing concepts include overproduction, excess material transportation, waiting, unnecessary processes, inventory, movement and defective products. The use of value stream mapping to identify wastage and explore the potential for waste at the firm. The potential of the waste will be reduced using appropriate instruments based on selected indicators. In this paper is expected to result in a more efficient production process so as to reduce production costs and will generate higher profits especially industrial goods.

1. Introduction

Waste (Waste) is any work activity that does not add value along the process stream in the process of changing inputs into outputs. Extravagance itself is divided into two types: type 1 and type 2. Type 1 is the waste that does not add value throughout the production flow but this activity cannot be avoided due to various reasons. While type 2 is waste that does not add value and must be reduced [1]. Increase productivity products effectively and overall efficiency, it is necessary to identify the activities of anything that can increase the value added (value added) in the product and is able to minimize and even eliminate various waste (waste), therefore we need an approach to the concept of lean manufacturing [2].

The problems facing companies today is related to the amount of waste activity that was not efficient or do not have added value (non-value added). Activities that do not have added value, among others, are in the process of supply of raw materials from suppliers, the flow of material from the beginning to the end of the process, the movement of the tools and machines that do not match the capacity, inefficient transport (spaced), the waiting process, process improper / unsuitable, causing rework (rework), and the presence of defective products cannot be sold to consumers. Writing is also still commonly found waste that would otherwise be easily identified by the depiction of VSM [3].

Indication of the failure of the company is waiting on a process waste engine breakdown. Improved handling machine takes longer. The damage resulted in disruption of the flow of the production process in the company. Indications other waste that arises is related to transportation where there are problems with the routing-offs for their layout problems. In addition, the limitations of material handling also cause the production process queue. Based

on the problems that have been described, there are various indications of waste which led to a potential loss of the company. These problems can be minimized by using lean manufacturing methods. Lean manufacturing is a process management philosophy derived from the Toyota Production System (TPS),

One solution would need to make continuous improvement is to create an effective and efficient work by concentrating on achieving continuous process flow to identify the value in every step of activity. Steps to be done is to identify all the waste as well as the root of the problem and then to design improvements in the production process in the form of a map Value-Stream Mapping (VSM) [5].

This paper aims to analyze the significant activity on the effectiveness of the company's production process accompanied by the literature of the relevant international journals. The literature study carried out in the last 10 years shows several approaches by researchers to solve the problem of improving the effective and efficient and value-added activity.

2. The Concept of Reduce Wastage

Lean is a continued effort - going to eliminate waste (waste) and increase the value added (value added) of products (goods and / or services) in order to provide value to the customer (customer value). [6]

The concept of lean manufacturing largely evolved from the Japanese industry, especially from Toyota. Lean manufacturing is considered as waste reduction techniques / waste as suggested by many authors, but in practice lean manufacturing to maximize product value through the minimization of waste. Lean success must focus on all the causes of waste so that the flow value (value stream) can run smoothly so that a more efficient production. Value Stream Mapping is the process of mapping the flow of material and information necessary to coordinate the activities carried out by the manufacturers, suppliers and distributors to deliver products to the consumer. [7]

Lean is a business philosophy that includes the use of resources including time source in corporate activity through improved and increased constantly, so just focus on the elimination of activities that are not valuable in the design of the production-related manufacturing or operations related directly with the customer. Lean explained that reduced wastage can use the method of Value Stream Mapping (VSM), 5S, 5 why, Kanban, and Fishbone Diagram. [8]

Based on the above problems the author uses the approach of lean manufacturing is done mapping the value stream mapping (VSM) to find out the manufacture of products ranging from booking until the product is shipped to the customer, then the mapping process activity mapping (PAM) to describe the activities of the production process will be grouped into categories of activity value added, non value added and non-value added Necessary at each workstation, so we get the results of the identification of waste inventory. Therefore, the authors need to design the proposed improvements to minimize waste inventory. The next stage, to identify the root causes of waste inventory with the fishbone diagram and 5 why's. As well as to the stage of completion of the root causes of problems in any of the waste inventory can implement kanban system.

3. Methods of Reducing Wastage

Manage the production process to be effective and efficient, many methods are used, one of which is *Value Stream Mapping* This comes from the company Toyota Production System (TPS), there are seven waste in the production process is as follows:

1. *Overproduction*, The waste caused by the excessive production, the intention is to produce products that exceed the required or produced earlier than the schedule that has been created.
2. *Waiting*, namely waste because the wait for the next process. Waiting is an interval when the operator does not use the time to do value adding activity due to waiting for the flow of product from the previous process (upstream).
3. *Transportation*, Transportation is an important activity but does not add value to a product. Transport is the process of moving materials or work in process (WIP) from one work station to another work station, using either a forklift or conveyor.
4. *Excess processing*, occurs when the working methods or sequence of work (processes) used is less good and flexible. It can also occur when there is not yet standardized process so that the possibility of defective products will be high. Working method variation operator.
5. *Inventories*, is less necessary supplies. The point is that too much material inventory, work in process is too much between processes from one another and thus require a lot of space to store it, the possibility of this waste is very high buffer.
6. *Motion*, is the activity / movement less necessary that the operators do not add value and slow down the process so that the lead time becomes longer.
7. *Defects*, is a product that is defective or not in accordance with specifications. This will lead to less effective rework process, the high complaints from consumers, as well as the inspection of a very high level [10]

Wastage should be analyzed first using 5 Whys Analysis. 5 Whys is a simple question and answer technique to investigate the causal relationship is at the root of a problem. This technique is a practice to ask why five times, why a technical problem occurred in an effort to determine the root cause of a defect or problem. This technique was developed by Sakichi Toyoda is then used in the company of Toyota Motor Corporation. In the 1970s, the strategy 5Why popularized by the Toyota Production System. This method is now used as one method of Six Sigma strategies.

Use of the 5S concept has been investigated by Gaspersz and Fontana, explaining that the 5s is one method to reduce or overcome the waste that occurs in the company, with 5s to establish the organization and reduce excessive inventories. Reduce lead time and so on. The study concluded that 5S is very useful for the implementation of lean. 5S is composed of, among others, are as follows.

1. Seiri (sort) is separating the materials needed from items of items or materials that are not needed, then discard unnecessary items from the workplace and storage of goods.
2. Seiton (Stabilize, straighten, set in order, simplify) is required to save items that the right place to be easily retrieved if used.
3. Seiso (shine, sweep) is a work area maintains it clean and tidy.
4. Seiketsu (standardize) is standardizing the practice of 3s (seiri, Seiton, and Seiso) above.
5. Shitsuke (sustain, self-discipline) is made so that discipline becomes a habit by following the procedures that have been established. [6]

Fishbone concept is also used to analyze the causes of waste. This diagram is known as a fishbone diagram (fish bone diagram), which was introduced first time by Prof. Kaoru Ishikawa (Tokyo University) in 1943. This diagram is useful to analyze and identify the factors having a significant effect in determining the characteristics of the quality of work output. In addition, this diagram is also useful for finding the real causes of a problem. In this

case the method of brainstorming (brainstorming method) will be quite effectively used to search for factors that cause the deviation of the work in detail.

To search for causative factors of irregularities quality of the work, then people will always get that there are 5 main causes significant factor that needs to be addressed:

- a. Human (Man)
- b. Methods (Work method)
- c. Machinery or other work equipment (Machine / Equipment)
- d. Raw materials (Raw materials)
- e. Work environment (Work environment) [11]

Concept FMEA is also used to minimize the potential causes of waste. FMEA is a design and engineering product planning structure thinking process to consider all the ways in which a product or component may fail. This is the analytical techniques to identify potential failure modes, assess the potential effects to customers, identify potential causes of failure, identify the need for change, minimizing potential causes of failure, facilitating dialogue between departments, facilitate the identification of important characteristics in the process. Steps FMEA:

1. FMEA Number
Enter the FMEA document number, which can be used for tracking.
2. Item
Enter the name and number of systems, subsystems or components, the process of being analyzed.
3. Process Responsibility
Enter MPM, departments and groups. Also show the supplier's name if known.
4. Prepared by
Enter your name, phone number and engineers from the company responsible for preparing the FMEA.
5. Model Year (s)
Enter the intended model year (s) that will be used and / or influenced by the design / process were analyzed (if known).
6. Key date
Enter the initial FMEA due date, which may not exceed the original scheduled date of the product.
7. FMEA Date
Enter the original date FMEA drawn up, and the latest revision date.
8. Core Team
Say the name of the individual responsible, and the department has the authority to identify and / or perform the task. (It is recommended that all members of the team name, department, phone number, address, etc., are included on the distribution list).
9. Process Function / Requirements
Enter a simple description of the operation process are analyzed (eg Turning, drilling, tapping welding, assembly). Indicate as succinctly as possible the purpose of the process or operation being analyzed. Where the process involves many operations (eg assembly) with different potential modes of failure, it may be desirable to list the operations as separate processes.
10. Potential Failure Mode

Here we identify and illustrate the potential for failure. It is important to consider all possible failure modes. Working on the principle that if it can go wrong may be mis Bent, Binding, dirty, Open, Short, Grounded worn tool.

11. Potential Failure Effects

Here we identify and assess the potential impact of failure and describes the effects of a failure in terms of fitness for purpose of the product. For example, noise, erratic operation, can not be binding, could not bear / taps etc.

12. Severity (S)

Estimating the severity of the effect of another failure on the 1-10 scale is usually:

Minor Severity 1

Low Severity 2-3

Medium Severity 4-6

High Severity 7-8

Very High Severity 9-10

13. Potential Causes of Failure

Here we are addressing ourselves to the potential cause of the failure, and a list of all possible causes of failure diverted. Use of cause and effect diagram. For example: Improper torque, over, under, inadequate ventilation / gating etc,

14. Genesis (O) (Continued)

Suggested Evaluation Criteria:

(The team must agree on evaluation criteria and ranking system, which is consistent, even if modified for individual process analysis.)

15. Control Current process

Process control now is a good description of control as far as possible to prevent the failure mode from occurring or detect failure modes should it occur. This control can control processes such as error-proofing equipment or statistical process control (SPC) or to post-process evaluation. Evaluation can occur in the subject operation or the next operation that can detect the failure mode of the subject.

16. Detection (D)

Estimating the probability Non detection of failures before reaching customers: Suggest Criteria evaluation.(The team must agree on evaluation criteria and ranking system, which is consistent, even if modified for individual process analysis.)

17. Risk Priority Number

The amount of risk (RPN) is only calculated as the product of the incidence, severity and detection.

$$RPN = O \times S \times D$$

18. Suggested action

It is based on (a) the value of the RPN calculated. High RPN requires immediate action. This is useful for this NDP rank (high to low) in order of priority similar to Pareto Analysis. (B) the individual values significantly high occurrence, severity or detection.

19. Responsible

Enter the organizations and individuals responsible.

20. Actions taken

Determine action to be taken to eliminate or mitigate potential problems. Issue instructions for action to be taken and to record the actions taken [12]

Last use Kanban system to improve production management resulting in increased productivity. Kanban system is not the same as the SPT (Toyota Production System), although many people mistakenly mentions SPT as a Kanban system. Toyota Kanban system is considered only as a sub-system of the entire SPT. SPT is a way to manufacture the product, while the Kanban system is a way to manage the JIT production methods. Kanban is a tool used to realize the JIT production system.

Kanban in Japanese means "visual record or signal".JIT production system using the flow of information in the form of Kanban card-shaped or equipment other woods such as flags, lights, and others. Kanban system is an information system that is in harmony controlling "production of products required in the necessary quantities at the necessary time" in each of the manufacturing process and also between companies.

The most commonly used form of a piece of paper are contained in a rectangular vinyl envelope. Kanban carries information both vertically and horizontally in a Toyota plant itself or between Toyota with partner companies. The sheets of paper that carries information consisting of three categories, namely:

1. Information retrieval
2. Removal information
3. Production information

Researchers Taiichi Ohno, "Kanban is a tool for production control", which is used in controlling material flows through the JIT production system to use traditional cards to order a workcenter move and produce a particular material or component. [11]

The concept of the authors mentioned above is processed using techniques like Value Stream Mapping (VSM), 5S, 5 why, Kanban, and Fishbone Diagram is used to meminimalisasi waste. So I can analyze the changes before and after using the concept as it has been mentioned to improve the quality of a product.

4. Conclusions

Approach to solve the problem is still not resolved seriously by the company resulting in a decrease in productivity.

The author analyzes using the Value Stream Mappingto know the general picture of companies that include information and material flow in the company. Through an understanding of the flow of information and material can be known problems and waste that occurs in the company. From the results of fishbone diagram, followed by a failure analysis using the FMEA process where in the activity of the main problem.

This paper presents some techniques reduce waste or activities that do not give value added in the process of transforming inputs into outputs, In practice, it is tailored to the needs and conditions of the industry itself to choose the most possible (feasible) to be applied in these circumstances. Approaches and techniques through proper analysis, the problem of non-value-added activity can be reduced so that it will improve the quality of the future.

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