



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

A CASE STUDY OF KAIZEN IMPLEMENTATION IN SMI

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor Degree of Manufacturing Engineering (Manufacturing Management) with Honours.

by

NOR AZLIN BINTI ALI

FACULTY OF MANUFACTURING ENGINEERING

2010



BORANG PENGESAHAN STATUS TESIS*

JUDUL: A CASE STUDY OF KAIZEN IMPLEMENTATION IN SMI

SESI PENGAJIAN: 2009/2010

Saya **NOR AZLIN BINTI ALI**

mengaku membenarkan tesis (PSM/Sarjana/Doktor Falsafah) ini disimpan di Perpustakaan Universiti Teknikal Malaysia Melaka (UTeM) dengan syarat-syarat kegunaan seperti berikut:

1. Tesis adalah hak milik Universiti Teknikal Malaysia Melaka.
2. Perpustakaan Universiti Teknikal Malaysia Melaka dibenarkan membuat salinan untuk tujuan pengajian sahaja.
3. Perpustakaan dibenarkan membuat salinan tesis ini sebagai bahan pertukaran antara institusi pengajian tinggi.
4. **Sila tandakan (✓)

SULIT

(Mengandungi maklumat yang berdarjah keselamatan atau kepentingan Malaysia yang termaktub di dalam AKTA RAHSIA RASMI 1972)

TERHAD

(Mengandungi maklumat TERHAD yang telah ditentukan oleh organisasi/badan di mana penyelidikan dijalankan)

TIDAK TERHAD

(TANDATANGAN PENULIS)



Alamat Tetap:
NO 7, TAMAN MAWAR,
06700 PENDANG,
KEDAH DARUL AMAN.

Tarikh: 25/5/2010

Disahkan oleh:



(TANDATANGAN PENYELIA)

IR. DR. PUVANASVARAN A/L A. PERUMAL
Pensyarah Kanan

Cop Rasmi: **Fakulti Kejuruteraan Pembuatan**
Universiti Teknikal Malaysia Melaka

Tarikh: 26/5/2010

* Tesis dimaksudkan sebagai tesis bagi Ijazah Doktor Falsafah dan Sarjana secara penyelidikan, atau disertasi bagi pengajian secara kerja kursus dan penyelidikan, atau Laporan Projek Sarjana Muda (PSM).

** Jika tesis ini SULIT atau TERHAD, sila lampirkan surat daripada pihak berkuasa/organisasi berkenaan dengan menyatakan sekali sebab dan tempoh tesis ini perlu dikelaskan sebagai SULIT atau TERHAD.

DECLARATION

I hereby, declare this thesis entitled “A Case Study of Kaizen Implementation in SMI” is the results of my own research except as cited in the reference.

Signature :
Author's Name : NOR AZLIN BINTI ALI
Date :

APPROVAL

This report submitted to the Faculty of Manufacturing Engineering of UTeM as a partial fulfillment of the requirements for the degree of Bachelor of Manufacturing Engineering (Manufacturing Management) with Honours. The member of the supervisory committee is as follow :

.....
Ir. Dr. Puvanasvaran A/L A.Perumal

Project Supervisor

(Official Stamp & Date)

ABSTRACT

Kaizen is a concept that focuses on improving a work area or an organization in incremental steps. Many organizations have begun to incorporate the philosophy of kaizen through the use of kaizen methodology. The first well-known and most frequently cited proponent of *kaizen* was Imai, who wrote *KAIZEN – The Key to Japan’s Competitive Success* (1986). He outlined the concept, its core values and principles, its relation to other concepts and the practices used in the improvement process. This paper illustrates about kaizen case study in Small Medium Industries (SMI) Company that is Micro Zass Sdn. Bhd. which produce machines spare part and food processing machines. The case study is focused on reducing lead time of sales order processing. Kaizen steps are used as guidelines and PDCA Cycle is chosen as problem solving approach to conduct the case study. The tools and techniques such as 5why, Work Instruction Sheet, Pareto diagram, Process Mapping, PDCA Cycle and brainstorming were used. The kaizen implementation has reduced the percentage of time losses which is 48.44%. More than that, sales order processing lead time was reduced about 6.98% and production lead time reduced about 14.93%. Besides, non value added time and necessary non value added time activities was reduced as much as 60.69% and 57.14% respectively. These results have proved the effectiveness of kaizen methodology.

ABSTRAK

Kaizen adalah konsep yang berfokus pada peningkatan kawasan kerja atau organisasi secara berterusan. Banyak organisasi telah mula menggabungkan falsafah kaizen melalui penggunaan metodologi kaizen. Tokoh kaizen pertama dan yang paling sering dirujuk adalah Imai, yang turut menerbitkan sebuah buku bertajuk KAIZEN- The Key To Japan's Competitive Success (1986). Beliau telah menggariskan konsep, menerangkan nilai-nilai utama dan prinsip kaizen, hubungannya dengan konsep-konsep lain dan cara yang digunakan dalam melaksanakannya. Buku tesis ini menggambarkan kajian kes tentang aplikasi kaizen dalam Industri Kecil Sederhana (IKS) iaitu di sebuah syarikat Micro Zass Sdn. Bhd. syarikat ini menghasilkan bahagian-bahagian mesin dan juga mesin-mesin pemprosesan makanan. Kajian kes difokuskan pada pengurangan masa pemprosesan order penjualan. Langkah-langkah Kaizen digunakan sebagai panduan dan PDCA Cycle adalah dipilih sebagai pendekatan kepada penyelesaian masalah untuk melakukan kajian kes. Teknik-teknik seperti '5why', borang langkah kerja, 'Pareto diagram', Pemetaan Proses, 'PDCA Cycle' dan 'brainstorming' telah digunakan. Aplikasi kaizen telah mengurangkan peratusan kehilangan masa sebanyak 48.44%. Selain dari itu, masa pemprosesan order penjualan juga berkurang sebanyak 6.98% dan masa pengeluaran produk berkurang sebanyak 14.93%. Selain itu juga, jumlah masa yang tidak bernilai dan jumlah masa yang perlu tetapi tidak bernilai telah berkurang sebanyak 60.69% dan 57.14% masing-masing. Pengurangan ini telah membuktikan keberkesanan metodologi kaizen.

DEDICATION

For my beloved family and friends for their loves and supports.

ACKNOWLEDGEMENT

Several people played an important role in the accomplishing of this thesis and I would like to acknowledge them here. First of all, I want thank to Almighty God for reasons too numerous to mention. I also would like to thank to Ir. Dr. Puvanasvaran a/l A. Perumal, my supervisor for the support and encouragement to pursue to this thesis and also for the invaluable guidance he has provided. All the knowledge that he gives me will helpful to my future. I also wish to give a special gratitude to Mrs. Salina, sales assistant at Micro Zass Sdn. Bhd., the company that the case study were conducted, for the information that she gave me about company, production and management of the company and also his effort to help me in data collection for use in this study. Without her, this thesis would have been most difficult. Besides, thanks also to my parents for their financial supports along case study progress. Last but not least, I would like to thank to my friends, for their comments and suggestions to improve the quality of my thesis.

TABLE OF CONTENT

Abstract	i
Abstrak	ii
Dedication	iii
Acknowledgement	iv
Table of Content	v
List of Tables	x
List of Figures	xi
List of Abbreviations	xii
CHAPTER 1: INTRODUCTION	1
1.1 Introduction	1
1.2 Background of study	1
1.3 Problem Statement	2
1.4 Objectives	3
1.5 Scope	3
1.6 Company Background	3
1.7 Expected Finding	4
CHAPTER 2: LITERATURE REVIEW	5
2.1 Introduction	5
2.2 Introduction of kaizen	5
2.3 History of kaizen	6
2.4 Principle of kaizen	7
2.4.1 Process orientation	7
2.4.2 Improving and maintaining standard	7
2.4.3 People Orientation	10
2.5 Kaizen Approach Applications in different scopes	10
2.5.1 A case study using cellular design in Meat Tenderizer Manufacturing	10

2.5.2	A case study using organizational design in Philips Business Unit	11
2.5.3	A case study using business process improvement in Viratec Thin Films	13
2.5.4	A case study using Total Productive Maintenance (TPM) in Ready Made Garments (RMG) sector	13
2.5.5	A case study using Total Quality Management (TQM) at Godrej Soaps Limited	14
2.6	Kaizen implementations in various industries	14
2.6.1	Implementation in Manufacturing Industry	14
2.6.2	Implementation in Aerospace Industry	15
2.6.3	Implementation in Small-medium Industry (SMI)	16
2.6.4	Implementation in Academic	16
2.6.5	Implementation in Public sector	17
2.7	Challenges/ Barriers in implementing kaizen	18
2.8	Benefits of kaizen	20
2.9	Conclusions	22
 CHAPTER 3: METHODOLOGY		27
3.1	Introduction	27
3.2	Research methodology	27
3.2.1	Conceptualization phase	30
3.2.2	Literature Review phase	30
3.2.3	Data Collection phase	30
3.2.4	Analysis phase	31
3.2.5	Implementation phase	31
3.2.6	Conclusion phase	32
3.3	Kaizen methodology	32
3.3.1	Define pilot area	32
3.3.2	Identify the losses	34
3.3.3	Plan preparation	35
3.3.4	Select the team	35
3.3.5	Project implementation	35

3.3.5.1 Step 1: Define the problem	36
3.3.5.2 Step 2: Detect root causes	37
3.3.5.3 Step 3: Collect data	37
3.3.5.4 Step 4: Analyze and Establish solutions	37
3.3.5.5 Step 5: Implement solutions	37
3.3.5.6 Step 6: Check and monitor results	38
3.3.5.7 Step 7: Standardize solutions	38
3.3.6 Conform Effectiveness	39
3.3.7 Follow up	39
3.4 Conclusions	39
CHAPTER 4: RESULTS & DISCUSSION	40
4.1 Step 1: Define Pilot Area	40
4.2 Step 2: Identify Losses	41
4.3 Step 3: Plan Preparation	43
4.4 Step 4: Organizing Team	44
4.5 Step 5: Project Implementation	45
4.5.1 Define the problem	45
4.5.2 Detect root cause	47
4.5.2.1 Why 1: Customers change specification	48
4.5.2.2 Why 2: Not fulfill customer's requirement	48
4.5.2.3 Why 3: Miscommunication and Misunderstanding	48
4.5.2.4 Why 4: Discuss without documentation or agreement	48
4.5.2.5 Why 5: procedures not appropriate and do not have customer approval	49
4.5.3 Data collection	49
4.5.3.1 Process 1	49
4.5.3.2 Process 2	51
4.5.3.3 Process 3	51
4.5.3.4 Process 4	51
4.5.3.5 Process 5	51
4.5.3.6 Process 6	52

4.5.3.7 Process 7	52
4.5.3.8 Process 8	53
4.5.3.9 Process 9	53
4.5.3.10 Process 10	53
4.5.3.11 Process 11	53
4.5.3.12 Process 12	54
4.5.3.13 Process 13	54
4.5.4 Analyze and Establish solution for the problem	54
4.5.5 Implement solutions	58
4.5.6 Check and monitor results	58
4.5.7 Standardize solutions	58
4.6 Step 6: Conform Effectiveness	60
4.6.1 Production lead times comparison	60
4.6.2 Sales order processing lead time comparison	61
4.6.3 Time losses comparison before and after improvements	62
4.6.4 Value added, non value added and necessary non value added time comparison before and after improvements	63
4.7 Step 7: Follow Up	64
4.7.1 Check sheet	64
4.7.2 Workers involvement	65
4.7.3 Top management strict enforcement	65
4.8 Discussion of Overall Results	65
CHAPTER 5: CONCLUSIONS AND RECOMMENDATION	67
5.1 Conclusions of kaizen case study	67
5.2 Conclusions of thesis	68
5.3 Recommendation for future study	68
REFERENCES	69

APPENDICES

- A Gantt chart for Bachelor Degree Project 1(BMFG 4932)
- B Gantt chart for Bachelor Degree Project 2(BMFG 4924)
- C Process Mapping of Sales Order Processing
- D Process Mapping of Dodol Machine
- E Project Schedule
- F Team Organization Chart
- G Product Structure for ‘Dodol’ Machine
- H Example of Customer Approval Drawing Form

LIST OF TABLES

2.1	Summary of literature reviewed on kaizen implementations	23
3.1	16 general losses	34
4.1	VA and NVA for production operations	42
4.2	Summary of VA and NVA total time	43
4.3	Responsibility of team members	44
4.4	Time and percent losses by problems	46
4.5	Value Added Analysis for sales order processing	55
4.6	Benchmarking of indicative measure	66

LIST OF FIGURES

2.1	Steps in application Deming's PDCA technique and associated tools	9
2.2	A typology of organizational designs for CI	12
3.1	Research methodology	29
3.2	Kaizen methodology	33
3.3	PDCA Cycle	36
4.1	Percentages of Time Losses by problems	46
4.2	Why-Why Analysis	47
4.3	Current process flow of sales order processing	50
4.4	A new procedures of sales order processing	57
4.5	Example of Work Instruction Sheet for Customer Approval Process	59
4.6	Production lead time comparison before and after improvements	60
4.7	Sales order processing lead time comparison before and after improvements	61
4.8	Percentages of time losses comparison before and after improvements	62
4.9	VA, NNVA and NVA comparison before and after improvements	63

LIST OF ABBREVIATIONS

AACSB	-	American Assembly of Collegiate Schools of Business
ACE	-	Achieving Competitive Excellence
BOM	-	Bill of Material
CI	-	Continuous Improvement
GKS	-	Godrej Kaizen System
JIT	-	Just-In-Time
NSC	-	Nippon Steel Corporation
OEE	-	Overall Equipment Effectiveness
PDCA	-	Plan-Do-Check-Action
PSM	-	Projek Sarjana Muda
QC	-	Quality Circles
QCC	-	Quality Control Circle
RMG	-	Ready Made Garments
SMI	-	Small Medium Industries
SOPs	-	Standard Operating Procedures
TPM	-	Total Productive Maintenance
TQC	-	Total Quality Control
TWI	-	Training Within Industry
VA	-	Value Added
NVA	-	Non Value Added
NNVA	-	Necessary Non Value Added

CHAPTER 1

INTRODUCTION

1.1 Introduction

These chapter overall discuss the introduction of the kaizen implementation (continuous improvement) in the Small Medium Industries (SMI). In this part, the briefing of the background, problem statement, objectives, scope and the expected of the study are discussed.

1.2 Background of study

Nowadays, organizations carry on seeking innovative ideas for improving their processes and retaining a competitive edge. Kaizen is a concept that focuses on improving a work area or an organization in incremental steps by eliminating waste. Kaizen can be applied to any area in need of improvement. Indeed, the overall concept of continuous improvement appears to be applicable to every area of industrial and logistics activity, from the production of basic materials such as steel, aluminium and timber to manufacturing industries as diverse as automotive, furniture, canning, food and drink (Leigh Pomlet, 1994). Many organizations have begun to incorporate the philosophy of kaizen through the use of kaizen methodology. Kaizen project typically focus on specific improvement goals. A kaizen team may include operators, managers, or supervisors from both the work area and from other work areas within the organization. Other support personnel may also be included in the event such as engineers or personnel from outside of the organization. The time period of kaizen

implementation is dependent on the difficulty of the goals and the complexity of the work area. The kaizen team may apply different tools to meet the goals of the kaizen project, such as brainstorming, Why-Why analysis, or Pareto analysis. Kaizen teams may also follow particular methodologies, such as Standard Work.

1.3 Problem Statement

This study focuses on continuous improvement (kaizen) of sales order processing procedure in Small Medium Industries (SMI) in order to reduce time loss and increase customer satisfaction through product that meets their need and on time delivery. Industries especially manufacturing is currently faced with the conflicting pressure to improve customer satisfaction and service as well as pressures of cost reduction, reducing lead time, and quality improvement in order to get better results. Opportunities for productivity improvement through reduced time loss are critical to organizational survival and these efforts can be driven through kaizen initiative such as standard operating procedure or reflow the procedure of sales order processing which will be expose in this case study.

The most important asset of any organization is its customers. Understanding the customer's needs and expectations is essential to win new business and keeping existing business. An organization must give its customers a quality product that meets their needs at a reasonable price, which includes on-time delivery and outstanding service. In order to make a quality product that meets customer needs is difficult if customer always unsatisfied with the design of product after manufacturer has completed it. This situation created many waste in term of cost and time. By using kaizen methodology and tools, the root cause of the problems are tackle and solved by using problem solving approach such as PDCA.

1.4 Objectives

An objective of this study is:

- (a) Identify time losses at production area,
- (b) Identify opportunities for kaizen improvement using a problem solving approach,
- (c) Describe the effects of the improvement using time measurements.

1.5 Scope

This study will thoroughly focus on reducing time losses while at the same time reducing the lead time of sales order processing in company Micro Zass Sdn. Bhd. and indirectly improve customer satisfaction. This condition will create a win-win situation between company and customers.

1.6 Company Background

Micro Zass Sdn. Bhd. with the status of “bumiputra” company is located at Lot C-6, Kompleks SME Bank, Km. 11, Telok Mas 75460 at Melaka, Malaysia. This company was incorporated in Malaysia under Companies Act 1965 on December 2003 with paid up capital of RM 1000.00.

Micro Zass Sdn. Bhd. is manage and led by selected team of Malaysia Professionals. Their expertises have been gained over a total collective of 25 years. The principal activity of Micro Zass is providing precision tooling & services to the Microelectronic Industry both locally and abroad. Totally committed in proving the best in quality, time delivery and services to the customer, also work with the customer on ways to improve on cost reduction.

By the expansion plan in midst Micro Zass Sdn. Bhd. is working to equip with start-of-the-art machinery to meet the stringent requirements of customer. Besides having highly motivated skilled, experienced tool and die makers and Machinist that can work independently, ensuring

that the provisional able to fulfill all customers demands and capabilities of designing die set and automation systems.

The culmination of these proposals and plans will lead Micro Zass Sdn. Bhd. In setting up new plant and machineries to provide the product and service with efficiently and effectively. In due course, to encourage a proactive participation by all witch leads the objectives of this company be addressed well and prepare to meet the challenges that waits in future.

Micro Zass Sdn. Bhd. also, believe that with the foundation and spirit which laid in the valued board member and partner, accomplishment of the dream able to pursue, and for a brighter future with mutual prosperity.

1.7 Expected Findings

At the end of the study, it's expected to know about the eliminating of non value added activities after improvement processes through value added analysis. Besides, the reductions of lead time of sales order processing also expected by eliminating non value added activities. Other than that, the effectiveness of kaizen methodology to reduce waste will be found in the end of project by using time measurement.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter will proceed with referenced review from the relevant literature. It's included the details related to information and history which already done by other people that involved in the kaizen activity previously. It also will explain about methods and tools of kaizen which generally used in various fields.

2.2 Introduction of kaizen

Kaizen was created in Japan following World War II. The word Kaizen means "continuous improvement". It comes from the Japanese words "kai" which means "change" (to correct) and "zen" which means "good" (for the better). Basically kaizen is for small improvements, but carried out on a continual basis and involve all people in the organization (Venkatesh, 2007). The author also said that the kaizen is opposite to big spectacular innovations and requires no or little investment. The principle behind is that a large number of small improvements are more effective in an organizational environment than a few improvements of large value.

In Brunet and New (2003), it stated that the implication in industry of all the uncontracted and partially contracted activities which take place in the Japanese workplace is carrying by kaizen to enhance the operations and the environment. Kaizen represent the employment of the workforce, providing the main channel for employees

to contribute to their company's development. In fact, the front-line employee is most familiar with the actual work; there may be no one person to ask for improvement ideas (Chen et al., 2000).

Many techniques and tools have been used including quality circles (QC), total quality control (TQC), standard operating procedures (SOPs), total productive maintenance (TPM), suggestion systems, kanban, just-in-time (JIT), productivity improvement, robotics and automation. A study of continuous improvement tool used of Australian firms conducted by Hyland et al. (2000) found that particularly, they more frequently to use three reasonably sophisticated tools which are process mapping tools, quality function deployment and the seven new quality tools.

2.3 History of kaizen

As stated previously, Kaizen methods for work process improvement that include making the improvements originated in the World War II Job Methods training program. It was developed by the Training Within Industry (TWI) organization, a component of the U.S. War Manpower Commission during World War II. Kaizen methods that suggest improvements also originated in the work TWI (Huntzinger, 2002).

As suggestion rather than action improvement programs, Imai points out that, "Less well known is the fact that the suggestion system was brought to Japan. Huntzinger (2002) also traces Kaizen back to the Training Within Industry (TWI) program. TWI was established to maximize industrial productivity from 1940 through 1945.

As the principle of continuous improvement, Kaizen has its origins in W. Edwards Deming's 14 points. Point 5 states, "Improve constantly and forever" the system of production and service (Deming, 1982).

2.4 Principle of kaizen

Kaizen philosophy embraces three main principles proposed by Imai (1986) which are process orientation, improving and maintaining standard and people orientation. All principles are significant in order to implement the kaizen.

2.4.1 Process orientation

Imai (1986) stated that kaizen is process-oriented. Before results can be improved, processes must be improved, as opposed to result-orientation where outcomes are all that counts. Berger (1997) added to what Imai said that the principle has at least two practical consequences for the improvement process. First, management's main responsibility is to stimulate and support the effort of organizational members to improve processes. In order to be improved, a process must be understood in detail. Second, process-orientation calls for evaluating criteria which can monitor and bring attention to the improvement process itself, while at the same time acknowledging its outcome (Berger, 1997).

2.4.2 Improving and maintaining standard

Kaizen is distinctive in its focus on small improvements of work standards as a result of an ongoing effort. Furthermore, Imai (1986) said "There can be no improvement where there are no standards" which in essence denotes the relation between kaizen and maintaining standard procedures for all major operations (Standard Operating Procedures (SOPs)) (Berger, 1997).

The three general characteristics have been identified by Berger (1997) as reasons for highlighting standards to which are claimed to follow with the standardization of operating procedures:

- (a) Individual authorization and responsibility.
- (b) Enhanced learning through the transmittal, accumulation and deployment of experience from one individual to another, between individuals and the organization and from one part of the organization to another.
- (c) Discipline.

The PDCA (Plan-Do-Check-Action) problem-solving format is used to support the desired behaviors. In practice, this simple but very systematic format of a “wheel” of never-ending improvements has become the most frequently used symbol for kaizen. It is a quite simple framework for using the different quality tools which make the improvement process both visible and measurable while also serving as the main link between improvements and standardized routine work (Berger, 1997).

In an article by Thomas et al. (2003), they are used the PDCA Cycle as a model to illustrate the process of adopting and using continuous quality improvement at the clinical research site to enhance ethical, quality benchmarking activities.

Related to the approach, Westbrook (1995) also using the PDCA cycle in cases improvement at large Japanese companies. Although the problems of course varied, the deployment of the PDCA cycle was identical in each case. He pointed out that the assumption of PDCA method is followed and the likelihood of a successful solution being obtained at one of the companies was tested and noted that company’s emphasis on strict procedure is itself significant.

Similar as Berger (1997), Thomas et al. (2003) and Westbrook (1995), Shamsuddin and Masjuki (2003) also suggested using Deming’s PDCA which is an excellent technique in monitoring and problem solving for continuous quality improvement where any bright ideas of individuals can be accommodated.