

The Productivity Performance's Measurement in SME Industry by using DMAIC of Six Sigma

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Abstract: It is crucial that Malaysia's Small- Medium Enterprises (SME) in the manufacturing sector could achieve desired productivity rate as this could contribute not only to the country's Gross Domestic Product (GDP), but also could contribute to the spending power of a nation. It is important for SME manufacturers to stay ahead in the ever-competitive market to ensure their survival and provide countless jobs for the nation. The objective of this paper is to study, analyse and propose viable solutions to improve manufacturer performance in terms of productivity and quality in the manufacturing sector by using various operation management tools. Hence, one SME company was chosen by utilizing the Value Stream Mapping (VSM) in DMAIC approach to measure their productivity. The aerosol production line was study, to see the gap measurement in productivity before and after applying a systematic method in operation management. Furthermore, along with various operation management tools such as Kaizen, Kanban system and 5S, a new layout (VSM) for the production line was proposed. Result shows that the proposed new layout could reduce the distance travelled by operator by 22.26 %, at the same time will increase the productivity and quality of product. Since the overall performance of the aerosol grease production line will be improved, the waste found in the production line also will be alleviated

Index Terms: DMAIC Approach, Increase Productivity, Process improvement, Production Layout Improvement, SME in Malaysia, Waste Reduction

I. INTRODUCTION

This is a case study explaining about the successful implementation of the DMAIC approach to segregate the problem-solving process systematically and develop a set of solutions to be proposed to solve the issues faced in the grease type aerosol lubricating spray production line at the case study industry plant. All manufacturing processes will have unique problems that will require different methods or tools to solved by utilizing suitable operation management (OM) tools to overcome the problems. By overcoming the issues faced in the production line, the performance of the manufacturing process can be improved. Problems such as high number of defects, reworking, unsuitable facility layout, unoptimized cycle time or unpredicted down time can bring detrimental effect to any manufacturing process and it is the goal the goal of any production line is to increase productivity and maintain high quality standards.

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II. THEORITICAL APPROACH

Dmaic Approach

The acronym DMAIC is well known among Six- Sigma practitioners and production planning experts. DMAIC is consists of five process to bring improvement, namely Define, Measure, Analyse, Improve and Control[1][2][3]. The data used for DMAIC must be quantifiable and the process must be defined, else it is impossible to measure [4]. A summary of DMAIC processes and descriptions is found in Table. 1.

Table. 1 Summary of DMAIC processes and descriptions

Process	Descriptions
Define	In the define stage, the problem to be solved using DMAIC, limitations of organization, project scopes and improvement opportunities in the process was identified.
Measure	Collection of qualitative data is to be done in the measure stage. Using the qualitative data collected, problems in process can be identified in the next stage which is analyse stage and goals for improvement could be proposed in the improve stage.
Analyse	The data obtained from measure stage will be analysed. Any gap for improvement between the current process performance and targeted process performance was identified.
Improve	Solutions or improvements towards the current process was developed and proposed to the organization in this stage.
Control	Once the relevant improvements are found for the production process, measures to control the improved process was proposed. Total control must be established to ensure successful implementation of improvements.

III. METHODOLOGY

Any process or activity that does not add value to a product from the view of consumers is called waste. All waste should be avoided as lean manufacturing focuses on only having value-added activities, with no rejected products and no inventory. But unfortunately, there will be some waste that are absolutely necessary to add value to the organization but not towards the products produced [5]. The seven types of 'Muda', which means waste in Japanese as identified by Taiichi Ohno which are overproduction, queues, transportation, inventory, motion, over processing and defective products[6].