UNIVERSITI PUTRA MALAYSIA

DEVELOPMENT OF AN ISO9001:2000 SELF-ASSESSMENT TOOL FOR USE IN ISO-CERTIFIED MANUFACTURING COMPANIES

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DEVELOPMENT OF AN ISO9001:2000 SELF-ASSESSMENT TOOL FOR USE IN ISO-CERTIFIED MANUFACTURING COMPANIES

By

SEYED ALI ASGHAR TAYEFEH MORSAL

Thesis submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfillment of the Requirement for the Degree of Master of Science

December 2008

DEDICATION

To my lovely wife and daughter

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfillment of the requirement for the degree of Master of Science.

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Chairman: Associate Professor Ir. Md Yusof Ismail, PhD

Faculty: Engineering

Measuring and computing the maturity of the Quality Management System (QMS) is one of the most important requirements in ISO 9001:2000. Many organizations have not found any accurate and unique approach to QMS maturity assessment. Considering this fact, the ISO has never issued any self-assessment model. However, some ISO certified organizations have to apply the award models. Some of certified organizations have even become compelled to change one of the award models according to their needs. Nevertheless, in applying it, this approach has caused many difficulties for them. The main objective of this research was developing a proper self-assessment tool in accordance with the ISO9001:2000 requirements.

The process of developing a self-assessment tool was carried out in three stages. In the first stage, the framework of the tool was developed, while it was compiled according to the ISO requirements in the second stage. This tool was

formed by eight principles, 33 criterions and 300 indicators. Each principle was organized into many criteria and indicators, which provided necessary situation for judgment. Audit team investigated the effectiveness, efficiency and suitability of their QMS using the present tool. The third stage allocated tool verification and validation. Verification was performed by comparing the requirements of ISO and the content of the tool and expert's views.

Meanwhile the validation was carried out by pilot test and case study. A certification body and two consulting services companies studied the tool and offered their opinions; whereas, eight volunteered ISO certified manufacturing companies applied the tool to assess and test it in the real environment. The data obtained from the case studies and the investigations by the experts were analyzed. The results showed that, the developed self-assessment tool could be used to investigate the QMS maturity of the organizations.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia
sebagai memenuhi keperluan untuk ijazah Master Sains

PEMBANGUNAN SUATU PERALATAN PENILAIAN SENDIRI ISO9001:2000 UNTUK DIGUNAKAN DALAM SYARIKAT PEMBUATAN YANG DISIJILKAN

Oleh

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Banyak organisasi tidak dapat mencari pendekatan yang tepat dan unik kepada keberkesanan QMS. Oleh kerana, ISO tidak membuat model bantuan kendiri, sesetengah organisasi yang telah diktiraf ISO terpaksa memohon model penganugerahan tersebut. Malah, sesetengah organisasi yang diiktiraf telah mengubah salah satu daripada model tersebut untuk kepentingan organisasi sendiri dan menggunakannya namun pendekatan ini telah mendatangkan banyak masalah kepada mereka. Objektif utama kajian ini ialah untuk membentuk bantuan kendiri yang lebih berkesan bertepatan dengan keperluan ISO9001:2000.

Proses untuk pembentukan bantuan kendiri ini terdiri daripada 3 tahap. Dalam tahap pertama, rangka program ini telah dibentuk dan tahap kedua, program tersebut disusun mengikut keperluan ISO. Program ini telah dibentuk daripada

8 prinsip, 33 kriteria dan 300 indikator. Setiap prinsip dipengaruhi oleh banyak kriteria dan indikator, yang memberi gambaran diperlukan untuk sesuatu keputusan dibuat. Pasukan audit akan menyiasat keberkesanan, efisien dan kesinambungan QMS mereka berbanding program terkini. Tahap ketiga ialah membuat verifikasi dan pembetulan. Verifikasi dibuat dengan membandingkan asas keperluan ISO dengan kandungan program terkini dan diuji dalam syarikat yang bersaiz kecil. Pembetulan pula dilakukan dengan menggunakan pemerhatian tenaga pakar dan kajian kes. Sebuah badan pengiktirafan dan dua syarikat konsultan mengkaji program tersebut dan memberi pandangan mereka terhadapnya dan 8 syarikat pengeluaran yang diiktiraf ISO menggunakan program tersebut dalam persekitaran pekerjaan yang sebenar.

Data yang diperolehi daripada kajian kes dan penilaian pakar dianalisis dan keputusan untuk pembentukan program kendiri adalah perlu untuk menguji keberkesanan QMS dalam organisasi-organisasi.

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I dedicate this piece of my work to my family, my sister and Mr. Cyrus Hami a colleague and close friend of mine, whose love and accompaniment had inspired me to achieve the highest goals in my life.

I certify that an Examination Committee has met on 6th October 2008 to conduct the final examination of Seyed Ali Asghar Tayefeh Morsal on his Master of science thesis entitled "Development of a self-assessment tool for ISO9001:2000 in ISO certified manufacturing companies " in accordance with Universiti Pertanian Malaysia (Higher Degree) Act 1980 and Universiti Pertanian Malaysia (Higher Degree) Regulations 1981. The Committee recommends that the candidate be awarded the relevant degree. Members of the Examination Committee are as follows:

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DECLARATION

I hereby declare that the thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at UPM or other institutions.

SEYED ALI ASGHAR TAYEFEH MORSAL

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TABLE OF CONTENTS

		Page
DEDICATION		ii
ABSTRACT		iii
ABSTRAK		v
ACKNOWLEDGEMENT		vii
APPROVAL		viii
DECLARATION		xi
LIST OF TABLES		xiv
LIST OF FIGURES		xvi
ABBREVIATION		xvii
CHAPTER		
1	**INTRODUCTION**	1
1.1	General Review	1
1.2	Problem Statement	3
1.3	Objectives	4
1.4	Benefits and Significant	4
1.5	Scope of Study	5
1.6	Layout of the Thesis	6
2	**LITERATURE REVIEW**	7
2.1	Introduction	7
2.2	Quality Management System (QMS)	8
2.3	Definition of Self-Assessment Model	9
2.4	Concept of Maturity	11
2.5	Types of Self-Assessment Models	12
2.5.1	The Deming Prize (DP)	13
2.5.2	The Malcolm Baldrige Nation Quality Award	14
2.5.3	European Quality Award (EQA)	14
2.5.4	Other Models	15
2.6	Objectives and Benefits of Self-Assessment	16
2.7	Application Problems of Award Models in Certified Organization	19
2.7.1	Similarities and Differences in Principles	21
2.7.2	Similarities and Differences in Structures	22
2.7.3	Similarities and Differences in Requirements (Scope)	24
2.7.4	Similarities and Differences in Expectations	28
2.7.5	Similarities and Differences in Fundamental Concepts	30
2.8	Differences in Development of self-assessment Model	31

	2.8.1	Difference in Tactics to Assessment	31
	2.8.2	Difference in Approach of Developing	35
	2.8.3	Difference in Type of Indicators	36
	2.8.4	Difference in Logic of Measurement	36
2.9		Specification of a Proper Self-Assessment Model	42
2.10		The Purpose of Each Concept	45
2.11		Previous Similar Studies	48
2.12		Radar Chart and Its Application in Judgment	51
2.13		The Validity of the Model	52
	2.13.1	Construct Validity	52
	2.13.2	Content Validity	52
	2.13.3	Predictive Validity	54
2.14		The Importance Degree of Principle (IDP)	54
3	**RESEARCH METHODOLOGY**		55
3.1		Introduction	55
3.2		Developing the Framework	57
	3.2.1	Identifying and Selecting Tactics	58
	3.2.2	Identifying and Determining the Criteria	58
	3.2.3.	Determining Indicators	61
	3.2.4.	Selecting Approach	61
	3.2.5	Measurement System	62
	3.2.6	Reporting System Adopting	72
3.3		Model Compiling	73
3.4		Model Verification and Validation	73
3.5		Identification of Population	75
3.6		The Sampling Method of the Study	75
3.7		The Strategy of Study	76
3.8		Justification of Company for Case Study	77
3.9		Analysis of Data	78
4	**RESULTS AND DISCUSSIONS**		80
4.1		Prologue	80
4.2		The Framework Developing Results	81
4.3		Model Compiled Results	84
4.4		Verification of the Tool	85
4.5		The Analysis of Validity	85
	4.5.1	Content Validity	86
	4.5.2	Construct Validity	87
	4.5.3	Predictive Validity	89
4.6		Selecting the Cases	90
4.7		Background of the Cases	93
4.8		The Result of the Pilot Test	97
4.9		The Results of the Case Studies	98

	4.10	Practicality of the Tool	104
	4.11	Determination of Priorities for Improvement	104
	4.12	The Significance of the Results	110
5	**CONCLUSION AND RECOMMENDATION**		111
	5.1	Conclusion	111
	5.2	Recommendation	113
	REFERENCES		114
	APPENDICES		119
	BIODATA OF THE STUDENT		222

LIST OF TABLES

Table		Page
2.1	Some self-assessment topics, objectives, and representative models	16
2.2	Benefits of the self-assessment process	18
2.3	Comparison amoung the principles of Deming, ISO9001:2000 and King Abd. model	22
2.4	The Differences between the structures of ISO and Baldrige	23
2.5	The relationship between the Malcolm Baldrige and ISO 9001:2000 elements	25
2.6	The relationship between the EFQM and ISO9000	26
2.7	The depth of requirements in a item of ISO9001:2000	29
2.8	The depth of requirements in the same item of the Baldrige	29
2.9	The comparison among the concepts of Baldrige, ISO and EFQM	30
2.10	Different tactics in self-assessment practice	33
2.11	ISO maturity level matrix	38
2.12	Matrix of scoring in the Baldrige Award Model	39
2.13	The fundamental concepts of EFQM and their weight	40
2.14	Matrixes of scoring in EFQM	41
3.1	Matrix for judgment about stage of Approach	64
3.2	Matrix for judgment about stage of Deployment	65
3.3	Matrix for judgment about stage of control & improvement	65
3.4	The equality of questionnaire range and Likert scale	79

4.1 The number of key statement of each concept 81

4.2 The Key statements of each concept 82

4.3 The number of indicators of each one of concepts 84

4.4 The result of expert's views about content of the tool 86

4.5 Expert's views about content of the tool in Likert scale 87

4.6 Common specification of the firms and their QMS maturity 99

4.7 The fulfillment amount of each principle in the firms 101

4.8 The mean for the fulfillment of the requirement in eight firm 102

4.9 The IDPS (severity and grade of priority) of the eight firms 104

4.10 The improvement opportunities 105

4.11 The result of the self-assessment of the Firm 3 107

LIST OF FIGURES

Figure		Page
2.1	The ISO9000/EFQM connectivity	27
2.2	Relationship of the ISO9000 and the Baldrige model	28
2.3	The procedure of developing a self-assessment model	34
2.4	Complexity of approaches used in the self-assessment process	35
2.5	An example of range scale measuring tool	56
3.1	The procedure of the research	56
3.2	Balance of measurement and its domains	65
3.3	The most value of the 3rd domain in prejudgment	67
3.4	The maximum decrease, for first critical word (if it is not logic)	67
3.5	The maximum decrease, for second critical word (if it is not compatible)	67
3.6	The octagonal radar chart	71
3.7	The verification and validation stages of the model	74
3.8	The procedure of self-assessment	78
4.1	The cluster of construct	88
4.2	The QMS maturity situations in the applied firms	103
4.3	The comparison between the principles maturity and the organization's maturity in the firms which focus on priorities	106
4.4	The fourfold diagram of the Firm 3	108

LIST OF ABBREVIATIONS

ISO	International organization for standardization
QMS	Quality management system
St. Dev.	Standard deviation
EFQM	European foundation for quality management
DP	Deming prize
UJSE	Union of Japanese scientists and engineers
MBNQA	Malcolm Baldrige nation quality award
MB	Malcolm Baldrige
NIST	National institute for standards and technology
EQA	European quality award
OMD	Organization's maturity degree in each key statement
IDP	Importance degree of principle
SWOT	Strength, weakness, opportunity and treatment
DNV	Det Norske Veritas (the Norwegian trust)

CHAPTER ONE

Introduction

1.1 General Review

All quality management systems models in general, whether before or after than the ISO models have been used to increase the effectiveness and efficiency of organization. Increasing the effectiveness and efficiency will promote the competitive ability and survival of companies and lead to an improvement in product quality and a decrease in the price of products and delivery time for customers (Yang and Haik, 2003). Success can result from implementing and maintaining a management system that is designed to continually improve performance while addressing the needs of all interested parties (Oztas *et al.*, 2007).

If a company has an aim of passing through the ISO9001:2000 QMS standards, all the requirements and responsibilities of that system must be established in the company (Alp, 2002). ISO9001:2000 also outlines that every company which is interested to certify must satisfy all requirements that are available in its business. The subject of the QMS is not limited to ISO9000 standards and many of the greatest companies in Japan, USA, and Europe prior to ISO9001 have implemented their QMSs according to the TQM philosophy and recommendations. Therefore, every company which has implemented the QMS

in its organization is considered as an advanced organization, so all companies which desire to be advanced organizations, and to be certified is a value in the society, whereas, contrary to a popular belief to be effective is a value not to be certified. Cobb (2003) says the goal is effectiveness not just compliance.

Measuring and computing the maturity of the QMS is one of the most important requirements in ISO9001:2000. Top management shall review the organization's QMS, at planned intervals, to ensure its continuing suitability, adequacy and effectiveness. This review shall include assessing opportunities for improvement the need for changes to the QMS, including the quality policy and objectives.

Also, it has been emphasized on the improvement of effectiveness, efficiency, suitability and adequacy of the QMS through the other clauses such as quality policy, quality objective, audit results, analysis of data, corrective and preventive actions. The ISO9001:2000 has not directly recommended the assessment and evaluation as a tool for identification of the actual QMS situation, as well as right decision making and planning to improve. Therefore, many organizations are assuming that auditing the QMS is the securest and the only way for identifying the improvement opportunity, whereas, it leads into an error for the simple reason that, the ISO9001 has not clearly determined the manner of assessment of audit results. The descriptions of ISO9000 can remove this deficiency.

1.2 Problem Statement

Audits are used to determine the extent to which the quality management system requirements are fulfilled (ISO9001:2000). This standard also indicates that audit findings are used to assess the effectiveness of the quality management system and to identify opportunities for improvement. At the same time, self-assessment can provide an overall view of the performance of the organization and the degree of maturity of the quality management system. In addition, it can help to identify areas requiring improvement in the organization and to determine priorities (ISO9000:2000). The lack of unique approach to assessment has caused many QMS's problems in organizations, and those who have acknowledged its necessity activity, do not know how they should do it (Oztas *et al.*, 2007). Unfortunately, the lack of developed practice in measuring the quality of services often becomes an impediment for successful quality improvement.

It is for sure that a few interested organizations may apply the award model (EFQM, Malcolm Baldrige, Deming model, and so forth) for self-assessment, but they are not comfortable, because there are many differences between the scope and the depth of the ISO requirements and the award models (Achilleos and Ioannou, 2000). Companies will have to choose the right approach based on their business need. Many of companies always face two difficult questions: which model to choose to best fit the company's need and in which direction to move (Keleman *et al.*, 2007).

Quality liaison group's research reveals that the defects arising today are virtually unchanged from those identified 20 years ago while some organizations (construction industry) have invested a great deal in improving quality. Despite of all discussions on the uncertainty surrounding the effectiveness of QMS (Oztas *et al.*, 2007), some researches, for example Al-Nakeeb *et al.* (1998) have stated the need for measuring the effectiveness of QMS. They also have stated that researches have been performed on seeking a way to measure the effectiveness of the system. With regards to the problems and deficiencies stated above, the existence of an easy and reliable self-assessment model can help to solve these problems.

1.3 Objectives of the Study

The main objectives of this study are:

A. To develop a self-assessment tool to determine the maturity of the ISO9001:2000 certified organizations.

B. To test and validate the self-assessment tool in ISO certified organizations.

1.4 Benefits and Significant

Generally, the assessment tool of the Quality Management Systems have brought about many benefits and significant which can be divided into two

main groups, internal organizational benefits and the external organizational benefits. The internal organizational benefits include:

A. To help organization meet the requirements of the standard.
B. To judge any factors concerning the organizations' performances or criteria (Brown, 2000).
C. To provide feasibilities that organizations can compare their situations in every term with later
D. To prepare a necessary and an appropriate infrastructure for the plan, do, check, and act (PDCA) cycle.

And in contrast, the external organizational benefits include:

A. To form an appropriate basis for benchmarking.
B. To lead to the existence of a unique approach to current affairs in organization.
C. To improve the organization's motivations for competition.

The model which will be proposed in the current study is expected to meet all the internal organizational benefits.

1.5 Scope of Study

This study will be focused on the development and validation of a self-assessment tool. Although, a self-assessment is a measurement instrument which is required to measure the extent of QMS maturity (effectiveness,

efficiency, suitability and adequacy of organization's QMS), it should be applied only in ISO certified manufacturing companies which have meet the requirements of the ISO9001:2000. Regarding to this requirement, the sample of companies were chosen from only ISO9001:2000 certified companies. The selected companies should also have at least five years passed QMS implementation in their organizations and involved in manufacturing industries.

1.6 Layout of the Thesis

This thesis consists of five chapters as listed below:

The first chapter introduces the background, objectives, benefits and scope of the research.

Chapter two elaborates the critical review of literature related to the overview of the self-assessment tools and principles of developing them.

Chapter three describes the methodology of developing and testing the tool in this research.

Chapter four explains the result analysis and discussion. It consists of case studies in eighty ISO certified manufacturing companies.

Chapter five concludes the new self-assessment tool for measuring the maturity of QMS in ISO certified manufacturing companies.

CHAPTER TWO

Literature Review

2.1 Introduction

The International Organization for Standardization (ISO) was established after the end of the World War II to bring commonality and uniformity to products and some critical quality areas. ISO is based in Geneva, Switzerland. It is a nongovernmental voluntary standards organization with a worldwide membership. Its charter is the development of voluntary international standards. Its activities include many topics and fields. In fact, ISO is an organization of organizations; meaning no individuals, companies, or countries are typically direct members (Sanders and Scott, 1997). Each national membership is usually held by the recognized standard body or agency from the member's country. The national standards body holding ISO membership is a recognized function or quasi function of the government in some countries (Wilson, 1996).

The development of the ISO9000 series was a natural step for the international organization upon standardization. This series was designed to bring uniformity to the area of quality systems. The ISO9000 series standards were developed by the committees of quality experts selected from member bodies