

PROPENSITY OF PRODUCT INNOVATION IN MALAYSIAN MANUFACTURING COMPANIES

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INTRODUCTION

The significance of new product development (NPD) to corporate success has drawn numerous studies over the last forty years. (NICB 1964; Cooper 1979, 1980; Calantone and Cooper 1981; Booz, Allen and Hamilton 1982; Maidique and Zirger 1984; Cooper and Kleinschmidt 1986, 1987, 1990). These studies have confirmed that new products are crucial to the financial well being of companies, making product development an inevitable function for most corporations.

The general conclusion from these studies, among others, indicates that a substantial percentage of company sales and profits are derived from products which did not exist five to ten years ago (Booz, Allen and Hamilton 1982; Johne 1985). These studies, however, have been principally conducted in the industrialized economies. Very few studies have been attempted to understand the nature and practices of new product innovation and development in the industrializing economies.

Involvement of companies in new product innovation and development in developing countries remain unclear. Many of the activities of firms in these countries have not been explored, particularly the methods of conducting new product innovation and the critical success factors in their development. It has not become obvious whether the attributes for successful product development in the industrialized economies also characterize firms in the industrializing economies.

OBJECTIVES OF THE STUDY

The objective of this study is to establish the role of new product development to corporate competitiveness in Malaysian companies. The study investigates significant

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issues relating to the techniques and procedures by which new products are conceived and introduced to the market as well as issues involving managerial responsibilities and planning in developing new products.

To achieve the above objectives, theories and practices of NPD of industrialized countries are reviewed and used as a basis for understanding NPD practices in Malaysia. This approach is taken because the theories and practices of NPD in western countries are deemed to be more developed due to their established and long-standing research and thus provides a broad-based framework from which to study NPD practices in Malaysia.

NEW PRODUCTS

Sampson (1970) offered a definition of a new product. According to him, a new product is one that:

- Satisfies new need, wants or desires,
- Possesses outstanding performance in such need satisfaction compared to other products, and
- Benefits from an imaginative combination of product and communication.

White (1976) defines new products based on a continuum of newness. On one extreme, new products can fall under the category of revolutionary products characterized by high novelty, radical breakthrough products and on the other, evolutionary products, characterized by low novelty.

In their study of new product introduction success, Booz, Allen and Hamilton (1982) propose 6 types of new products based on the degree of newness to the firm and market. These products include:

- radical products, i.e. products that are completely new to the world (10%).
- new product lines, i.e. products that are new to the organizations but not necessarily new to the markets (20%).
- additions to product lines, i.e. products that supplement an organization's established product lines (26%).
- modified products are existing products that have undergone some major or minor improvements (26%).
- repositioned products are existing products that are targeted to new market segments (11%).
- cost reduction products are new products that provide similar performance but at a lower cost (7%).

Other descriptions of new product are based from a consumer standpoint. It is argued that newness of a product depends on how customers perceive this product based on the attributes for which the product can be new to them. In this regard, products are new if it has improved performance, or have accrued benefits from its use.

For the purpose of this study, a new product is one that is new to the firm. This definition means that the newness of a product is unaffected by the fact that other companies are marketing an identical product, or that consumers fail to perceive the product as new.

New Products and Company Success

New and innovative products have been widely accepted as the cornerstone for economic growth and survival for corporation and nation (Booz, Allen and Hamilton 1963, 1982; Ughanwa and Baker 1986). They are crucial to the survival and growth of a company (Booz, Allen and Hamilton 1968; Cooper 1986; Baker 1982; Cooper and Kleinschmidt 1991; Baker and Hart 1993). It is regarded as the organization's lifeblood that nurtures and sustains its existence (Buggie 1981; Barclay and Benson 1990). For companies that operate in a rapidly changing environment, innovation has become the key factor in their economic success. The emphasis on innovation as a success factor has been well recognized such that Drucker (1955) elevated the role of innovation to be as critical and fundamental as that of a marketing function.

The significance of new products can be seen to affect an organisation in 3 major ways:

- (a) A major contributor to company growth,
- (b) A primary influence on profit performance, and
- (c) A key factor in business planning.

Booz, Allen and Hamilton (1963) found that companies that spend an increased amount of capital on new product development tend to achieve greater rate of growth. A major proportion of this growth is attributable to sales and profitability of new products. This is evidenced by a survey in 1982 involving more than 700 U.S. manufacturing companies and over 13,000 new products which indicates that new products contribute to an increase of over 30 percent in sales and 40 percent in the overall corporate profit.

New products contribution to profit performance can be seen from the product life cycle (PLC) concept. The product life cycle describes a pattern of changes that most products go through from the point they are conceived until they are phased out from the market. A point will be reached when demand for the product will decrease

especially towards the end of the maturity stage. This is due to changes in the market needs or competitors' actions. It is important at this stage for company to have alternative newer products to replace old ones where there would be a continuous flow of new products and phasing out of unprofitable ones.

A prudent product planning is important. The purpose is to provide firm direction for which organizational resources can be directed and to adjust company's resources according to the changing environmental condition. Product planning must be formulated around corporate strategic objectives.

DATA COLLECTION

A questionnaire was used to collect the data. In formulating this questionnaire, a number of previous studies were consulted (Cooper 1979; Calantone and diBenedetto 1988; Calantone et. al. 1993; Rothwell 1972; Kheir-El-Din 1990; Baker and Hart 1989; Khanwalla 1977). The resultant questionnaire incorporated questions from these studies since most of the questions have been tested to have high reliability scores of over 0.70. Interviews were conducted as well. The respondents were selected from the Federation of Malaysian Manufacturers Directory. A total of 614 questionnaires were mailed to a random sample of Malaysian companies. 201 questionnaires were received, representing a 33 percent response rate.

Table 1: Profile of Respondents by Industry Classification

Industry Classification	Frequency	Percentage (%)	National Average (%)
Chemicals, petroleum, coal, rubber and plastic products	64*	34.6	29.4
Fabricated metal products, machinery and equipment	33	17.8	18.9
Electrical and electronics products	31	16.8	13.7
Food, beverage and tobacco	13	7.0	10.2
Basic metal industries	11	6.0	5.3
Wood and wood products	10	5.4	4.8
Non-metallic mineral products	9	4.9	6.7
Textile weaving apparel and leather	8	4.3	5.4
Paper and paper products	6	3.2	5.6
Total	185	100.0%	100.0%

*To be read: 64 companies (34.6%) fall under Chemicals, petroleum, coal, rubber and plastics industry.

Profile of Respondents

Companies that participated in this survey represented a cross-section of the manufacturing industry in Malaysia (Table 1). They are deemed to represent close approximation of their composition in the population. Greater participation was obtained from companies that belong to the newer and faster growing industries, i.e. chemicals and petroleum, and electronics industry. This is also reflective of the country's national policy for a relatively higher proportion of NPD in these sectors.

The above industry sectors were re-classified into:

- modern industry, comprising chemicals, petroleum, coal, rubber and plastic products, fabricated metal products, machinery and equipment, and electrical and electronics products, and,
- traditional industry comprising food, beverage and tobacco products; basic metal industries; wood and wood products; non-metallic mineral products, textile weaving, apparel and leather and paper and paper products industry.

FINDINGS

The first few findings below provide a profile characteristics of Malaysian manufacturer's involvement in NPD. The result in Table 2 indicates if their organizations had developed any new products in the past 5 years. Of the 185 companies that responded, 124 companies or 67 percent indicated that they were actively involved in new product development during the past five years. The remaining 33 percent of the companies were not actively involved in developing new products during the same period.

This finding suggests that there has been an increasing trend in the Malaysian manufacturing sector to embark on new product development, although the initiation has come only rather recently.

Companies that are active in developing new products are mainly large manufacturers (44 percent) although small to medium size manufacturers seem to have been rather active in NPD as well. This seems to suggest that NPD is not idiosyncratic of companies of a specific size.

Companies that are involved in NPD are those that are relatively new in their operation. More than half of them (51 percent) were established during the past 10 years, which suggests that NPD is a fairly new phenomenon for Malaysian companies. However, it is starting to gain popularity perhaps due to the shift in the country's industrial policy

which places greater emphasis on manufacturing. It also indicates that companies are beginning to realize the impact of new products on their corporate performance.

Table 2: Characteristics of Respondents

Involvement in NPD during the past 5 years		Frequency	Percentage(%)
Developed new product		124*	67
Do not develop new product		61	33
Total		185	100%
Industry/Size	Small	Medium	Large
Modern industries	25 (28.7%)	24 (27.6%)	38 (43.7%)
Traditional industries	5 (13.9%)	15 (41.7%)	16 (44.4%)
Total	30 (24.4%)	39 (31.7%)	54 (43.9%)
Industry/Age	Newly established (1-5 years)	Established (6-10 years)	Well established (over 11 years)
Modern industries	24 (27.6%)	22 (25.3%)	41 (47.1%)
Traditional industries	9 (25.0%)	8 (22.2%)	19 (52.8%)
Total	33 (26.8%)	30 (24.4%)	60 (48.8%)
Market Served	Frequency/(Percentage)		
Domestic only	33 (27%)		
Export Only:	36 (29%)		
ASEAN	5 (4)		
rest of the world	30 (24)		
ASEAN & rest of the world	1 (0.8)		
Domestic & Export:	55 (44%)		
domestic & ASEAN	18 (14)		
domestic & rest of the world	12 (10)		
domestic & ASEAN & rest of the world	25 (20)		
Total	124 (100%)		

*To be read: 124 companies (67%) were involved in NPD during the past 5 years.

In terms of market served, 27 percent of Malaysian manufacturers produced new products to served domestic market, 29 percent served export markets while the other 44 percent served both domestic as well as export markets.

NATURE OF NEW PRODUCT DEVELOPMENT DRIVERS

The respondents were asked a series of questions about the nature of NPD to determine the source of their product development. NPD can originate either internally, that is, as a consequence of technological innovation carried out by the company or, externally whereby new products are the outcome of the market demand and need. Companies that are technologically innovative would be more likely to practiced technology-push product strategy while a market oriented companies would be more likely to practiced market-pull product strategy.

Table 3: Nature of New Products

VARIABLE: NATURE OF NEW PRODUCTS		Means	Std. Dev
NATURE1	Ideas derived from the market	4.355	1.135
NATURE3	New product was an outcome of market need	4.331	1.087
NATURE9	New product enabled company to serve new market segments	4.137	1.284
NATURE6	New product fit in existing product lines	4.121	1.347
NATURE2	Specifications for new products were defined by the markets	3.887	1.410
NATURE5	New product has similar function as existing products	3.831	1.441
NATURE10	Knew technical specification from beginning	3.331	1.452
NATURE7	Highly innovative products	3.000	1.650
NATURE8	New production process is required to product this new prod	2.984	1.734
NATURE4	New product is outcome of company's technological breakthrough	2.968	1.546

Note: The scale used is a five point scale where 5=strongly agree, 4=agree, 3=neither agree nor disagree, 2=disagree and 1=strongly disagree

The results in Table 3 shows that Malaysian manufacturers are more market oriented than technology oriented. This is evidenced by the high mean scores for market-oriented statements, i.e. NATURE1, NATURE3 and NATURE2 as compared to technology oriented statements, i.e. NATURE4, NATURE8 and NATURE7. This suggest that the driver for new products are derived mainly through market pull factors rather than technology push factors. For Malaysian manufacturers, cues for new products are derived from the market, resulting in products that meet the needs of the consumers. As such, market-driven products typify more of the incremental innovative

product type (Marquis 1988) rather than something that is radically new because it is anticipated that consumers may not have the capacity to conceptualize products of which they have no experience.

Market driven new products enable companies to enter new market segments thus expanding their market shares. The findings also indicate that Malaysian manufacturers are more inclined to manufacture products with which they are more familiar and have had prior experience in producing similar products. They are more likely to produce products that match their current product lines by using existing production processes.

Malaysian manufacturers are less technologically oriented as evidenced by their low agreement with the statement that their new products were outcomes of their companies' technological breakthrough. This is not surprising since Malaysian companies are still lagging in research and development of indigenous technological know-how in comparison to industrialized countries.

The above findings support a number of previous studies which suggest strong association between market orientation and NPD (Cooper 1976; Globe, Levy and Schwarts 1973; Marquis 1969; Myers and Marquis 1969; Robert and Burke 1974).

TYPES AND CHARACTERISTICS OF NEW PRODUCTS

A new product can be described in terms of its degree of newness to an organization. Malaysian manufacturers are more inclined to develop products which can be categorized as:

- new product lines (81 percent),
- additions to existing product lines (78 percent), and
- modified products (71 percent)

Radical new products, that is, products that are new to the world market, were produced by only 17 percent of the respondents in the survey. This indicated that Malaysian manufacturers are either not inclined or are not able to produce products of this nature. This is not surprising since most of these companies are still lacking in R&D and technology to spearhead the development of radically new products.

New Product Development Process

In relation to the NPD process, respondents were asked to indicate the activities performed during the NPD process. Table 4 shows that there are activities deemed important to Malaysian manufacturers. They are:

- trial production for new products

- sample testing of new products
- testing of prototypes
- inter-departmental co-operation
- product introduction
- preliminary engineering, technical and manufacturing assessment
- product engineering, design and R&D, and
- trial selling

Table 4: Process Involved In NPD

VARIABLE: PROCESS INVOLVED IN NPD		Means	Std. Dev
PROCESS6	carried out trial production for new product	4.32	1.09
PROCESS7	carried out sample testing on customers	4.06	1.12
PROCESS4	carried out test on prototype	3.96	1.23
PROCESS5	good inter-dept co-operation throughout development of new product	3.95	1.04
PROCESS9	introduction of product was carried out well	3.82	1.16
PROCESS2	carried out preliminary engineering, technical and manufacturing assessment	3.81	1.19
PROCESS3	carried out product engineering, design and R&D for new product	3.72	1.17
PROCESS8	carried out trial selling	3.51	1.43

Note: The scale used is a five point scale where 5=strongly agree, 4=agree, 3=neither agree nor disagree, 2=disagree and 1=strongly disagree

This finding demonstrates the different activities that Malaysian manufacturers undertook during the NPD process. Based on the different type of activities and testing procedures that they perform on the new product during its development, could imply that Malaysian manufacturers are quite meticulous in their task. The task was carried out to ensure that the new product is fit to be commercialized.

Even before a prototype of the new product is developed, preliminary assessments were carried out to determine if the company is equipped well enough with the necessary engineering, technical and manufacturing capabilities to undertake the development of the new product. During the prototype development stage, new products are subjected to rigorous testing procedures. Before the new product is launched in the market, prelaunch activities such as trial production, market testing and trial selling of the new products were carried out. Last but not least, the introduction of the new product was carefully planned and carried out well.

This observation differs greatly from the NPD experience of Japanese companies. Due to their vast experience in NPD, Japanese companies generally launch their new products without performing a market test, indicating their high level of confidence in NPD (Kheir-El-Din 1990). Since Malaysian manufacturers have not yet gained the high level of expertise similar to that of Japanese companies, they tend to be extra careful in their approach towards the development of new products and their introduction to the marketplace.

Another point to note is that Malaysian manufacturers recognize that new product development is an interdepartmental task. As such it takes the co-operation of all the departments that are directly or indirectly involved, throughout its development, to ensure that the NPD project arrives at a successful conclusion.

Activities Associated With The NPD Process

According to the normative theory, there are seven distinct stages through which new products evolve. Each stage calls for specific activities to be performed starting with the idea generation stage to final commercialization of the new product into the marketplace (Booz, Allen and Hamilton 1982). Of the seven main activities associated with NPD process, this study found that Malaysian manufacturers do not strictly observe the conceptual model proposed by Booz, Allen and Hamilton (1982) above. Only 30 percent of the respondents carried out all the activities involved in the process from stage one to stage seven, followed by 15 percent of the respondents who carried out activities up to stage six and 23 percent carried out activities up to stage five. This finding concurs with the findings by Cooper and Kleinschmidt (1986) and Mahajan and Wind (1992) where they found that most companies do not perform all the activities during the NPD process. According to them, there is a strong relationship between frequency of use and the relative importance of an activity in the new product development process (Mahajan and Wind 1992). A company will carry out activities that were perceived as important and will omit activities that they feel are less detrimental to the successful completion of the NPD.

The above finding appears to suggest that disregarding some of the less important activities is common and usually practiced by companies. To omit any of the activities, companies must separate, clearly, the less important from the more important ones. It also depends on the type of NPD that is undertaken. If the company were developing a relatively new product with little prior experience, to omit any of the activities in the stages would be detrimental to its success as compared with NPD involving product modifications for a known market.

Although the need to introduce new products at a faster rate is crucial, companies must look into how to speed up the process rather than skipping over any of the stages in the process. The important linkages between each stage is so crucial that the more complete the process, the greater the chances of success in NPD (Cooper and

Kleinschmidt 1986; Hise et al. 1989; Dwyer and Mellor 1991). This effect has been investigated in a study conducted by Cooper and Kleinschmidt (1986) which confirms that the more complete the process is, the greater the success of the new product will be.

The three most performed tasks during the NPD process are product development activities (92 percent), commercialization activities (90 percent) and prototype development activities (81 percent). This is followed by activities related to the search for new product ideas (69 percent), screening and evaluating ideas (68 percent), feasibility studies (65 percent) and market testing (63 percent). This finding supports finding by Mahajan and Wind (1992) which found that the most performed task in the NPD process is that of product development.

This finding suggests that a task is carried out if it is deemed crucial to the success of the new product. Tasks that are not so important to the success of the new product will be disregarded. However, in 9 percent of the companies, important tasks such as commercialization of the new product were entrusted to consultants. This could imply their inability to perform the task effectively by themselves or just leaving this important task in the hands of experts.

Alliances With External Groups During NPD Process

Respondents were asked to indicate if any external groups such as customers, suppliers, consultants, competitors, government agencies, trade associations and universities were involved during the process of their NPD.

Almost all (94 percent) of the companies sampled involved their customers during their NPD process. Of these, 68 percent of the companies involved their customers during the idea generation and commercialization stage and 65 percent were involved during the test marketing stage. This implies that Malaysian manufacturers extensively consult their customers during those stages where customers are most likely to provide information, that would increase the chances of market acceptance once the product is introduced into the market. This finding also reflects the companies' market-oriented characteristic.

Suppliers were involved in 67 percent of the cases. In this instance, 61 percent and 54 percent of the suppliers were involved during the prototype development and actual product development respectively. This suggests that Malaysian manufacturers are still inexperienced and lack the necessary skills to develop new products on their own. In order to overcome these limitations and to minimize the risk of product failures, Malaysian manufacturers employed the assistance of their suppliers especially during the prototype and the actual product development. In this manner, problems regarding production technicalities could be detected earlier in the process and corrective action

could be taken to resolve it. In 40 percent of the cases, consultants were commissioned to assist companies during the NPD process. Consultants' involvement was evenly spread out over the seven stages of the NPD process.

Knowledge and information regarding competitors were also integrated in the development process. This is prevalent especially during the idea generation stage. Malaysian manufacturers, however, seek out the assistance and expertise of government agencies, trade associations and universities during their NPD process only on a very limited number of occasions. It is rather unclear as to why companies did not fully seek out the assistance of government agencies and local universities. The government has been actively propagating the increase in R&D activities and generation of indigenous technology by setting up R&D centers and technology parks for this purpose. At the same time local universities are also active in technological research. It will be a waste of government investment if companies do not take advantage of these facilities.

Managerial Input

Input from top level management is deemed to be important by Malaysian manufacturers. These include:

- commitment for NPD project,
- overall support for NPD project,
- involvement in identifying NPD project,
- involvement in selection of NPD project,
- involvement in monitoring progress of projects, and
- assumes responsibility for failed projects.

Table 5: Managerial Decision Making Process During NPD

VARIABLE: MANAGERIAL DECISION MAKING PROCESS DURING NPD		Means	Std. Dev
DECISN10	top mgmt commitment to new product project	4.16	1.01
DECISN9	overall top mgmt support from idea generation to commercialization	4.10	1.01
DECISN4	top mgmt involved in identifying new product projects	4.10	1.22
DECISN5	top mgmt involved in selection of final projects	4.06	1.05
DECISN6	top mgmt involved in monitoring progress	3.92	1.07
DECISN7	top mgmt takes responsibilities for failed projects	3.92	1.19

Note: The scale used is a five point scale where 5=strongly agree, 4=agree, 3=neither agree nor disagree, 2=disagree and 1=strongly disagree

The above findings suggest that Malaysian manufacturers recognize the impact of top management commitment to new product projects. Their overall support throughout the NPD process and their involvement in identifying and selecting projects as well as monitoring progress of the project are all crucial to the development of new products (Table 5). Top management has an important role to ensure that the NPD project progresses successfully from the initiation stage to final commercial introduction.

In the case of Malaysian manufacturers, a majority of the respondents (70 percent) reported that their company's top management accepts responsibilities for failed projects. This suggests that management recognize the fact that not all NPD projects will end up successfully and no one individual will be liable for failed projects. This is because the financial implications would be great whenever an NPD project does not meet its successful completion. Since no one person will be solely liable in the case when NPD failed to materialized, would foster greater initiatives and innovativeness among employees to experiment with new ideas or new product concept.

NPD Planning

The importance of new products to corporate growth can also be evaluated by new product contributions to corporate performance, in terms of increased market share and profitability. In the case of Malaysian manufacturers, new products are a significant contributor to companies' market share and profitability. 86 percent and 90 percent of the respondents said that new products are a significant contributor to their companies' market share and profitability respectively (Table 6). Therefore, it can be inferred that Malaysian manufacturers also share the same notion about the importance of new products for future growth and survival as their western counterparts.

Table 6: New Product Contribution To Company's Market Share and Profitability

Variable	Not Significant at all	Insignificant	Rather significant	Significant	Very significant
new product contribution to market share	4%*	9.7%	29%	36.3%	21%
new product contribution to profitability	0.8%	9.7%	23.4%	43.5%	22.6%

*To be read: for 4% of the companies, new products do not contribute significantly at all to company's market share.

Note: The scale used is a five point scale where: 5=very significant, 4=significant, 3=rather significant, 2=insignificant and 1=not significant at all.

Although new products are considered to be important to corporate growth as affirmed by 66 per cent of Malaysian manufacturers, this study found that NPD is not given the priority it deserves. This is because NPD is performed as and when it is required, i.e., on an ad hoc basis. It is not an activity planned and imbedded in the companies' corporate planning. Only 13 per cent of these companies reported to have developed NPD plans and strategies. For them, the chief executive officers have great influence on decisions regarding the adoption of NPD strategies (Table 7). For most companies (43 per cent), NPD was carried out in the absence of any written NPD strategy, implying that NPD is carried out as when required, and not as an ongoing activity.

Table 7: NPD Planning

VARIABLE: NPD PLANNING		Mean	Std Dev
NPDPLAN6	CEO has great influence over NPD strategy decision	4.00	1.15
NPDPLAN1	carry out long term strategic planning	3.79	1.00
NPDPLAN5	NPD as and when required	3.57	1.32
NPDPLAN4	NPD plan governed by written strategy	2.52	1.24
NPDPLAN3	NPD not important for corporate growth	1.72	0.86

Note: The scale used is a five point scale where 5=strongly agree, 4=agree, 3=neither agree nor disagree, 2=disagree and 1=strongly disagree

CONCLUSION

Malaysian manufacturers are generally actively involved in new product development. They do generate new products to an extent that technology resources have allowed them to do so. However, product planning in these companies is haphazard and many have generally failed to incorporate the planning as part of the companies' overall strategic planning process. The implication to that is the likelihood that the product development may not be sustainable and is in the danger of being short term in nature rather than as part of their long term strategy. Many have taken the stance of an incremental rather than a radical approach to product development due to the lack of manpower, skills, financial resources and experience. Going forward, Malaysian manufacturers will have to redefine their product planning process to ensure its integration with the overall strategy of the company. Only then, the long term impact of product development can be realized to ensure a sustainable success of the company.

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