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Process Innovation: A study of Malaysian Small Medium Enterprises (SMEs)

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The main purpose of the paper is to explore process innovation of small and medium enterprises (SMEs) in Malaysia. A survey of 50 Peninsular Malaysia-based manufacturing SMEs was conducted. The respondents were asked questions about their perception on the company's innovative characteristic which in this study is focusing mainly on process innovation (e.g. new product development, systems and technology). In this study, a definition of innovation was established based on past studies and a systematic approach to measure company innovativeness was adopted. Company innovativeness was measured using ten indicators. The top 20 per cent firms were compared with bottom 80 per cent firms in terms of product innovation management, systems and technology. Means of responses were compared for two sets of companies. The results showed that the characteristics of more innovative SMEs manufacturing firms are perceived to be different as compared to the less innovative SMEs manufacturing firms.

Field of Research: Small and medium enterprises, Manufacturing

1. Introduction

Past studies have discovered key characteristics of large innovating firms (Pettigrew, 1985; Pavitt, 1991; DTI/CBI, 1993/1994), but little research has been done on innovation in SME manufacturing single products. This is in spite of in Malaysia, like any other countries, the small and medium-sized enterprises (SMEs) are also recognized as being one of the principal driving forces in economic development. SMEs in Malaysia stimulate private ownership and entrepreneurial skills. Besides, those SMEs are also flexible and can adapt quickly to changing market demand and supply situations. In due process, those SMEs generate employment, help diversify economic activity and make a significant contribution to exports and trade.

Therefore, SMEs are undeniably are very important to the economy of the country. Therefore, it is very vital not only to ensure long term survival of SMEs but also to encourage the emergence of new SMEs in particular relating to manufacturing industries because at the present moment SMEs made up of more than 90 percent of the total manufacturing firms in Malaysian manufacturing sector (National Productivity Corporation, 2001).

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Hence, innovation is fundamental to SMEs in order for them to survive and maintain their competitiveness in the market place. They cannot afford to often invest in new technologies and equipment, providing world-class skills and training to their workforce and winning new markets like their larger manufacturing companies counterparts. Nevertheless, studies by Mosey et al. (2002) and Mosey (2005) showed that a small number of SMEs manufacturing firms in Britain survived and thrived through the release of innovative new products.

This paper will focus on process innovation for the manufacturing industry of SMEs in Malaysia. This paper seeks to identify on how the innovative firms perform in several aspects of process innovation such as the application of modern technology, product development and barriers to innovation. The measure of innovativeness and perception of innovation are listed in Table 1 and Table 2.

2. Literature Review

There are a number of recent studies that also looked at a few of contributing factors which might lead to an increase in company innovative performance such as benchmarking, networking (Mitra, 2000; Terziovski, 2003; Massa and Testa, 2004), R&D (Raymond and St-Pierre, 2004) and organisational learning. At the corporate level, corporate entrepreneurship (Zhara et al., 2000) embodying a company's innovation and venturing was found to influence company performance. The same goes to strategic orientation and competitive structure (Salavou et al., 2004) in which a company operates was found to have effects on company innovative performance.

As mentioned above, innovation studies in SMEs are diverse. The literature review also showed research in this area is fragmented in so far as innovation management is concerned, new product development and process innovation were often explored in isolation and, the research normally was often done through field studies, questionnaire surveys or case studies focusing on a small sample of companies.

Based on the literature review, it is found that past literature had identified several aspects of what was considered as critical success factors for innovative strategy in SMEs (Dogson and Rothwell, 1991; Bowen and Ricketts, 1992) and effective strategic formulation in successful small hi-tech firms (Oakey and Cooper, 1991). The success factors highlighted in these studies among others were: (1) promoting a corporate culture, (2) creating structure reflecting in the effective use of systems, and (3) technology and investors in people (IIP) (or also known as process innovation), analyzing competitors, developing co-operations and partnerships similar to the networking concept.

With regard to process innovation, current literature suggested innovation was part of a long-term organizational evolution, customer relationships were important to long-term sourcing both financial and knowledge terms, while human resource development issues were necessary in order to underpin the

two elements mentioned above (Barnett and Storey, 2000). Under the same note, past literature also always hypothesized that SME did not innovate in formally recognized ways and that they made much more extensive use of external linkages (Barnett and Storey (2000) citing Hoffman et al. (1998).

Also another finding by Barnett and Storey (2000) related to this theme was companies emphasized process innovation as much as product innovation. This was further supported by Georgellis et al. (2000) who showed that the degree of innovation in processes closely associated with degree of innovation in new products and services. This finding seemed to contrast with tendency in literature to emphasize either process improvement or new product development. For instance, Blumentritt (2004) found that US SMEs pursued process innovation more than developing new products found that SMEs spent more time developing new ways of producing products or services and new ways of delivering them to customers.

Some studies focusing on new product development suggest that product innovation activities are the cornerstone of better-performed companies and, those with aggressive growth ambitions (Mosey et al., 2002; Mosey, 2005). Mosey (2005) further suggested that manufacturing SMEs by repeatedly introducing innovative new products opens up new market niches, which is essential to their survival.

Innovation literature also places great importance on company learning, benchmarking, training and networking. For example, highly innovative firms were found to place great emphasis on employee development training through industrial education of young people in the locality through modern apprenticeships, student placement and school visits which is a clear contrast with SMEs in general (Barnett and Storey, 2000). Regarding benchmarking, a recent study found that this enables a company to compare its practices and performances with others as well as to acquire external explicit and tacit knowledge, which may lead to improvements and innovations (Massa and Testa, 2004). Other researches also showed that SMEs were better able to innovate when they were part of clusters (Mitra, 2000), i.e. networking. Additionally, a study conducted among Australian manufacturing SMEs suggested that small manufacturing companies was more likely to improve their chances of achieving business excellence through networking than without (Terziovski, 2003).

Moreover, size, age and flatter hierarchies were found to have effects on company innovativeness. White et al. (1988) for example, suggested that the smallest firms (< 20 employees) had the benefit of individualism, the larger firms (> 50 employees) the benefit of more resources and systems, while the intermediate group (20-49 employees) lacked the best of either world. Ettlie and Rubenstein (1987) also suggested the type of innovation that moderated the size relationship. They further stated for radical innovations may require additional funds for technical work, capital investment for plant and equipment, marketing and promotions. Larger size may be a key enabling condition because of access to key resources and addressing these key

issues. Whereas Rothwell and Zegveld (1986) contrasted firm size and innovation across several industries and concluded that the issue of innovation by firm size was not to do with the question of "big" or "small" firms, but with other factors such as different phases in the industry cycle that would vary with technology, markets and government policy.

Little was explored in the literature to determine whether age of the company or how established the company is would have an impact on a company's innovativeness, as far as age is concerned. But, Reid and Garnsey (1996) in their study on small hi-tech companies asserted that companies spent the first ten years to contract out and began a program of product innovation later. This suggests that age may have an impact on company innovativeness. Flatter structure or hierarchies were also suggested to be the norm in successful SMEs (Heunks, 1998; Motwani et al., 1999; Chandler et al., 2000; Georgellis et al., 2000; Beaver and Prince, 2002).

3. Methodology and Research Design

A mail survey was conducted randomly among chief executives (CEOs)/owners of 400 Small and Medium Enterprises (SMEs) manufacturing firms located in Peninsular Malaysia. The list of companies was obtained from the 2008 Federation of Malaysian Manufacturers (FFM) Directory of Malaysian Manufacturers. Of the 400 questionnaires mailed, a total of 54 were returned giving a response rate of 10 per cent, four were non-usable. Based on our working definition of innovation as "seeking new or better products, processes and/or work methods" (Laforet & Tann, 2006), CEOs/owners were asked questions about their perception on the company's innovative characteristic which in this study is focusing mainly on process innovation (e.g. new product development, systems and technology). As for dimensions of process innovation, 1-5 Likert scales were used to measure respondents' perception i.e. to vary from very low importance to very high importance perceptions, of variables as listed in Table 4 below.

The responses were entered into a SPSS database and analysed using both descriptive statistics and inferential statistics to generate hypotheses and validate the results observed.

Criteria used to measure the level of innovativeness of a company are listed as in Table 1 below:

Table 1: Measure of the level of innovativeness

(1) number of new product ideas a company had in last five years; (2) number of new product(s) launched in last five years; (3) number of product (s) improvement introduced in last five years; (4) innovation prize(s); (5) when the newest product introduced; (6) the percentage of sales from this product; (7) extent to which major customers provide specification for new product(s); (8) level of investment in systems and technology for office; (9) level of investment in systems and technology for shop floor; and (10)new or improved ways of working in last five years.

Those ten indicators derived mainly from referencing the United Kingdom's 1993/1994 DTI (Department of Trade & Investment) / CBI (Confederation of British Industry) report.

Then, the same methodology as Laforet & Tann (2006) is adopted where top 20 per cent companies, which scored high on the ten criteria above, were compared with the bottom 80 per cent companies, which scored low on the same criteria. The former companies would be referred as "more innovative" companies, the latter as "less innovative" companies. The grouping is such that because, like (Laforet & Tann, 2006) it is found that none of the companies surveyed were consistently innovative over the ten indicators above (Table 1). Some led on certain innovations and followed on others and this is not unusual.

T-tests were then performed to determine whether any significant difference exists between means of responses from more and less innovative companies on the independent variable mentioned above; process innovation (e.g. new product development systems and technology).

4. Discussion of Findings

Process Innovation.

The results showed more innovative companies have a better systems and technology in place than less innovative companies. With regard to computer-aided design (CAD) and computer-aided manufacturing (CAM) processes, more innovative companies perceived that the uses of CAD (M = 4.67, SD = 0.49, N = 12) and CAM (M = 4.50, SD = 0.52, N = 12) as at the high level of importance than less innovative companies where the use of CAD (M = 1.79, SD = 0.65, N = 38) and CAM (M= 1.79, SD = 0.82, N = 38) are perceived to be of low importance (Table 2 shows a significant difference between more and less innovative companies on these two variables based on t-test conducted).

Table 2: Mean and Standard Deviation of Process Innovation Perception

Table 2

Process innovation

Items	Statement	Overall		More Innovative		Less Innovative	
		Mean	SD	Mean	SD	Mean	SD
1	use of CAD	2.37	1.31	4.67	0.49	1.79	0.65
2	use of CAM	2.33	1.34	4.50	0.52	1.79	0.82
3	employee suggestion scheme	3.12	1.11	4.58	0.52	2.75	0.89
4	new ideas for products and processes evaluated by team members	2.48	1.20	4.42	0.52	2.00	0.74
5	criteria for evaluating new product projects are known by everyone	2.65	1.27	4.67	0.49	2.15	0.83
6	time	4.48	0.50	4.67	0.49	4.44	0.50
7	money	4.45	0.59	4.50	0.52	4.44	0.62
8	knowledge	4.62	0.59	4.58	0.52	4.63	0.61
9	market demand	4.07	1.26	1.83	0.72	4.63	0.53

Part of process innovation identified in literature on large firms and the Dogson and Rothwell (1991) report includes the organization for new product development, such as the use of an employee suggestion scheme, new ideas for products and processes evaluated by team members and the criteria for evaluating new product projects are known by everyone in the company. Similarly, Mosey et al. (2002) raised the issue of cross-company communication of decisions and plans in successful SMEs manufacturing firms. The results showed that more innovative companies perceived that employee suggestion scheme to be of high importance (M=4.58, SD = 0.52, N = 12), a new product development team taking the lead in implementing new product projects also is perceived to be of high importance (M = 4.42, SD = 0.52, N = 12) as well as the criteria for evaluating new product projects were known by everyone in the company (M = 4.67, SD = 0.49, N = 12).

Consistent with Laforet and Tann (2006), in this study, more innovative companies also differed from less innovative companies in terms of the CEO/owner's background and their perception of barriers to innovation. The results showed in more innovative companies, the CEO/owner's background were in sales/management accounting/self-employed as opposed to a background in engineering. More innovative companies also perceived time (M = 4.67, SD= 0.49, N = 12), money (M = 4.50, SD = 0.52, N = 12) and knowledge (M = 4.58, SD = 0.52, N = 12) as barriers to innovation, while less innovative companies perceived time (M = 4.44, SD = 0.50, N = 38), money (M = 4.44, SD = 0.62, N = 38) , knowledge (M = 4.63, SD = 0.61, N = 38) and market demand (M= 4.63, SD = 0.53, N = 38) as barriers to innovation.

The findings suggest that one of the drivers of innovation in small manufacturing firms in this study is process innovation including leadership factor and culture. Based on the drivers, it is found that there is perception that SMEs manufacturing firms' main drawbacks are lack of knowledge and skills, networking, and training due to perhaps lack of financial resources. With regard to skills, Scott et al. (1996) reported that SMEs' lack of suitability skilled or trained personnel to be a major business problem in the third quarter of 1988.

The findings showed that innovative companies provided a good level of training. However, in less innovative SMEs, training is perceived to be not important (M=2.13, SD = 0.87, N = 38) compared to more innovative companies which perceived it to be of high importance (M = 4.67, SD = 0.49, N = 12). Scott et al. (1996) suggested that small manufacturing companies were lacking in terms of skills and technology.

5. Conclusion and Limitation

Finally, it is important to note that this study was subject to a number of limitations. First, the response was very poor, only 54 response out of 400 firms. This poor response was mainly due to time constraints. Most of the firms that failed to participate in this study were approached using mail surveys and were given only 2 weeks to respond. Second, the study was based on a survey. This approach has shortcomings as it captures a situation or an event at a point in time. In the future similar to Laforet & Tann (2006), it is recommended that this research needs to be complemented by qualitative more detailed research aiming to provide an insight into companies' innovative behavior, to address issues such as whether innovation is associated with cost reduction, profit, turnover, or return on investment and whether it is associated with growth or recession as company history, how they start up and how they aim to continue.

In conclusion, the study had examined process innovation for a specific industry i.e. the manufacturing industry of SMEs only. This is for two reasons: one, previous studies did not focus specifically on particular industry (Leseure 2000), hence the advice for these companies were too general and therefore, not sufficient in terms of assisting the particular sector. Secondly, manufacturing sector is very important for the Malaysian economy and this study would be able to give some insights on the perception of process innovation in this particular industry.

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