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Critical Success Factor Of Manufacturing Practices And Manufacturing Capabilities Among Local Manufacturers In Malaysian Northern Region

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Abstract

Generally, manufacturing capability is the important factor in running and developing business. Hence, this research is aimed to identifying the relationships of critical factors and make sure the companies can survive in the northern region of Malaysia. Those identified factors are manufacturing practices and manufacturing capabilities. Through the email survey, a total of 89 companies representing various industries had responded. The hypotheses involved were tested using correlation and regression techniques. The results of the study support all the hypotheses. The multiple regression analysis indicates that there are significant relationships among the factors on each criterion to manufacturing capabilities. While hierarchical multiple regression analysis was carried out to test the role of moderating in the relationship between independent variables with dependent variables. The results of the hierarchical multiple regressions indicate that training moderated the relationship between manufacturing practices, knowledge sharing to manufacturing capabilities. It is believed that results of this study will be beneficial for shareholders and directors of companies to apply these manufacturing capabilities.

Keywords— Manufacturing Practices; Manufacturing Capabilities; Local Manufacturers ; Northern Region Of Malaysia.

Introduction

Malaysia had becomes the transit and destination for foreign companies and multinational manufacturing companies to invest and develop their business. With this environment, Malaysia needs to be competitive in order to be a good player in manufacturing sector. The major step towards globalization was set by all our Prime Minister in the nation's vision 2020, the achievement of this vision is contingent upon how capable to use and manage our manufacturing practices, apply our knowledge and learning and training to perform in our areas. As Zeleny (1986) explained, we must not lack the ideas, which will enable us to perform certain tasks effectively and efficiently.

The Malaysian economy has sustained an enviable growth of an average of 8% in its Gross Domestic Products (GDP) over the last ten years, with 1995 recording 9.4%. In 1996, the GDP was estimated at US$96.6 billion, which reflected a significant growth of 8.9% (SIRIM QAS Directory, 2005).

Manufacturing Capabilities

The concept of strategic capabilities that determine a manufacturing's contribution to the success of a firm is closely related to the notions of strategic resources, competences and priorities. In contrast to capabilities, resources are something a firm possesses or has access to, not what a firm is able to do. Resources can be tangible, e.g. specialized production systems, and intangible, e.g. level of training of workers (Hall, 1992; Hall, 1991). Based on such resources, capabilities are developed. For instance, flexible production systems in combination with highly skilled workers or resources, allow to produce in a flexible way, capability. Capabilities allow an enterprise to develop and to exploit resources in order to generate profit through its products and services (Amit & Schoemaker, 1993).

Agility

Agility is the ability to easily move from one manufacturing state to another. Agility divided to two criteria which are volume flexibility and mix flexibility. Volume flexibility refer to the ability of efficiently produce wide

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ranges in the demanded volumes of products. Mix flexibility is the ability to manufacture a variety of products, over a short time span, without modifying facilities (Swink & Hegarty, 1998). The new concept agility in manufacturing, these drivers are competition, fragmentation of mass market, cooperative production relationship, evolving customer expectations, and increasing social pressures.The main issue in this new area of manufacturing management is the ability to cope with unexpected changes, to survive unprecedented threats of business environment, and to take advantage of changes as opportunities. This ability is called agility or agile manufacturing (Sharifi & Zhang,1999).

Agile manufacturing that was sometimes mixed up and confused with previous thought schools of manufacturing management such as flexibility and lean manufacturing has been backed for having novel concepts beyond the former remedies. This has happened thanks to the wide concern it received during the past few years, though in place this has been a natural result of the increasing need to resolve problems with the so-called remedies and increasing pressures on manufacturing companies in competing for success. Agility in concept comprises two main factors. They are 1)Responding to change (anticipated or unexpected) in proper ways and due time. 2)Exploiting changes and taking advantage of them as opportunities. These, indeed necessitate a basic ability that is sensing, perceiving and anticipating changes in the business environment of the company. An agile manufacturer, in this way is an organisation with a broad vision on the new order of the business world, and with a handful of capabilities and abilities to deal with turbulence and capture the advantageous side of the business.

Agility is an ability and a character that every manufacturing company must have to be able to survive and prosper in the new order of the world business environment.

Different organisations are di!erent in the way they should respond to changing business environment, so they need di!erent levels of agility.Agility is a response to the changes that a company faces, and shall become a characteristic of the company. Therefore, the way that the company should act in turbulent circumstances of the business environment, which is called agility, is a direct function of changes in the business environment, and also the business environment itself and the company's situation. Agility in concept is a strategic response to the new criteria of the business world, and in practice, is a strategic utilisation of business methods, manufacturing and management processes, practices and tools, most of which are already developed and used by industries for certain purposes, and some are under development to facilitate the capabilities that are required for being agile. Information system/technology in its utmost level of timeliness, coverage, communication ability, data banking and interchange, etc., is a major differentiator of an agile manufacturing company compared to traditional systems.

Manufacturing Practices

In order to enhance and utilize these capabilities, manufacturing strategies need to be developed. The nature, content and scope of these strategies and their link to agility and mass customisation are by no means clear (Papke Shields & Malhotra, 2001; Bozarth & McDermott, 1998). One consequence of the changing nature of manufacturing industry has been a difficulty for practitioners and academics to understand and evaluate findings relating to a particular practice before having to move on and examine new ones. Bolden, (1997), clustered the identify practices in terms of ‘strategic emphasis’ (i.e. why the practice is used) and the ‘domain of application’ (i.e. the part of the manufacturing process primarily involve).

Within ‘strategic emphasis’, two types of primary emphases were identified: business focused and organization focused. While business focused strategic emphases draw primarily on operation management theory, organization-focused strategies represent the core subject areas of engineering and organizational psychology/ organizational behaviour.

Quality Management

The quality of a product is a measure of its relative ‘usefulness’ to the customer. It includes product features, which might differentiate it from competitive products (New 1992). Two of the mentioned measures are consistent quality and high performance products (Roth & Miller 1990). Essential decisions need to be made in terms of cost/quality, product technology and process technology (Hill 1983). Measures for product and process quality can include, for example: i) Manufacturing conformance, product quality and reliability, customer service and support, delivery reliability, environmental performance (Laugen et. al. 2005), ii) Return rate, defective rate (Ward et al. 1995), iii) Vendor quality (Ward et al. 1995), iv) Quality control circles (Ward et al. 1995), v) ISO 9000 certification (Ward et al. 1995), vi) Field failure under warranty (Neely et al. 1994), vii) In process quality (Neely et al. 1994), viii) Incoming parts quality (Neely et al. 1994) and vix) Consistent quality with low defects (Meyer and Pycke 1996)

Based on the discussion it can be concluded that manufacturing practices play an important role in determining manufacturing capabilities. Therefore, it is essential to consider these factors in studying manufacturing capabilities. This study focuses on manufacturing practices namely quality management. The investigation on the effects of manufacturing practices on the manufacturing capabilities addressed by the following hypotheses;

H1 Quality Management has significant influence on Innovation

Methodology

The Sample and Data

A survey was conducted to collect cross sectional data in Northern Region of Malaysia which is one of the state introduce as the Silicon Valley of Malaysia. The population of this study was the Top Management and Managers. These grades consist of management and professional employees which identified a group with high potential to engage manufacturing capabilities. The selection of the survey location and the sample was due to the Federation of Manufacturers of Malaysia (FMM). A set of questionnaire was formulated and designed based on the previous literature in the subject area. The questionnaires were emailed to 160 respondents. 119 sets questionnaires received within two weeks giving the response rate of 74.4%. The sample profile of the survey is shown in Table 1.

From Table 1 it is found that more than 75% respondents are Malaysian owned companies and 83 companies had more than 150 workers in their operation. The respondents are 3 General manager, 89 Manager and 27 Executive and 63 from the respondent work more than 10 years. 98 from this respondent are from Degree level.

Reliability Analysis

An internal consistency analysis was performed separately for the items of each personality traits and cyberloafing behaviour by using the SPSS version 20, reliability procedure. Hair, Money and Samuel (2007) suggested an acceptable alpha value is greater than 0.6. As show in Table 2, the alpha values of reliability analysis for this study ranges from 0.70 to 0.85. From the results obtained, all the alpha values are greater than 0.7. Thus it can be concluded that this instrument has good internal consistency and is therefore reliable.

Table 1:
Sample profile of the respondent

Variables	Item	Frequency	Percentage (%)
Companies's Type	Malaysian owned	75	63.0
	Foreign owned	28	23.5
	Joint Venture	16	13.5
Size of Company(In term of Full Time Employees	Less than 5	-	-
	5 to 50	-	-
	51 to 150	36	30.0
	More than 150	83	69.7
Respondents' Job Designation	General Manager	3	2.5
	Manager	89	74.8
	Executive	27	22.7
Year of designation	Less than 1 years	8	6.7
	1-5 years	31	26.1
	6-10 years	17	14.3
	More than 10 years	63	52.9
Education level	Degree	98	82.3
	Master Degree	20	16.8
	PhD	1	0.9

Table 2:
Reliability analysis result

Variables	Number of items	Alpha
Quality Management	4	0.914

Agility	4	0.864

Descriptive analyses for the manufacturing practices and manufacturing capabilities are shown in Table 4 and Table 5. The levels of manufacturing practices and manufacturing capabilities are based on the levels of mean score range provided in Table 3 which adopted from Kosnin and Lee (2008).

Table 3:
Level of Mean Score Range

Range of mean score	Level
1.00 – 2.33	Low
2.34 – 3.67	Medium
3.68 – 5.00	High

Findings

The Level of Manufacturing Capabilities

Manufacturing capabilities among the manufacturing companies are measured based on the values of means and standard deviations. Table 4 shows the ranking of knowledge transfer and the value of mean and standard deviation for each activity.

Mean values explained the propensity of the respondent to involve with manufacturing capabilities (Li, 2000). According to Kosnin and Lee (2008) the mean values in range of 2.34 to 3.67 is categorized as medium stage. The mean score for the overall manufacturing capabilities is 3.66. This indicated that the level of manufacturing capabilities among manufacturing companies is at the medium stage.

Table 4:
Mean Values of Manufacturing Capabilities

Activities	Mean	Standard Deviation
Able to efficiently produce wide ranges in the demanded volumes of products	3.64	0.687
Able to manufacture a variety of products, over a short time span, without modifying facilities	3.67	0.634
Able to accelerate or decelerate the rate of production quickly to handle large fluctuations in demand	3.68	0.643
Manufacturing Capabilities	3.66	0.654

The Level of Manufacturing Practices

Table 5 gives the mean values for the eight Manufacturing Practices. It is shown that one of the manufacturing practices has more than 3.67 mean values which is 3.92. Base on Table 3, the levels of these manufacturing practices are considered as medium stage among the manufacturing companies.

Table 5:
Mean Values of Manufacturing practices

Personality Traits	Mean	Standard deviation
Had supplier certification programs	3.94	0.89
Statistical Process control	4.04	0.87
Real time quality information	4.01	0.92
Had quality improvement teams	3.96	0.94
Quality Award guidelines	3.92	0.86
Had plant quantity certification	3.98	0.87

Continuous improvement	3.99	0.93
Acceptance sampling	4.01	0.91
Manufacturing Practices	3.98	0.89

The lowest mean of manufacturing practices is quality award guidelines and the average mean value of manufacturing practices is at high levels.

Correlation Analysis

From the results of correlation analysis it is found that manufacturing practices is significantly correlated to manufacturing capabilities. As shown in Table 6, the correlation coefficients are found to be positive and statistically significant at 0.01 level ($p<0.01$).

Table 6:
Pearson Correlation Coefficients between manufacturing practices and Manufacturing Capabilities

Variable	F1	Manufacturing Capabilities
F1	1.00	
Manufacturing Capabilities	0.956**	1.00

** Correlation is significant at the 0.01 level (1-Tailed)
* Correlation is significant at the 0.05 level (1-Tailed)

Therefore, Hypothesis 1 is supported. There is a significant relationship between quality management with the other variables that is agility (manufacturing capabilities). Hence, Hypothesis 1 is supported.

Discussion

This study is to identify empirically the core manufacturing capabilities in manufacturing companies, across industry in the northern region of Malaysia. The rationale of the study stems from the major consideration, that is, the emerging concern of shareholders of the manufacturing companies and the directors of the companies in this industry in particular to develop core manufacturing capabilities.

The analysis based on the respondents' perception of core manufacturing capabilities in manufacturing companies showed that manufacturers took a lot of effort in manufacturing practices in achieved high degree of core manufacturing capabilities.

The findings show that manufacturing practices is the important variables that must be consider by the manufacturers in their operation. These findings are supported by previous researchers who have studied in developing manufacturing capabilities (Swink & Hegarty, 1998; Haifeng, 2006; Li, 2000)

The correlation analysis show that manufacturing practices is the priority variables that must be highlight which show the correlations coefficients 0.956 at the 0.01 level (1-Tailed).

The Limitation

This survey has been conducted with the manufacturers in Northern Region of Malaysia. Nevertheless, the result may not be able to generalise the influence of manufacturing capabilities on manufacturing capabilities for the whole country as there are different focus on their operation. This study focuses solely on the manufacturing practices in term of quality management. Future research should consider other factors that influence the manufacturing capabilities such as timed based management and team works.

Conclusion

This paper has applied empirical analysis on the influence of manufacturing practices on manufacturing capabilities of local manufacturers.. Survey on manufacturing capabilities on the local manufacturers reveals that the level of manufacturing capabilities is high level. The results show that the manufacturing practices contributes to the manufacturing capabilities. The results suggest that, all manufacturers must consider quality management (Manufacturing practices) as their focusing aspect to survive in the business. Companies or manufacturers must increase their manufacturing practices in term of quality management to gain significantly in the core manufacturing capabilities. The manufacturing practices absalutely is very important in develops manufacturing capabilities.

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