DEVELOPMENT OF A DIAGNOSTIC TOOL TO BENCHMARK BEST MANUFACTURING PRACTICES IN MALAYSIAN SMEs

MARIAM BINTI ABDUL AZIZ

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MASTER OF SCIENCE
UNIVERSITI PUTRA MALAYSIA

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By

MARIAM BINTI ABDUL AZIZ

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfilment of the Requirements for the Degree of Master of Science

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

DEVELOPMENT OF A DIAGNOSTIC TOOL TO BENCHMARK BEST MANUFACTURING PRACTICES IN MALAYSIAN SMEs

By

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June 2007

Chairman: Associate Professor Rosnah Mohd Yusuff, PhD

Faculty: Engineering

In developing countries such as Malaysia, the small and medium scale enterprises (SMEs) play an important role in increasing the country’s economy. For the SMEs to remain competitive and to ensure their survival in the globalize era, the SMEs must continuously improve their manufacturing practices. The development of self assessment tool can facilitate the SMEs to benchmark their manufacturing practices and will help them in becoming more competitive.

Based on literature review, eight areas of manufacturing practices have been proposed for benchmarking and the areas have been validated by selected companies. The areas of manufacturing practices included in this tool are management practice, human resource, marketing strategy, quality, production process, customer focus, supply chain management, technology and product innovation.
The development of this web-based tool used the Hypertext Preprocessor (Php), Structured Query Languages (SQL) scripting languages and Internet as a platform. The participating SMEs can log into the system and choose a particular area to be benchmarked. Based on the indicators that have been developed, summary of their performance and how they fare with others will be generated in the form of a graph. The graph clearly indicates the gaps in their practices. The SMEs can then make appropriate decisions on which areas to be improved, with those results.

The benchmarking tool system has been tested and validated by seven SMEs. From the companies’ feedback, some improvements and modifications have been made on the system such as questionnaires, output results and company registration form. The system was developed in dual language (Malay and English) to facilitate SMEs benchmark in the company. It is hoped that the SMEs using this tool will become more aware of the importance of certain practices, facilitate SMEs to be more competitive and able to develop a culture of continuous improvement.
Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Master Sains

PEMBANGUNAN SATU SISTEM PENGUKURAN AMALAN TERBAIK SEKTOR PEMBUATAN DALAM PERUSAHAAN KECIL DAN SEDERHANA DI MALAYSIA

Oleh

MARIAM BINTI ABDUL AZIZ

Jun 2007

Pengerusi: Profesor Madya Rosnah Mohd Yusuff, PhD

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Bagi negara yang sedang membangun seperti Malaysia, Perusahaan Kecil dan Sederhana (PKS) memainkan peranan yang penting dalam meningkatkan ekonomi negara. Untuk PKS kekal dalam persaingan dan bagi memastikan ia dapat bertahan dalam dunia globalisasi, PKS mestilah secara berterusan membaiki amalan pembuatan mereka. Pembangunan satu alat pengukur penilaian yang menolong PKS untuk melaksanakan aktiviti penilaian akan membantu mereka menjadi lebih berdaya saing.

Berdasarkan kajian literatur, terdapat lapan bidang amalan pembuatan yang telah dicadangkan untuk penilaian dan kesemuanya telah pun disahkan oleh syarikat-syarikat yang terpilih. Lapan bidang tersebut adalah amalan pengurusan, sumber manusia, strategi pemasaran, kualiti, proses pengeluaran, fokus pelanggan, pengurusan rangkaian sumber, teknologi dan inovasi. Pembangunan sistem berlandaskan laman web ini, menggunakan program php, mysql dan Internet sebagai landasan untuk pelancaran
sistem. PKS yang berdaftar boleh memasuki sistem ini, memilih bidang untuk dinilai dan berdasarkan penanda aras yang telah dibina, satu rumusan berkaitan pencapaian mereka dan perbandingan dengan syarikat lain akan diperolehi dalam bentuk graf. Graf tersebut akan dengan jelas menunjukkan kekurangan dalam amalan mereka. Dengan keputusan tersebut, PKS boleh membuat keputusan bidang mana yang perlu dibaiki.

Sistem penanda aras tersebut telah diuji dan disahkan oleh tujuh syarikat PKS. Dengan maklum balas daripada syarikat-syarikat tersebut, beberapa perubahan dan pembaikan telah dilakukan terhadap sistem tersebut yang merangkumi soalan soal selidik, keputusan akhir dan ruangan pendaftaran syarikat. Sistem tersebut dibina dalam dwi bahasa (Melayu dan Inggeris) untuk memudahkan PKS menanda aras syarikat mereka. Adalah diharapkan PKS yang menggunakan sistem ini akan menjadi lebih perihatin terhadap kepentingan amalan terbaik, membantu PKS menjadi lebih berdaya saing dan boleh membentuk budaya pembaikan secara berterusan.
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Last but not least, I wish to thank my friends, the SMEs companies, NPC and KMP staff for their co-operation during this project. May Allah bless all of you.
I certify that an Examination Committee met on 26 June 2007 to conduct the final examination of Mariam Binti Abdul Aziz on his Master of Science thesis entitled “Development of diagnostic tool to benchmark best manufacturing practices in Malaysian SMEs” 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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Date :13 December 2007
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.

______________________
MARIAM BINTI ABDUL AZIZ

Date: 11 October 2007
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GLOSSARY OF TERMS

ASP  Active Server Page
CAD  Computer Aided Design
CAM  Computer Aided Manufacturing
CIM  Computer Integrated Manufacturing
ERP  Enterprise Resource Planning
FMS  Flexible Manufacturing System
HTML Hypertext Markup Language
JIT  Just in Time
KPIs Key Performance Indicators
MRP  Material Resource Planning
NPC  National Productivity Corporation
PHP  Hypertext Preprocessor
R&D  Research and Development
SCM  Supply Chain Management
SMEs Small Medium Enterprises
SQL  Structured Query Language
XML Extensible Markup Language
CHAPTER 1

INTRODUCTION

SMEs in the manufacturing sector represent an important part in Malaysian economy. In 2003, the Malaysian economy recorded growth in gross domestic product (GDP) of 5.2 percent compared with 4.2 per cent in 2002. Most of the contribution was from manufacturing sector (SMIDEC, 2004).

However, from SMEs performance report in 2003, SMEs still lack the capability to meet industry standard. In global competitiveness market, SMEs need to adopt or achieve ‘best practice’ or ‘World-class’ performance. There are many ways to improve Malaysian SMEs and one such tool is benchmarking. Benchmarking is an activity adopted by many companies to improve their performance and it is an interesting strategy for organizational learning and improvement (St-Pierre and Raymond, 2004). Camp (1989) also defined benchmarking as the searching of best practices that will lead to superior performance.

1.1 Problem statement

Malaysian Small and Medium Enterprises (SMEs) are facing competitive pressures from globalization and high quality requirements of customers. In order to survive, SMEs must increase their productivity and their competitiveness. The ability of Malaysian SMEs to survive and compete in today’s competitive markets is a concern for the
government, since Malaysian SMEs are often faced with lack of skill workers and knowledge of managerial practices (Baharun et al., 2004).

Continuous improvement of Malaysian SMEs through benchmarking activity helps SMEs in trying to cope with today’s challenging markets. Benchmarking is a system of continuous process of searching, learning, adapting and implementing the best practices from within an organization or from other organizations towards attaining superior performance (NPC Malaysia, 2003). By comparing itself with its competitors through an appropriate benchmarking activity, SMEs are able to identify areas of their weakness and find solutions for the improvement (Bhutta and Huq, 1999). Benchmarking will thus lead SMEs to search for and adopt new manufacturing practices in order to achieve world-class manufacturing (St-Perre and Raymond, 2004).

However, SMEs on their own face difficulties in implementing benchmarking because SMEs generally have insufficient human and financial resources to allocate for benchmarking activity. Furthermore the expected benefits of this activity are not immediate (Badrinath (1998) cited in St-Pierre and Raymond, 2004). Therefore, a self-assessment tool can facilitate SMEs in benchmarking activity. SMEs also can share and assess performance of their business operations, functions and process against the best performers in specific areas of interest. Using internet as a platform, this assessment tool can be accessed easily.

Other researchers have also developed self assessment tool for benchmarking such as Voss (1994) developed a score card to identify best practice of technology management
in organizations. Thiagarajan and Zairi (1998) also developed Critical Card Index to assess quality practice in companies. However, with fast growth of internet and information technology, development of online benchmarking tool is more accessible and eases to collect other companies’ database compared to traditional system.

The development of this online benchmarking tool also can help SMEs to benchmark their company practices because the areas and indicators were developed based on SMEs best manufacturing practices such as production and process, supply chain management, technology and innovation, quality and human resource management. Comparing to other tools such as from NPC and IndustryWeek, the indicators were developed based on large scale industry and service type of industry. For example Benchmarking On-line Networking Database (BOND) from NPC was developed based on the eight excellent criteria of the organizational excellence framework of service and manufacturing sector such as leadership, quality data and information, human resource management, customer focus, process management, process improvement, business performance and corporate responsibilities (NPC, 2005). Furthermore, the tool from NPC is not user-friendly for Small and Medium scale industries compared to this new system. This new system was developed as an online survey with 5-Likert style in order to assist SMEs benchmark their company faster. This system also was developed with an interactive webpage in order to attract SMEs to participate in this benchmarking activity. Besides that, function of current online benchmarking tools is very limited. Users only can benchmark their company practice and performance between the competitors but their performance towards achieving World Class Manufacturing cannot be identified. Therefore, ability of this benchmarking tool has been upgraded where SMEs position
towards achieving World Class Manufacturing can be justified in a scatter graph. This benchmarking tool also can help the SMEs in comparing their companies’ practices against the best from all industry groups or from the same industry group. Database of other companies’ practices are available in the tool and quick benchmarking analysis can be carried out.

Besides low cost of benchmarking system, the development of this assessment tool can help the SMEs to make quick assessment of their manufacturing practices and enable them to identify the important practices to increase their competitiveness. It is hoped that the development of the tool will encourage the SMEs to improve their business.

1.2 Project Objectives

The objectives of the project are:

1. To identify the areas and the indicators of best manufacturing practices.
2. To develop a web-based diagnostic tool to measure best manufacturing practices in Malaysia SMEs.

1.3 Significance of the Project

Identification of the areas and indicators of best manufacturing practices provides the SMEs with better knowledge on the practices towards achieving World-class Manufacturing. Besides that, development of a web-based diagnostic tool for Malaysian SMEs assists them to benchmark their company’s practices and performances against the best. The areas that have to be improved can be identified faster and helped them to
continuously improve. It is hoped that, using the tool, SMEs can increase their business performance and productivity.

1.4 Limitations of the Study

The scope of the study is to develop a self-assessment tool to benchmark SMEs manufacturing practices and performance. In order to develop the tool, areas and indicators of manufacturing best practices for Malaysian SMEs have been identified. The benchmarking areas and indicators were selected from literature review and have been validated by SMEs award winners. Only eight areas have been used for the benchmarking purpose such as management, human resource development, marketing strategy, quality, production process, technology and innovation, supply chain and customer focus.
CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

Small and Medium Enterprises (SMEs) play an important role in developing the Malaysian economic growth. SMEs in the manufacturing sector consist of 90% of the total 51,606 manufacturing industry (SMIDEC, 2004). In the globalization era, SMEs should be more competitive to achieve world class manufacturing. To achieve the status, SMEs have to improve their practices and performances. Development of a tool to measure best manufacturing practices for Malaysian SMEs will assist them to benchmark their company faster. It is hoped that the development of the tool will encourage SMEs to continuously improve their business.

2.1.0 Small and Medium Scale Enterprise

2.1.1 Definition

In practice, both quantitative and qualitative criteria are used to define SMEs. In Malaysia, the definition is only based on fixed quantitative criteria such as the number of employees, amount of capital, amount of assets and sales turnover (Hashim and Abdullah, 2000). Malaysian Small and Medium Industries Development Corporation (SMIDEC) defined SMEs as:

i. Small-scale firm with sales turnover between RM 250,000 to less than RM 10 million and the number of full-time employees between 5-50.
ii. Medium-scale firm with sales turnover between RM 10 million to RM 25 million and the number of full-time employees between 51-150.

(SMIDEC, 2004).

2.1.2 Category of Malaysian SMEs

In determining the contribution of small and medium enterprise to Malaysian economy, Hashim (1999a) categorized the SMEs firm into three sub-sectors as shown in table 2.1. The manufacturing sector continued to provide the strongest contribution of economic growth in 2003, followed by agriculture sector and general business sector such as services, constructions and mining (Ministry of Finance Malaysia, 2003).

Table 2.1: Category of Malaysian SMEs (Hashim, 1999a)

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<th>Manufacturing sector</th>
<th>Agriculture sector</th>
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<td>Construction, wholesale and retail trade, transport and storage, business services and activities, and providing services such as hotel and restaurant businesses.</td>
<td>Processing and production of raw materials such as food, textile, wood, chemicals, petroleum, rubber, plastic, metallic and nonmetallic materials, transport equipment, and electronics appliances and components.</td>
<td>Natural product such as of rubber, padi, oil palm, coconuts, cocoa, pepper, tobacco, livestock timber, fish, fruits and vegetables.</td>
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According to Figure 2.1, SMEs in the manufacturing sector consist of 7% of the total SMEs in Malaysia. Although the percentage is low, SMEs in the manufacturing sector forms about 90% of the total 51,606 manufacturing industries in Malaysia (SMIDEC, 2004).