

EFFECTIVENESS OF SIX SIGMA IMPLEMENTATION IN HARD DISC  
MANUFACTURING COMPANY

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*Specially dedicated to*

**Shahridzul, Aiman, Akil & Afiq**

*For their endless love, encouragement, sacrifice and support*

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## ABSTRACT

In today competitive business world, in order to survive most of the company is continuously improving the quality of their products. Six sigma which is an extension of total quality management (TQM), is used to reduce the process variability and also to provide cost saving to the company. Six sigma has been proven and successfully applied in many companies such as Motorola, General Electric, Allied Signal and etc. Company Aj has been adopting six sigma since September 2009. The objective of this adoption is to reduce the process variation and provide cost saving to the company. Up to 2012, more than 30 projects has been implemented. However the achievement has yet to reach the six sigma level. For further understanding on the problem, a thorough investigation has been carried in this company. The objective for this study is to understand the current implementation of six sigma, identify the critical success factors and obstacles, and propose suggestions for improvement. In order to fulfill this objective, a survey was conducted to determine the critical success factors and obstacles based on respondents perception. Several projects implemented were also reviewed together with Master Black belt and project leader. From the survey, most of the employees agreed that training and development is the most critical success factors. The employees also agreed that insufficient time to conduct the training is most of the obstacle in the six sigma implementation. Although the survey shows training and insufficient times were the critical factors but the most critical factor was management support. Without support from management, the training is unable to be conducted. As a conclusion, management in this organization should give support and commitment toward six sigma in order to make the six sigma implementation to be more successful.

## ABSTRAK

Dalam dunia perniagaan yang penuh persaingan pada masa kini, kebanyakan syarikat senantiasa memperbaiki kualiti produk secara berterusan supaya perniagaan terus bertahan. *Six sigma* merupakan lanjutan kepada pengurusan kualiti menyeluruh yang digunakan untuk mengurangkan variasi proses serta memberi penjimatan kos kepada perniagaan. Pelaksanaan *six sigma* di *Motorola*, *General Electric*, *Allied Signal* dan sebagainya telah berjaya membuktikan keberkesanan pendekatan ini. *Syarikat Aj* mula melaksanakan *six sigma* sejak September 2009. Misi utama pelaksanaan ini adalah untuk mengurangkan variasi proses and penjimatan kos syarikat. Sehingga tahun 2012, lebih daripada 30 projek telah dilaksanakan. Namun pencapaiannya masih belum pada tahap *six sigma*. Untuk lebih memahami masalah ini, satu kajian menyeluruh dilakukan di syarikat ini. Objektif utama projek ini adalah untuk memahami pelaksanaan *six sigma* dan mengenalpasti faktor kejayaan dan halangan disamping mencadangkan tindakan penambahbaikan kepada syarikat. Bagi memenuhi objektif ini, satu kajiselidik telah dijalankan bagi mengetahui faktor-faktor kejayaan berdasarkan pandangan daripada responden. Beberapa projek yang telah dilaksana juga dinilai bersama *Master Black belt* dan ketua projek. Hasil kaji selidik mendapati kebanyakan pekerja bersetuju bahawa pembangunan dan latihan adalah merupakan faktor utama kejayaan. Mereka juga bersetuju bahawa kekangan masa dalam menjalankan projek merupakan halangan utama dalam pelaksanaan *six sigma*. Walaubagaimanapun, faktor terpenting adalah penglibatan pihak pengurusan. Tanpa sokongan daripada pihak pengurusan, latihan tidak akan dapat dilaksanakan. Kesimpulannya, pihak pengurusan dalam organisasi ini harus memberikan sokongan dan komitmen terhadap *Six Sigma* bagi memastikan pelaksanaannya berjaya.

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**LIST OF ABBREVIATIONS**

AMK	Ang Mo Kio
BB	Black Belts
BU	Business units
CEO	Chief executive of operation
CSF	Critical success factors
DIDOV	Define, Identify, Design, Optimize, Validate
DMAIC	Define, Measure, Analyze, Improve, Controls
GE	General Electric
KPIV	Key process input variables
MBB	Master Black Belts
RTY	Rolled throughput yield
SPSS	Statistical package for social sciences
TQM	Total quality management
USA	United States of America

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## CHAPTER 1

### INTRODUCTION

#### 1.1 Introduction

Business today is more challenging. In order to survive, most of the company needs to be competitive especially in improving their performance in terms of products or services quality. Organizations operating in today industrial sector have to continually improve their product quality and delivery; reduce material and labor cost, waste and vulnerability in the supply chain. This can help to increase customer satisfaction, productivity and profitability.

Spring *et al.* (1998) suggested that it is important to apply quality tools and techniques within the quality problem solving approach when conducting process improvement. Six sigma is defined as a set of statistical tools adopted within quality management to construct a framework for process improvement (Goh, 2004). Now, most of the industries have adopted six sigma methodologies to improve their quality of products and services.

Six sigma methodology is an extension of total quality management (TQM) and is used to reduce the process variability and also to provide cost saving

opportunities to the company. Motorola was the first organization to adopt six sigma approaches in late 1980's and subsequently other companies such as Allied Signal, General Electric, IBM, Toshiba and etc. also adopted them. These companies used six sigma methodologies to improve work processes, expand employee's skills and produce high-level strategic results.

Improved quality, reduced cost and increased productivity are some of the benefits derived from six sigma. The benefits of implementing six sigma have been suggested by previous researchers (Kumar *et al.*, 2006; Hong *et al.*, 2007). Therefore, the tools and techniques require close attention in relation to a number of critical success factors (CSF) which will make their implementation effective and efficient (Putri, 2011).

## **1.2 Problem Statement**

Company Aj has started adopting six sigma since September 2009 for process improvement. Up to February 2012, more than 30 improvement projects have been conducted. However the yield loss has not met the targeted value. During the February yield meeting, it was reported that the current rolled throughputs yield (RTY) is 90%. The total product scrap per day is approximately 30,000 units out of 300,000 outputs per day. Although the company has implemented six sigma for more than three years, the yield is not yet achieved six sigma levels. The latest targeted yield set by management is 96%. The yield target is achievable if the company applied the six sigma methodologies systematically.

The main factor for conducting this project is to find out the contribution factors that affecting the existing of six sigma implementation in the organization. Therefore to fulfill this purpose, a thorough investigation is carried out in Company Aj. It is strongly believe that the finding from this project will help the company become more efficient and productive.

### **1.3 Research Question**

The following research questions have been formulated to meet the project objective:

- a) Does the implementation of six sigma have an impact to the organization performance?
- b) How six sigma implementation be assessed?
- c) What are the critical success factor for a six sigma implementation?
- d) What are the difficulties or obstacles faced in the implementation of six sigma?
- e) What are the practical guides for a successful implementation of six sigma?

### **1.4 Objective**

The objectives of this project are:

- a) To assess the existing implementation of six sigma.
- b) To identify the key critical success factors and obstacles affecting the successful implementation of six sigma.
- c) To propose improvement actions in ensuring a systematic implementation of six sigma thereby enabling the fulfillment of the targets set.

## **1.5 Scope of Study**

This project is focus on the implementation of six sigma at hard disc manufacturer based in Senai, Johor (Company Aj).

## **1.6 Significance of Study**

Reduced costs, reduced project time, improve results and improved data integrity are some of the benefits of the six sigma (Ferrin *et al.*, 2005). These benefits cannot be achieved without proper implementation. Failure of six sigma implementation may lead to waste of time, money and resource efforts. The employees' morale are also effected from this issue.

Therefore, this project will determine the critical success factors and obstacles affecting the successful implementation of six sigma. It helps company to understand the current gap or weakness in the implementation. Both employee and management's perceptions toward the implementation will also be obtained. This project also helps in knowing the potential areas of focus in order to achieve successful six sigma implementation. As the result, the company will meet the company performance as targeted as a result of the benefits from six sigma implementation.

## **1.7 Outline of Thesis**

This thesis is organized into seven chapters. The first chapter described on the background of the study, problem statement, project objective, scope of the project and finally the significance of this study to the organization.

Chapter 2 provides the literature review related to this project. This includes six sigma definition, obstacles and challenges, critical success factors in six sigma implementations. Review of the books, journal and previous research are summarized in this chapter.

Chapter 3 presents the background of the company and the six sigma implementation at the organization. The role of six sigma personnel and type of training program also is discussed in this chapter.

Chapter 4 describes the methodology employed in this study for data collection. A flow diagram of the methodology created to give a detail description of the research design and overall structure of the study.

Chapter 5 provides the results and analysis of the survey data collection obtained from the questionnaire survey, open-ended interview session and project review on selected improvement projects.

Chapters 6 discussed the results obtained. Further explanations on findings, gap analysis with company which has successfully implemented six sigma. Recommendations for improvement is discussed in this chapter.

Finally, Chapter 7 is the conclusion of this study. Summary of project findings, limitation of study and potential future work is discussed in the chapter. The outline of the thesis is shown in Figure 1.1.

<b>Chapter 1</b>	• Introduction
<b>Chapter 2</b>	• Literature review
<b>Chapter 3</b>	• Company background
<b>Chapter 4</b>	• Methodology
<b>Chapter 5</b>	• Survey results and analysis
<b>Chapter 6</b>	• Discussion and recommendation
<b>Chapter 7</b>	• Conclusion and future study

**Figure 1.1** Outline of the thesis

## **1.8 Summary**

This chapter has highlighted the background of the project. This project was conducted at a hard disc manufacturer to identify the CSFs and obstacles affecting the successful implementation of six sigma. This chapter also discusses the importance of this project to the organization. The following chapter provides a literature review of the related topics.

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