

## The importance of technology diffusion in Malaysian Manufacturing SMEs

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**Abstract.** This paper researches the importance of technology diffusion and adoption in Malaysian manufacturing SMEs. Semi structured interviews were conducted with the decision makers of four Malaysian manufacturing companies to get their insight into the topic. Their reasons for adopting or not adopting new technology into their business operations have been gained for further research purposes.

**Keywords:** Technology diffusion, adoption, Malaysian manufacturing SMEs

### 1. Introduction

This paper will discuss the importance of technology diffusion and adoption in Malaysian manufacturing SMEs. According to Bryne (2000) and Scott (1999), an organization will be at a competitive disadvantage if unable to sustain the technology diffusion process because it will not be able to adapt to the speed and instability caused by technological change. Recker, Goldsby & Neck (2002) mention that the challenge for today's business company is to develop capabilities that support adaptation to technological advancement and increased competition. Technology can be a powerful tool to gain competitive advantage for two primary functions: 1) for supporting the business processes to produce products or services which are cost effective and 2) for the time savings through the improvement of productive yields (Hussain, Sushil & Pathak, 2002). Technological progress crucially depends on the diffusion and adoption of new technologies (Fuentelsaz, Gomez & Polo, 2003). Thus, managing the process of technology diffusion is imperative to ensure the implementation of technology (Rogers, 2003).

Referring to the Malaysian scenario, technology adoption among Malaysian Small and Medium Enterprises (SMEs) has become an important issue because of its significant contribution to Malaysia's economic development (Abdullah, 2002). The ability of SMEs to utilize technology will enable them to be more competitive and sustainable.

However, the process of technology diffusion is misunderstood by some, and Malaysian technology policy continues to focus mainly on encouraging innovation and not the diffusion of technology (Rosnah, Lo & Hashmi, 2005). Rosnah, Lo & Hashmi (2005) indicate that such policy leads to too little adoption of technology in the Malaysian manufacturing industry. Rosnah, Megat & Osman (2004) stated that though the Malaysian manufacturing SMEs are aware of the potential benefits of manufacturing technologies, these manufacturing companies have a lack of understanding of the specific ways in which technology can help businesses.

An initial set of semi structured interviews were conducted with decision makers of four Malaysian manufacturing companies to get their perceptions of the diffusion of technology in their company. Their

opinions on the reasons for adopting or not adopting new technology into their business operations was obtained and will provide an indication for further research.

## 2. Malaysia, SMEs and technology

The Malaysian Government is most concerned about technology development in Malaysia. In the Seventh Malaysia Plan (1996-2000), the Malaysian Government formulated various policies and incentives to upgrade and develop indigenous technological capabilities of Malaysian owned companies. The Malaysian Government created an environment for Malaysian companies to upgrade their competitive advantage by introducing more sophisticated technology and methods, and for venturing into more advanced fields. In the Seventh Malaysia Plan (1996-2000), Small Medium Industries (SMIs) contribution to overall development of the manufacturing sector was less effective than it could have been. The reasons were the smallness of their size which hampered them from adopting advanced technology, employing more skilled workers, increasing their production capacity, expanding their market or enjoying economies of scale.

In the Eighth Malaysia Plan (2001-2005), the Malaysian Government continued its efforts to promote technology where innovation-driven and technology-led development was prioritized. Moreover, one of the policy thrusts in the Eighth Malaysian Plan (2001-2005) was to increase the use of technology by Malaysian manufacturing companies. The Malaysian Government placed its effort to strengthen Malaysia SMEs with introduction and implementation several programmes including the Technology Development and Acquisition, Skills Development and Upgrading, Market Development, Infrastructure Development and Financial Support, Industrial Linkage (ILP) Programmes (Figure 1).

The Malaysian Government effort continues in the Ninth Malaysia Plan (2006-2010). The Malaysian Government is aiming to move Malaysia towards developed nation status through emphasising science, technology and innovation development. Malaysia encourages the wide diffusion and use of science and technology to optimize the quality of life and to ensure higher standards of living for the nation including wide usage in manufacturing companies (The Ninth Malaysia Plan, 2006-2010). It is one of the Malaysian Government's policy thrusts to develop innovation-driven manufacturing SMEs to compete in global markets. Even though it is mentioned that the overall performance of SMEs in manufacturing sectors improved, there are still concerns of inadequate technological capability and low adoption of enabling technologies.

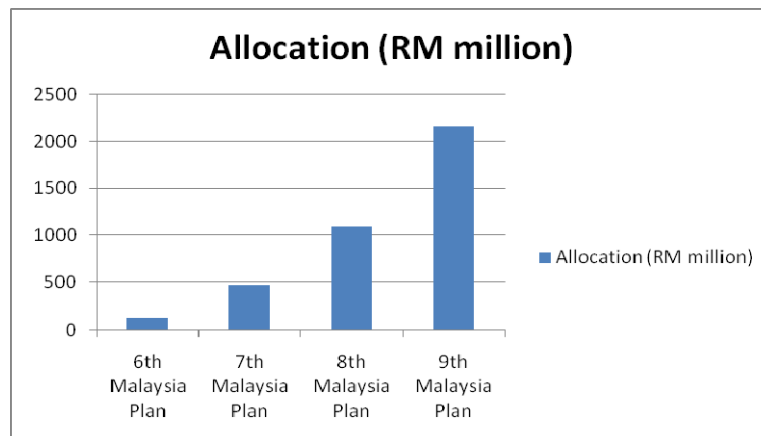


Figure 1: Allocation for SMEs development (6<sup>th</sup>, 7<sup>th</sup>, 8<sup>th</sup> & 9<sup>th</sup> Malaysia Plan)

In summary, the Malaysian Government efforts to accelerate technology diffusion and development in Malaysian manufacturing SMEs are not only limited to policy making but also include various incentives including financial assistance and technological infrastructure. This indicates that the Malaysian manufacturing SMEs are very important as contributors in generating economic growth, but has the significant Malaysian Government direction and commitment been as effective as it could have been?

## 3. Methodology and findings

The study used semi-structured interviews with decision makers of four Malaysian manufacturing companies to solicit views on the reasons they adopt new technologies into their companies. The goal of the semi-structured interview was to ascertain their ideas and perceptions of technology diffusion and adoption.

### 3.1 The role of the interviewee in their company regarding technology decision making

The interviewees (Table 1) were asked about their position in the company. The researcher also wanted to know their role in terms of technology decisions in the company. The rationale was to ensure their knowledge of technology and their authority in decision making.

People	The role of the participants interviewed
Mr. A	A project manager in a medium sized electronics based manufacturing company. He is responsible for deciding certain company projects and what technology is suitable for the project.
Mr. B	An operations director in a medium sized electronic based manufacturing company. He is in charge of operations. He also has the authority to decide which technology the company will adopt.
Mr. C	A manager of a small sized food based manufacturing company. He manages the operations and administration of the company. He decides what technology or equipment is to be used in the company.
Mrs. D	A managing director of small size oil and gas equipment manufacturing company. She is accountable for business development and financial viability of the company. She makes decisions on technology after discussions with the executive vice president of the company.

TABLE I. THE ROLE OF THE INTERVIEWEE IN THE COMPANY REGARDING TECHNOLOGY DECISION MAKING

Two participants were from medium sized companies and two were from small sized companies. The definition of small and medium manufacturing companies was adopted from the Secretariat to National SME Development Council (2005). ‘A small enterprise in manufacturing (including agro-based) and manufacturing related services is an enterprise (company) with full-time employees of between 5 and 50. A medium enterprise in manufacturing (including agro-based) and manufacturing related services is an enterprise (company) with full-time employees of between 51 and 150’ (Secretariat to National SME Development Council, 2005).

### 3.2 Reason to adopt or not to adopt new technology

Table 2 shows the reasons why the Malaysian Manufacturing SMEs adopted new technology into their business operations. Some of the reasons are to be competitive in the market, to differentiate from the competitors and emerge with new products to sustain their businesses. These results are consistent with other studies (Rosnah, Megat & Osman, 2004) and suggest that manufacturing companies are aware of the potential benefits of the manufacturing technologies.

People	Summary: why adopt new technology?
Mr. A	- To enhance product line. In order to give benefits to customer. - To innovate the products
Mr. B	- To keep up with the market requirement
Mr. C	- To differentiate from competitors
Mrs. D	- To have a niche and differentiation

TABLE II. REASONS TO ADOPT NEW TECHNOLOGY

Table 3 shows the factors that hinder the intention to adopt new technology. Decisions were most influenced by customers, cost and resources. While they were aware of the new technologies, they had doubts about the implementation into their business operations.

People	Summary: why not adopt new technology?
Mr. A	- If the demand of the customer is less, there is no point in adopting new technology into product line - Doing own R&D and developed own technology
Mr. B	- Doing own R&D but not patented because it is very expensive to patent new technologies
Mr. C	- Cost and resources

Mrs. D	- Don't have enough resources to implement the technology
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TABLE III. REASONS NOT TO ADOPT NEW TECHNOLOGY

These participants' involvement in technology adoption mostly seems to depend on the companies that they affiliate or associate with because technology transfer from large size companies is perceived as less of a risk. One of the companies will only consider new technology into their business operations if it has value for money. Investment of new technology not only incurs cost but also demand for specially trained resources. Two companies undertake their own R&D to develop new technologies for their company.

## 4 Conclusion

This paper has researched the importance of technology diffusion and adoption in Malaysian manufacturing SMEs, Malaysia Plans (1996-2010) on technology and SMEs, and opinions on the reasons four Malaysian manufacturing companies' decided to adopt or not to adopt new technologies into their business operations.

This research shows that the Malaysian Government's financial allocation for SME technological development is increasing (7<sup>th</sup>, 8<sup>th</sup> and 9<sup>th</sup> Malaysia Plan). This evidence suggests that the Malaysian Government recognizes that SMEs play a significant role in the nation's economy and wellbeing. The numbers of Malaysian manufacturing SMEs are increasing year by year where in 1996 there were 20200 establishments reported (8<sup>th</sup> Malaysia Plan) and this increased to 33113 establishments of 2005 (9<sup>th</sup> Malaysia Plan). This indicates the need for thorough attention from the Malaysian Government towards Malaysian manufacturing SME's development. Malaysian manufacturing SME's attitude as to whether they adopt or do not adopt technology in their business processes should be taken into account for future technology development and investment in Malaysia.

The issues are whether the Malaysian Government policy and its significant assistance (RM2160.2 million or US655 998.45 allocated for 9<sup>th</sup> Malaysia Plan) for Malaysian manufacturing SMEs is less than effective, or that the Malaysian manufacturing SMEs may be less than competent. Further research and discussion to explore the factors that facilitate or hinder technology diffusion and adoption is necessary to gain more understanding<sup>2</sup> of the impact of technology on Malaysian manufacturing SMEs.

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