International Review of Business Research Papers
Vol. 5 No. 4 June 2009 Pp.147-156

Role Of Research And Development In Product Innovation: A Correlation Study

Iqra Rafique Dar* And M.Shakil Ahmed**

This study highlighted the role of research and development in the product innovation.The study was conducted from October till December; 2008 the Sample chosen for the study is 70 employees of UNILEVER companies. The factors affecting product innovation were identified; as core competencies (0.876), competitive edge (0.461*), profit (0.136*), market share expansion (0.715**).Analysis showed immense support for positive relationship between R&D and product innovation; greatly affected Technological advancement, Attitude toward new technology, Organizational structure, Production capacity respectively. All these results are statistically significant thus providing rigor and generalizability in research. This exploratory study suggests for the positive relationship between Research and Development and product innovation*

Field of research: Human Resource Management

1. Introduction

The research and development view of the firm contributes to the management of product development by highlighting how different functional and integrative capabilities affect process efficiency and product effectiveness**.** 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.

---

* Iqra Rafique Dar, Student BS (BA)-VI, Department of Management Sciences, COMSATS Institute of Information Technology, 43600, Attock Campus, Pakistan
Corresponding Author, Email: iqrarafique@yahoo.com; onlyshakil@gmail.com

** M.Shakil Ahmed, Lecturer, Department of Management Sciences**,** COMSATS Institute of Information Technology, 43600, Attock Campus, Pakistan

Capabilities aim at deploying and coordinating different resources (e.g., Amit & Schoemaker, 1993; Grant, 1996; Prahalad & Hamel, 1990; Teece, Pisano, & Shuen, 1997), and they reside in routines that are intrinsically intangible (e.g., Conner & Prahalad, 1996; Itami & Rohel, 1987; Kogut & Zander, 1992; Leonard-Barton, 1992; winter, 1987). Product development is critical because new products are becoming the nexus of competition for many firms (e.g., Clark & Fujimoto, 1991). Product development is also important because, probably more than acquisition and merger, it is a critical means by which members of organizations diversify, adapt, and even reinvent their firms to match evolving market and technical conditions (e.g., Schoonhoven, Eisenhardt, & Lyman, 1990)

2. Literature Review

Technological capabilities are a first important driver of product development outcome. In fact, the presence of R&D and manufacturing routines can positively affect rent generation (Camuffo & Volpato, 1996; Hayes, Pisano, & Upton, 1996; Hayes, Wheelwright, & Clark, 1988; Helfat, 1994; Henderson, 1993). Besides R&D and manufacturing, technological complementarities are another dimension of functional capabilities related to technology. Previously accumulated technological knowledge is, for instance, an important driver of organizational rent (Helfat, 1997; Tripsas, 1997), even if specific capabilities deploying this knowledge still have to be linked to the efficiency of the innovation process**.** Marketing capabilities concerning the screening, use, and dissemination of market in- formation can represent another valuable functional source of knowledge (Day, 1994; Hunt & Morgan, 1995). In this regard, research techniques employed to capture customer needs, wants, and preferences are a first dimension of marketing capabilities used in product development. Leonard-Barton (1995)

Lansiti (1997) and Pisano (1994) highlight the integration of different internal sources of technological knowledge (i.e., R&D, design, engineering, and manufacturing) as a primary driver of lead time and productivity. More broadly, Leonard-Bar- ton's longitudinal analysis of Chaparral Steel shows that a firm can improve the product development outcome by widening the internal integration from the project team to the entire organization through the minimization of vertical and horizontal boundaries (Leonard-Barton, 1997). The literature on product development continues to grow. The research is varied and vibrant, yet large and fragmented. Organizing the burgeoning product-development literature into three streams of research: product development as rational plan, communication web, and disciplined problem solving. Second, synthesize research findings into a model of factors affecting the success of product development. The model highlights the distinction between process performance and product effectiveness and the importance of agents, including team members, project leaders, senior management, customers, and suppliers, whose behavior affects these outcomes. Third, indicating potential paths for future

research based on the concepts and links that are missing or not well defined in the model.

Product development is thus a potential source of competitive advantage for many firms (Brown & Eisenhardt, 1995). Product development is also important because, probably more than acquisition and merger, it is a critical means by which members of organizations diversify, adapt, and even reinvent their firms to match evolving market and technical conditions (e.g., Schoonhoven, Eisenhardt, & Lyman, 1990). Thus, product development is among the essential processes for success, survival, and renewal of organizations, particularly for firms in either fast-paced or competitive markets factor affecting success of product development. This rational plan perspective emphasizes that successful product development is the result of careful planning of a superior product for an attractive market and the execution of that plan by a competent and well-coordinated cross-functional team that operates with the blessings of senior management. Simply put, a product that is well planned, implemented, and appropriately supported will be a success.[3]

The Scientific Activity Predictor from Patterns of Heuristic Origins (SAPPHO) study, the first comparative study of product success and failure, was conducted during the early seventies in the United Kingdom (Rothwell et al. 1974, Rothwell 1972). The SAP- PHO investigators identified 43 product success and failure pairs in the chemical and scientific instruments industries. The products were selected from two unrelated industries in order to identify possible industry effects. The SAPPHO study concluded that product success was primarily related to the following five factors:
(1) understanding of user needs,
(2) Attention to marketing and publicity,
(3) Efficiency of development,
(4) Effective use of outside technology and external scientific communication, and
(5) Seniority and authority of the managers' responsible for the development of the product (Rothwell et al. 1974, Rothwell 1972).

The SAPPHO findings confirmed three of prior researchers' findings, and introduced two new success factors both of which were related to characteristics of the organization and the team that developed the successful products. First, R&D teams must be efficient and effective in their development efforts. R&D efficiency and effectiveness was defined as the ability to
(1) Identify product defects prior to the product launch,
(2) assess the feasibility of projects and select the most promising ones,
(3) Appropriately allocate both capital and labor resources, and
(4) Efficiently utilize the available resources.

The second new factor, one that was also confirmed in several subsequent studies, was the need for an executive champion, a senior member of the firm

with power and authority who fought for the product. Researchers have suggested that product champions facilitate the allocation of resources to the development effort, and stimulate cooperation and com- munication between the functional groups, other important factors in product success. The results of these early studies highlight the importance of external communication to success. Specifically, these studies observed the presence of "gatekeepers"-(i.e., high-performing individuals who also communicated more often overall and with people outside their specialty) (Allen, 1971).

Other authors have built on this early work by Allen and colleagues. For example, the content of external communication has been examined closely by Ancona and Caldwell (1990, 1992a, b). We found from these studies that new product success was likely to be greater under the following circumstances.
(1) The firm has an in-depth understanding of its customers and the marketplace.
(2) The firm markets proficiently and commits a significant amount of its resources to selling and promoting its successful products.
(3) The firm's R&D is efficiently planned and well executed.
(4) The firm's R&D, production and marketing functions are well coordinated.
(5) The firm provides a high level of management support for the product from the development stage through its launch to the marketplace.
(6) The product has a high performance to cost ratio.
(7) The product benefits significantly from the firm's existing market and technology strengths.
(8) The product provides a high contribution margin to the firm. (9) The market has few competing products (Maidique and Zirger 1984).

2.1 Model

In the following section we explain the significant attributes of the model followed by the hypotheses we developed to test the influence of each of these attributes on product outcome. The model describes the development process in terms of the organizational and external entities that influence product outcome. Internal to the organizational are three primary groups involved in a new product's development:
R&D,
Manufacturing and
Marketing.
Prior research indicated that three factors relating to these functional groups influenced product outcome.
First, the competence of the functional groups. Product success was more likely if development was conducted by a competent and skilled R&D, manufacturing (Cooper 1987) and marketing team.
Second, it was important that the development process was well-planned and capably executed (Cooper 1987). Often this included the assistance of a product champion (Rothwell et al. 1974, Rubenstein et al 1976).

BILLIE JO ZIRGER AND MODESTO A. MAIDIQUE

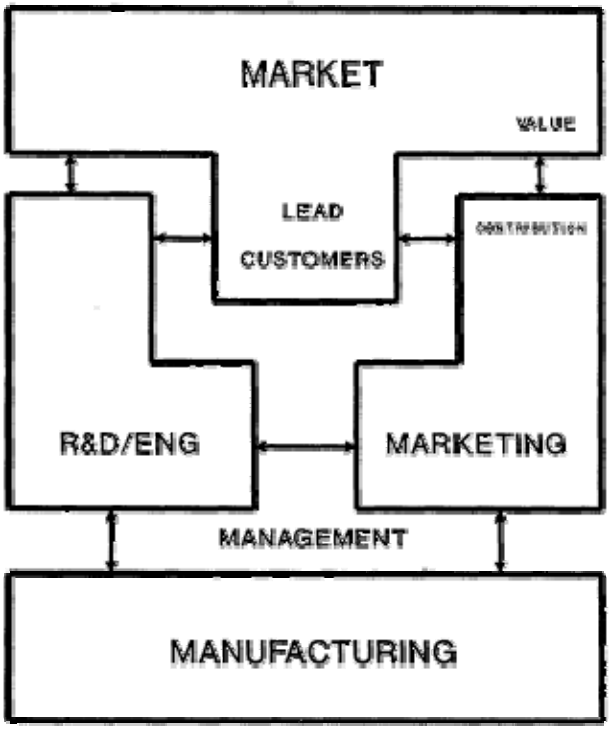


FIGURE 1. Critical Elements of the New Product Development Process.

Who promoted the product to senior management, to other functional groups and to customers throughout the development and introduction cycle? Finally, successful development relies on strong communication links and cooperation between the func- tional groups (Rubenstein et al. 1976, Souder and Chakrabarti 1978, Souder 1981, Gupta 1985) in order to effectively manage the transition of the product through the various design and development stages. The implicit barrier between the functional groups is represented in the model by physical separations between the entities. Without conscious efforts by the organization to bridge these gaps, information critical to the product's form and function are likely to be lost, particularly as an organization grows in complexity and diversity. These findings led to the following hypotheses that represent the importance of competent functional groups and strong internal and external communication.

3. Methodology

The sample study used tells the variability and reliability of the biographical data of the respondents. The procedure used to gather data is the hypotheses and the statistical techniques used to analyze the data

3.1 Instrument

Primary Data sources were themselves the suppliers of the Unilever who are working in the region of Rawalpindi/Islamabad the data for the role of research and development for the product innovation, the main instrument for primary data collection would be questionnaire. Secondary data would be collected through journals, official records. The qualitative data is also determined through observations, semi structured interviews, articles and recent research papers.

3.2 Procedure and Statistical Methods

70 questionnaires were distributed among the house officers out of whom 45 were responded appropriately giving an 85% response which is acceptable to make this study rigorous and generalizable. The obtained data is analyzed through Statistical Package for Social Sciences (SPSS) version 16. The statistical methods involved those of inferential statistics (Pearson Correlation) for the predictors of product innovation

4. Result

4.1 A Correlation Between Dependent & Independent Variables

A statistical concept that shows the tendency of two or more numerically valued random variables to change their values at the same time, either in the same direction (positive correlation) or opposite directions (negative correlation).

Table 1: Correlation matrix

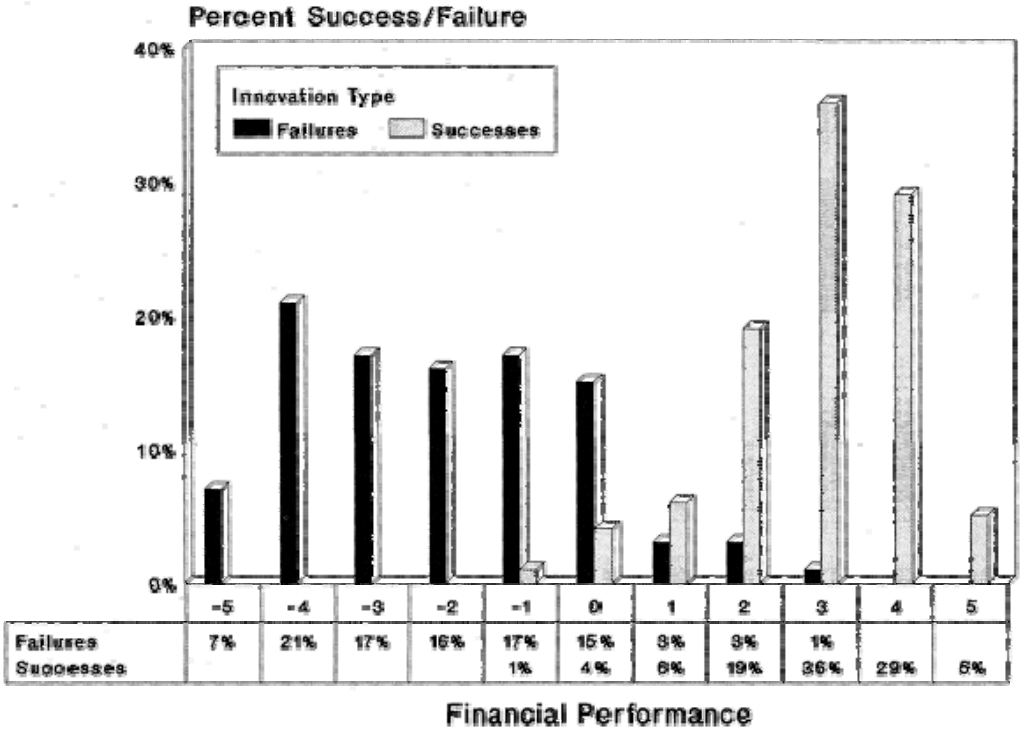
Product innovation / R&D		Core competencies	Competitive edge	Profit	Market share expansion
Technological advancement	Pearson Correlation	0.876*	0.461*	.136*	.715**
Attitude toward new technology	Pearson Correlation	0.461**	0.71*	0.16*	0.361**
Organizational structure	Pearson Correlation	.136*	0.34*	0.75*	.287**
Production capacity	Pearson Correlation	.715**	0.361*	.287*	0.62**
	N	70	70	70	70

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

According to matrix the R&D variable such as increase in technological advancement is highly positively correlated with product innovation variable such as core competencies (0.876*), competitive edge (0.461*), profit (0.136*), market share expansion (0.715**). The second variable of R&D the positive attitude toward new technology is positively correlated with product innovation variable such as core competencies (0.461**), competitive edge (0.71*), profit (0.16*), market share expansion (0.361**). Similarly the third variable organizational structure is highly positively correlated with product innovation variable such as core competencies (0.136*), competitive edge (0.34*), profit (0.75*), market share expansion (0.287**). Like wise production capacity is highly positively correlated with product innovation variable such as core competencies (0.715**), competitive edge (0.361*), profit (0.287*), market share expansion (0.62**) and this correlation is significant at 0.05 and 0.01 level. The data demonstrate strong support for the hypothesis that the use of R&D increase in the product innovation for the organization.

Firms should choose projects that build upon the firm's existing technological, marketing, and organizational competences. Related products allow firms to use and further develop existing techno- logical competences, and take advantage of communication sources and networks both internal and external to the firm. "Sticking to your knitting" (Peters and Waterman 1982) has been a common theme in the popular general management literature. Not- withstanding this synergy benefit, we do not suggest that a firm never venture into new technical or market arenas. Without occasional ventures in new directions, the firm will soon exhaust the technical potential of current product lines particularly in rapidly changing high technology markets. It is, however, important that when new ventures are undertaken, the firm consider and perhaps minimize where possible one or more dimensions of newness. Management commitment is also essential to product success. Without management.

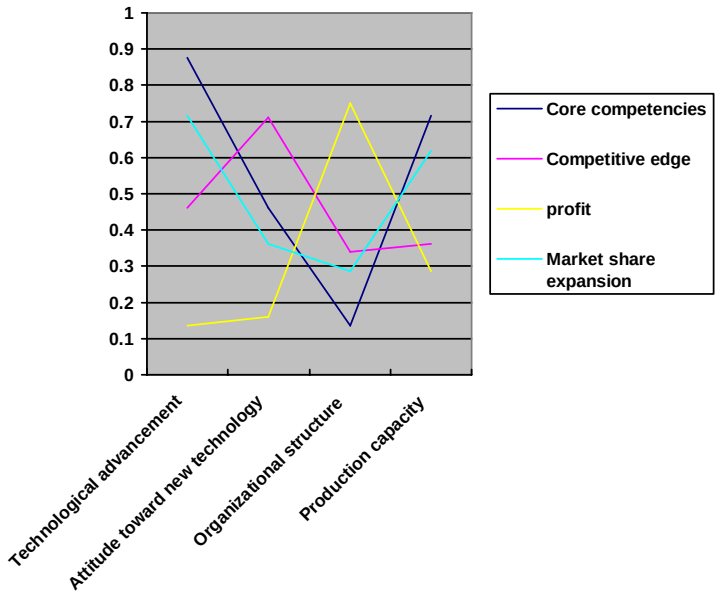
4.2 Financial Performance



Breakeven = 0

FIGURE 2. Innovation Financial Success (Percent of Total).

4.3 Graphic Representation



5. Conlusion And Recommendation

On the basis of the survey results it is seen that the R&D positively role in the innovation of the product. As with the increase the use of R&D the core competencies level increases beside this competitive edge, profit, and market share also expand, with the use of R&D organization is able to get competitive edge, this also help organization to move profit to the peak, as the organization invest in R&D this will help in expanding market share. Understanding of how senior managers affect development is incomplete. They are consistently found to be important contributors to project success However, the management-related concepts such as vision, subtle control, and even support are vague. There is also little understanding of the links between product effectiveness and the creative processes by which senior managers and others match firm competencies with market needs to create an effective product concept. This process has been virtually unexplored.

Organization need to be practiced its employees familiar with the new technology, there must be flexible organizational structure so that organization is able to mould itself according to the latest information. The findings in this paper represent our understanding of the critical components affecting the successful launch of a new high technology product. It is hoped that these findings can be a guide to further research, as well as, useful to practitioners who are managing product development programs in the ever increasingly competitive electronics

market. Religious adherence to these success factors-managerial excellences, superior benefit to cost, strategic focus, managerial commitment and early entry into large and growing markets-cannot, unfortunately, ensure a firm of a new product winner. On the other hand, we are convinced that careful attention to the areas that our extensive research has identified will lead to enhanced probabilities of success for new product developers and will assist subsequent researchers in their own contributions to our field.

6. References

Gianmario Verona Universita Boccioni: A Resource-Based View of Product Development. *Academy of Management Review 1999*, Vol. 24, No. 1, 132-142.

Shona l. Brown Kathleen m. Eisenhardt Stanford University Product Development: Past Research, Present Findings, And Future Directions *Academy of Management Review 1995,* Vol. 20, No. 2, 343-378.

Avard, s., v. Catto and M. Davidson, "Technological Innovation-Key to Productivity," Research Management, July 1982.

Von Hippel, e., "Lead Users: A Source of Novel Product Concepts," Management Sci., 32, 7 July 1986, 791-805.

Billie Jo Zirger and Modesto a. Maidique a Model of New Product Development: an Empirical Test
Academy of Management Review 1999, vol. 36, july 1990
Department of Industrial Engineering and Engineering Management, Stanford University, Stanford, California 94305 Florida International- University, University Park, Miami,

Ander, R., D. Levinthal. 2001. Demand heterogeneity and technology evolution: Implications for product and process innovation. Management Sci. 47(5) 611-628.

Aghion, P., P. Howitt. 1992. A model of growth through creative destruction. Econometrica 60 323-352.

Balcer, Y., S. A. Lippman. 1984. Technological expectations and adoption of improved technology. J. Econom. Theory 34 292-318.

Bayus, B. 1995. Optimal dynamic policies for product and process innovation. J. Oper. Management 12 173-185.