Proceedings of the
International Conference on Mechanical Engineering 2003
(ICME2003) 26- 28 December 2003, Dhaka, Bangladesh

ICME03-AM-30

A COMPARATIVE STUDY OF BENCHMARKING PRACTICES OF MALAYSIAN COMPANIES WITH AND WITHOUT QUALITY CERTIFICATION

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ABSTRACT

This paper is based on a survey of benchmarking practices in the Malaysian companies involved in automotive manufacturing sector. This study aims at providing empirical evidence on the differences in benchmarking implementation and adoption practices between companies with and without quality certification. A questionnaire with 49 items was developed based on previous studies, checked for reliability and validity by experts and practitioners, and applied to create a self-assessment measure of benchmarking practices. Analysis of the survey results showed that there was no significant difference in benchmarking practices between manufacturing companies with and without quality certification.

Keywords: benchmarking, practices, performance, ISO 9000, manufacturing, Malaysia

1. INTRODUCTION

Gathering intelligence about competitors is not a new idea. Historically, industries growth and development has been advanced by imitation of technology, business, practices and organizations of other countries. For example, in the mid 1880s, American engineers visited Britain, copied and made major changes to British engines to adapt them to different fuel prices and characteristics of North American Rivers [1]. However, the formalization of benchmarking as an instrument of managerial practice and its widespread use within change efforts such as business process redesign, total quality management (TQM), reengineering, and etc. is relatively recent and was developed by Xerox Corporation in the late 1970s [1; 2]. Xerox Corporation was the market leader for the sale and rental of photocopy machines until 1975. However, by 1980, Xerox had lost virtually 50% of its market share and competition in the business was intense [3]. The main competitors were Cannon and Ricoh, Japanese companies which match Xerox's quality, reliability and service but better on price [3]. If Xerox was to remain as market leader, they need to change their business approach and renew their customers' focus. In an attempt to get back its market share, Xerox compared its operation and quality standards to its competitors [4; 5]. Using Fuji- Xerox, which won the 1980 Deming Prize, as the role model, they realized that there was a need to change the corporation's culture and management style [3].

Xerox began its journey of benchmarking when it sent a project team to learn from its Japanese joint-venture partner, Fuji-Xerox. Xerox was able to secure significant improvements in quality, costs and time to market by learning best practices from the Japanese and Xerox success in benchmarking is widely publicized [4; 6]. Elmuti [7] and Brah et al. [8] reported that more than 70% of Fortune 500 companies in the USA and 78% of The Times Top 1,000 companies in the UK claimed to be conducting benchmarking on a regular basis. Pryor and Katz (1993) attribute the dramatic improvement in the performance of Xerox, Ford, Motorola, etc. to benchmarking (as quoted by [8]). It is expected that an efficient company will be: able to withstand market competition; less sensitive to unfavourable changes in the environment; and more likely to use indicators to link the best of its short, medium and long-term goals [9].

2. BENCHMARKING DEFINITIONS

Modern benchmarking practice is aimed at importing best practices across the organization through implementing change. There are numerous definitions that have been proposed for benchmarking by different authors. As evidenced in the literature, most authors have provided almost similar views on benchmarking definitions and they can be characterised into three major areas such as measurement via comparison, continuous improvement and systematic process in carrying out benchmarking activity [4; 8; 9]. Thus, it is believed that these three areas encompass pertinent aspects of any benchmarking process. In this research, the authors define benchmarking as "a continuous, systematic process for evaluating the products, services and work processes of organizations recognized as sector/industry or world class leaders for the purposes of organizational improvement within an organization".

3. METHODOLOGY

3.1 Survey Instrument Development

The survey questionnaire in this study was developed based on previous benchmarking empirical studies found in the literature and using the general rules as provided by Fowler [10] on questions and answers basic characteristics, which are fundamental to a good measurement process. A set of survey questionnaire was carefully designed to ensure most of the pertinent issues concerning benchmarking were included. The survey instrument with 49 elements was developed based on the nine major factors, believed to be critical for benchmarking implementation such as: top management leadership (F1.1-F1.6), systems and processes (F2.1-F2.7), creativity and innovation (F3.1-F3.5), human resource management (F4.1-F4.6), policy and strategic planning (F5.1-F5.6), resource management and business results (F6.1-F6.4), customer satisfaction management (F7.1-F7.5), employee satisfaction management (F8.1- F8.3), and organizational culture and work environment (F9.1-F9.7).

In this survey, respondents were asked to rate on a five point Likert scale for each statement in each critical factor the extent to which they thought it is currently a practice in the organisation. To conduct the pilot study, the final draft of the questionnaire was sent to benchmarking experts (i.e. universities academicians and consultants) and benchmarking practitioners (i.e. executive and managing directors; manufacturing, operation, production and quality managers), who had the relevant expertise and experience in benchmarking implementation for validation, comments and suggestions on the survey questions clarity and appropriateness. A total of 30 questionnaires were sent-out and the response rate was almost 37%. The comments and feedback given were very useful in rectifying and improving the instrument.

3.2 Sampling Procedure

The sample for the study consisted of 350 companies, which were randomly selected from the Malaysian automotive industry first and second-tier vendor's lists for PROTON and PERODUA. A questionnaire was mailed to the top management of each company. A reply-paid self-addressed envelope was included. A total of 68 companies responded to the questionnaire, giving a response rate of about 19%. Another 11 of the questionnaire were returned due to companies having moved to new locations or ceased operations. Given the low response associated with mail surveys, this response rate was considered reasonably adequate.

4.0 DISCUSSION OF RESULTS AND FINDINGS

4.1 Profile of the Respondents

The majority (i.e. 69%) of the respondents companies were completely owned by Malaysian (see Figure 1). This figure shows that locally based companies form the majority of vendors to the Malaysian automotive manufacturing sector. Meanwhile, almost 28% of the companies were on joint-venture basis and the remainder 3% were completely owned by foreigners.

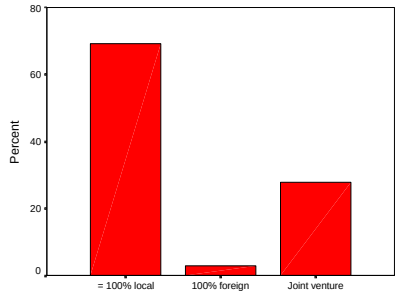

Figure 1 Bar chart showing the type of company ownership

Table 1 shows the distribution of the products types manufactured by the respondents' companies. Referring to Table 1, it can be seen that 42.6% are producing metal parts, 20.6% plastic parts, 17.6% electronic parts, 16.2% electrical parts, 13.2% rubber parts, and 25.0% other parts (i.e. comprise of carpet, lamps, glass, oil, paint, etc.) for the automotive industry.

Table 1 Types of Products Manufactured

Products Manufactured	Number of companies	Percent
Metal parts	29	42.6%
Plastic parts	14	20.6%
Electronic parts	12	17.6%
Electrical parts	11	16.2%
Rubber parts	9	13.2%
Other parts	17	25.0%

Note: The total exceeds 68 since some companies produce more than one type of product.

Table 2 Types of Quality System Certification – Overall

Quality systems	No. of companies	Percent
ISO 9002:1994	27	39.7%
QS 9000	21	30.9%
ISO 9000: 2000	16	23.5%
ISO 9001: 1994	9	13.2%
Others	9	13.2%
None	12	17.6%

Note: The total exceeds 68 since some companies have more than one quality system certification.

With regards to quality system certification, about 82% of the respondents had at least one certification in place (see Table 2). However, as shown in Table 2, it is quite surprising to discover that almost 18% of the respondents did not have any quality certification. When examining the results in more detail, it was found that almost 40% (ISO 9002:1994); 24% (ISO 9000:2000); 13% (ISO 9001:1994) and 13% were certified to other types quality standards. In addition, it is also quite surprising that only 31% of the respondents have the more stringent QS 9000 even though it has almost become a requirement for companies involved in the automotive industry.

Regarding to benchmarking knowledge, Figure 2 shows almost 72% of the respondents have prior knowledge before embarking on the benchmarking initiatives acquired through seminar, conference,

workshop, training or the mass media. Meanwhile, 26% had embarked in benchmarking activities through "try-and-error" due to their lack of knowledge of the benchmarking technique and 2% were did not know or unsure how to response.

Only one of the respondent companies (1.5%) had

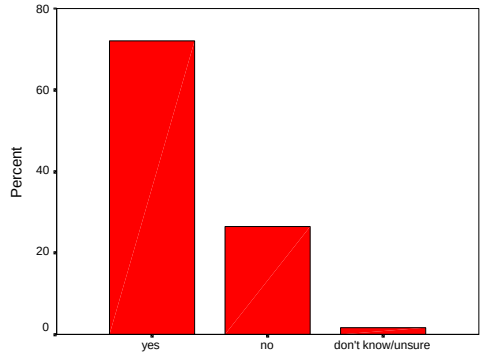

Figure 2 Prior knowledge on benchmarking

implemented all the seven benchmarking initiatives listed in Table 3, indicating that it is already in the advanced stage of benchmarking implementation. The other 10 companies (14.7%) had implemented at least four of the initiatives listed, indicating that they were on their way to fully use the benchmarking tool in improving their business process and performance. Referring to Table 3, the four benchmarking initiatives with the highest implementation rate ranked in terms of percentage are knowing and understanding own process (60.3%), establishing benchmarking measures (33.8%), education and training in benchmarking (27.9%) and identifying benchmarking partner (27.9%). It is quite surprising to know that only about 19% of the respondents companies had set-up a formal benchmarking unit in their respective companies. In other words, the survey results and findings revealed that 81% of the respondents had conducted the benchmarking effort without having a proper unit to organize and monitor its implementation progress and success.

Table 3 Types of Benchmarking Initiatives Implemented - Overall

Benchmarking Initiatives Implemented	No. of companies	Percent
1. Knowing and understanding own process	41	60.3%
2. Establishing benchmarking measures	23	33.8%
3. Education and training in benchmarking	19	27.9%
4. Identifying benchmarking partner	19	27.9%
5. Employee involvement in benchmarking	15	22.1%
6. Developing benchmarking strategies	14	20.6%
7. Setting-up a benchmarking unit	13	19.1%

Note: The total exceeds 68 since some companies have implemented more than one types of benchmarking initiatives.

The authors believed, it is very important to set-up a benchmarking unit before embarking on benchmarking initiatives because it could help top management in making policy decisions, identify and select the key business performance measures to be benchmarked from a spectrum of performance measures depending upon the objectives, priority set by the company, etc., decides on the benchmarking technique to be adopted and to review all activities in the benchmarking process. Members of this unit should comprise of representatives from managerial, supervisory and operator level.

4.2 Reliability and Validity of the Survey Instrument

Reliability tests on the survey instrument were performed using the guidelines provided by Saraph et al. [11]. Reliability refers to the consistency of the results on different items in a test [12]. A reliable measuring instrument when used repeatedly shall yields similar results under a variety of circumstances [13]. The internal consistency of a set of measurement elements refers to the degree to which elements in the set are homogeneous [11]. Cronbach's alpha (α) is one of the most commonly used reliability coefficients, which ranges in value from 0 to 1 to estimate the value of internal consistency [13; 14]. The α value can be calculated from any subset of the elements and it can provide the best illustration as regard to internal consistency. In this study, an internal consistency analysis was performed for the elements of each critical success factor by using the SPSS reliability analysis procedure. The items in each factor were grouped into nine scales and coefficient alpha was calculated for each group. Cronbach (1951), Nunnally (1967) and Scott (1981) as quoted by Saraph et al. [11] held the same view that α value of 0.7 and above are considered to be adequate for testing the reliability of the factors. Referring to Table 4, the reliability coefficient (α) of the factors ranged between 0.7193 and 0.8865. In summary, the reliability analysis (see Table 4) had indicated that all the nine factors have alpha values more than 0.7. Thus, it can be concluded that on overall the survey instrument is reliable because it has high internal consistency.

Table 4 Results of Internal Consistency Analysis

	Critical Factors	No. of items	(α) value
F1	Top Management Leadership	6	0.8175
F2	Systems and Processes	7	0.7493
F3	Creativity and Innovation Management	5	0.7898
F4	Human Resource Management	6	0.7451
F5	Policy and Strategic Planning	6	0.8736
F6	Resources Management and Business Results	4	0.7193
F7	Customer Satisfaction Management	5	0.8865
F8	Employee Satisfaction Management	3	0.7253
F9	Organizational Culture and Work Environment	7	0.8623
	Total	49	

A measure has content validity if the instrument has measurement items that adequately cover the content domain of the variable being measured [14]. The nine measures of critical factors and their respective elements for benchmarking implementation developed in this study have high content validity because they were based on exhaustive literature review, have undergone detailed evaluation and verification by academicians, experts and practitioners [13]. Furthermore, the factors found in the instrument were very close to those previous developed by authors such as Jeffcoate et al. [15], McAdam and Kelly [16], and Motwani [17]. In addition, the survey instrument had also been pilot tested in practising companies, which indicated that the content of each factor was well represented by the measurement items employed. Thus, the authors firmly believes that the section on critical success factors (CSFs) in this survey instrument has high content validity since all the pilot companies have positively accepted it.

The construct validity is carried out to ensure that each construct actually represents one factor. Factor analysis is often used in data reduction to identify a small number of factors that explain most of the variance observed in a much larger number of manifested variables [18]. A measure has construct validity if it measures the theoretical construct or trait that it was designed to measure [11; 19]. The construct validity for each of the nine critical factors was evaluated by factor analysing the measurement items of each of the nine critical factors using the "practice" data. In this analysis, each critical factor was assumed to be a separate construct [11]. The SPSS Data Reduction and Factor Analysis Procedure and steps provided by Isa [20] were used in performing the analysis.

The items assigned to each of the nine critical factors for benchmarking were submitted to principal component factor analysis to determine the number of factors and factor loadings extracted by the Kaiser criterion (with Eigenvalue greater than one). The first run proved to be quite satisfactory because 7 of the 9 factors were found to be uni-factorial and the remainder 2 factors were bi-factorial. Prior to secondary factor analysis, elements that did not have strong correlation with the component and those having low communalities (i.e. proportion of the variance of that variable that can be explained by the components) were eliminated. In this case, elements of the two bi-factorial factors (F2.6, F2.7, F4.2 and F4.4) were eliminated to improve the reliability of the instrument and the revised loadings were calculated. As a consequence, the results of the secondary factor analysis showed that all the nine factors were uni-factorial. The revised loadings ranged between 0.658 and 0.907. These results are broadly similar to those of Rahman [13], Black and Porter [21], and Samson and Terziovski [22].

The Kaiser-Mayer-Olkin (KMO) measure of sampling adequacy was used to assess the suitability of the sample for each uni-factorial determination. Referring to Table 5, in general the KMO values found are considered acceptable [23]. All factors in each uni-factorial test accounted for more than 55% of the variance of the respective variable sets. This suggests that only a small amount of the total variance for each group of variables is associated with causes other than the factor itself.

Table 5 Construct Validity Tests of the Factors

	Critical success factors	KMO	% Variance explained by Comp. 1
F1	Top Management Leadership	0.838	67
F2	Systems and Processes	0.801	59
F3	Creativity and Innovation Management	0.763	57
F4	Human Resource Management	0.764	63
F5	Policy and Strategic Planning	0.872	69
F6	Resources Management and Business Results	0.750	66
F7	Customer Satisfaction Management	0.810	71
F8	Employee Satisfaction Management	0.739	80
F9	Organizational Culture and Work Environment	0.880	59

5. DISCUSSIONS ON CRITICAL FACTORS

The means for the nine critical factors for benchmarking implementation for companies with and without quality certification are shown in Table 6. The means ranged between 2.92 and 3.40 for companies with quality certification and between 2.86 and 3.50 for companies without quality certification. In this study, a score of 4 or more indicates high practice with a particular factor, a score of 3 to 4 indicates moderate practice, a score between 2 and 3 indicates low practice and a score of less than 2 indicates a very low practice with a factor. On overall, the responses fell between low to moderate for both companies with and without quality certification.

Referring to Table 6, customer satisfaction management and top management leadership had the two highest overall mean rating of the nine critical factors for both companies with and without quality certification. This indicates that they play very significant role in driving the benchmarking implementation effort in these companies.

Systems and processes had the third highest overall mean rating followed by resources management and business results, organizational culture and work environment for companies with quality certification. On the other hand, organizational culture and work environment was third in the overall mean rating for companies without quality certification, followed by employee satisfaction management, and creativity and innovation management, and systems and processes. The mean rating for all other critical factors were found to be about the same for both companies with and without certification.

Table 6 Independent Samples t-test Results for Quality Versus Non-Quality Certified Companies

Description	Quality (Mean) pract.	Non-Qual. (Mean) pract.	Diff. in mean	t	p-value
F1 Top Mgt. Leadership	3.3831	3.5008	-0.1177	-0.346	0.731
F2 Systems & Processes	3.2628	3.1073	0.1555	0.486	0.629
F3 Creativity & Inno. Mgt.	3.0500	3.1667	-0.1167	-0.327	0.745
F4 Human Resource Mgt.	2.9198	2.9444	-0.0246	-0.077	0.939
F5 Policy and Strategic Pln.	2.9167	2.8608	0.0559	0.161	0.873
F6 Resources Mgt. and Business Results	3.2098	3.1042	0.1056	0.309	0.758
F7 Customer Satisfaction Mgt.	3.3964	3.6500	-0.2536	-0.711	0.480
F8 Employee Satisfaction Mgt.	2.9166	3.4442	-0.5276	-1.426	0.159
F9 Organiza. Culture and Work Enviro.	3.0534	3.4525	-0.3991	-1.146	0.256

Note: p = 0.05 level of significance with 66 degrees of freedom
Non-Quality certified = 12 companies;
Quality certified = 56 companies

6. HYPOTHESIS TESTS RESULTS

The following hypothesis was formulated for conducting the significance test for the quality and non-quality certified companies. To test for a significant difference in extent of practice means between quality certified and non-quality certified companies:

H_o: $\mu_1 - \mu_2 = 0$ (i.e. there is no significant difference between the two means).

H_1: $\mu_1 - \mu_2 \neq 0$ (i.e. there is a significant difference between the two means).

The authors used the t-test for testing the Null hypothesis that two population means are equal when the variable being investigated has a normal distribution in each population and the population variances are equal. There are two types of t-tests, first the independent samples t-test and second, the paired samples t-test [24]. The independent samples t-test can be utilise when the data are a sample from a population in which the mean of a test variable is equal in two independent (unrelated) groups of cases. Meanwhile, the paired samples t-test can be employed when the two population means are equal and when the observations for the two groups can be paired in some way.

In this case, an independent samples t-test and the SPSS compare means procedure were employed [24; 25]. Referring to Table 6, all the p-values for the nine critical success factors are more than 0.05 (significant level); hence the Null hypothesis H_o was accepted. In short, it can be concluded that there is no significant difference in practice of the nine critical success factors (CSFs) for benchmarking implementation between quality certified and non-quality certified companies.

7. LIMITATIONS AND CONCLUSIONS

In this study, the nine CSFs for benchmarking implementation success were developed based on extensive literature review and previous empirical studies. These CSFs was used in developing a survey instrument with 49 items and applied to create a self-assessment measure of the benchmarking practices. The items assigned to each of the nine factors to benchmarking implementation success were submitted to principal component factor analysis.

The results showed that critical factors in the survey instrument were reliable and valid for assessing benchmarking implementation practice in companies with and without quality certification involved in the automotive manufacturing sector. The hypothesis test showed no significant difference between the benchmarking practices of companies with and without quality certification.

The survey methodology used in this study had several limitations. The reliability and validity tests and the analysis were conducted based on 68 companies only, which is considered to be a small sample size. Therefore, the results of this study must be treated with caution. This paper is a part of an on-going research on benchmarking implementation in Malaysian automotive companies.

7. ACKNOWLEDGEMENTS

The authors would like to thank the Ministry of Science Technology and Environment (MOSTE) and Universiti Teknologi Malaysia for their support in providing the research grant for the project entitle "Development of an Integrated Quality Engineering Approach for Malaysian Automotive Industry" (IRPA Vote No: 74068).

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