Faculty of Mechanical and Manufacturing Engineering Technology

APPLICATION OF TOTAL PRODUCTIVE MAINTENANCE (TPM) TO MINIMIZING QUALITY PROBLEM IN MANUFACTURING INDUSTRIES

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Date	: …….

ABSTRAK

Penyelenggaraan Total Produktif (TPM) boleh digunakan dalam industri makanan terutamanya dalam produk minuman. Kajian ini bertujuan untuk membangunkan metodologi untuk meningkatkan kadar pengeluaran, meningkatkan kualiti produk dan menyediakan persekitaran kerja yang lebih sihat dan selamat di Zaliza Food Industries Sdn Bhd. Dalam operasi pembuatan, produktiviti adalah isu penting yang perlu diuruskan untuk meningkatkan faktor potensi seperti pengeluaran dan kualiti pengeluaran. Dalam kes ini, produktiviti dan pemerhatian kualiti adalah langkah-langkah yang perlu sebelum tindakan untuk penambahbaikan diambil. Tujuan projek ini adalah untuk mengkaji Keberkesanan Penyelenggaraan Total Produktif dengan penggunaan lapan tonggak untuk aplikasi dalam proses pengeluaran Industri Makanan. Pertama, kita perlu memahami konsep TPM, kemudian mengenal pasti faktor penambahbaikan dalam meningkatkan hasil pengeluaran harian dan akhirnya boleh mencadangkan alat pillar TPM di syarikat itu. Data perlu dikumpul untuk mencapai keputusan untuk projek ini. Temuduga dan pemerhatian adalah kaedah yang digunakan untuk mengumpul data untuk projek ini. Untuk mendapatkan keputusan untuk projek ini, data yang diperoleh daripada temuduga dan pemerhatian akan digunakan dalam analisis data dan perbincangan. Terdapat dua jenis data pengumpulan yang merupakan data utama dan data sekunder. Alat yang digunakan ialah Carta Pareto, Rajah Tulang Ikan, dan "Why-Why Analysis". Fungsi Pareto Carta untuk mengesan kecacatan yang paling tinggi antara lain, Rajah Tulang Ikan adalah untuk mencari punca kekurangan dan "Why-Why Analysis" adalah untuk mencari penyelesaian untuk menyelesaikan punca utama. Penemuan untuk projek ini ialah Penyelenggaraan Total Produktif adalah bagaimana meningkatkan pengeluaran dan mengurangkan kecacatan melalui tiang TPM. Selain itu, bagaimana tindakan perlu meningkatkan output pengeluaran dengan menggunakan TPM. Tugas yang perlu adalah untuk mencadangkan peningkatan besar yang berkaitan dengan produktiviti dan kualiti. Keputusan diperoleh setelah semua analisis selesai dan penyebab utama masalah dikenalpasti. Adalah didapati bahawa terdapat produk kecacatan yang perlu dihapuskan dari barisan pengeluaran proses. Oleh itu, beberapa peningkatan yang dicadangkan telah dilakukan dan dicadangkan dalam kajian ini. Salah satu peningkatan yang dicadangkan adalah untuk mendapatkan latihan yang lebih baik untuk pengendali di barisan pengeluaran dan menyediakan Jig khusus pada pemeriksaan pengeluaran talian. Makalah ini menerangkan apa yang dipercayai sebagai penyelidikan pertama yang khusus membincangkan masalah yang dihadapi oleh syarikat industri makanan dengan tujuan untuk meningkatkan kecekapan pengeluaran.

ABSTRACT

Total Productive Maintenance(TPM) can be apply in food industry especially in drink products. This research aimed to develop a methodology for increasing the production rate, improving the quality of the products and providing a healthier and safer work environment in Zaliza Food Industries Sdn Bhd. In manufacturing operation, productivity is a vital issue need to be managed in order to increase potency factors such as production output and quality. In this case, productivity and quality observation are the necessary steps before action for improvement are taken. The purpose of this project is to study the Effectiveness of Total Productive Maintenance with the use of eight pillars to applications on the process at the production in the Food Industry. Firstly, we need to understand the concept of TPM, then identify the factor for improvement in increasing daily production yield and lastly may propose the TPM pillar tools at the company. Data is need to be collect to achieve the result for this project. Interview and observation are the methods that are used to gather data for this project. In order to get the result for this project, data obtained from interview and observation will be used in data analysis and discussion. There are two types of collection data that is primary data and secondary data. The tool that been used is Pareto Chart, Fishbone Diagram, and Why-Why Analysis. Pareto Chart function to detect the highest defect among others, Fishbone Diagram is to find the defect root cause and why-Why Analysis is to find a solution to solve the root cause. The finding for this project is what Total Productive Maintenance is on how to increase production and decrease defect through the TPM pillar. Other than that, how do the action need to increase production output by using TPM. The foremost necessary task is to propose a major improvement associated with productivity and quality. Results are obtained after all analysis is completed and the root cause of the problems is identified. It is found that there is a defect product that needs to be eliminated from the process production line. Therefore, a few proposed improvement is done and suggested in this study. One of the suggested improvement is to get improved training for operators in the production line and provide specific Jig at line production inspection. This paper describes what is believed to be the first research that specifically discusses the problems faced by food industry companies with a view to improving production efficiency.

DEDICATION

To my beloved mother and father

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TPM	Total Productive Maintenance
PM	Preventive maintenance
PdM	Predictive maintenance
CM	Corrective Maintenance
MP	Maintenance Prevention
RCM	Reliability-Centered Maintenance
PM	Productive maintenance
CMMS	Computerized Maintenance Management Systems
SHE	Safety, health and environment
SOP	Standard of Procedure

CHAPTER 1

INTRODUCTION

1.1 Research Background

In today's highly competitive world, the development and achievement of the Malaysian manufacturing industry are remarkable and it has become a major contributor to the country's economic development. This excellent achievement has enabled local products to have its own advantages in terms of cost and product quality in global market competition. However, this achievement relies heavily on the efficiency and effectiveness of the involved production equipment so that it will not affects product quality. According to (Jain et al., 2014) global markets can be seen as a great competition from customers and competitors in the manufacturing industry, as well as the services sector.

In the era of globalization, it needs to compare with another country like in Japan, India, China, and others in the business. It is important to push local ventures toward current improvement in all parts, including the department of manufacturing. In well-developed countries, the equipment used in the production process is apparently sophisticated and complex. Additionally, the current product trends adopt high quality levels and low manufacturing costs and emphasize the need for stable production equipment. Then, the maintenance cost of this complex equipment would be increased. Hence, the implementation of (TPM) in the manufacturing industry is seen as a very important operational strategy in addressing and for minimizing the quality problem.

Total productive maintenance (TPM) is one of the most effective tool among the best tools existed in order to lead local manufacturing industry to improve and succeed in the

field of maintenance (Hanged and Kumar, 2013). For the rapid changing business sector, the gradual increase in installation activities does not guarantee the persistent profitability or survival of the association. In rapid development, productive manufacturing is a way to remain competitive with other industries. Quick changing business sector necessities call for enhancements in an organization's exhibition by concentrating on cost cutting, expanding profitability levels and quality and convenient conveyance to fulfil clients.

Besides that, Quality and Production are a key factor in achieving goals in the maintenance department (Kaur et al., 2013). When TPM was introduced, the manufacturing industry experienced unprecedented changes involving drastic changes in customer management, product technology and process expectations, suppliers' attitudes, and competitive behaviour. According to (Norddin and Saman, 2012), all industries want to be a world-class organization known to everyone. However, many obstacles need to be encounter or processed in order to become a world-class maintenance.

The purpose of this study is to understand the TPM implementation process and to obtain the optimum planning so that the TPM can minimize the quality problem and can be successfully implemented in the manufacturing organization. This study will also focus on the early stages of product manufacturing and technologies used during the manufacturing process that will have the effect of implementing the TPM. Therefore, some aid in TPM will be used to help overcome the problem and increase the efficiency of the beverage making industry and minimizing the quality problem.

1.2 Problem Statement

In developing countries, for those who do not have enough knowledge in TPM to address the quality issues in the production of the product in the manufacturing sector, especially for small and medium enterprise (SME). Quality is a critical thing that affects the

production of a company. There are several TPM solutions used to solve minimizing quality problems in production such as the issue of equipment damage. Equipment damage is due to the frequency of equipment use and has no proper maintenance in terms of maintenance. This situation caused the production process of the product to be disturbed and the effect on quality was also affected. When the problem is not resolved accordingly, the company may suffer losses in terms of short production and cost loss should be incurred when equipment is not operating. In this issue, it may apply for planned maintenance emphasizing on maintenance activities and figuring out how to create maintenance such as mid-sized, predictive and routine to overcome large damage losses to minimize costs.

Besides that, the production process is disrupted during production. This is because of the damage to the product due to employee negligence in the production line. Other than that, this situation is due to the lack of skill level during the production process. Companies that often hire new employees affect the production line because, in order to produce skilled workers, it takes time. Quality is also disturbed because the production of skilled and unskilled workers is different. The production time also affects the company's losses. The company should provide training or knowledge as an example of six months to strengthen the individual's skills. In this case, to strengthen the Education and Training, the pole can be applied because it emphasizes about developing the proper application to perceive and introduce the required skills and knowledge for the organization.

Most companies suffer losses because of returning products from customers due to defects or damage to the product. This condition is due to the process of checking before delivery to dealer or customers. There is negligence from worker to isolate the dispose of or a good product. This is because the employee loses focus during the production process and it needs to be addressed urgently to avoid any major losses. Other than that, it is due to the old equipment that affects product quality. All these situations because of no continuous

improvement in terms of equipment or employees. The company should not let this happen, which could disrupt product production to meet customer demand. In this case, the implementation of the continuous improvement used in TPM should be considered to address the issue of a quality problem in production.

1.3 Research Question

Based on the problem statement, there are three research questions that is recognized from the problem statement.

RQ1: What components of the TPM can be used to minimize quality problems in industries?

RQ2: How can TPM be practiced in production?

RQ3: How can TPM increase production quality?

1.4 Research Objectives

The main objective of this study is to come up with a proposal for improvement for Zaliza Food Industries Sdn Bhd. The other objectives of this study are:

i. To identify the factor of TPM related to quality in the manufacturing industry.
ii. To apply the TPM concept for quality in manufacturing.
iii. To propose an action improvement activity in productive maintenance to minimize the quality problem in the industry.

1.5 Research Scope

This study will focus on production activities at Zaliza Food Industries Sdn Bhd. The main task is to minimize quality problems on machine at Zaliza Food Industries Sdh Bhd thru TPM invitation. Therefore, all planning should be obeyed in order to achieve the

objective of this study. Then, k-chart is a tool for systematically organizing research that can be seen shows in appendix A.

1.6 Expected Results

The expected outcome to identify the suitable TPM concept for quality improvement. To propose improvement for the quality for decreased quality issue Zaliza Food Industry Sdn Bhd.

Moreover, its review will monitor and control the level of manufacturing performance before running the manufacturing process within the industry. In addition, with the improvement in the production process will benefit the company by implementing tool such as eight pillars in the company's organization. Finally, the expected outcome is to resolve and assist in reducing quality problems and increasing production of the company's daily revenue.

1.7 Thesis Frame

In this chapter, which the introduction to the entire study is given. This is a complete description of the study on what has been described. Besides that, the problem statement for the study was stated. The objectives of this study are also mentioned in chapter one. Other than that, the scope of the study and the expected results are also described in this chapter.

In chapter two are explains about literature. Here, explain about Total Productive Maintenance (TPM) in more detail. Additionally, describe the problem during the manufacturing process that affects the quality of the product. In this study also states how the Total Productive Maintenance process is created. It also states the impression of Total Productive Maintenance (TPM) in the maintenance. In literature it also states eight pillars used in Total Productive Maintenance (TPM).

Next, chapter three serves as the chapter to describe the methodology of the study done. In this chapter's review emphasizes the detailed explanation of the equipment used in the fulfilment of this study. In addition, the problem-solving methodology is also presented in this chapter in more depth.

In chapter four, there are has results and discussion. This chapter, explain how the tools from the previous chapter were used. In this study also requires Data collection from the production process to make Data analysis for easy selection of TPM tools. In addition, the tools used explain how the tool achieved the objectives of this study. However, tool selection should be accurate and tailor-made for Proposal of Improvement and should consider how to maintain improvements

Finally, the fifth chapter states the entire study of this thesis in translation. In this chapter, all the views of the improvement of this study are presented in this chapter. Therefore, in this chapter there are future research proposals that can improve the quality of maintenance by expecting organizations to achieve zero defects in product production. Finally, the overall conclusion of this study is stated in this final chapter.

1.8 Summary

Excellent quality performance depends on the efficiency of the production process to produce a good product. Good manufacturing processes in the industry can reduce the losses faced by the company. Failure in the production process affects the quality that can cause distrust dealer and inadequacy of customers. One of the causes is the quality of the product is not lasting because the non-productive manufacturing process will cause problems for the company that is losing money. Therefore, the production process should have a long-term improvement. If there is no improvement in the production process, it will give the company a huge burden to achieve the desired level of quality that can cause the company to bankrupt.

The method chosen in handle the quality problems depends on the production process to produce quality products. This implementation of TPM is very important to monitor all problems during production. If the company does not have a good setup in the TPM, it will waste time and money because for this implementation need to be serious and focused for a long time. In this study, the Productive Total Maintenance is best suited for solving problems in quality by using the pillars that are in TPM.