



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

SIX SIGMA IMPLEMENTATION TO IMPROVE QUALITY

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor Degree of Manufacturing Engineering Technology (Process and Technology) (Hons.)

By

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BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA

TAJUK: **SIX SIGMA IMPLEMENTATION TO IMPROVE QUALITY**

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This report is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfillment of the requirements for the degree of Bachelor of Manufacturing Engineering Technology (Process and Technology) (Hons.). The member of the supervisory is as follow:

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ABSTRAK

Kertas kerja ini bertajuk penggunaan six sigma untuk meningkatkan kualiti, di mana penulis telah menyatakan secara jelas tujuan six sigma untuk meningkatkan kualiti. Kertas kerja ini akan memberikan kajian secara terperinci berkenaan penggunaan kaedah six sigma (DMAIC) untuk meningkatkan prestasi kualiti. Kajian ini akan membentangkan dapatan kajian berdasarkan kepada masalah bagaimana penggunaan kaedah six sigma mampu meningkatkan kualiti di industri. Dalam kajian ini juga, kaedah six sigma iaitu, DMAIC akan digunakan untuk mengenal pasti samada kaedah tersebut boleh digunakan untuk meningkatkan sesuatu kualiti ataupun tidak. Penggunaan kaedah ini hanya akan dilaksanakan kepada satu produk yang mempunyai masalah kualiti yang teruk dan setelah itu, kaedah tersebut akan dilaksanakan ke atas produk-produk yang lain. Kajian ini akan menggunakan perisian Excel untuk menganalisis keputusan dari kajian ini. Dari penggunaan kaedah six sigma ini, dapatan kajian yang diperolehi menunjukkan bahawa, dengan penggunaan kaedah six sigma (DMAIC) kualiti produk dapat ditingkatkan dan penggunaan kaedah tersebut di jalankan ke atas produk-produk lain.

ABSTRACT

This paper is entitled Six Sigma implementation to improve quality. In this paper, the writer elaborate the purpose of six sigma and how six sigma take place in order to improve the quality. The aim and purpose of the project is using six sigma methodologies (DMAIC) to improve quality performance. This paper presents the finding of the case study on how the implementation of the six sigma methods may improve the quality in industries. In this study the six sigma methods which is DMAIC tools will be applied to ensure either the tools can be used to improve the quality performance. The implementation of six sigma will focus on only one product that has poor quality performance in the company. The case study will be analyzed by using the Microsoft Excel to ease the writer to analyze the result. This study found that, by using the six sigma method (DMAIC), the quality performance will be increased and the implementation of the six sigma tools for other product will follow.

DEDICATION

I dedicated this thesis to my beloved family whom always give me support to finish up my project, which always give me strength to continue my project and always pray for my successful in finishing this project. Besides that, I also would like to dedicate this thesis to my friends, and lecturers that always give their attention to me whenever I've got a problem.

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LIST OF ABBREVIATIONS, SYMBOLS AND NOMENCLATURE

DMAIC	-	Define, Measure, Analyse, Improve, Control
QC	-	Quality Control
VOC	-	Voice of Customer
CTQ	-	Critical to Quality
SIPOC	-	Supplier, Input, Process, Output, Customer
HOQ	-	House of Quality
QFD	-	Quality Function Deployment
PPM	-	Part per Million

CHAPTER 1

INTRODUCTION

Producing goods in industries is one of the critical phases that should be done by the operators and quality team to make sure the product produces has less quality problems and can be sell to the customers. In order to maintain the quality, several methods have been used and implemented in the industries. The quality team has been formed in order to detect and solve the quality problems. Quality issues can be solved by using the specific methods. It can be used by the quality teams to solved the problems and identify the cause of the quality performance in the line productions.

1.1 RESEARCH BACKGROUND

Quality can be defined in many ways according to someone perspective. It is interesting to observe how its definitions is varies through the quality activities. According to Juran (1964) defines quality as fitness for use. Crosby (1979) describes quality in terms of conformance to requirement and Deming (1986) say that quality is concerned with the present and future needs of the customers. Quality is defined according to the peoples thought and it was very critical problems that happened every days.

Recently, quality is one of the critical things that always concerned in industries. Quality is the characteristics that product should have and it is something difficult to handle. It always makes customer concern with the products produce. Quality problem always happens in industries because of several factors that cannot be avoided. It always becomes one of the top problems in producing the goods.

Quality can be measured through several methods where it will help to eliminate the waste and also control the quality performance in industry. The methods that can be used in increasing the quality performance in industry are seven QC tools, and six sigma. By using this methods the quality improvement can be obtain easily and it also should be sustained to make sure the quality will be maintaining their improvement.

Six sigma is one of the best method that was introduced to helps the company to solve the quality problems. According to Tom McCarty et.al. (2005), Six sigma is used to assess process performance and the result of improvement efforts – a ways to measure quality. Six sigma provides DMAIC tools, where it is used to analyse the processes in order to root out the problems and eliminate or reduce errors. Once the DMAIC methods have been implemented, controls are put in order to sustain the results.

Six sigma focused on helping the organizations make more money by improving customer value and efficiency. It focused on quality improvement by defect preventions, cycle time reductions and cost savings. By implementing the six sigma methods, where it used the DMAIC tools, the quality problems can be easily solve. This is because, according to the Pyzdex, T. and Keller, P. (2010), the organizations that implement the six sigma methods spend less than 5% to fixing the problems. By using DMAIC tools, the quality problems can be easily control. It can easily help the organization to reduce the quality problem that they faced.

Six sigma has been applied in mostly industry in Malaysia. It was applied to improve the quality performance and eliminate waste by using the six sigma methods. In company, they have a six sigma team which is, they will handle all six sigma activities by using the DMAIC methods. By applying the DMAIC tools, the quality problem can be easily traced and can be control in easy way.

DMAIC which is abbreviation from Define, Measure, Analyse, Improve and Control is the method that can be used in order to identify the certain quality problems in industries. It also used to monitor and maintaining the quality of the product by using several format to ease the six sigma team to trace the problems. DMAIC tools have certain procedure and also methods used in order to solve the problem the company facing. By using all the methods, the quality problems will be control and it will reduce the high cost that company facing.

1.2 PROBLEM STATEMENT

When talking about quality, it's not only happen in Malaysia, but it was a worldwide problem in industrial organizations. Quality problems always occur when something is not right with the process. It also happens when the machine breakdown occurs. Usually the quality of the company is depending to the performance of the operator and the satisfactions of the customer. If the operator performance is good, so, the goods will be produce without many problems and the customer will not make the complaint to the products.

If the complaint has been received, the DMAIC tools will be used. Before the DMAIC can be applied, the company should identify what is the quality performance of the company. With this information, the DMAIC analysis will be ease to do. This is because the six sigma team knows the quality performance of the company. They will make the consideration about the quality performance of the company before proceed with DMAIC analysis.

Besides that, before implementing DMAIC tools, the company should consider the effectiveness of the methods. Either the quality performance can be improved by using six sigma or not. This DMAIC tools is used in order to improve the quality requirement in the company. If the quality performance cannot be improved by using six sigma, the company should find other quality control methods to solve the quality problem in the company. If the DMAIC methods can be implemented to solve the problems, the methods can be straight away use in order to save the time.

Quality performance of the company should be measured first, before implement the DMAIC tools to make sure the result obtained. This is because by implementing the DMAIC tools, the company should compare the result they gain before and after implementing the DMAIC tools. The comparison should be done in order to identify the quality of the product before and after implementing six sigma. By doing the comparison, the six sigma team will identify either six sigma methods can be used in improve the quality performance or not.

The problems statements that can be seen in this report are:

1. What is the current quality performance of the product?
2. What is the root cause of the poor quality?
3. How to improve the quality performance?

1.3 OBJECTIVE

Six sigma is one of the methods that often used by the company to solve the quality performance occurs. In this PSM project, the writer have been decided to do the Six Sigma implementation to improve quality, so, in order to accomplish this experiment, there are several objectives that should be done.

The objectives are:

1. To find out the quality performance of the product.
2. To find out the root cause using DMAIC tools.
3. To develop improvement plan for quality.

1.4 SCOPE OF WORK

Six sigma is one of the critical methods that should be concerned in specific work to let the tools implement properly. Based on the project, the implementation of the DMAIC tools will be focus on only one product. This is because of the time limitation that was given, not allows to do the quality improvement for the entire product that produced in the industries. The method that was used by the writer to shows the graphical data is by using the Microsoft Excels. By using the Excels, the graph can be created easily.

The writer will focus on the selected product and implement the six sigma method for the product. Before implementing the six sigma methods, the condition or the quality of the product should be identify to choose the product that should be used in this experiment. The product chosen should have poor quality condition,

where, the writer can try to improve the quality of the product by implementing the DMAIC tools.

By using DMAIC tools, the quality problems cannot be measured if the define process is neglected. Because of that, it is better to limit the work scope to make sure we can implement the six sigma method by using DMAIC tools in better way. The comparison about the effectiveness of the DMAIC tools can be easily obtained after implementing the six sigma methods.

CHAPTER 2

LITERATURE REVIEW

Quality is one of the basic things that should exist in industries. The knowledge about the quality should be kept in every workers mind. This is because, without the quality, producing goods is just a waste to the company. So, because of that, quality is one of the critical things that should be concern by everyone in industries. Producing goods without the quality will just let the workers produce more waste than goods. By doing the production without the quality will let the purpose of the company going waste and waste the workers effort in making the product. Quality not just considers producing the goods it also considers the customer needs in market.

2.1 CONCEPT OF QUALITY

When talking about quality, there are several methods that can be used in order to improve the quality problems. Quality also refers to the customer satisfactions and also doing it right the first time. It not only just refers to the quality of the product produces, but, it also refers to the quality of the service that the company provides. It is the critical things that always happened in mostly company not only in Malaysia but it also happened in other countries. Quality can be measure by their product or process characteristic.

The basic things that quality can provide are the customer satisfactions, where the quality can be measured through the customer feedback. Besides that, by doing it right in the first things also can improve the quality of the company.

2.1.1 What is Quality?

Quality is one of the important things that should be the center of gravity, where the entire product that will be selling should meet the decided level of the quality. According to Pyzdek and Keller (2010), Juran and Gryna (1988), says quality can be define as the entire collection of activities through which we achieve fitness for use, no matter where these activity are performed. Juran and Gryna (1988) also grouped the quality activities into three categories which are:

1. Planning
2. Control
3. Improvement

According to Juran and DeFeo, (2010), Quality Planning is the activity of developing the products and processed required to meet customer needs. It involves a number of universal steps which are:

1. Define the customers.
2. Determine the customer needs.
3. Develop product and service features to meet customer needs.
4. Develop processes to deliver the product and service features.
5. Transfer the resulting plan to operational personnel.

Both Juran and DeFeo, (2010), also state that Quality Control is the process used by operational personnel to ensure that their processes meet the product and service requirement. It is based on the feedback loop and consists of the following steps:-

1. Evaluate the actual operating performance.
2. Compare actual performance with goals.
3. Act on the difference.

Quality Improvement aims to attain levels of performance that are unprecedented – levels that are significantly better than any past levels. It will bring out and implementing the quality policies.

Quality usually will be led by the quality department that was responsible to manage and solve the quality problem by forming the quality control team. The

quality control team will make the planning and try to solve the problems that occur either for service or for productions line in the company. By forming the quality team, the department and production line will be alert with quality problem the company facing. Because of that, the workers will able to do the job properly.

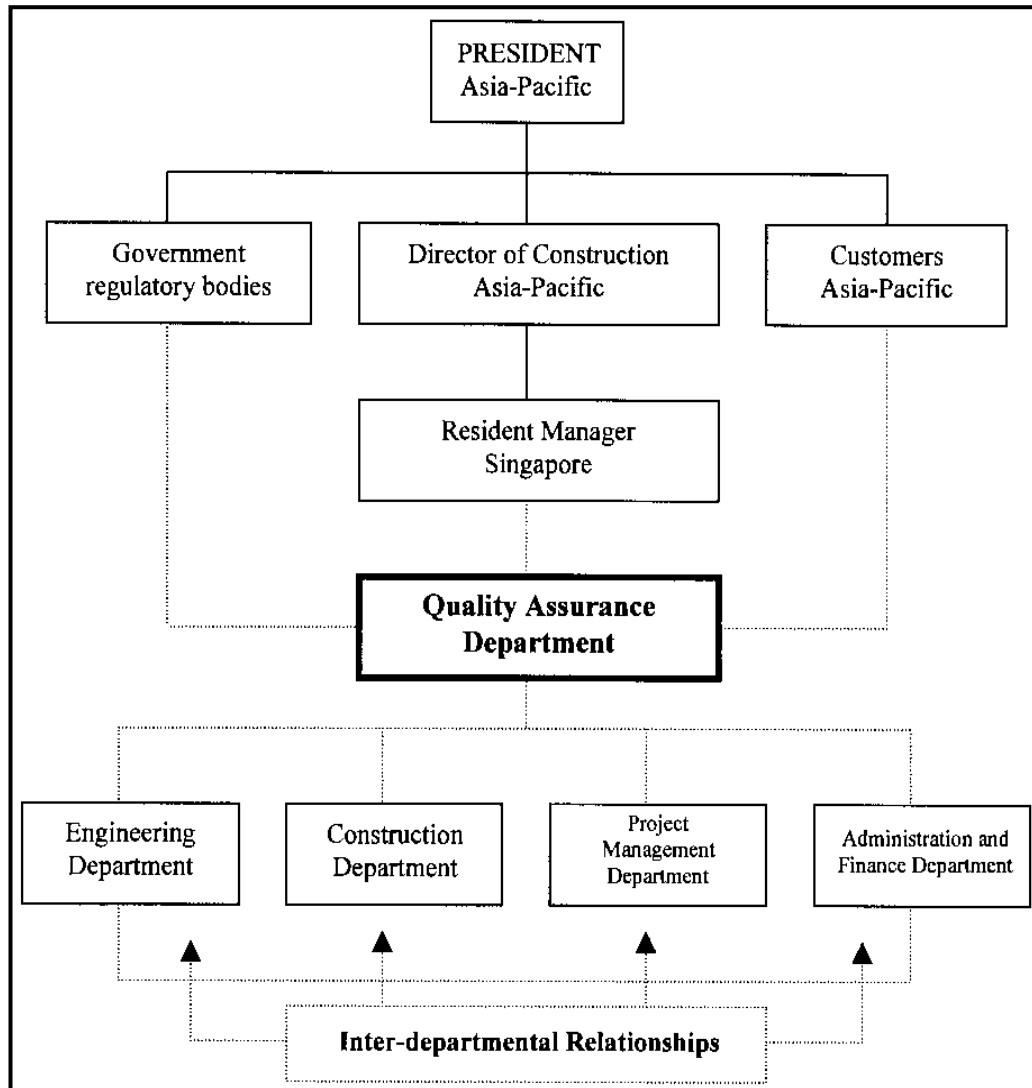


Figure 2.1: Example of the Quality Team Chart

2.1.2 How to Measure Quality

When talking about quality, there are plenty of methods that can be used in order to solve the problems. But, how the methods take place to solve the problem? It can be used either for the minor problem or major problems that happens in the