

**BENCHMARKING MANAGEMENT PRACTICES AND MANUFACTURING
PERFORMANCE OF MANUFACTURING COMPANIES IN PENANG**

BY

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TABLE OF CONTENTS

	<u>PAGE</u>
TITLE	i
ACKNOWLEDGEMENT	ii
TABLE OF CONTENTS	iii
LIST OF FIGURES	viii
LIST OF TABLES	ix
ABSTRAK	x
ABSTRACT	xi
CHAPTER 1: INTRODUCTION	
1.1 Background	1
1.2 Problem Statement	5
1.3 Research Objective	6
1.4 Research Questions	6
1.5 Significance of the Study	6
1.6 Definition of Key Terms	8
1.7 Organization of the Report	8
CHAPTER 2: LITERATURE REVIEW	
2.1 Introduction	9
2.2 What To Benchmark	9
2.3 The Process of Benchmarking	10
2.4 Different Types of Benchmarking	12

2.5	Benchmarking and Best Practices	13
2.6	Why Benchmarking Failed	14
2.7	Benchmarking and Performance in Manufacturing Industry	15
2.8	Summary of Literature Review	17
2.9	Theoretical Framework	17
2.9.1	Gap in the Previous Literature	17
2.9.2	Justification of the Framework	18
2.9.2.1	Independent Variables	18
2.9.2.2	Dependent Variables	20
2.9.3	Development of Hypotheses	21
2.10	Summary	24

CHAPTER 3: METHODOLOGY

3.1	Introduction	25
3.2	Research Design	25
3.2.1	Population, Unit of Analysis, and Sampling Design	25
3.2.2	Data Collection	25
3.2.3	Questionnaire Design	26
3.3	Variables and Measurements	26
3.3.1	Criterion Measures - The extent of benchmarking adoption	26
3.3.2	Independent Variables – Areas of Benchmarking	27
3.3.2.1	Leadership	27
3.3.2.2	Product development	28
3.3.2.3	HR management and development	28
3.3.2.4	Process Management	28

3.3.2.5	Quality results	28
3.3.3	Dependent Variables – Manufacturing Performance	28
3.3.3.1	Product Quality Performance	29
3.3.3.2	Flexibility Performance	29
3.3.3.3	Cost Efficiency Performance	29
3.3.3.4	Delivery Performance	29
3.3.3.5	Customer Service Performance	29
3.3.3.6	Customer Satisfaction Performance	30
3.3.4	Demographic Variables	30
3.4	Data Analysis Techniques	31
3.4.1	Descriptive Statistics	31
3.4.2	Reliability and Validity	31
3.4.3	Test for the Underlying Assumptions	32
3.4.4	Regression Analysis	33
3.5	Summary	33

CHAPTER 4: FINDINGS

4.1	Introduction	
4.2	Respondent Profile	34
4.2.1	The Sample Characteristic	34
4.2.2	Use of Benchmarking by Companies	35
4.3	Reliability of Measurements	37
4.3.1	Reliability Analysis and Intercorrelations for Variables	37
4.4	Descriptive Analysis of Major Variables	38
4.5	Correlations Analysis	38

4.6	Hypothesis Testing – Hierarchical Multiple Regression Analysis	39
4.6.1	Impact of Benchmarking on Product Quality Performance	41
4.6.2	Impact of Benchmarking on Flexibility Performance	42
4.6.3	Impact of Benchmarking on Cost Efficiency Performance	43
4.6.4	Impact of Benchmarking on Delivery Performance	45
4.6.5	Impact of Benchmarking on Customer Service Performance	45
4.6.6	Impact of Benchmarking on Customer Satisfaction Performance	46
4.7	Summary	47

CHAPTER 5: DISCUSSION AND CONCLUSION

5.1	Introduction	53
5.2	Recapitulation of the Study	53
5.3	Discussion	53
5.3.1	Impact of Benchmarking on Product Quality Performance	54
5.3.2	Impact of Benchmarking on Flexibility Performance	54
5.3.3	Impact of Benchmarking on Cost Efficiency Performance	55
5.3.4	Impact of Benchmarking on Delivery Performance	56
5.3.5	Impact of Benchmarking on Customer Service Performance	56
5.3.6	Impact of Benchmarking on Customer Satisfaction Performance	57
5.4	Extent of Use of Benchmarking	58
5.5	Implications of the Study	59
5.6	Limitations	60
5.7	Suggestion for Future Research	60
5.8	Conclusions	61

REFERENCES

62

APPENDICES

69

Appendix A: Questionnaire

Appendix B: Descriptive Statistics

Appendix C: Reliability Analysis

Appendix D: Descriptive Analysis and Correlations

Appendix E: Regression Analysis

LIST OF FIGURES

Figure 1.1	The Benchmarking Process	3
Figure 2.1	Theoretical Framework	19

LIST OF TABLES

Table 3.1	Distribution of Questionnaire Items for Variables	30
Table 4.1	Frequency Count and Percentage of Respondents Demographics	36
Table 4.2	Summary of Reliable Analysis	38
Table 4.3	Descriptive Analysis of Variables	39
Table 4.4	Correlations Table	40
Table 4.5	Regression Result on Product Quality Performance	42
Table 4.6	Regression Result on Flexibility Performance	43
Table 4.7	Regression Result on Cost Efficiency Performance	44
Table 4.8	Regression Result on Delivery Performance	46
Table 4.9	Regression Result on Customer Service Performance	47
Table 4.10	Regression Result on Customer Satisfaction Performance	48
Table 4.11	Summary of Hypotheses Testing	50

ABSTRAK

Benchmarking (tanda aras) adalah satu cara untuk mengira tahap strategi dan kemajuan dengan syarikat-syarikat luar yang lebih berwibawa, dalam dan luar dari industri. Tujuannya ialah untuk mengenalpasti pelaksanaan tanda aras dapat dilaksanakan bagi meningkatkan kemajuan sesebuah organisasi. Fokusnya ialah untuk mencari satu cara yang terbaik untuk mencapai kemajuan dengan mengenalpasti, pelaksanaan dan pengurusan tanda aras. Dengan itu, kajian ini dilaksanakan bertujuan untuk mengenalpasti arah aras tanda yang dilaksanakan dapat memajukan kemajuan setiap bahagian dalam organisasi. Analisis ini bertujuan untuk mengetahui tahap signifikan di antara tanda aras dan keputusan kemajuan melalui kutipan data dengan soalan kertas kerja. Sejumlah 114 responden memaklum balas kepada soal selidik berstruktur yang dianalisis menggunakan analisis regresi. Keputusan kajian ini mendapati bahawa pengurusan dan pembangunan kemanusiaan berkait rapat dengan pencapaian bahagian kemajuan yang dikaji. Kajian juga mendapati tanda aras keputusan kualiti juga berkait rapat dengan bahagian-bahagian kemajuan yang dikaji seperti efisensi kos, penghantaran dan penyelenggaraan pelanggan. Tanda aras produk baru juga didapati berkait rapat dengan kemajuan kos dan kualiti produk. Akhir sekali, tanda aras didapati berkait rapat dengan efisensi kos. Dengan penemuan kajian ini, adalah diharapkan akan memanfaatkan industri pembuatan bagi tanda aras untuk kemajuan. Selain itu, hasil kajian boleh digunakan sebagai panduan kepada syarikat yang akan melaksanakan tanda aras secara besar-besaran.

ABSTRACT

Benchmarking is a way of measuring an organization's strategies and performance against best-in-class companies, both inside and outside the industry. The aim is to identify best practices that can be adopted and implemented by the organization with the purpose of improve a company's performance. Focus has evolved from benchmarking as a means to improving company performance through the identification of best practice, to the need to identify, manage and transfer best practices. Hence, this study is conducted with the objective to identify which specific areas of benchmarking will improve which dimension of manufacturing performance. The study aims to examine the impact of benchmarking towards manufacturing performance by data collection through questionnaire. A total of 114 respondents participated in the structure questionnaire. The analyses were done through regression method. The findings revealed that HR management and development is the most significantly related to both direct and indirect manufacturing performance criteria studied. This study also found that benchmarking quality result has significance effect to cost efficiency, delivery, and customer service performance. Benchmarking product development are positively related to product quality and cost efficiency performance. For benchmarking process management, the result shows significance only to product quality performance. Lastly, benchmarking leadership was found only positively related to cost efficiency performance. With the finding of this study, it is hope that it will provide a detail analysis of which areas to benchmark to the manufacturing industry for improvement. In addition, this study will serve as a guideline to those that have intention to extensively used benchmarking all over the organization in a big way.

Chapter 1

INTRODUCTION

1.1 Background

Benchmarking is a continuous, systematic process for evaluating the products, services and work processes with those recognized as representing the best practices, for the purpose of organizational improvement (Brah, Ong & Rao, 2000). The end result, with successful implementation and effective review, the benchmarking process will make a company's operation achieve and improve quality as well as productivity. In today's challenging business world, continuous improvement is vital to any organizations to compete effectively for survival. Hence, one of the strategic tools for improvement is by adopting the benchmarking process that will make an organization's operation achieve efficiency in order to be on par or better than its competitors. Organizations need to be innovative and adaptive to best practices and keep comparing with other organizations in order to sustain its competitive advantage.

Henczel (2002) claimed that when organizations want to improve their performance, they benchmark. They compare and measure their policies, philosophies, and performance against high-performing organizations anywhere in the world. Benchmarking process is used to identify useful business practices, new and innovative ideas, effective operating procedures and winning strategies that can be adopted by an organization to ensure cost improvement besides improve quality and productivity. The Xerox Corporation was one of the first companies to develop and apply benchmarking techniques as a legitimate aspect of their organizational quality programmed. To this day, Xerox along with many other organizations is still applying and developing benchmarking in order to learn competitive practices from the rich

diversity of organizations that exist (Fernandez, McCarthy & Rakotobe-Joel, 2001). In other word, the benchmarking process has proved to be valuable in helping individual organizations evaluate their competitive position compare to their competitors.

The benefits of benchmarking have long been recognized in the manufacturing industries (Bogan & Callahan, 2001). In 1912, a curious Henry Ford watched men cut meat during a tour of a Chicago slaughterhouse. He found out that the smooth flow of each process from one station to another station makes the whole process faster and systematic. Then comes the word assembly line, which was practiced so widely later on. Although benchmarking has been used as a management tool for many years, it experienced resurgence in the early 1980s due to the Total Quality Management (TQM) movement in which benchmarking was inherent as a means of ensuring quality improvement. Its focus was on accountability, performance measures, best practice and the rational use of resources (Henczel, 2002). This was further implemented by the Japanese giant auto maker such as Toyota's just-in-time system where it practiced the system of replenished practices of the United States supermarket (Even & Lindsay, 2002).

According to Lee (2004), benchmarking is an activity which organizations use for discovering best practices and to establish a leadership position. Understanding the competition's strengths and how they operate will enable the companies to adapt and build upon their excellent practices for organization's own use. Benchmarking helps to improve the organization's effectiveness and make the changes required to be the world-class organization or industry leader. This will successfully help organizations to initiate strategic benchmarking practices that are expected to provide significant benefits to organizations.

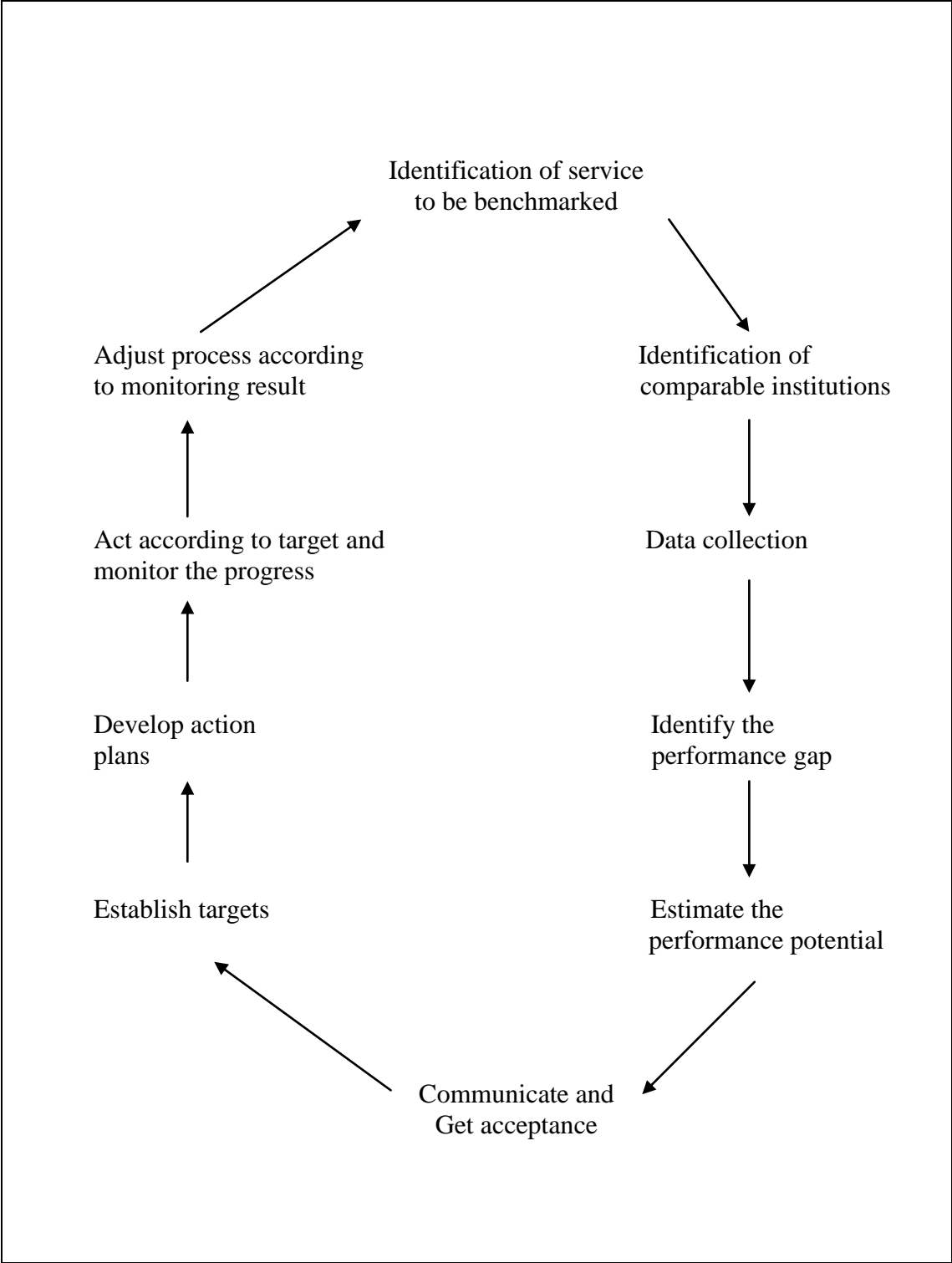


Figure 1.1 : The Benchmarking Process

Source : Camp (1989)

Figure 1.1 above shows Camp's recommendation of Ten-step benchmarking process. It start with identification of service to be benchmarked, follow by identification of comparable institutions, collect data, identify the performance gap, estimate the performance gap, communicate and get acceptance, establish targets, then develop action plans, act according to targets and monitor progress and finally adjust according to monitoring results.

Benchmarking can also be used as a goal-setting process (Voss, Ahistrom & Blackmon, 1997). By setting clear performance objectives it will assist companies to achieve performance improvement. By practicing using best-in-class companies, it will enhance performance improvements and organizational learning. Companies strive to achieve the best performance in order to be among the best and be able to compete effective with the current competitors and soon to be competitors or newcomers in its industries. Benchmarking can also be an effective tool for planning and implementing change processes that will lead to organizational improvement when the knowledge gained is converted into detailed action plan to further improve competitive edge and advantages. Continuous improvement creates competitive advantages and vast global opportunities for manufacturing organizations. Therefore, organizations need to be innovative and adaptive to dramatic changes and surrounding challenges especially competitors and ever demanding customer expectation in order to sustain its competitive advantage. In doing so, improvement tools to enhance quality and productivity are always introduced and initiated in the organization.

In an era of shrinking resources and unprecedented demands for accountability, benchmarking offers much potential as a powerful vehicle for organizational improvement (Lefkovitz, 2004). With the nature of global business

world today, company must equip with knowledge on how to continuously improve its performance in every segment of the business. Benchmarking is seen as a management tool that can serve as a gateway to best practices compared to the best performers.

1.2 Problem Statement

The purpose of an organization practicing the benchmarking as an improvement tool is due to the fact that they want to practice the best and be among the best in its industry. Therefore, companies should initiate to have an effective benchmarking program to improve the quality, productivity and organization's reputation that will increase employee's moral, job satisfaction and sense of belonging. A committed group or teams of staff will definitely increase the productivity and efficiency; this in turn will enable an organization to meet the desired target.

Therefore, the link between best practices and improved performance should be analyzed in order for organization to evaluate the effectiveness of implementing benchmarking practices. Benchmarking promotes higher performance through helping a company identify practices and set challenging performance goals (Voss et al, 1997). There must be a clear target set when implement an improvement plan which should improve desired performance set to achieve. Hence, this research studies the relationship and link between the benchmarking practices and the performance in the sense of manufacturing performance set by each organization.

1.3 Research Objectives

With the current globalization nature of business and economic pressure, continuous improvement is of utmost importance for the survival of the organization in the world

market place. Benchmarking is seen as a vital improvement tool to be practiced by companies for competitiveness.

The main objective of this research is:

- 1) To investigate whether there is a relationship between best practices and improved manufacturing performance.
- 2) To examine and identify the extent of adoption of benchmarking by manufacturing companies.

1.4 Research Questions

This study attempts to answer the following questions:

- 1) To what extent have companies adopted benchmarking?
- 2) Does benchmarking lead to higher manufacturing performance?

1.5 Significance of the Study

There have been few researches studying on the relationship between benchmarking practices and improved performance. Empirical study in this area within the local context of Malaysia is very little. Theoretically, this study would add to the limited literature in understanding the result in practicing benchmarking practices.

Studies of relationships between practices and performance in the areas of manufacturing are limited. However, the studies that have taken place vary in methodology and results (Davies & Kochhar, 2002). There are a few key issues that must be considered prior to choosing a methodology for a practice-performance study. These are: the structure of the study itself; the extent to which practices have been implemented; whether the study investigates the global or national context; the choice of industries for study and the unit of analysis used; and the research instrument and

type of data (Davies & Kochhar, 2002). Thus, this study will take into consideration the above methodology issues and investigate the details into various areas of benchmarking and manufacturing performance.

With the finding from this study, companies planning to develop and adopt benchmarking strategy as a competitive priority are able to ascertain which areas of benchmarking should be emphasized more in order to improve specific dimension of manufacturing performance. With that, companies will be able to take more effective measures and corrective actions when certain manufacturing performance decreases.

This study contributes to the manufacturing sector by integrating theory and empirical data to investigate whether benchmarking, as an organizational learning tool, leads to improved performance. Besides, from the practical perspective, this study would contribute to local government on which area to emphasize in order to promote the benchmarking practices, and further development of benchmarking concept to the local companies. Lastly, the finding of this study also will provide a guideline to the manufacturing sectors that have little or no experience in adopting benchmarking for improvement. Therefore, the significance of the study is to provide a relationship between benchmarking and manufacturing and in turn organizational performance.

1.6 Definition of Key Terms

Benchmarking practices— refers to the implementation of benchmarking by manufacturing companies as a technique for further improvement.

Best practices- is defined as those that will lead to the superior performance of a company.

Key success factors refers to the limited number of the company's subject areas in which results, if they are satisfactory, will ensure successful competitive performance for the organization.

1.7 Organization of the Report

Chapter 1 gave a glance of the need for this research and overview the background of the study. The problem statement, objectives and significance of the study were discussed. This is followed by the definitions of key terms and finally the outline of this report is presented. Previous researches were studied and reviewed in the chapter 2. Theoretical framework for this study is established and hypotheses were then developed based on the theoretical framework and literature review. Chapter 3 discusses research methodology used during the study. This includes the sampling design, data collection method, measures and statistical tests used for analysis of data. Questionnaire was developed based on the methodology discussed. Chapter 4 performed the statistical analyses and hypotheses testing. Finally, discussion of the findings, implications, limitations of the study, and suggestion for future research were concluded in the chapter 5.

Chapter 2

LITERATURE REVIEW

2.1 Introduction

To initiate and implement successful benchmarking practices, a systematic and comprehensive strategy should be practiced in the organization. Benchmarking involves learning about your own practices, learning about the best practices of others, and then making change for improvement that will enable one to meet or beat the best in the world. This chapter will first review the previous literature on benchmarking practices against the performance. The process, implication and importance as well as weaknesses of benchmarking are also studied. Based on the literature review, theoretical framework and hypotheses are developed at the end of this chapter.

2.2 What To Benchmark

A key issue within the literature is that of what to benchmark. According to Cassell, Nadin, and Gray (2001) originally benchmarking was mainly used to compare measures of business or product performance. It has now been considerably extended to business processes. These include the variety of company activities such as Human Resources activities, accountancy practices, innovation, and product development. Adam and Vandewater (1995) suggested that a number of questions should be used to aid this decision. These include:

- a) What are the critical success factors for our organization's success?
- b) Which processes are causing the most trouble?

- c) Which processes contribute most to customer satisfaction and which are not performing up to expectations?
- d) What are the competitive pressures impacting the organization the most?
- e) Which processes or functions have the greatest potential for differentiating our organization from the competition?

Given that benchmarking requires considerable time, effort, resources and management attention. If this first stage is not done correctly, then the subsequent stages of collecting and analyzing benchmarking information may prove futile. Thus, the basic of what to benchmark must be clearly identified and with total management commitment it will help in implementing successful benchmarking.

The research done by Carpinetti and Melo (2002) emphasized the importance of benchmarking practice as a means to promote continuous improvement in organizational performance and provide a basis for learning what a company's weakness and strengths are. The studies have confirmed that the strategic benefits of continuous improvement in terms of enlarged market share and return on investment as well as lower manufacturing costs in the long run and improved productivity and profitability.

2.3 The Process of Benchmarking

To increase operation efficiency and productivity, organizations now have to always seek to implement best practices. Freytag and Hollensen (2001) in their article have identified the seven phases in benchmarking. They are 1. Which function to benchmark 2. Importance of each subject area, 3. Whom to benchmark against, 4. Gather the benchmarking information, 5, Identify performance gaps, 6. How to learn

from the best-in-class (benchlearning), and 7. Implementation of the changes (benchaction). They argue that benchmarking, benchlearning or benchaction is a strategy for implementing changes in organization. It is a way of measuring operations against similar operations in order to improve business processes. The main purpose of benchmarking is to improve products and processes in order to meet or exceed customer's requirement. Therefore, the linkage of the process to customer needs is critical to effective benchmarking. It is also a way of measuring an organization's strategies and performance against best-in-class firms. The aim is to identify best practices that can be adopted and implemented by the organization with the purpose of improving company performance.

Freytag and Hollensen (2001) also identify key success factors (KSF) as the limited number of the firm's subject areas in which results, if they are satisfactory, will ensure successful performance for the organization. In benchmarking projects the starting point is identification of subject areas within which improvements are critical. They have argued that a key success factor is a statement on a causal relationship between actual success in business performance and causes of success. The immediate cause of differences in performance can be reduced to two basic factors: the value that customers perceive in the product/service offered, and the cost of creating this value. Therefore, the terms KSF is reserved for the skills and resources that have a direct impact on customers' perceived value or relative cost compared to the competitors. The KSF cover a wide range of different factors such as production factors, organizational factors, managerial factors and marketing factors but some of them are more critical to the firm's performance than others.

2.4 Different types of benchmarking

Bhutta and Huq (1999) in their paper had identified seven combinations of types of benchmarking that can be used to yield better results.

- 1) Performance benchmarking. This is the comparison of performance measures for the purpose of determining how good our company is compare to others.
- 2) Process benchmarking. The method and processes are compared in an effort to improve the processes in our company.
- 3) Strategic benchmarking. The study is undertaken when an attempt is being made to change the strategic direction of the company and the comparison with one's competition in terms of strategy is made.
- 4) Internal benchmarking. When comparisons are made within a company and among the departments or business units.
- 5) Competitive benchmarking. It was used against direct competitors to compare its products and services.
- 6) Functional benchmarking was performed with outsiders against industry leaders in terms of technological area.
- 7) Generic benchmarking. Comparison of processes against best process operators regardless of industries. It focused on the best work processes.

Freytag and Hollensen (2001) had identified that there are four different types of benchmarking depending on what the company wants to benchmark. They are internal benchmarking, industry (functional) benchmarking, competitive benchmarking and process (generic) benchmarking.

Lefkovitz (2004) described a tiered model of benchmarking that delineates between three distinct types of benchmarking: descriptive, comparative, and process

benchmarking. Descriptive benchmarking aggregates organization's data to establish an average performances and it is the most common form of benchmarking. Comparative benchmarking builds upon descriptive benchmarking by statistically gauging organization's individual performance against obtained data. Process benchmarking seeks as to why certain organization performs better than others.

2.5 Benchmarking and best practices

The essence of benchmarking is the process of identifying the highest standards of excellence for products, services, or process, and then making the improvements necessary to reach those standards – commonly called ‘best practices’. (Buutta & Huq, 1999). The studied reveal that more than 70 percent of the US Fortune 500 companies use benchmarking on a regular basis, including Ford, Eastman Kodak, IBM, Ford Motor Company and Weyerhaeuser. They also mentioned that benchmarking is a way to move away from tradition. In order to ensure continuous improvement, the identification of company's basic process such as benchmarking is very important. This process is to achieve the company's objectives, output and goals and is essential to company survival. The benchmarking practice has to be implemented in an organization and only then can the organization take full benefits of the benchmarking study. Benchmarking gives the company to look at the outside world and forces the organization to look at what its competitors are doing. It will cause the organization to focus its competitive edge, while bringing the other process up to mark with those of its competition. (Bhutta & Huq, 1999). In other words, benchmarking will raise the standard of competition and equip the company to implement improvements in its processes.

The Japanese word “dantotsu” means striving to be the best of the best. It captures the essence of benchmarking, which is a proactive process of changing operations in a structured way to achieve superior performance (Sweeney, 1994). The study carried out by Sweeney, (1994) to investigate the organization’s performance measures on standard financial measures on a general recognition on cost control and limited number of non-financial measures. The study concluded that there is a visionary gap between using traditional financial measures of performance and the performance measures to implement manufacturing strategies.

2.6 Why Benchmarking Failed

There are several researchers indicated that some reasons as to why benchmarking has failed. Davis and Kochhar (1999) listed out the reasons such as lack of implementation, preoccupation with metrics, lack of planning and implementation of findings, failure to involve all levels and areas of organization, lack of structure in benchmarking project and there was no feedback of results into business plan targets. Davis and Kochhar (2002) further argued that although there is an increasing interest in studies of benchmarking, much of the work remains descriptive. This is due to the complexity of mathematical relationships to an environment in which many variables exist. However, even with the descriptive studies, there is still a large element of subjectivity in the findings.

Freytag and Hollensen (2001) in their paper highlighted the limitation to benchmarking. They are focusing on numbers, losing focus on customers and employees, over reliance on quantitative data, difficult to obtain useful information about competitors, lacking proper implementation, not treating benchmarking as

ongoing process but as a one-time project, and cultural difficulties in transferring benchmarking in multinational firms.

2.7 Benchmarking and Performance in manufacturing industry

Several studies have been conducted in the manufacturing industry to establish the link between benchmarking practices and manufacturing performance. These studies have used different measures to quantify business performance such as operational performance, financial performance, market share, productivity, cost performance, quality performance, and so on (Issac, Rajendran, & Anantharaman, 2003). One of the most widely cited empirical studies is the one conducted by Voss, Ahlstrom, and Blackmon, (1997), with regards to the relationships between best practices and improved performance are assumed to be self-evident. The study points to a link between benchmarking and performance, the results show that the use of benchmarking is linked strongly to both improved operational performance and overall business performance. The need to link benchmarking to performance has become especially important for companies striving to achieve the goal of world-class manufacturing. The study by Voss, Chiesa and Coughlan, (1994) indicates that manufacturing performance is critical to overall competitiveness, and that the benchmarking is critical to manufacturing performance. They found that the most successful companies were those that adopted best practices to improve operational performance in every area of manufacturing. These causal relationships between benchmarking practices and manufacturing performance are the key to improving overall competitiveness. Thus, there is a need to investigate which areas of benchmarking improve which areas of performance in order that guidelines can be suggested to improve specific areas of performance.

The study conducted by Delbridge, Lowe and Oliver (1995) found that the choice of which attribute to measure performance is of paramount importance. Measures were developed in three areas: productivity, quality and time. The research concluded that the data collected were able to infer the relative impact of these variables.

Further studies have been conducted in the manufacturing industry to establish the best practices to achieve better performance. The need to link practices to performance has become especially important for companies striving to achieve the goal of world-class manufacturing. According to Davies and Kochhar (2002), the previous research such as IBM Consulting Group and Anderson Consulting studies was to test the relationship between practice and performance and to investigate whether companies that implement best practices perform better. They found that the most successful companies were those that the leading companies had adopted best practices which had resulted in strong operational performance. Thus, there is a need to investigate which practices improve which areas of performance in order that a guidelines can be given to improve specific areas of performance and the causal relationships between operational practice and operational performances are the key to improving overall competitiveness.

Although there is an increasing interest in studies of benchmarking, a large proportion of the studies relating to the effects of best practices on performance indicate that relationships do exist; however, there is little indication of the strengths of relationships (Davis & Kochhar, 2002). Without an indication of the strength of relationship, it is difficult to priorities practices for implementation. Such a classification would allow benchmarking to be implemented in a sequence that would enable maximum performance benefits to be achieved.

2.8 Summary of Literature Review

The proper use of benchmarking tactics enables organizations to obtain their desired outcomes in order to attain their goal effectively. The popular usage of benchmarking by many companies today could be associated with superior performance. Studies have indicated that there is a positive linkage between benchmarking practices and the desired improve in performance both in manufacturing and overall business in general. Lastly, various processes of benchmarking and impact on use of best practices tactics were also gained from literature review.

2.9 Theoretical Framework

2.9.1 Gap in the Previous Literature

Previous literature has helped to develop the foundation of this study. The literature suggested that there is positive relationship between benchmarking and the manufacturing as well as overall business performance. Besides that, the study will survey the response from the manufacturing industries in this part of the world as most of the previous studies was done and conclude either in Europe or the North America. This study will identify the behaviors and perceived interest of the relationship between benchmarking and performance especially in the northern part of Malaysia.

However, those literatures were all done separately and independently. There have been no previously reported studies of the relationship among the areas of benchmarking with criteria of manufacturing performance such as product quality, flexibility, cost efficiency, delivery performance, customer service, and customer satisfaction. Thus, it is the main objective of this study to add to the existing studies

and to understand the impact of level of relationship between areas of benchmarking towards the desired manufacturing performance.

2.9.2 Justification of the Framework

After studying previous researchers' work, it is of interest to further study the positive relationship between benchmarking and the performance with the practice of benchmarking in the areas listed as independent variables. It illustrates the areas of benchmarking in leadership, product development, HR management and development, process management, and quality results (independent variables). Overall direct manufacturing performance such as product quality, flexibility, cost efficiency, delivery performance and indirect manufacturing performances such as customer service and customer satisfaction (dependent variables).

2.9.2.1 Independent Variables

From figure 2.1, the frameworks of benchmarking areas were developed by Ingrid Lobo and Zairi (1999), and Voss, Chiesa and Coughlan, (1994), were incorporated in this study. The study was conducted on the independent variables as the areas of benchmarking on airlines industries. Thus, independent variables of this study are the areas of benchmarking as below:

a. Leadership. This category examines senior executives' personal involvement in creating and sustaining clear and visible quality values, along with a management system, to guide all activities of a company towards quality and business excellence (Lobo & Zairi, 1999). The leadership criterion recognizes the role of senior management in the success of an organization as well as management's influence in

the development of quality and business systems throughout all parts of an organization (Lobo & Zairi, 1999).

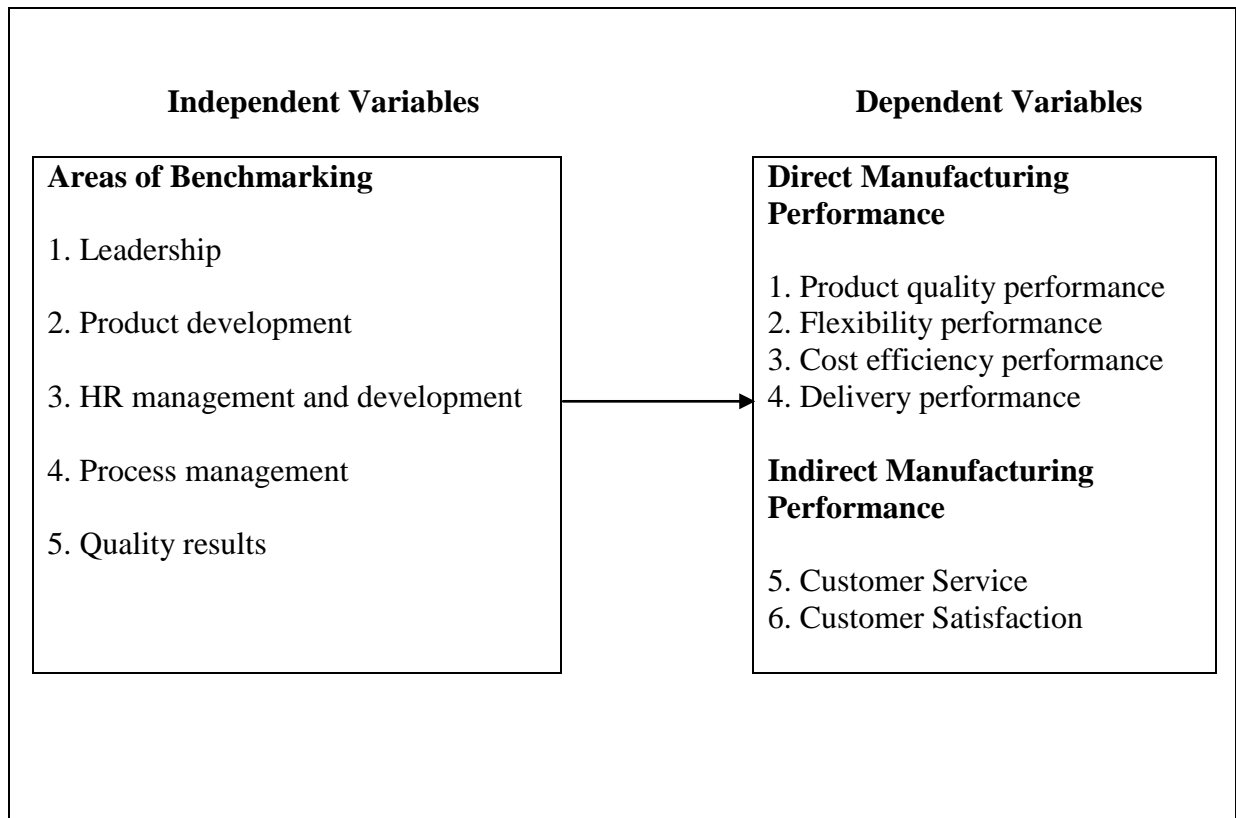


Figure 2.1. Theoretical framework.

b. Product development. It is a process of bringing a new product concept through development and manufacturing to the market (Voss, Chiesa & Coughlan, 1994).

c. HR management and development. To undertake formal systems of review that includes the areas of human resource planning, employee involvement, employee training and development and employee satisfaction (Lobo & Zairi, 1999). The human resource criterion will examine how employees are aligned with a company's quality and performance objectives and how the company works to develop an environment that promotes employee excellence, participation and growth (Lobo & Zairi, 1999).

d. Process management. It examines the systems a company uses to pursue higher quality and performance and how the assessment and improvement of processes, products and services is accomplished (Lobo & Zairi, 1999). This criterion recognizes the importance of customer focused design and control processes to continually improve the products and services of an organization and to ensure that market needs are fully met (Lobo & Zairi, 1999).

e. Quality results. The quality result category examines a company's quality levels as well as operational and supplier performance trends based on objective measurement and current quality performance levels in relation to those of competing companies (Lobo & Zairi, 1999). It recognizes the importance of measurement and without a formal system to measure and compare processes and performance, a company has no gauge of its improvement, its ability to meet market needs and its ability to compete against companies with similar products and services (Lobo & Zairi, 1999).

2.9.2.2 Dependent Variables

From figure 2.1, the frameworks of direct and indirect manufacturing performance were developed by Ingrid Lobo and Zairi (1999), Toni and Tonchia, (2001), Yeow, (2002), Narasimhan and Das (1999) and Ng (2003).

a. Product quality performance. Product quality performance in this study is focused on the quality of the product in terms of conformance to predetermined specification through statistical process control (SPC) measures, customer return rate and outgoing inspection defect rate. All three measures are measuring product quality (Toni & Tonchia, (2001).

b. Flexibility performance. New product flexibility is defined as the capability of a company to design, prototype and produce new products to meet stringent time and

cost constraints (Narasimhan & Das, 1999). Volume flexibility is defined as the capability system to respond to volume fluctuations and expand production on short notice beyond normal installed capacity (Narasimhan & Das, 1999). Modification flexibility is defined as the capability of the system to make minor changes in product design to meet customer demand (Narasimhan & Das, 1999).

c. Cost efficiency performance. The objective is to achieve lowest unit cost of manufacturing. It includes the ability to produce at lowest cost, minimized cost of quality and reduced service failures (Ng, 2003).

d. Delivery performance. It is concern with speed and reliability of delivering goods to customer. Speed of delivery is measured by delivery lead time while reliability of delivery is measured by numbers of faultless deliveries (Toni & Tonchia, 2001).

e. Customer service. It is defined as the accessibility of the external customer to the company's customer service personnel, able to response promptly and precise and clarity of communication (Lobo & Zairi, 1999).

f. Customer satisfaction. It examines a company's relationship with, and knowledge of, customers, its overall customer service systems, its responsiveness to customer needs and its ability to meet those needs. The criterion also examines a company's trends in customer satisfaction and its customer satisfaction levels versus competitors (Lobo & Zairi, 1999).

2.9.3 Development of Hypotheses

Based on findings of previous research, the following hypothesis is suggested:

H1a: Benchmarking leadership is positively related to product quality performance.

H1b: Benchmarking leadership is positively related to flexibility performance.

H1c: Benchmarking leadership is positively related to cost efficiency performance.

H1d: Benchmarking leadership is positively related to delivery performances.

H1e: Benchmarking leadership is positively related to customer service.

H1f: Benchmarking leadership is positively related to customer satisfaction.

H2a: Benchmarking product development is positively related to product quality performance.

H2b: Benchmarking product development is positively related to flexibility performance.

H2c: Benchmarking product development is positively related to cost efficiency performance.

H2d: Benchmarking product development is positively related to delivery performance.

H2e: Benchmarking product development is positively related to customer service.

H2f: Benchmarking product development is positively related to customer satisfaction.

H3a: Benchmarking HR management and development is positively related to product quality performance.

H3b: Benchmarking HR management and development is positively related to flexibility performance.

H3c: Benchmarking HR management and development is positively related to cost efficiency performance.

H3d: Benchmarking HR management and development is positively related to delivery performance.

H3e: Benchmarking HR management and development is positively related to customer service.

H3f: Benchmarking HR management and development is positively related to customer satisfaction.

H4a: Benchmarking process management is positively related to product quality performance.

H4b: Benchmarking process management is positively related to flexibility performance.

H4c: Benchmarking process management is positively related to cost efficiency performance.

H4d: Benchmarking process management is positively related to delivery performance.

H4e: Benchmarking process management is positively related to customer service.

H4f: Benchmarking process management is positively related to customer satisfaction.

H5a: Benchmarking quality results is positively related to product quality performance.

H5b: Benchmarking quality results is positively related to flexibility performance.

H5c: Benchmarking quality results is positively related to cost efficiency performance.

H5d: Benchmarking quality results is positively related to delivery performance.

H5e: Benchmarking quality results is positively related to customer service.

H5f: Benchmarking quality results is positively related to customer satisfaction.

2.10 Summary

This chapter first reviewed literatures done on benchmarking practices and its relationship with the manufacturing performance. Theoretical framework was

developed based on findings of the previous research. There are total thirty hypotheses are formulated after theoretical development. The next chapter will discuss the research methodology that was used in this study.