Waste Identification using Value Stream Mapping in Animal Feed Industry

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Abstract: The animal feed industry plays an important role in supporting the development of the livestock industry in providing the availability of meat and derivative products. Feed also determines product quality, livestock productivity and profits for livestock entrepreneurs. In general, the main raw material used in the process of corn import. The dependence of animal feed on imported raw materials leads to increase production costs and impacts the price of animal feed. To maintain the stability of production costs, the animal feed industry capable to maintain and improve efficiency in the production process. The efficiency of the production process improved by waste minimization. To minimize waste, it is necessary to identify the first waste in the production process of animal feed to find out the most usual waste by categorizing all activities in the production process into value added, necessary but non value added, and nonvalue added categories. This identification done by using value stream mapping tools such as current state mapping. With current state mapping, it is found that the VA percentage of 61.02% with total lead time of 7219.5 seconds, percentage of necessary but NVA of 18.16% with total transportation and inspection time of 1220.8 seconds and 927.4 sec, while those included in the NVA of 20.82% with total delay and storage time respectively of 1463.3 seconds and 999.6 seconds.

1 INTRODUCTION

Business competition in the animal feed industry is increasing strictly and growing demands every company to always making improvements and improvements in performance to develop and compete better with other competitors. The domestic animal feed industry plays an important role in supporting the development of industry in providing the availability of meat consumption and its derivative products. Animal feed determines the quality of livestock products, livestock productivity and livestock profits.

Animal feed industry located in Medan City produces various animal feed products. Products produced include chicken feed, duck feed, quail feed, cattle feed and pig feed. All products are generated generally through the same process stages of raw material pouring, raw material filtration, drying of raw materials, weighing raw materials, milling, mixing, pellet forming, crumble forming, finage spraying, animal feed packaging. In general, the main raw material used in the process is imported corn.

This causes the price of animal feed will continue the increasing of Indonesian market due to the spike in the dollar exchange rate against the rupiah. The dependence of livestock feed on imported raw materials leads to increase production costs and impacts the price of animal feed. In addition, the production of animal feed which is doing rework causes quality decrease and only be sold with a lower grade. To maintain the stability of production costs, animal feed industry must capable to maintain and improve efficiency in the production process. The efficiency of the production process increased by waste minimization (waste) occurs along the feed supply chain. To minimize the waste, it is necessary to identify the first waste in the production process of animal feed to find out the waste that most often occurs and causing the production process is disrupted and done immediately. Waste identification done using activity description during process production into value added activity, necessary but non value added, and non value added activity using lean manufacturing (Syahputri, 2017).

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Lean is defined as a strategy in determining a significant increase of all resources and time in the total process (Neha, 2013). The term "lean" is a concept that implies activities to eliminate waste and non-value-added operation (Manzouri, 2014), (Wee and Wu, 2009), (Marshall and Farahbakhsh, 2013). The Lean manufacturing concept derives from the method developed at Toyota, which is described by authors such as Taiichi Ohno and Shiego Shingo. But these concepts in the form of a Lean Manufacturing System (LMS) are united with international recognition, as a result of the book, Machine Changes the World, written by researchers Womack et al. One method used for lean manufacturing is value stream mapping. VSM is a powerful tool that allows visualization and understanding of material and information flows through the value chain. This is to provide a global vision of activities involved in the production process, and allow projecting of sources (Lacerda, 2016), (Pavnaskar, 2003).

The use of VSM has existed after the success of the Toyota Company in Japan since the 1980s. It was developed by the Toyota Company between 1960 and 1970. At the beginning, VSM was a method that identified waste time and unnecessary actions in the process. Now is the time for VSM to work for operations process (Reddy, 2013).

Many researches have been done with lean manufacturing approach. (Girish) Research was conducted to create a case study in the foundry using a value stream mapping tool. (Khannan and Haryono) Research was also conducted on companies producing lean manufacturing to eliminate waste on production lines. (Wojcik and Kocon, 2015) Other studies were also conducted with lean manufacturing tools to improve operations at paper companies. However, there is no much research with the lean manufacturing approach was conducted in animal feed industry in Medan. This study aims to identify waste in the production line to find out which is the most usual waste in production lines and animal feed production process becomes disrupted.

2 METHODOLOGY

The research was conducted on one of the company produces animal feed in Medan city with the object is the production line of animal feed making. The research begins by making direct observations to the production floor to collect information related to animal feed production process. Activityat this stage is observing formulation of the problem occurs in the company. After the observation, then determined the topic and research objectives in accordance to existing conditions on the production floor. After determined the topic and purpose of the research, then conducted data collection needed to identify waste occurs in the production line. The data needed for the time cycle of making animal feed and the process flow of animal feed production. After data is collected, then the waste identification is done with several steps.

The first stage is to map the flow of the overall plant with current state mapping. Current State Map (CSM) chart presents flow of information and materials as a product through the manufacturing process. This is an important thing to understand the need for change and to understand lie's opportunity (Goriwondo, 2011).

At this stage, each process is combined with material flow and information flow into a single flow in the factory. After mapping the flow of the overall process in the factory is made, the next step is to identify of waste in the flow of production process. Identification is done based on the result of current state mapping. From the current state mapping results, obtained activities exist in the production process of making animal feed. The activities will be classified into three categories: value added, necessary but non value added, and non value added. Types of activities includes value added are operations, the types of activities included in the category of necessary but non-value added are transportation and inspection of the types of activities included in non-value added activity categories are storage and delay. By grouping activities by category, will be obtained percentage at each category of activity and known the percentage of waste exist in animal feed production line.

3 RESULT AND DISCUSSION

Research in identifying waste with value stream mapping is done by describing current state mapping first. Current state mapping is used to describe the overall system belong to the value stream contained in the company. With current state mapping, known the information flow and physical in the system, the lead time required at each process. Current state mapping of animal feed production process can be seen in Figure 1.

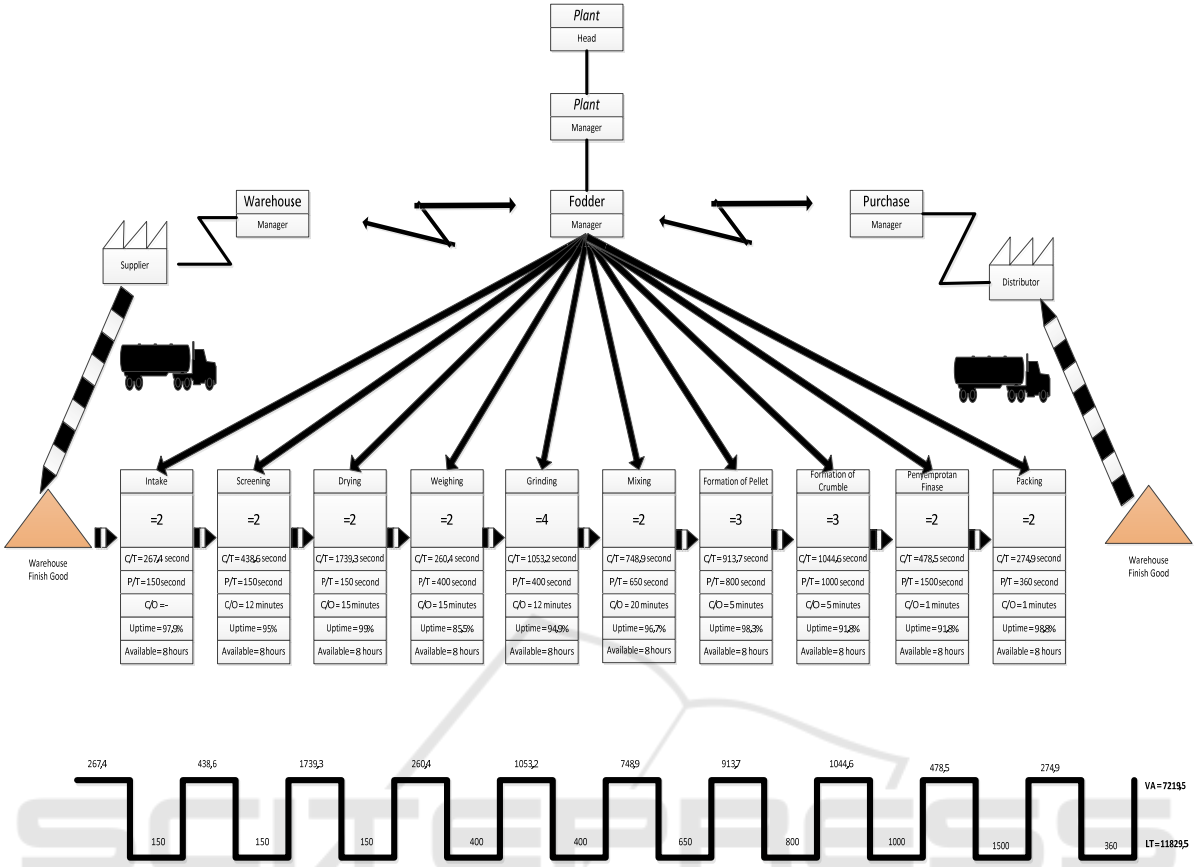

Figure 1. Current State Mapping of Animal Feed Production Process

Based on the mapping above, obtained activities that exist in the process of making animal feed. The activities are then classified according to their each categories to see the percentage at each activity. The result of activities identified by current state mapping can be seen in Table 1.

Table 1. Recapitulation of Activity in Animal Feed Production Process

Activity Category	Time (Second)	Percentage
Operation	7219,5	61,02%
Transportation	1220,8	10,32%
Inspection	927,4	7,84%
Delay	1463,3	12,37%
Storage	999,6	8,45%

Based on the table above, it is found that the percentage of value added activity is 61.02%, the percentage of necessary but non-value added activity is 18.16%, and non value added activity is 20.82%. Based on the results obtained, it can be seen that there are 20.82% of activity in the process of animal feed production is an activity has no added value or activity causing waste. This is related to the number of waiting activities occurs between stations, causing the overall process of animal feed production to be large.

4 CONCLUSIONS

Value stream mapping is used to identify waste occurring in animal feed production process by categorizing activities in the production process into value added, necessary but non-value added, and non value added categories. By categorizing all activities according to the three categories, it is found that the percentage of value added activity is 61.02% with total lead time is 7219.5 seconds, the percentage of necessary but non value added activity is 18.16% with total transportation and inspection time of 1220.8 seconds and 927.4 seconds, while non value added activity is 20.82% with total delay and storage time of 1463.3 seconds and 999.6 seconds.

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