CRITICAL SUCCESS FACTORS IN NEW PRODUCT DEVELOPMENT

Ekrem CENGİZ[*]
Hasan AYYILDIZ[**]
Fazıl KIRKBİR[***]

Abstract: New product development (NPD) is essential for outstanding corporate performance, and research about what leads to new product success has been carried out for both goods and services frequently. Despite extensive documentation on how to achieve success, NPD remains a high risk venture. Recent studies showed that the overall rate of success for newly commercialized products has remained stable at less than 60 %, indicating that substantial resources continue to be devoted to new product development efforts that fail in the marketplace. Therefore, In this research, to prevent the unsuccessful resource use that allocate to new product development, critical success factors that affect new product performance are presented.

Key Words: New product development (NPD), critical success factors

I. Introduction

NPD is the locus of the innovative potential of organizations. Every organization, regardless of size, profit motive, or industry experiences regular pressures to renew, expand, or modify its product or service offerings (Leenders et al, 2003: 69). The rate of market and technological changes has accelerated in the past decade. Central to competitive success in the present highly turbulent environment is the firm's capability to develop new products (Gonzalez and Palacios, 2002: 261). New products are increasingly cited as the key to corporate success in the market. During the 1970s, new products accounted for 20 % of corporate profits; in the 1980s, they accounted for 33 % of profits (Takeuchi and Nonaka, 1986: 139). In the 1990s, this figure has risen to 50 % (Slater, 1993: 22). A recent study estimates that new products provided over 42 % of company sales in the period 1985–1990, up from 33 % in 1980 (Page, 1993: 275). The number of products introduced by these firms was expected to double (Booz et al, 1982: 43). However, new products continue failing at an alarming rate. The most recent studies show new product success rates at launch of less than 60 %-54.3 % for the UK, 59 % for the US, 59.8 % for Japan and 49 % for Spain (Edgett et al, 1992: 7). Recent years have witnessed extensive research into the determinants of new product success, however, these new studies do not appear to have had much of an impact on managerial

[*] Araş. Gör., Karadeniz Teknik Üniversitesi, İktisadi ve İdari Bilimler Fakültesi, İşletme ABD,
[**] Yrd.Doç.Dr. Karadeniz Teknik Üniversitesi, İktisadi ve İdari Bilimler Fakültesi, İşletme ABD,
[***] Araş. Gör., Karadeniz Teknik Üniversitesi, İktisadi ve İdari Bilimler Fakültesi, İşletme ABD,

performance. Therefore, a clear understanding of the factors that drive product success is needed in order to help firms optimize the resources dedicated to the product development process and increase the market demand for a firm's new products.

II. Concept of New Product

The concept of new product is susceptible to various definitions. A definition considered basic describes a new product to cover original products, improved products, modified products and new brands developed through an organization's research and development efforts (Ulrike, 2000: 170; Kotler, 1991: 310). In a similar classification (Petrick and Echols, 2004: 84; Stanton et al., 1994: 101), three distinct categories of new products are identified. These are: those that are really innovative, satisfying unsatisfied needs; replacement products that are significantly different from the existing one in form, function and benefits provided; imitative products new to the organization but not new to consumers.

In the other hand, new products had been described along two dimensions: 'newness to the organization' and 'newness to the markets'. Ranging from low to high on each dimension, six categories have been identified. These categories are: cost reductions; improvements in existing products; repositioned products; additions to existing product lines; new product lines allowing a firm to enter established; markets, new to the world products that create new markets (Ilorri et al, 2000: 334; Pujari et al, 2003: 657).

III. Critical Success Factors for NPD

NPD is indeed very important for companies. However, developing new products is a risky and uncertain process. In order to reduce the risks and uncertainties, companies need to evaluate their new product initiatives carefully and make accurate decisions. Although the outcome of a new product evaluation decision can be influenced by the environmental uncertainties that are beyond a company's control, companies can successfully improve the accuracy of their new product evaluation decisions (Ozer, 2003: 1; Debruyne et al, 2002: 159). Historical cases suggest that firms can make two types of erroneous decisions when evaluating their new product ideas. First, they might decide to pursue a potentially unsuccessful new product idea. Second, they might decide not to develop a potentially successful new product. In either case, firms accure big losses, while the former leads to investment loses the latter leads to missed investment opportunities. Given this background, it is clear that it is in the interests of firms to make accurate new product evaluations and critical success factors for NPD can sign a way to evaluate this process accurately (Sanders and Monrodt, 1994: 98).

In the recent literature we can find several models based on the lessons and recipes for success in the product development process. For example,

Rosenau and Moran (1993) furnish a guide for success with project management tools to the product development process, emphasizing speed to market, quality management and multifunctional teamwork. On the other hand, Bowen et al. (1994) highlights seven critical elements that any outstanding product development project should have in common: (1) recognize and nurture the firm's core capabilities, (2) a guiding vision shared by all members in the cross-functional team, (3) project leadership and organization, (4) ability to instill the team with a sense of ownership and commitment, (5) ability to rapidly learn and to reduce mistakes and misunderstandings, (6) ability to push forward the company's performances, and (7) ability to integrate within projects following a systems approach. Bobrow (1997) provides a list of success factors for new products, including a clear strategic direction, a corporate culture aligned behind new products, a sensible allocation policy of resources and people, and a cross-functional team dedicated to the new product development process. Beside this, Chorda et al (2002) state that top management support, NPD process and analysis of market requirements are key success factor for NPD. In the view of Gonzalez and Palacious (2002) critical success factor are top management support, nature of market, product quality, supplier and costumer involvement in design process. According to Varela and Benito (2004), management emphasis, experience in NPD, centralisation, novelty, NPD process style and technical activities are important factors to achieve succesfull NPD.

Furthermore, many of these studies report the presence of common success factors. In a review of some of the most important studies, some of the most critical determinants of new product success have been selected. These factors are shown in Figure1.

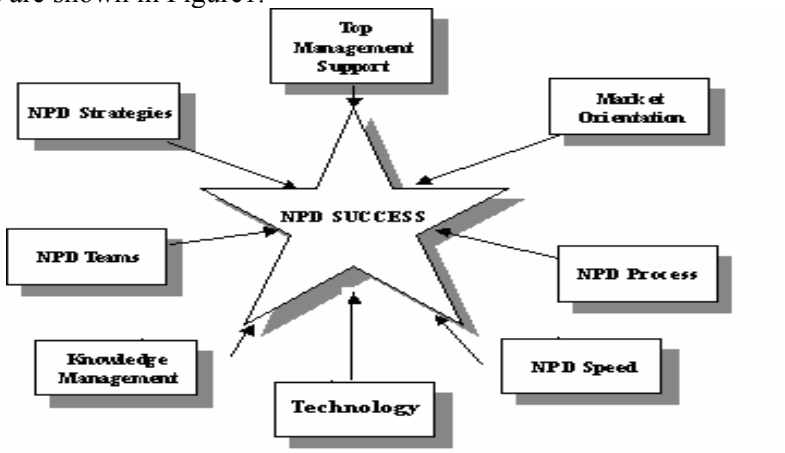

Figure 1. Critical Success Factors
(Adapted From Gonzalez and Palacious, 2002: 262)

A. NPD and Top Management Support

The Malcolm Baldrige criteria highlight the importance of leadership. Leaders must pay attention to developing the "right" corporate culture. In the words, order, rules, and regulations, along with uniformity take second place to goal achievement. The strategic focus moves away from stability, predictability, and smooth operations toward a search for value added. It is emphasized that without management commitment, improvement efforts fail. This commitment must be not only active, but also visible. The intent is to develop leadership that is open-minded, supportive, and professional (Spivey et al, 1997: 206)

NPD is an ambiguous process with different people and departments having different perspectives about how things are to be done. It is therefore a political process involving struggles for resources, influence and power which can generate conflicts. This conflict only be able to cope with top management decisiveness (Atuahene, 1997: 506). Several works documented that top management initiative and support is a key aspect in order to achieve new product success (Zirger and Maidique, 1990: 870; Chorda et al., 2002: 305; Varela and Benito, 2004: 2). Management commitment provides organizational support for change, generates enthusiasm, provides a clear vision of the product concept and assures sufficient allocation of resources (Poolton and Barclay, 1998: 200; Clarck and Fufimoto, 1990: 110).

B. NPD Strategies

NPD strategy is determined within the framework of the organizational objectives, environmental factors, past and present performances, resource availability and corporate capability. Generally, three types of organization can be identified depending on the NPD strategy adopted. These are classified as reactors, planners and entrepreneurs (Ilori et al, 2000: 336). 'Reactors' wait for problems to occur (e.g., dwindling market share) before attempting a solution while 'planners' anticipate such problems. 'Entrepreneurs', however, anticipate both problems and opportunities for timely exploitation.

A simple classification gives two types of NPD strategies as either offensive or defensive (Debruyne et al, 2002: 162; Wilson et al., 1992: 291–324). The offensive strategy opens up new markets or enlarges the existing one through careful planning, while competitive forces or other changes in the operating environment stimulate the defensive strategist into action. An organization's continued commitment to an offensive strategy could be very expensive in terms of the high degree of risk and investment in money, skill and time, but also with a lot of potential for higher returns. This contrasts sharply with the relatively low risk/low return defensive strategy(Liu et al, 2004: 3; Kim et al, 2004: 2).

In other consideration, Johne and Snelson (1990) gave two approaches in formulating NPD strategies as the traditional asset-based and market-based. The components of the traditional asset-based approach are given as product

cost-cutting, product modification, product-line extension and new product line. These, all seeking to build on existing product lines and technical know-how, are applicable in the existing market and with greater intensity in new markets. Beyond the conventional asset-based approaches, the market-based options seek for a wider and a more profitable exploitation of opportunities with a sharper focus on potential market opportunities outside a firm's business. Considered a novel and exciting approach, it is made up of project offering, system offering, commodity offering and service offering strategies within a product support matrix. These offering strategies consider a wider myriad of benefits a product offers to specific target market, hence the differentiations in products and support as considered appropriate.

Firth and Narayanan (1996) defined a NPD strategy as having three aspects: (1) new embodied technology; (2) new market applications; (3) innovation in the market. Based on these three aspects, his research lead to a NPD strategy definition, i.e. (1) innovators; (2) investors in technology; (3) searching for new markets; (4) business as usual; (5) middle-of-the-road. Beside this, Barczak (1995) divided NPD strategy into three categories based on Ansoff and Stewart's classification: first to market, fast follower and delayed entrant. Song and Montoya-Weiss (1998) utilized Ansoff's product market matrix model considering the growing in our current market and technology strategy. The results lead to incremental NPD. A development strategy that pursues a new market with a new product and technology will create a "real new product". A strategy involving a current market and new product or new market and current product is classified as a moderate innovation. Veryzer (1998) used new models with two important aspects: technological capability and product capability. Technological capability means that a product must be made using a technology beyond the current company technology level. Product capability represents the benefit of a product recognized or experienced by customers. Therefore strategies that firms follow decide to their NPD performance.

C. NPDTeams

NPD teams are frequently used to integrate employees from several company departments and give opportunities for simplification and parallel processing. Many empirical studies have found that this practice increases a project innovation and NPD success rate (Sanchez and Perez, 2003: 140; Atahuene and Evangelista, 2000: 1275; Bonner et al, 2002: 233; Jassawalla and Sashittal, 1998: 237). NPD teams can take various forms including teams comprised of personnel temporarily assigned to an NPD team from a firm's functional departments to develop new product. In addition, members of NPD teams often are organizationally linked through matrix structure to their functional departments. Two other NPD team forms involve, first, functional specialists permanently assigned to distinct new product or new venture development groups and, second, senior managers whose primary focus makes

them directly responsible for the development of new products (Millson and Wilemon, 2002: 2; Oliver et al, 2004: 251). NPD team members face the same types of challenges that all decision makers face: they are subject to judgmental biases, believe in their ability to influence results post-decision, suffer from limited capacity to deal with data, are often overly ambitious, and must face the consequences of their decisions. The work is considered to be inherently challenging and often depends on making intuitive "leaps"(Cooper, 2003: 118). So NPD teams composition and other group factors affect NPD process.

D. NPD Process

New product evaluation is a dynamic process and generally can be conducted at five major stages including concept testing, prototype testing, pretest market, test market, and launch (Mahajan and Wind, 1988: 347; Tzokas et al, 2004: 620) The concept testing stage is concerned with assessing consumers' reactions to a new product concept, identifying important attributes, and determining potential market size. In the prototype testing stage, individuals evaluate a prototype of a new product (Varela and Benito, 2004: 2-3). The pretest market stage deals with the simulation of a shopping environment and measures the reactions of potential buyers to a new product. The test market stage is an evaluation with a limited product launch and is the final step before a full-scale commercialization. Finally, the launch stage involves predicting the future sales of a new product by using its early sales data (Lu and Yang, 2004: 595). As Figure 2 shows, one can evaluate a new product by going through the whole process. This can be an ideal practice, as previous studies suggest that using multiple methods improves forecasting accuracy. However, due to competitive pressures and increasingly shorter product life cycles, companies tend to introduce new products as quickly as possible by skipping several stages of the process. It should be noted that the process runs parallel to the NPD process and is applicable to both stagegate and concurrent processes; thus, companies can utilize the models either sequentially or concurrently.

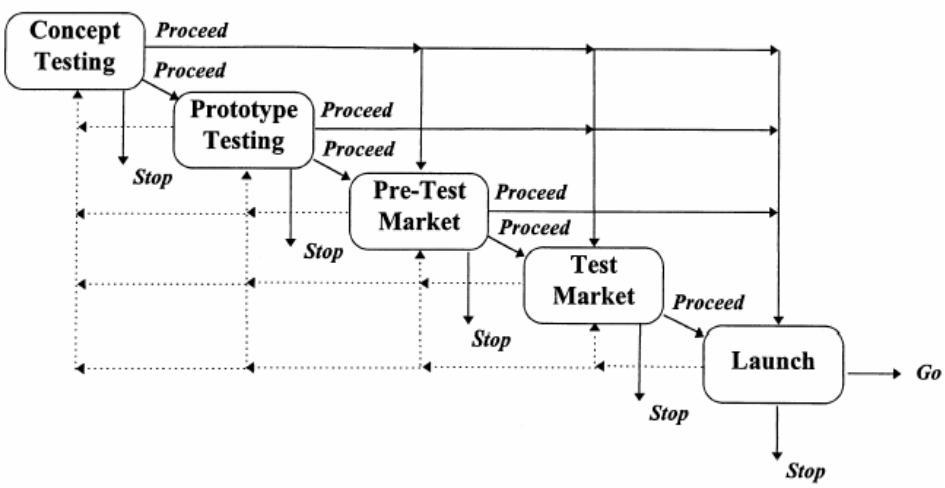

Figure 2. NPD Process Stages (Ozer, 1999: 78)

Cooper and Kleinschmidt (1986) and Maylor (2001) found that proficiency in NPD phases was correlated to new product success.

E. NPD and Market Orientation

Firms' orientation towards customers or competitors is likely to influence how they respond to changes in the marketplace, in particular, the extent to which firms develop and introduce new products (Lewis, 2001: 188).

The link between market orientation and new product activity is based on considerable research in marketing that has focused on the consequences of market orientation. Thus, Han et al. (1998) argue that innovation is the missing link in the market orientation–performance relationship and find empirical support for this hypothesis. In a similar vein, Hurley and Hult (1998) focus on the influence of organizational antecedents, such as market and learning orientation, on the firm's ability to successfully adopt or implement new ideas, processes or products. Their study implies that market orientation, which involves interfunctional activity, is likely to strongly influence the extent of a firm's new product activity (Frambach et al, 2003: 379).

As well as underplaying the specificity of individual organisations, much of the NPD literature largely ignores the role of the competitive environment in defining success. Some studies (Cooper and Kleinschmidt, 1987: 172) have concluded that market dynamics have a less significant impact on success or failure than internal organisational factors despite the abundance of evidence to suggest the contrary. For instance, the precise proportion of products that fail varies from market to market, with the literature reporting a range of failure rates from 37 % to 80 %. Where market considerations are included, they tend to generate broad generalisations, such as Zirger and Maidique's (1990) finding

that early entry into large, growing markets was more likely to lead to success. Such assertions sit uneasily with research into the potential pitfalls facing industry 'first-movers' (Robinson et al., 1992: 620). Recentwork suggests that customers have a crucial role to play in understanding how and why innovation works. In a comprehensive study of the disk-drive industry for instance (Rosenbloom and Christensen, 1994: 659) it is argued that established firms fail to respond to radical innovation not because they lack the requisite skills but because their customers (who have become structured to use the firms current products) actually prevent it. So great potential benefits can be achieved by both the customers and suppliers if they are involved in the NPD process as early as possible (Huang et al, 2003: 301).

Gonzalez and Palacious (2002) claim that, Some market characteristics were found to influence product outcome. Firstly, firms that enter markets where competition is weak have a better chance of providing a significant value to the customer. Secondly, markets that are large and growing are positively related to successful outcomes. Other characteristics that may influence product success are the life cycle of the product and the degree of importance that innovation has over the competitiveness in the industry.

F. NPD Speed

The current business environment rewards firms that are able to develop new products quickly and on-time. Numerous accounts in the academic and popular presses suggest that firms who rapidly develop new products enjoy substantial competitive advantages. Faster firms waste fewer resources on peripheral activities, changes, and rework (Clark and Fujimoto, 1991: 30). Speedy, reliable NPD also yields higher returns in the marketplace. Consequently, speeding-up NPD remains a top priority for managers at many firms (Swink, 2003: 319).

Competition, coupled with the rapid rate of technological change, has made speed to market a critical competency for successful NPD. Speed is no longer a luxury in NPD, it is an economic necessity (Lynn et al, 1999: 439). Developing and launching a product quickly can have considerable impact on the success of the development effort. Karagozoglu and Brown (1993) state that "earlier product introduction improves profitability by extending a product's sales life, creating an opportunity to charge a premium price, and allowing development and manufacturing cost advantages." McKinsey and Company argue that, under certain specific circumstances, introducing a product on budget, but 6 months late, may cut cumulative profit between 17 % and 35 % over 5 years. However, introducing a product with up to a 50 % increase in budget, but on time, can cut profit by only 4 %. In light of this, it is not surprising that managers prefer to go over budget rather than delay product release (Gupta et al, 1992: 13).

Fast NPD allows greater opportunities to access experience effects from longer production runs while improving the likelihood that the organization's technology platform will become industry standard. Furthermore, shorter NPD cycles more readily allow organizations to integrate technological innovations into new versions of their products (Lukas et al, 2002: 34).

G. NPD and Knowledge Management

Knowledge management is a group of clearly defined processes or methods used to search important knowledge among different knowledge management operations. Knowledge is a kind of flow that can transfer knowledge between the knowledge supplier and knowledge demander. Knowledge management was alternatively used to confirm new product strategies and strengthen human resource management in achieving the enterprise's goals. Knowledge management involves collecting information and transferring information to demanders. Such activities, including knowledge obtaining, knowledge refining, knowledge storing and knowledge sharing, can effectively increase the value of the knowledge asset in an organization. This is called knowledge management (Liu et al, 2004: 2).

Integrating internal and external knowledge in the organization and maintaining good management will lead to a positive effect on NPD performance. Grant (1996) thought that knowledge management could be regarded as knowledge integration. Clark and Wheelwright (1993) divided knowledge integration into interior and exterior parts. The combination of these two could increase new product performance. Teece et al. (1997) placed emphasis on the importance of knowledge integration and thought that business owners must effectively acquire and integrate external knowledge to develop innovative ideas. Moorman (1995) pointed out that an enterprise with a good capability to absorb market information would reduce market uncertainty (namely external knowledge management), and obtain comparatively high success opportunities. Enterprises with good knowledge management methods will have successful NPD (Liu et al, 2004: 3).

H. NDP andTechnology

Innovation in the management of a business is essentially concerned with product improvements, the development of new ones and the development or improvement in production processes. This suggests that technological innovation is very central to new product development, whether it is viewed as resulting from demand pull or technology push. In fact, the Central Advisory Council on Science and Technology equates NPD to innovation, and describes it as "the technical, industrial and commercial steps which lead to the marketing of new manufactured products". The ultimate purpose of all new product development activities is to meet consumer needs. One of the means of achieving this is by the exploitation of new technology which may develop

hand-in-hand with the needs (Ilori et al, 2000: 337). Booz, Allen and Hamilton, Inc. (1982) also report that one of the leading stimuli to new products in all industries is technological advances, implying that rapid technological development promotes new product introductions.

IV. Conclusion

Market dynamics have been changing dramatically. Popular strategies of the 1980s, such as cost saving and quality improvement, are no longer sufficient to win the competitive battles of the 1990s. These battles will be won by those companies that can create and dominate new markets by developing new products. NPD is the process by which an organization uses its resources and capabilities to create a new product or improve an existing one. Product development is seen as "among the essential processes for success, survival, and renewal of organizations, particularly for firms in either fast-paced or competitive markets".

Product innovation can be defined as the commercialization of a technologically distinct product, including new products whose design characteristics change to improve the service to users. Nowadays there is an agreement among the analysts in considering that a need for radical innovation of products arises when the properties, characteristics, uses, attributes, design properties and use of materials and components differ significantly from the pre-existing products. Such innovations usually rely on the introduction of new technologies or new applications of prior technologies. On the other hand, incremental innovation of a product is related to improvements to the existing product properties or functioning. This indicates that the development process of an existing product has been improved in a significant manner. In this research, a list of critical success factors for the NPD process, based on the analysis of existing literature, is identified. The major critical factors for the success of product development and innovation are classified into eight groups: Top Management Support; NPD Strategies; NPD Teams; NPD Process; Market Orientation; NPD Speed; Knowledge Management; Technology

These factors should be taken into consideration by managers and investigated, So, NPD advanture will conclude in success..

Özet: Firmaların performanslarının artırılmasında yeni ürün geliştirme önemli bir etkiye sahiptir. Bundan dolayı gerek mal gerekse hizmet üretiminde yeni ürün geliştirmede etkili olan başarı faktörleri sıklıkla ele alınmaktadır. Bu çabalar sonucu yeni ürün geliştirme hakkında yığınla bilgi bulunmasına rağmen hala yeni ürün geliştirme çabaları riskli bir macera olarak görülmektedir.Yeni ticarileştirilen ürünlerin genel başarı ortalamasının % 60'ın altında olması, yeni ürün geliştirmeye ayrılan kaynakların başarısız kullanıldığının bir göstergesidir. Bundan dolayı bu araştırmada, yeni ürün geliştirmeye ayrılan başarısız kaynak kullanımını engelleyici kritik başarı faktörleri ele alınacaktır.

Anahtar Kelimeler: Yeni ürün geliştirme, kritik başarı faktörleri

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