

**STUDY OF KEY SUCCESS FACTORS IN NEW PRODUCT DEVELOPMENT
PROCESS IN INDIAN SMES: WITH SPECIAL REFERENCE TO CHEMICAL
INDUSTRIES OF SARIGAM**

**Rashvin Tailor
Dr. Manisha Panwala**

ABSTRACT

The value of new product development to the performance of firms has led to numerous studies conducted to identify the critical or successful factors. However, most of these studies were conducted in the developed countries or for large organization relatively little is research found about how small and medium-size enterprises (SMEs); develop new products in many of the emerging markets. This paper tries to bridge the gap by examining the key success factors of NPD in Indian SMEs. The research is based on a sample of 30 SMEs located in a medium developed region and Chemical Zone of (Sarigam) western India. The main objective of this research is to examine the key success factors in each stage of new product development and their relative importance. Findings of this research are the firm is not regard finance as important factors and concentrate more on marketing factors.

Keywords: Key Success Factors, SMEs.

I. INTRODUCTION

Rapid development of new product has quickly become a great importance in present day organizations as competitors rush to commercialize emerging technologies and satisfy fragmenting customer needs. New product development (NPD) is a key factors influencing profitability, maintaining a competitive advantage and ensures organizational survival. Driven by intense global competition, rapidly changing customer need, technological innovation, shortened product cycles and high costs of R&D, managing NPD has become more critical and complex. Much of the early research on NPD focused on activities and their impact on new product success. However, such identification requires an understanding of new product success, as different definitions of “success” can produce different results (Craig and Hart, 1992). The successful market introduction of new products or services is key to the survival and success of business enterprises. Small and medium-sized enterprises (SMEs) are no exception (Wynarczyk 1997). With increased competition and rapid changes in technology, customer requirements, and business practices, product life cycles have shortened (Wind and Mahajan 1997). This has imposed pressures on all organizations, including SMEs, to innovate more effectively and efficiently.

Research has provided valuable insights into the factors that influence new product performance, suggesting a number of variables that distinguish new product success from failure (see Craig and Hart 1992; Hart and Baker 1994; Montoya-Weiss and Calantone 1994). In a recent extensive study, Cooper and Kleinschmidt (1995) found that a firm's new product performance depends mainly on its processes, resources, and strategies, which are the "cornerstones of successful product development" (Cooper 1996, p. 655).

This research try to bridge this gap by analyzing the key success factors of NPD in Indian SMEs. India is one of the largest and fast-growing economies in the world. Understanding the main success factors of NPD in India will help reveal the innovation dynamics in other emerging markets as well, and improve the success of technology transfer.

II. THEORETICAL BACKGROUND

A new product concept, as defined by Crawford and Di Benedetto (2003), is "A statement about anticipated product features that will yield selected benefits relative to other products or problem solutions already available." According to Belliveau, Friffin and Somermeyerer (2002), "A product (either a good or service) new to the firm marketing it. It excludes products that are only changed in promotion." According to Cooper (2001) explains that a new product is defined as new if it has been on the market for five years or less, and includes extensions and major improvements. According to Ulrich and Eppinger (2004) describe New Product Development as "Set activities beginning with the perception of market opportunity and ending in the production, sale, and delivery of a product." According to Belliveau et al. (2002), new product developments are "the overall process of strategy, organization, concept generation, product and marketing plan creation and evaluation, and commercialization of a new product."

III. LITERATURE REVIEW

Jifeng Mu et.al, study is to bridge the gap by examining the key success factors of NPD in Chinese SMEs. Different from the traditional approach regarding the success factors in each stage of NPD as homogeneous, the key success factors in each stage of the NPD process are examined from a managerial perspective. This paper finds Chinese SMEs do not regard financial return as the primary criterion in the idea-generation stage. Although the key success factors are relatively quite different in various stages, technological, marketing, commercial, and managerial factors are important across all stages.

Isidre March-Chorda`et.al, Rapid product development has been treated as a competitive strategy in a global market environment. It is essential to improve the product development process with the objective of reducing product development cycle time and hence to reach the market as quickly as possible. The main objective of this research is to identify the major determinants that confront the product development. The cost of product development projects that discourages commitment to new product development and the uncertainty of the market acceptance were found to be the major factors. According to the study reported in this paper, the fulfillment of the key success factors as suggested by the literature is, in general, low.

Xueli Huang et.al. This article examines the new product development process (NPDP) in Australian small and medium-sized enterprises (SMEs). Findings from a sample of 276 innovative Australian SMEs suggest that marketing-related activities were undertaken less frequently and were less well executed than technical activities in developing new products.

Holger Ernst continuous development and market introduction of new products can be an important determinant of sustained company performance.

B.C. Ghosh et.al. The research tries to determine the strategy dynamics and key success factors (KSFs) for excellence in performance of the so-called ``tiger'' SMEs in Singapore. In 1995 and 1996, 50 top privately owned and successful enterprises in Singapore were identified. They have shown that they can excel, even in the current highly competitive and high operation cost environment. Their performance can be attributed to their dynamism and a few KSFs that are apparently universal to these successful companies.

Karl T. Ulrich et.al. This paper is a review of research in product development, which defines as the transformation of a market opportunity into a product available for sale. Review is broad, encompassing work in the academic fields of marketing, operations management, and engineering design. The value of this breadth is in conveying the shape of the entire research landscape. We focus on product development projects within a single firm. Research devotes our attention to the development of physical goods, although much of the work we describe applies to products of all kinds.

Wonseok Choi et.al. Review the nature of new product development and explore diverse NPD processes. Also discussed Introduction of NPD process models and strategies of companies and products in the textile apparel industry.

IV. METHODOLOGY

Adopted the most popular three-stage model for my study: idea generation and concept development (stage 1), design and development (stage 2), and commercialization (stage 3). The search for new ideas and concept development is the first stage of the NPD process. In this stage, firms try to find commercially feasible new ideas and new concepts, which are then revealed and checked for new product and business opportunities. Ideas development involves the creation of new ideas that do not exist. In this sense, product development primarily is an idea search process for solving problem. If completed successfully, it will produce high returns to firms. Once a problem is selected, firms engage in a process to search for solutions over different conditions. Understanding firm technological capability, the problem dependence within the technological background, the formal processes that can be utilized to realize high-return solutions and to make better product development choice are fundamental to problem solving in NPD. In this research researcher used 46 criteria for evaluating the NPD success factors in the survey. These criteria kindly refer Table I.

A large amount of success factors have been identified till date, and these include strong market orientation, clear product definition, how the product development is organized, influence of the core competency, and top management support. Efforts have been made to summarize these factors for assisting technology and new product management. Most of the studies analyzed the NPD process regarding the success factors in every stage of NPD as uniform, which might not be true in practice. This research used the key success factors tested in China.

The business environment of the Indian firms has witnessed a series of great changes over the past years, especially since India adopted Liberalization, Globalization and Privatization system in 1990: new technologies are diffused at a rapid pace, product life cycles are shortened, product and service markets are further fragmented, and competition has reached a new level never seen before. Firms in this environment cannot afford to develop new products on a sequential basis. Because of the time pressure and the uncertainty and complexity of the business environment, firms have to parallel their NPD activities.

This way, firms have to integrate the management, marketing, technology, and other factors into the entire process of NPD. In turn, this organization of key

factors of NPD will lead to speedy, quality, efficient, and effective problem solving.

I. Sampling

Survey was randomly selected 30 SMEs from list provided by Sarigam GIDC, which started their businesses by developing one or more new products. Researcher visited the managers of the selected firms and further briefed them about the purpose and method of the study and collected data using structured questionnaires to ensure prompt responses.

The survey asked managers and owners to score, on a Likert scale from 1 to 5, the importance of the key success factors in each stage of the NPD process, with one representing the most important. Most of the owner, manager or product managers. Therefore, they were in a good position to provide relevant and accurate information. A total of 30 questionnaires were distributed. The sample used in this study is from Sarigam GIDC and these firms might not represent all SMEs in general.

II. Objectives

- I. To examining the key success factors in each stage of NPD process.
- II. To study importance of Key success factors in each stage of NPD process, from Technological, Marketing, Commercial and Managerial Factors (Jifeng Mu et.al. 2007).

III. Hypothesis

Ho: Firms do regards financial return as the most important factor in the idea generation and concept development stage of new product development.

Ha: Firms do not regard financial return as the most important factor in the idea generation and concept development stage of new product development.

Ho: The relative importance of the Key Success Factors do not varies across the different stages of new product development.

Ha: The relative importance of the key success factors varies across different stages of new product development.

V. DATA ANALYSIS AND DISCUSSIONS

Computed the mean value of each criterion for each stage, and ranked the criteria based on their mean values. To know the importance of key success factors in each stage. Kindly Refer Table II.

In stage 1, the mean value of the top ten criteria are all above 2, and among them, there are eight marketing factors, 1 managerial factors and 1 Commercial factor.

The eight marketing factors are; The market is big enough, The Market is Growing, The Market Demand is Stable, There are clearly defined Product, The Target Market is Clearly Defined, There are no or few substitute products, There exists identifiable market, The product has unique competitive advantage . One managerial factor the inventor owns the patent. One Commercial factor The Product can make up the cost of patenting.

The results show that, in this stage, firms put a lot of emphasis on marketing factors and the market potential of the product. Although managerial and commercial factors are a primary consideration in this stage, marketing factors are among the top priority. More importantly, we found that criterion C13, C14 and C15, which measure the financial returns on the projects, are not ranked in top ten. Hence, H1 is supported.

In Stage 2, there are 5 Marketing Factors, 4 Commercial factors and 1 Managerial Factors. The 5 marketing factors are; the production cost is low, there are no or few competitors, the product has unique competitive advantage, there is no dominant competitor, there is few or no substitutable product. The 4 Commercial Factors; The product can make up the cost of patenting, the product can be manufactured at low cost, the product can be easily financed, the company has strong financing capability and Only Managerial Factor i.e. the inventor owns the patent. If compare the result of stage two with stage one the same factors are important as well.

In stage 3, 6 marketing factors, 2 managerial factors, 2 commercial factors. 6 marketing factors are; The Product has unique competitive advantage, there are few or no substitutable products, there are no dominant competitors, there are few or no competitor, the product is clearly defined. Two Managerial Factors are there is good product development, the inventor owns the patent. 2 Commercial Factors; the company has strong financing capability; the product can be easily financed.

The above analysis clearly shows that the ranking of the key success factors during the three stages of the NPD process not vary substantially.

To further investigate if the four factors vary over period of time, I calculate each of the four factor value by averaging its each criteria score and then applied ANOVA to test if there is any difference across the three stages. For the results Kindly refer table III.

The results show that importance of the four factors is different over the stages. It is possible that respondents score marketing factors higher in single stage. Therefore need to test the ranking difference of the criteria over the three stages. For this purpose, application of the pair wise Spearman Rank Correlation to test if ranking orders are correlated. The results are in correlation table. For the Result Kindly Refer Table IV.

The results show that the ranking of the 46 criteria across the three stages are moderately correlated, thus the relative importance of the key success factor varies moderately across the different stages of NPD.

VI. FINDINGS

This research found that firm's do not regards financial factors as the most important factor of New Product Development during stage 1 of the new product development. If firms will pay more attention to the financial factors such as return on investment instead they give more attentions towards marketing factors as per the result shown in table II market potential and size of the market in the first stage, many innovative ideas could be killed and not able to develop new product. From finding firm's are inviting new ideas in initial stage of NPD process.

From the table III and Table IV confirms that the relative importance of the KSF differs moderately across different stages. Firms pay more attention on marketing factors and gradually attention turns other 3 namely managerial factors, commercial factor and technological factors.

VII. CONCLUSION

From the analysis it is concluded that the Indian SMEs are actively involved in NPD. The majority of the SMEs concentrate on marketing factors and than other three. As firm giving more importance to marketing factors firms inviting new ideas and competitive advantage for new product and come to know about potential market and cost of new products.

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TABLES

Table I List of Key Success Factors and respective Criteria

Factors	Criteria	Code
Technological Factors	1. The technology is new	T1
	2. The technology is core or platform	T2
	3. The technology is reliable	T3
	4. The technology is complex	T4
	5. The technology is hard to be substitute	T5
	6. The technology is not easy to imitate	T6
Marketing Factors	1. The Product has first-mover advantage	M1
	2. The time to reach market is short	M2
	3. The market has no entry barrier	M3
	4. The target market is clearly defined	M4
	5. The market is growing	M5
	6. The market is big enough	M6
	7. The market demand is stable	M7
	8. There exist identifiable market	M8
	9. There are no dominant competitors	M9

	10. There are few or no competitors	M10
	11. There are few or no substitute products	M11
	12. The product has unique competitive advantage	M12
	13. The production cost is low	M13
	14. The product is clearly defined	M14
Commercial Factors	1. There is reasonable pricing strategy	C1
	2. There are reasonable market channel plan	C2
	3. The product has strong functional attributes	C3
	4. The quality of product is reliable	C4
	5. There is manufacturing flexibility	C5
	6. The firm have relevant manufacturing experience	C6
	7. The company has sufficient resources	C7
	8. The inventor has experiences in the industry	C8
	9. The inventor can support the product development	C9
	10. The inventor has good reputation	C10
	11. The product can be manufactured at low cost	C11
	12. The product can be easily financed	C12
	13. The product has recognizable quantitative revenue	C13
	14. The product has expected positive return on investment	C14
	15. The product has positive return on investment	C15
	16. The product has positive present cash value	C16
	17. The product can make up the cost of the patenting	C17

	18. The company has strong financing capability	C18
Managerial Factors	1. The inventor owns the patent	Mg1
	2. There is good product development team	Mg2
	3. There are managerial expertise in the company	Mg3
	4. There is a good management team	Mg4
	5. The firm has effective incentive mechanism	Mg5
	6. The firm has highly qualified marketing staff	Mg6
	7. The firm has highly qualified production staff	Mg7
	8. The firm has highly qualified technical staff	Mg8

Table II Ranking of Criteria

Ranks	Stage 1		Stage 2		Stage 3		Ranks	Stage 1		Stage 2		Stage 3	
	Criteria	Mean	Criteria	Mean	Criteria	Mean		Criteria	Mean	Criteria	Mean	Criteria	Mean
1	M6	4.2	Mg1	4.3	Mg2	4.2	24	M2	2.5	M4	2.2	M2	2
2	Mg1	4.2	C16	3.8	C17	3.9	25	Mg2	2.5	M1	2.1	T5	2
3	M5	4.1	M13	3	M12	2.7	26	M1	2.4	Mg3	2.1	C16	2
4	C16	4	M10	2.9	M11	2.7	27	C3	2.4	M4	2.1	T7	2
5	M7	3.9	M12	2.9	M9	2.7	28	C9	2.3	C13	2.1	C3	2
6	M14	3.9	M9	2.7	M10	2.7	29	C13	2.2	C3	2	C7	2
7	M4	3.7	M11	2.7	M14	2.6	30	C1	2.2	C4	2	C6	2
8	M11	3.7	C11	2.7	Mg1	2.6	31	C8	2.1	C6	2	Mg4	2
9	M8	3.6	C12	2.6	T6	2.6	32	Mg3	2.1	M6	2	C15	2
10	M12	3.6	C17	2.5	C12	2.5	33	C6	2.1	M5	2	T3	1.9
11	M9	3.4	T6	2.5	T1	2.5	34	C2	2.1	C14	1.9	M1	1.9
12	M3	3.4	M7	2.5	M8	2.5	35	C15	2.1	T7	1.9	M5	1.9
13	M10	3	M3	2.5	T2	2.4	36	T7	2	T3	1.9	C8	1.9
14	M13	2.9	M8	2.4	M3	2.4	37	T3	1.9	C7	1.9	M6	1.8
15	C11	2.7	T1	2.4	M13	2.4	38	Mg4	1.9	C9	1.9	C5	1.8
16	T6	2.7	T4	2.4	Mg3	2.3	39	C4	1.9	Mg4	1.8	C11	1.8
17	C17	2.7	T2	2.3	C13	2.2	40	C7	1.9	M2	1.8	C1	1.8
18	T1	2.6	T5	2.3	C2	2.2	41	Mg7	1.9	Mg5	1.8	C9	1.7
19	T4	2.5	C1	2.3	M4	2.2	42	Mg5	1.8	C8	1.7	C10	1.6
20	C5	2.5	C2	2.3	M7	2.2	43	Mg6	1.8	C10	1.7	Mg5	1.6
21	C12	2.5	Mg2	2.3	T4	2.1	44	Mg8	1.8	Mg6	1.7	Mg8	1.5
22	T2	2.5	C5	2.3	C14	2.1	45	C10	1.7	Mg7	1.7	Mg6	1.5
23	T5	2.5	C15	2.3	C4	2.1	46	C14	1.7	Mg8	1.7	Mg7	1.5

Success Factors	Mean Score			FStatistics
	Stage 1	Stage 2	Stage 3	
Technological	2.37	2.23	2.23	0.66
Marketing	3.46	2.42	2.42	24.34
Commercial	2.30	2.24	2.24	0.09
Managerial	2.25	2.17	2.17	0.03

Table IV Correlations:

		Mean Score 1	Mean Score 2	Mean Score 3
Mean Score 1	Pearson Correlation	1	.629**	.324*
	Sig. (2-tailed)		.000	.028
	N	46	46	46
Mean Score 2	Pearson Correlation	.629**	1	.439**
	Sig. (2-tailed)	.000		.002
	N	46	46	46
Mean Score 3	Pearson Correlation	.324*	.439**	1
	Sig. (2-tailed)	.028	.002	
	N	46	46	46

** . Correlation is significant at the 0.01 level (2-tailed). * . Correlation is significant at the 0.05 level (2-tailed).

ABOUT AUTHORS

Mr. Rashvin Tailor, MBA Assistant Professor Department of Management, SRIMCA, Uka Tarsadia University, Bardoli. Published 1 Teaching Case Study and Two Papers in Reputed Management Journals. Co-Authored book Strategic Management (Gujarati Version). His area of Interest is New Product Development.



Dr. Manisha Panwala, Professor Ph.D., M.B.A., B.E. (Electrical), FDP (IIMA), Department of Business and Industrial Management, Veer Narmad South Gujarat University, Surat. More than 20 years of Professional Experience. Publish and presented many papers in National and International conferences and Journals. Area of interest is Marketing Research.