

CHAPTER 2

LITERATURE REVIEW AND THEORETICAL BACKGROUND

2.1. Literature Review

In the literature review subchapter, some research done by previous researchers in accordance with the current research topic will be explained. This literature review will be used as a reference and guideline for the research conducted at Setiawan Mebel by taking into account the uniqueness of the problem which is: work system in the company, the work system of piece work system in the company is unique because the workers who accepted the job will work from the start to the product completion alone, meaning the workers will measure, cut, until assembly, sanding, and painting all by themselves. The production system in the company is made to order, but in the case of chair and table set, there is already a standard design for them, so the customers only need to order the amount to be produced without providing design.

Six sigma is one of the tools that can be used to solve the problem in Setiawan Mebel, according to a case study by Smętkowska and Mrugalska (2017). The application of DMAIC can increase effectiveness while also capable of reacting to the appearing problems. This is achievable by implementation of SMED, employee trainings, Standardization of work, and total productive maintenance. Then introduce continuous control on the efficiency of the processes performed by the machine. There are several benefits of the implementation such as:

- Company – company can avoid penalties for non-compliance with the agreement, lower production cost, productivity increased, and reducing WIP amount.
- Customers – Increased customer satisfaction due to increased timeliness.
- Employees – Increased comfort and better organization, lack of overtime.
- Other – the possibility of taking more orders during the “calendar season”

Based on a journal by Soković et al. (2006). Six Sigma is an effective method in order to find where the greatest process needs are and which the softest points of the process are. Six sigma also provide measurable indicators and adequate

data for analysis. An example of application of six sigma DMAIC tools and methodology within an automotive parts production achieved several results:

- Reduce tool expenses by 40%.
- Reduce cost of poor quality (CORQ) by 55%.
- Reduce labor expenses by 59%.

Also, the significant results are achieved by two indexes that are not dependent on the volume of production:

- Production time reduced by 38%.
- Index cost/volume reduced by 31%.

5S is a useful tool to improve the workplace, it is mainly used to improve the productivity of an organization but it can also improve the safety and health of said organization. An example of the result of ignoring 5S application is when demand increased, the wide variety of products and the push production system, significant waste unorganized workstations, and an unhealthy work environment were encountered. This led to increased production costs, frequent delays, and low employee morale (Al-aomar, 2011). On that note, Randhawa and Ahuja (2017) did a study that resulted in a significant contribution of 5S projects in the organization. Such as production, quality, safety, and effective use of the workspace for sustained organizational improvement. While in an experiment done by Srinivasan et al. (2016) two groups of staff (case and control groups) completed a safety climate project for the 5S event, after one and two months. The safety climate improved significantly for the case group but remained the same for the control group during the project time. In particular, involvement and commitment of management over safety climate have improved for the case group.

While a study by Gupta and Jain (2015) reported that the implementation of 5S led to general improvements to the organization. The implementation of "5S" achieved great benefits in terms of search time for the tool. The search time on the shopping floor has been shortened from 30 to 5 minutes. The evaluation was conducted at the organization. Bayo-Moriones et al. (2010) study shows that there is a positive relationship between the use of 5S and several contexts, such as size, integration of the factory into, type of product produced, technology used, and quality plans in the plant. Besides, 5S is also positively related to some

performance measurements related to quality and productivity. These implement 5S an important task that many organizations must take to survive in today's condition.

2.2. Theoretical Background

There are several methods available that can be used such as:

2.2.1. Six Sigma (DMAIC) Method

Six Sigma methods is chosen as an option because it's a method that help reducing the production based on aforementioned reviews. The DMAIC concept of six sigma can be defined as follows:

- **Define:**
Describe the problems that need to be solved to identify the variables that affect the problems.
- **Measure:**
To collect baseline information regarding the performance of the processes.
- **Analyze:**
Determine which variable, or input, that have the most effect on the output.
- **Improve:**
To identify opportunities for improvements based on the information gathered.
- **Control:**
To implement the solution chosen based on the opportunities found on the improve step and to make sure the solution are engrained in the organizational process.

2.2.2. 5S Method

According to Rojasra et al. (2013) Lean manufacturing is one of the methods for reducing non-value-added activity (waste) and improving the organization's operational efficiency. Effective implementation of 5S technology leads to a subsequent improvement in the plant's productivity. 5S improves environmental performance and is therefore mainly associated with the reduction of waste in production, and promotes neatness in the storage. Implementation of 5S leads to the organization of the company being improved in various ways, for example:

- a. Better working area usage.
- b. Improvement of work environment
- c. Tool loss prevention
- d. Accidents reduction
- e. Waste reduction
- f. Pollution reduction
- g. Increasing employee discipline
- h. Increasing employee morale and awareness
- i. Improving the internal communication
- j. Improving the internal human relation
- k. Mistakes decreased through error proofing

In essence, the goal of 5S is to get the workplace to improve safety and efficiency, reduce the speed of product defects, and other possible waste (Singh and Ahuja, 2015).

2.2.3. Productivity Definition

According to Kanawaty (1992) productivity is described as the ratio of output over input. So calculating the productivity of an organization can be calculated using Equation 2.1.

$$\text{Productivity} = \text{Output/Input} \quad (2.1)$$

From the description, it can be derived that the bigger the value of the productivity the better, from the formula can also be deducted that if the productivity is below 1 it means a loss for the business and the value of productivity above 1 is desired for the company to gain benefit, but in this particular case is the reverse. Because the desired output (production time after solution implementation) should be lower than the input (production time before solution implementation), meaning that the ratio of <1 is desirable.

According to Katyani (in Serpel, 2016), 8 factors that are influencing the productivity, including:

a. Technical Factors

Technical Factors includes: location of the plant, layout of the plant , and the size of the plant, and the usage of right machinery and equipment. As well as application of computerization and automation determined the location, if the

company make use of latest technology appropriately, productivity will be even higher.

b. Personnel Factors

Personnel directly affect the productivity in the company. Right people must be placed in the right position. appropriate training and development, good working conditions and the environment need to be provided to the employees. employees need to be well motivated, both financially and non-financially.

c. Management Factors

A professional and competent management will positively influence the productivity of the business. Management that need to use the best method in their field to provide a good work environment and always motivate employees which will significantly increase the productivity.

d. Production Factors

Production Factors include planning, coordinating and controlling production, the use of good quality raw materials, and the simplification and standardization of the production process. If all factors of production can work well, it will increase productivity.

e. Financial Factors

There must be good financial planning and control of finances or working capital. Capital or financial waste must be avoided. Management must take into account the return on the capital they invest. A well-managed finance will increase the productivity.

f. Government Factors

Government regulations and policies such as labor regulations, fiscal policies that include interest rates and taxation will greatly affect the productivity of an organization. Organizational management that has knowledge of government regulations and policies and maintains a good relationship with the government will be able to increase the productivity of the organization.

g. Location Factor

The work productivity of an organization also really depends on the location where the organization is located. These location factors include infrastructure facilities, proximity to markets, proximity to sources of raw materials, skilled labor, and others.

h. Organizational Factors

Organizational Factors are factors related to the type of organization used, clearly defining the authority and responsibilities of each individual and department as well as the division of work and specialization of work performed.

