

SUSTAINING COMPETITIVENESS THROUGH PRODUCT DEVELOPMENT ACTIVITIES WITHIN MALAYSIAN AUTOMOTIVE SUPPLIERS

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Keywords: *Product development, SMEs, automotive suppliers, competitiveness.*

Abstract *The local automotive suppliers are facing a number of important challenges such as globalisation, new requirement in market specifications and the competition brought about by the Asean Free Trade Area (AFTA) agreements. In an effort to enhance the competitiveness of the manufacturing sector, the government has implemented the Second Industrial Master Plan, IMP2 (1996-2005). The focus of the IMP2 is more on innovation and applications of new technologies, so that industries can move up the value chain of their activities. Innovative capabilities achieved from companies' new product development activities have been recognized to be crucial for companies to sustain their competitiveness and organisational success. The importance of product development is most obvious in the context of the discussion on the competitiveness of the Malaysian automotive suppliers. The study will focus on the small medium enterprises (SMEs) that make up more than 60 % of these automotive suppliers. The study is to determine the extensiveness of the suppliers' product development activities by examining the involvement of the suppliers in customer's product development activities. Consequently, the impact of this involvement to the competitiveness of the suppliers is examined. The results were established based from a survey to parts and components suppliers of Proton, the Malaysian car national assembler. The study has shown that the SMEs were involved from the early stages of the product development process that is during the design stage. The product development efforts have shown to contribute towards increasing firms' market share and firms were also able to gain a better understanding of future product demand. A significant number of the suppliers have managed to penetrate the export market. Unfortunately, among the respondents, there is only one system supplier. This indicates that, either the technological capabilities of the SMEs still needed upgrading for the requirement as a system suppliers or it may not be the only deciding factor for suppliers to be chosen as system suppliers. It is intended that this paper should serve to inform management in particular the suppliers on the present status of the SMEs in seeking to improve their competitiveness from product development effort.*

Introduction

It is seen that one of the objectives of the Malaysian National car project; that is spearheading development of local component industries has been almost successful. The development of the local component industries that is suppliers to the car assemblers particularly in terms of numbers has been encouraging. The number of companies in operation in the manufacture of automotive components

has increased from about 300 in 2001 (Malaysia Industrial Development Authority, 2002) to presently more than 350 manufacturers in 2003 (Malaysia Industrial Development Authority, 2004). These components have contributed to local content of over 70 percent and 50 percent respectively for Proton and Perodua; the first and second national car assembler respectively. However, these

increased in numbers do not reflect whether one of the objective of the set-up of the industry that is encouraging the upgrading of technology with emphasize on technical and engineering skills of the company have been achieved. The Second Industrial Plan Malaysia, IMP2 (1996-2000) also have focus on innovation and applications of new technologies.

The development of new products is important for the survival of companies. It has been widely acknowledge that competitive advantage maybe achieved from involving suppliers in product development activities with suppliers. Thus, a study on the product development activities is most obvious in the context of the discussion on the competitiveness of the Malaysian automotive suppliers.

Proton has given their suppliers more responsibilities in the development of parts and pushing the engineering responsibilities to the suppliers. During the initial stage the suppliers were included at the tooling stage. Subsequently, in the 'Waja' model project launched in 2000, Proton brought the suppliers into the product development scene earlier then the previous projects; from design stage.

Involvement during co-design (i.e. at a very early stage of the Original Equipment Manufacturer (OEM) product development process, has a positive impact on project performances mainly cost, quality and lead times (Clark and Fujimoto, 1991).

The purpose of this study is to determine whether the involvement in product development activities have improved the competitiveness of the supplying firms. The ability of suppliers to penetrate other markets by being more responsive to customer's needs and the ability to contribute towards technical knowledge can indicate the competitiveness of the firms.

The study will focus on the small medium enterprises, the SMEs. There is a need to principally address the small medium enterprises or SMEs as they made up a large proportion of the automotive parts and components industry. To date, 62.7 percent of the 196 local vendors to Proton, the first national car assembler and Perodua, the second car project are SMEs. Furthermore, there is a need to investigate the competitiveness of the SMEs because it is often assumed that the size of the SMEs make them less capable of investing in product development activities and thus making them less competitive in comparison to the non-SMEs.

Supplier Involvement in Product Development

The involvement of supplier's in product development has long been the forte of the automotive industry. The intensifying competition and increased globalization is seeing a change in the basic methods of making cars. It is well known fact that the involvements of suppliers in product development activities contribute to the competitive advantage of the Japanese car industry enabling them improve delivery time, cost and quality performances (Clark, 1989) and become world leaders.

As products continue to become more technically complex and global in scope, assemblers must rely more on their suppliers (Swink and Mabert, 2000). Such that, (Bruce *et al.*, 1995) advocates that, the collaborative effort is regarded as one of the most strategic decision in a business agenda with no clear alternative. But, the reasons for collaborating are mostly biased toward the assembler or customer. For example, suppliers were included where buyers require greater flexibility and decreased product life cycles with the further advantage of

spreading risks of component development with the suppliers (Quinn, 1992). To the suppliers the main objective maybe meeting customer's requirement of supplying low cost, quality products and delivering them on time. However, the ability of a supplier to access other markets and better understanding of future product demand provide better standing for firms.

The question is when should the suppliers be involved? Supplier involvement may range from simple consultation on design ideas and suggestion to making suppliers responsible for the complete development, design and engineering of a specific part or sub-assembly (Ragatz *et al.*, 2002; Wynstra and Pierick, 2000). Although, as shown in Figure 1, suppliers' involvement maybe sought at any point in the development process, it will become increasingly difficult and costly to make design changes in the later stages (Monczka *et al.*, 1995). It is seen that the changes at the concept and engineering stage has the most significant effect on total cost of product (depicted as the area in the dotted circle in Figure 1). De Toni *et al.* (1998) have offered a more detail breakdown of the suppliers' involvement. These activities were used in determining the technical support that may be offered by the suppliers. The design activities are

examined in three different stages. The activities include:

- a. During the product concept and functional design stage:
 - i. Provide complete and true information regarding the technological expertise
 - ii. Contributed to the identification of new materials and new product
- b. During the product structural design and engineering stage:
 - i. Contributed towards simplifying product design
 - ii. Provide useful information for making decisions regarding the choice of product components
 - iii. Contributed to the design/use of standard components
 - iv. Contributed towards designing resources
 - v. Timely and reliable in making prototypes
 - vi. Provided information relating to modification carried out during prototyping stages
 - vii. Make contributions to FMEA
- c. During the process design and engineering stage:
 - i. Contributed to application of DFM/DFA techniques
 - ii. Support in process engineering equipment

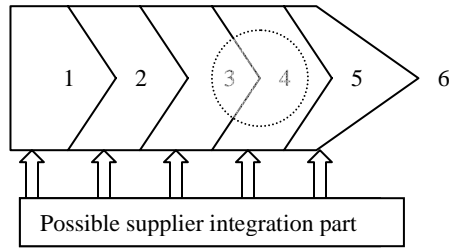


Figure 1. Stages of involvement of suppliers in customer’s product development activities

Table 1. Description of the stages in the product development process

Stage	Process elaboration
1	Idea generation
2	Preliminary assessment
3	Concept development
4	Engineering and design
5	Prototype
6	Full scale operation

Research Methodology

The study is based on a survey and interviews. The samples of the study are the small and medium enterprises, SMEs that are supplying parts to Proton, the first national car assembler Proton.

In this study, SMEs are defined as enterprises with full time employees not exceeding 150 or enterprises with net assets of not more than RM 2.5 million. These companies are involved in various business activities including rubber, metal stamping, forging and electrical.

To ensure the validity of the data the survey were targeted to the person most likely to be involved with the product development effort. In most cases, was addressed to the top management of the companies.

Research Questions

In the survey, the respondents are requested to provide the general information regarding the company. The other questions addressed in this paper are: (1) the level of involvement in the product development activities (2) the market of the suppliers and (3) the outcomes that are related to the competitiveness of the firm as a result of the involvement in product development activities. Questions (1) and (3) were answered on a set of five Likert questionnaires; scale 1 strongly disagree to scale 5 strongly agree. Answer to scale of 4 and greater is considered as agreeable.

Result and Discussion

All the respondents were in the best positions to answer the questions in the survey. 4 respondents were either the managing director or general manager, 12 were R&D manager or similar post with 12 holding executives post which include business development manager and similar job title. It is assumed these are the best people to response to the questions given in the survey. This is significant with respect to the validity and accuracy of the information provided. The following results are aggregated, without distinguishing the types of industries as the objective of this paper is to only show the trends in the product development activities and the resulting impact on the competitiveness of the SMEs.

Involvement in the different phases of the design and engineering activities

Table 2 shows the number of companies that are involved during the design and engineering stages. The survey was administered to a total of 151 companies after some pre-determined criteria are taken into account (Cavana *et al.*, 2001). As 62.7 % was established to be SME's, thus the target sample was 95. To improve response rate, phone-calls were made to companies. It is established that many companies were reluctant to cooperate because they were not convinced of their contributions in customer's product development activities. A total of 28 SME's companies responded. This gives a response rate of 29.47 %. Although the response rate is low, it is believe that the SMEs are well represented. This is because most companies that responded were convinced of their contributions. The survey response is being dominated

by metal industry that is 14 companies, 3 from electronics and electric, 3 are plastics, 5 are rubber and 3 others. This was expected as the metal industry is one of the pioneer industries in Malaysia.

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Involvement in the different phases of the design and engineering activities

Table 2 shows the number of companies that are involved during the design and engineering stages.

It is noted that the majority of the respondents indicated that the company were involved during the first and second design stages. But, the mean for all the stages were found to be less than 4. The design stage is important because it is during this stage that suppliers may contribute their knowledge and expertise. Ragatz *et al.* (2002) established that the knowledge and expertise offered by the suppliers has helped reduce concept-to-market customer cycle time, costs and quality problems and improve overall design effort.

Table 2. Involvement in design and engineering

Stages	Number 28 (mean)
Product concept and functional design <ul style="list-style-type: none"> • identify technology expertise • Identify new material 	24 (3.86) 21(3.68)
Product structural design <ul style="list-style-type: none"> • simplify design • contribute on decision on choice of components • design product to suit resources • make prototypes on time • modify prototype 	20(3.68) 24(3.86) 21(3.75) 25(3.64) 23(3.79)
Process design <ul style="list-style-type: none"> • application of design for manufacture and assembly • support in process engineering equipment 	12 (3.25) 12(3.25)

Relatively, the number of suppliers that are involved during the process design stage was very much lower as compared to during the concept development and design stage. General comments from interviews have established that all suppliers hoping to supply to customer were included during the initial stage of the discussion. Thus, this explains the high number of involvement during the first two stages. Although many of the suppliers were involved during the initial stage only a few were given the contract to supply to Proton. These companies do not continue to the third stage that is the process stage. It is noted that process design stage is an important feature of the suppliers' involvement because during this stage the manufacturing engineers work together with the design team by inputting their requirements from the very start of a product. If suppliers are

not included during this stage, the manufacturing capability of the supplying firm cannot be put to the test.

Suppliers' market

Table 3 shows the different markets that the suppliers are supplying. The survey shows that all the responding companies are supplying to the OEMs. This also confirms the validity of the survey sample as Proton is one of the OEM in the country. It is noted that 32.1% of the SMEs have penetrated the export market. This gives evidence that the technical capability of the automotive parts and components suppliers particularly the SMEs are being recognised by OEMs outside Malaysia. It was also found that one of the SMEs has been upgraded to a system supplier. This signifies better future for the suppliers.

Table 3. Suppliers' market

Suppliers' market	28 (100 %)
Original Equipment market (OEM)	28 (100 %)
Replacement market	14 (50 %)
Export market	9 (32.1%)

Influence of SIPD on firms' competitiveness

In the study, from Table 4, it is encouraging to note that a majority of the SMEs have indicated that they have been able to understand future product demands and thus become more responsive to customer's demand with means of 4.07 and 4.00 respectively. This is encouraging since this indicates

that the suppliers are ready to venture into the market place and will be less dependable on Proton for business.

Although, the mean for the technology part is less than 4.00 the continuity of demand can increase the likelihood of investments in R&D, training and procurement of new and more efficient equipment to meet market demands.

Table 4. Investigating firms' competitiveness

Statement	28 (mean)
Improved market share	24 (3.86)
Market:	
• Gain better understanding of future product demand	25 (4.07)
• Become responsive to market needs	26 (4.00)
Technology:	
• Able to align technology to customer requirement	26 (3.96)
• Able to find better application for in-house technology	23 (3.86)

Conclusion

In this paper it is shown that the SMEs are actively involved in product development efforts with the customer. It is established that the suppliers were involved from the early stage of the design activity and were thus able to offer their expertise and knowledge. The product development efforts with the customer have provided a good base for suppliers to improve their capabilities. Although, many of the suppliers did not manage to eventually supply to the customer, it is believe that the

involvement have provided a good exercise for the suppliers. This is seen in the number of suppliers that have penetrated the export market. This is understandable as the market demand in Malaysia is limited and suppliers that plan to expand their business will need to look for markets outside Malaysia.

This paper has indicated that the automotive parts and components suppliers particularly the SMEs are moving in the right direction. This is important if the SMEs need to sustain their competitiveness. From the findings we believe that the SMEs can access new

markets as their knowledge and capabilities are further developed. A more detailed study need to be conducted

to examine the effectiveness of the different stages of the involvement.

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