

The Determinants of New Product Performance in Malaysian Industry

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Abstract

The literature on new product development is growing but Malaysia manufacturing industry often lacks these discussions. Therefore, this paper focuses on linking the determinants of an effective product development process and new product performance within manufacturing companies across industries in Malaysia that have certain level of new product development activities taking in their organization. Further, the paper organises the burgeoning new product development literature into four main determinants: customer orientation, cross-functional team, new product development team proficiency and management support. The selection of determinants to the theoretical framework is adjusting for manufacturing industry origins in previous written research material. The literature review focuses on the product development process and builds the framework of conceptual model detailing the initialization and implementation stage in the product development process. Two theoretical perspectives have guided the conceptual framework which is the resource-based view and organizational theories. The proposal is to give an increased understanding of the changed new product process in Malaysian industry and its implication on activities concerning organisation and management of the new product development process. This framework reflects a growing interest in extending new product development paradigms to emerging in ASEAN countries, thus contributing to a wider body of knowledge.

Keywords: New product development, new product performance, Malaysian industry.

Introduction

The field of new product development (NPD) is widely researched in a variety of organizations such as universities, consulting firms, manufacturing companies and university-industry collaboration. It is located in a wide range of disciplines, including technology management, engineering, business policy and marketing. Much of that research has specifically focused on discovering what organizational, strategic and process-related factors characterize successful new product developments.

Organisation and management of the product development process have been an issue in both academia and industry for over three decades but often lacking discussion by the process industry (Chroner & Laurell-Stenlund, 2006).

New product development is critical to the growth and survival of modern corporations. Hence, the quest for factors that underlie success has become a popular research direction in recent decades. However, despite our gains in knowledge and experience, the commercial rate of success of new products is still low. According to Mat and Jantan (2009), between 33 per cent

and 60 per cent of all new products fail to generate an economic return after reached the market place. Indeed, NPD is a complex and sizable activity whose outcome remains largely unpredictable.

Most of the studies have centered on new product development conducted in the United States, Canada, Western Europe, Japan, Taiwan, Korea and China (Zirger & Maidique, 1990; Li & Atuahene-Gima, 1998; Song & Parry, 1997a; Song & Xie, 2000; Im et al. 2003; Ernst, Hoyer & Rubsamen, 2010). Seems that a little study of NPD have been conducted in Association of Southeast Asian Nations (ASEAN), particularly in Malaysia context (Mat & Jantan, 2009; Shalabi & Rundquist, 2009). The propose concept was motivated by the fact that Malaysia's economy diversified and transformed itself from agriculture-based to manufacturing-based. Manufacturing sector is the leading sector in Malaysia, contributing significantly to the overall country's output (67 per cent), GDP (24.9 per cent) and employment (28.9 per cent) in 2012. Moreover, the value added of the manufacturing sector expanded by 4.8 per cent (MIDA, 2012). Malaysia now is changing its emphasis from purely manufacturing towards higher value-added products and activities including research and development (R&D), design and prototyping, logistics, and marketing.

In comparative with ASEAN neighbouring countries, the development of the automotive industry in Malaysia has been inferior to Thailand (Tai & Ku, 2013). However, Malaysia firms in the electronics industry exhibit a higher degree of innovation than their counterparts such as Singapore and Thailand (Berger & Diez, 2006; Shalabi & Rundquist, 2009). Furthermore, the growing of foreign investment will encourage new product innovations. Foreign Direct Investments (FDI) also

serves to bring new technology, knowledge or innovative processes to a country and to accelerate a country's integration into global economy. Therefore, Malaysia was the third largest recipient in FDI flows among ASEAN countries in 2011 after Singapore and Indonesia. FDI inflows to Singapore registered a strong growth of USD64 billion in 2011, Indonesia was USD18.9 billion and Malaysia was recorded at USD11.9 billion. Indeed, ASEAN countries required to manufacturer new products and to enter new markets to achieve sustained rapid economic growth.

In order to support and stimulate the Malaysian industrialization process, the government, in the early 1980s established the Standards and Industrial Research Institute of Malaysia (SIRIM) and the National Productivity Centre (NPC). SIRIM and NPC were given the responsibility to test and validate products for quality maintenance and to help improve productivity. The role of SIRIM was later expanded towards enhancing Malaysia's international competitiveness through partnerships in industrial technology and quality. In achieving this, industrial research became a major component of SIRIM's establishment.

This paper focuses on linking the determinants of an effective product development process and new product performance within manufacturing companies across industries in Malaysia that have certain level of new product development activities taking in their organization. The present conceptual model is proposed based on gaps revealed in the previous literature.

New Product Performance (NPP)

Oliver, Dostaler and Dewberry (2004) suggest that NPD performance

should be valued upon external and internal quality, cost, lead time, schedule following and product profits. Cooper and Kleinschmidt (2007) revealed that NPD productivity is actually in decline. The past figures show that overall sales from new product a generally applied measure of NPD performance has fallen from 32.6 per cent of total company sales in the mid 1990s to 28 per cent in 2004. With R&D investment remaining relatively constant at about 2.8 per cent of sales, the result is a 14 per cent drop in R&D output per spending in less than a decade.

Majority of success or failure studies tend to treat new product performance as a single dimension, usually, financial performance. In the typical study, new product projects are either classified as “success” or failures”. However, numerous research works have examined the outcomes of NPP specific in new product market performance and timeliness of development (Li & Atuahene-Gima, 1998), profitability and cycle time reduction (Cooper and Kleinschmidt, 1995), new product creativity and development speed (Ganesan, Malter and Rindfleisch, 2005), reduce time and cost in NPD process (Meybodi, 2005), speed to market and market performance (Barczak, Sultan & Hultink, 2007), degree of product innovation and market performance (Yalcinkaya, Calantone & Griffith, 2007). Therefore, the market performance, creativity, time and cost are suggested as to measure NPP in present research.

The relation between determinants-NPD Process and NPP

An extensive study of determinants, new product development process relates with new product performance is by Im et al. (2003). They proposed a literature-based model of determinants, including the stages of new

product work, which describes the determinants' influences on one another and on NPP. The authors tested the model empirically using a survey of nearly 300 managers involved in innovation initiatives in Korea and Japan. The authors learned that the determinants of NPP are interrelated and that the new product development process itself is central, namely the stages of initiation and implementation. These two stages directly determine NPP, though initiation appears to be more important. The stages are strengthened by factors such as customer orientation, cross-functional integration, and new product team proficiency; however, the effects are not uniform. Although the model and hypotheses are largely supported, however, the authors found a few differences between the countries.

Therefore, the determinants can be parsimoniously grouped as strategic, organizational, market environment and NPD process which influences NPP. To avoid a diffused focus, this study proposed a limited number of strategic, organizational, and process factors to examine. Present study chose customer orientation as a strategic factor, cross-functional integration, team proficiency and management support as organizational determinants, and the initiation and implementation stages as process drivers. The outcomes of NPP to be measured included the market performance, creativity, time and cost.

Customer Orientation Strategy

Customer orientation is further conceptualized as a firm's understanding of its own customers, which enables it to provide superior value (Narver & Slater, 1990; Mohd Mokhtar, 2013). One avenue to provide value is the creation and launch of products that address market

needs. Without such a strategic focus, firms may develop products because of an internal technological drive or in reaction to competitors' activities. This may result in sporadic successful innovations but consistently ignoring customer preferences is detrimental to firm performance in the long run. Therefore, they suggested that customer orientation contributes to superior product and market innovation.

In prior research, Im et al. (2003) quoted customer orientation aids the initiation stage by directing product developers toward external users, seeking their input to hone new product ideas. Customers' insights or problem-solving activities often result in new product concept. Thus, a customer-oriented firm is more likely to provide innovative ideas in the initiation stage of NPD. Although developers should avoid following customer feedback blindly, especially for radical innovations, the astute application of feedback rather than isolated laboratory endeavours can improve the chances for product success.

Similarly, we expect customer orientation to enhance the NPD implementation process. At this phase, customer orientation directs firms toward monitoring the changing needs of potential buyers, making any necessary adjustments in product design, gauging likely buyer responses to the product through market and product tests, and conceiving and executing market-informed launch plans. Di Benedetto's (1999) study on new product launches concluded that information generated in the initiation stage is critical throughout the NPD process, but the information becomes more valid and reliable as the project moves toward commercialization. Tripathi, Guin and De's (2012) recent study, the primary factor for getting a new product accepted by consumer is

customer need orientation. Under present construct, customer orientation is the ability and will to identify, analyze, understand, and answer user needs. The preceding discussion implies the following proposition:

Proposition 1: Higher customer orientation is associated with (1a) better initiation and (b) better implementation.

Cross-functional Team

A 1995 survey of US firms found that over 84 per cent of more innovative product development projects used cross-functional teams (Griffin, 1997). Cross-functional new product teams are thought to facilitate the product development and marketing process because they solve an information-processing problem. That is, they bring together people from different disciplines and functions that have pertinent expertise about the proposed innovation problem. Recent study by Mohd Zaki and Othman (2013), they suggested different background of team members was vital to ensure high new product development performance.

Cross-functional refers to the process in which marketing and R&D functions communicate and cooperate. As proposed by functional integration theory (Li, 1999; Song and Dyer, 1995), close interfacing improves the prospect of new product acceptance in the market, whereas lack of integration increases the degree of mismatch between market needs and what is developed. Specifically, a close marketing-R&D interface allows a firm to realize its technological capability more efficiently than the competition through identifying innovative product features desired by the market which leading to new product advantage. Interfacing also affects product market performance because it enables a firm to increase its acceptance rates for new

products by reducing the customer's cognitive and behavioural resistance to product introduction. Given its importance for NPD, the marketing-R&D interface has received considerable attention in the literature.

Many terms have been used to describe the bridging of distinct groups. We adopted Im et al. (2003) definition of cross-functional integration as effective unity of effort by R&D, manufacturing, and marketing in NPD. Prior studies often examined exclusively the interface between R&D and marketing, but all three functions are increasingly recognized as critical to NPD. For this construct, we used a three-item measure adapted from Im et al. (2003), which examined relationships among R&D, marketing, and manufacturing. Thus, we posit the following proposition:

Proposition 2: Greater cross-functional integration is associated with (a) better initiation and (b) better implementation.

NPD Team Proficiency

One of the first studies that acknowledged the role of proficiency was Cooper's (1979) Project NewProd, which surveyed several hundred Canadian firms to identify keys to success. The highest discriminator after product uniqueness and superiority is marketing knowledge and proficiency. Firms that have a sound understanding of customers, including their price sensitivities, and that apply this expertise throughout the NPD process are high performers. The next most important discriminator is technological and production synergy and proficiency.

Sivasubramaniam, Liebowitz and Lackman (2012) reviewed 38 studies related to new product development team performance. In that meta-analysis, team

ability was one of the determinants to NPD performance. Furthermore, they identified cognitive ability predicts team performance and teams experience improves speed to market. The results reinforce the team ability has a positive impact on NPD outcomes. Thus, they suggested NPD team members should be selected for their cognitive ability and prior experience with NPD teams.

According to Im et al. (2003), both initiation and implementation should benefit from greater new product team proficiency, though the types of competencies that are drawn on differ. During the initiation stage, it is important for a team to identify market and technological opportunities adroitly and to conceive of new product concepts to fill those gaps. In addition, the ability to forecast sales or to estimate the size of a market is necessary. Initiation can be hampered by a host of problems tied to proficiency, including inadequate market assessment, over specification of manufacturing tolerances, and the continual change of product features and requirements (Khurana and Rosenthal, 1998).

During implementation stage, manufacturing staff should be able to determine configurations for production and cost implications, R&D should fulfil the product concept, and marketing personnel should provide accurate assessments of customer and competitor responses along with strong marketing-mix designs to introduce the product. Quality problems from poor manufacturing or design can force companies to withdraw products or postpone market rollouts, thereby raising launch costs and threatening first-mover advantages.

Therefore, the team should acquire technical skills, marketing knowledge and team efficiency in the group responsible

for NPD process. In view of this, we offer the following statement of proposition:

Proposition 3: Higher new product team proficiency is associated with (a) better initiation and (b) better implementation.

Management Support

The early studies suggested that the management support have direct effect on NPD process. Zirger and Maidique (1990) find that management support is one of the critical components affecting the successful launch of a high technology product in US industry. Song and Parry (1996) explore the links between new product success and senior management support in Japanese firms.

Another study carried out by Ovens (2006), he found that most respondents indicated senior management's attitudes towards NPD programmes are crucial. In his study, 42 per cent of the respondents of the respondents claimed that major reason for product development delays were due to company management's attitudes which included low priority given to NPD programmes, unrealistic expectations, short-term vision, lack of strategic thinking, risk averseness, and the inability to learn from past failures. Overall findings, senior company management helped surmount rather than create obstacles for this project. For example, senior company management frequently made encouraging versus discouraging remarks during team meetings. Team members also received help from senior company management if they asked.

Suwannaporn and Speece (2010) discovered that their respondents perceived a support from top management is most critical factor cause the success in the NPD success. This was followed by a number of variable with

roughly similar levels of perceived important, many of which related to strategy and planning. In respondents' perceptions, they considered top management support to be most critical cause for success in the NPD process. However, no prior study the management supports effect on NPD process stages. Therefore, we posit below proposition.

Proposition 4: Higher management support is associated with (a) better initiation and (b) better implementation.

NPD Process

Research often suggests that formal NPD processes increase the success rate of NPD projects in a firm. However, many firms still do not use a formal NPD process even though the effectiveness of product development processes has been well-proven (Rundquist & Chibba, 2004; Shalabi & Rundquist, 2009). There are various NPD models explaining the factors affecting NPD process. The generally used model constitutes eight steps. These steps are idea generation, idea screening, concept development and testing, marketing strategy, business analysis, product development, test marketing and commercialization (Kotler & Keller, 2006).

The new product development process is defined as those activities that occur from idea through to launch in a typical new product project (Kleinschmidt, 1994). Another definition by Park (2010), product development process is a transformation of technology into new product based on customer needs, organization strategy, and the internal and external environment. In addition, new product development is a continuous process starting from idea generation and strategic evaluation of the new product, feasibility study, planning,

implementation and validation, and then to product realization and performance feedback.

Loch (2000) studied 90 high-tech companies in Europe and suggested that a customer-oriented new product development project with completed designed process and assessment, cross-functional integration, high-rank supervisors' support and powerful execution would be the success factors for companies.

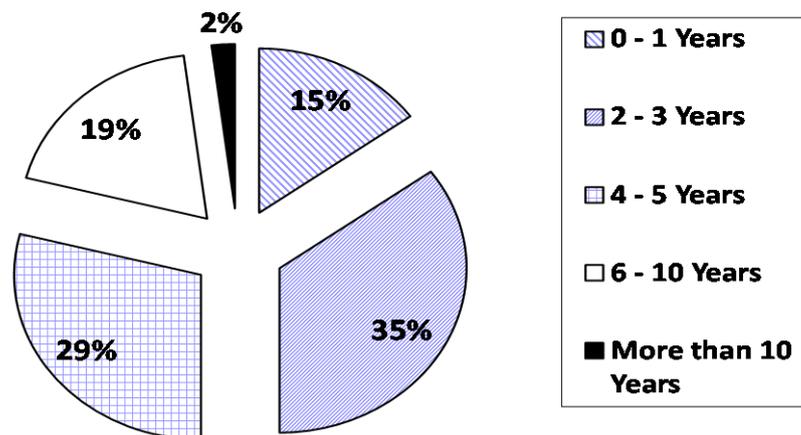
According to Sivakumar and Nakata (2003), the two key phases in this process are "initiation", which includes idea generation, screening, and concept testing, and "implementation", which covers product design, test marketing, and market introduction. These two stages are also referred to as the "front end" and "back end" by Zaltman, Duncan, and Holbeck (1973), and are

essentially distinguished by the first focusing on conceptualizing the product and the latter fulfilling that concept.

Shalabi and Rundquist (2009) also found that the use of NPD-process in Malaysian firms seems to be as young as ten years (refer to Figure 1). Out of the entire 72 samples of their study, 41.7 per cent of the firms do not use formal processes and 58.3 per cent use formal processes (refer to Table 1). However, the automotive firms are more likely to use formal NPD processes with up to 70 per cent compared to 46.2 per cent of the chemical industries. Therefore, two key phases are more appreciate to adopt in Malaysia industry. Thus, we posit that initiation influences implementation.

Proposition 5: Better initiation is associated with better implementation.

Figure 1. The time when Malaysian firms started using formal NPD-processes



Source: Shalabi and Rundquist (2009)

Table 1. The use of formal/informal NPD documentation for respective industry

Industry	Formal / Informal		Total	
	Do not have NPD documentation	Have formal NPD documentation	Number of firms	Per cent (%)
Automotive	30	70	40	100
Chemical	53.9	46.1	26	100
Electronics	66.7	33.3	6	100
Entire sample	41.7	58.3	72	100

Source: Shalabi and Rundquist (2009)

Influence of NPD Processes on NPP

On the basis of the literature, we also posit that NPD process stages determine NPP. Past studies found that NPP is higher (1) when "the developing organization is proficient in marketing and commits a significant amount of its resources to selling and promoting the product" and (2) when "the R&D process is well planned and executed." It has also been determined that the proficiency of NPD processes (including screening, market research, development, test market, and market launch) significantly enhances NPP (Cooper, 1979; Song & Parry, 1997a).

The connection between NPD and new product outcomes also has been found specific in new product market performance and timeliness of development (Li & Atuahene-Gima, 1998), profitability and cycle time reduction (Cooper and Kleinschmidt, 1995), new product creativity and development speed (Ganesan et al., 2005), reduce time and cost in NPD process (Meybodi, 2005), speed to market and market performance (Barczak, Sultan & Hultink, 2007), degree

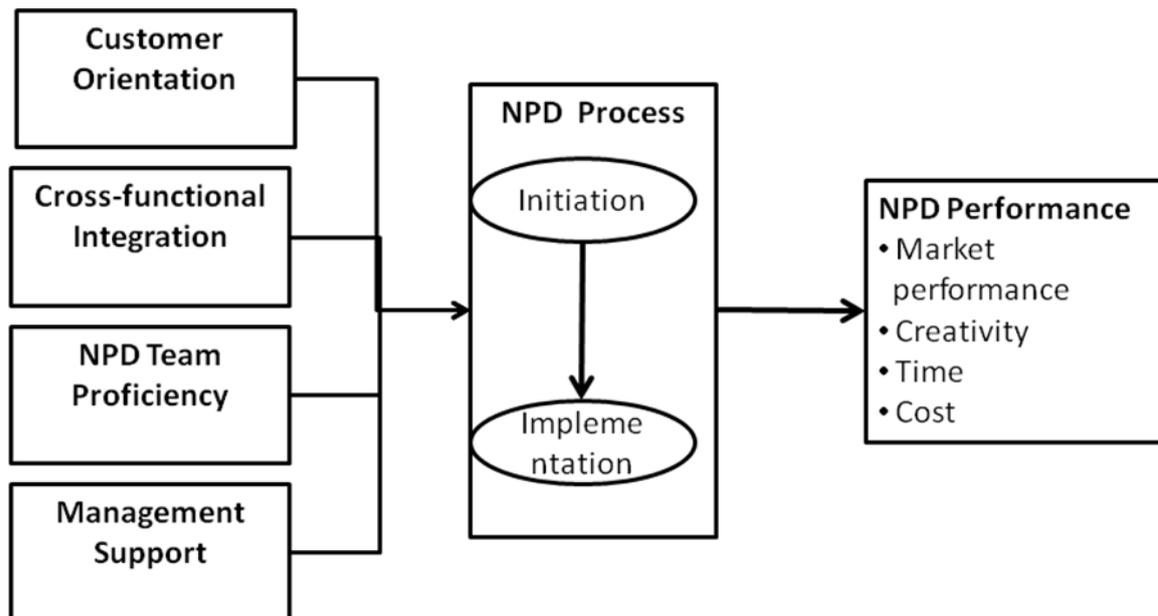
of product innovation and market performance (Yalcinkaya, Calantone & Griffith, 2007). Therefore, the market performance, creativity, time and cost are suggested as the NPD outcomes in present conceptual framework. We posit a direct influence of implementation on NPP.

Preposition 6: Stronger NPP is associated with (a) better initiation and (b) better implementation.

Theoretical Framework and Theoretical Underpinnings

By referring to the empirical review, the present study develops a theoretical framework that focus on strategic and organizational antecedents namely, customer orientation, cross-functional integration, NPD team proficiency and management support are essential in enhancing NPD process from initial stage to implement stage, which will eventually improve NPD outcomes. The proposed theoretical framework is shown in Figure 2.

Figure 2. Theoretical Framework of the Determinants of New Product Performance



In this study, two theoretical perspectives have guided the theoretical framework. The first is the resource-based view. It suggests the resource and capabilities based views of firms, which are key theories in the strategic marketing and organizational management literature (Barney, 1991; Abu Bakar & Ahmad, 2010a). A company's customer orientation, adroitness in carrying out NPD tasks in teams, and management of information flows across functional departments are resources brought to bear on the innovation endeavour. The greater these resources are in focus, intensity, and quality, the more ably the firm executes initiation and implementation of the NPD process. Consistently strong execution leads to a strategic capability, differentiating a firm's performance from others and leading to competitive advantage. In other words, routinely performing initiation and implementation well leads to innovations that generate higher sales, market shares, and profits over those of the competition. All of this points to an important avenue for firms to

obtain a sustainable competitive advantage.

The second is the organizational theory, which argue that NPD depends on the resources available (organizational factors) and on the overall direction provided (strategic orientation) in the firm. If the process of developing and launching the product goes well, NPP is likely to be high. But this process is effective only insofar as the proper organizational tools and means are provided, along with a clear strategic vision and motivating purpose (Im et. al., 2003). Thus, the present propose framework was undertaken to relate resource-base view and organizational theory to the firm's new product performance.

Conclusion

Success in product development is a critical management issue for the modern firm, especially those in technology driven industries. Clearer understanding of the factors that drive product outcome can help a firm focus

valuable R&D resources, better utilize resources dedicated to the product delivery process and increase the market demand for a firm's new products.

As NPD is a vital and risky process due to the hundreds of millions it can cost in case of a failure, its determinants should be carefully analyzed. And although the factors affecting NPD are important as a group, the scrutiny of individual dimensions would provide a better understanding for the success of NPD. Moreover, determination of the dimensions which are critical for the success can provide useful insights and suggestions for management into the screening decision.

Due to the uniqueness of this proposal on Malaysian manufacturing firms as the first and only study, the obtained finding on the status of NPD in Malaysia can be used as reference to the managers in Malaysia. The best practices for the new NPD process, from idea generation phase through the product launch phase.

Implication and Future Research

The proposed framework has several managerial implications. Foremost are managerial implications that the interrelated model of strategic, organizational, and process determinants is a useful description and guide for strengthening NPP to the future researcher. In particular, the customer orientation, cross-functional integration, new product team proficiency and management support emphasize four critical areas that can be manipulated for better NPD results. Firms can focus their efforts on improving these dimensions rather than attempting to work on tens of variables simultaneously. Dimensions that are weak will require more immediate attention.

A second implication is that NPD process factors are crucial. How well a firm engages in initiation and implementation largely determines the fate of new products. The predictive approach indicates that initiation is particularly important because of its cascading effect into the subsequent phase. Thus, companies should be especially diligent about conducting marketing research, opportunity identification, concept generation, and idea screening.

A final managerial implication is the need to observe distinctions in NPD by country. Although this model is conceived to describe Malaysia context, but it does not represent the entire ASEAN countries due to historic, economic, and cultural differences. Further research should examine the model in more ASEAN countries, particularly ones that are more geographically and culturally distinct. At the same time, this framework reflects a growing interest in extending NPD paradigms to emerging in developing country contexts, and therefore it contributes to extant knowledge.

About Author

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