A New Consideration on New Product Development Models

M.Hamidizadeh, M.Hoseini, M.Akhavan, H.Shojaeefard

Professor, Associated Professor, Assistant Professor, Ph.D. Student Management Department, Shahid Beheshti University, Tehran, Iran

Abstract

In order to achieve a successful new product, and certainly the successful implementation of a new product into a company, it is necessary to have a structured and documented approach to New Product Development (NPD), therefore providing a clear roadmap for the development of new products.New product development is a multi-stage process. Many different models with a varying number of stages have been proposed in the literature which in this paper are briefing them. This review highlights the NPD Models and process, from concept to consumer, and aim to find the consist gap of different NPD's models in order for a company to succeed and use New products as a source for Competitive advantage.

***Keywords**: Product Development, models, Performance Evaluation*

1. Introduction

Intense global competition, rapid technology change and shifting patterns of world market opportunities compel companies to continually invest in NPD; if not for profit, then for survival, and this is considered to be the key to success (Cooper & Kleinschmidt, 1995, 1997, 1999a; Schmidt, 2005). The advance of New products and their development is widely recognized as an important source of competitive advantage (Thomas, 2015). However, despite the importance of NPD, for both the present and future prosperity of companies, a high percentage of new products fail when released into the market. Research (Liberatore & Stylianou, 2005; Twigg, 2010) demonstrates that most new idea concepts fail to become commercial successes, without the aid of a structured process.

Subsequently, formal NPD processes have had a positive impact on the way that some companies' new product programs are managed and controlled (Cooper, 2011). Therefore, new products, if properly managed, can offer a substantial injection in growth that cannot usually be managed by existing products.

The new product development (NPD) literature emphasizes the importance of introducing new products on the market for continuing business success. Its contribution to the growth of the companies, its influence on profit performance, and its role as a key factor in business planning have been well documented (Booz, Allen & Hamilton, 1997; Crawford, 2007; Urban & Hauser, 1999; Cooper, 2011; Ulrich & Eppinger, 2014). New products are responsible for employment, economic growth, technological progress, and high standards of living. Therefore, the study of NPD and the processes through which they emerge is important.

In the last few decades, the number of new product introductions increased dramatically as the industry became more aware of the importance of new products to business. Correspondingly, managing the NPD process has become a challenge for firms as it requires extensive financial and human resources and is time sensitive. The harsh realities are that the majority of new products never make it to market and those that do face a failure rate somewhere in order of 25 to 45 percent (Crawford, 1997; Cooper, 2014). For every seven new product ideas, about four enter development, one and a half are launched, and only one succeeds (Booz, Allen & Hamilton, 2008). Despite the extensive research on how to achieve success in NPD, firms continue to deliver products that fail and therefore NPD ranks among the riskiest and most confusing tasks for most companies. As the number of dollars invested in NPD goes up, the pressure to maximize the return on those investments also goes up. It becomes worse as an estimated 46 percent of resources allocated to NPD are spent on products that are canceled or fail to yield an adequate financial return.

2. New product development

The NPD process consists of the activities carried out by firms when developing and launching new products. A new product that is introduced on the market evolves over a sequence of stages, beginning with an initial product concept or idea that is evaluated, developed, tested and launched on the market (Booz, Allen & Hamilton, 2009). This sequence of activities can also be viewed as a series of information gathering and evaluation stages. In effect, as the new product evolves, management becomes increasingly more knowledgeable (or less uncertain) about the product and can assess and reassess its initial decision to undertake development or launch. Following this process of information gathering and evaluation can lead to improved new product decisions on the part of firms by limiting the level of risk and minimizing the resources committed to products that eventually fail. The NPD process differs from industry to industry and from firm to firm. Indeed, it should be adapted to each firm in order to meet specific company resources and needs (Booz, Allen & Hamilton, 1982).

Many researchers have tried to develop a model that captures the relevant stages of the NPD process (Ulrich & Eppinger, 2011; Wind, 2001; Cooper, 2001; Crawford, 1987; Scheuing, 1974). A number of detailed NPD models have been developed over the years, the best known of which is the Booz, Allen and Hamilton (1982) model, shown if Figure 1, also known as the BAH model, which underlies most other NPD systems that have been put forward. This widely recognized model appears to encompass all of the basic stages of models found in the literature. It is based on extensive surveys, in depth interviews, and case studies and, as such, appears to be a fairly good representation of prevailing practices in industry.

The stages of the model are as follows:

·New Product Strategy: Links the NPD process to company objectives and provides focus for idea/concept generation and guidelines for establishing screening criteria.

Idea generation: Searches for product ideas that meet company objectives.

Screening: Comprises of an initial analysis to determine which ideas are pertinent and merit more detailed study.

Business Analysis: Further evaluates the ideas on the basis of quantitative factors, such as profits, Return-on-investment (ROI), and sales volume.

Development: Turns an idea on paper into a product that is demonstrable and producible.

Testing: Conducts commercial experiments necessary to verify earlier business judgments.

Commercialization: Launches products.

Booz, Allen and Hamilton (1982) found that companies that have successfully launched new products are more likely to have some kind of formal NPD process and that they generally pass through all of the above stages. Our framework is based on the BAH model, however, we exclude the commercialization stage; while this stage represents an important area of concern.

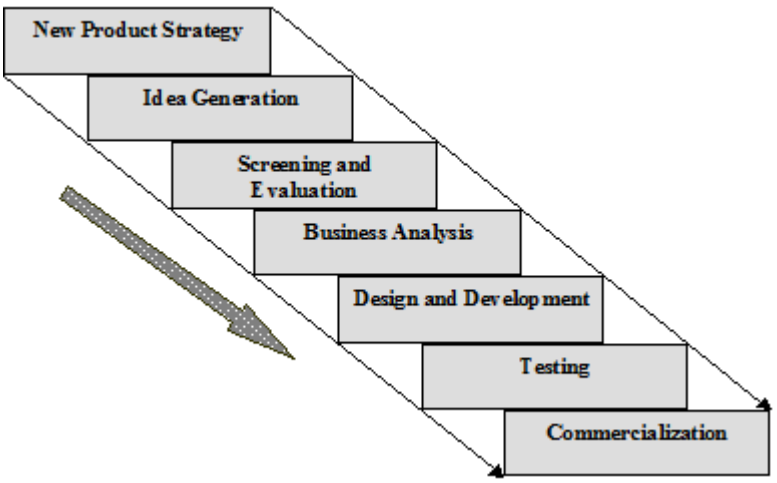

Fig1. Stages of New Product Development (NPD) (Booz, Allen & Hamilton, 1982)

3. Product Life

The useful life of a product is the age beyond which the product is deemed to be unsuitable for further use due to its inability to perform satisfactorily. This is a random variable due to variation in manufacturing and/or usage. For a repairable product, a component of the product can fail several times over its useful life and is restored to operational status through corrective maintenance actions. In the context of new products, a related notion is the time for which a consumer uses the purchased product beforeit is replaced by a new one. This can be called the period of ownership. This is also a random variable as different consumers keep the purchased product for different lengths. If consumers keep the products for the useful life, then the products are scrapped at the end of their useful life. In this case, there are no second-hand products. If the period of ownership is shorter than the useful life, a market for second-hand products is created.

4. Product Life Cycle

The product life cycle concept is quite different in meaning, intent, and importance for consumers and manufacturers.2 From the manufacturer's perspective there are two different notions. The product life cycle can be viewed in a larger overall context, with important strategic implications (Betz, 1993). Here, the productlife cycle is seen as embedded in the technologylife cycle where there are several productlife cycles within a technologylifecycle.Revolutionarytechnologicalinnovationsresultinanewtechnology platform (e.g., internet access) with multitudes of technology generations developing over time (e.g., phone modem, ISDN, ADSL) with each technology generation characterizedbyfourphases:introduction,rapidgrowth, mature,anddecline.Withineachtechnologygeneration,a multitudeofproductsaredeveloped,followingsimilar product life cycles. The technology platform also follows a similar technology life cycle.

5. new product development models

Conceptual models have been designed in order to facilitate a smooth process. The concept adopted by IDEO, a successful design and consulting firm, is one of the most researched processes in regard to new product development and is a five-step procedure. These steps are listed in chronological order:

Understand and observe the market, the client, the technology, and the limitations of the problem;

Synthesize the information collected at the first step;Visualise new customers using the product; Prototype, evaluate and improve the concept; Implementation of design changes which are associated with more technologically advanced procedures and therefore this step will require more time.

One of the first developed models that today companies still use in the NPD process is the Booz, Allen and Hamilton (BAH) Model, published in 1982.This is the best known model because it underlies the NPD systems that have been put forward later. This model represents the foundation of all the other models that have been developed afterwards. Significant work has been conducted in order to propose better models, but in fact these models can be easily linked to BAH model. The seven steps of BAH model are: new product strategy, idea generation, screening and evaluation, business analysis, development, testing, and commercialization.

A pioneer of NPD research in the consumers goods sector is Robert G. Cooper. Over the last two decades he conducted significant work in the area of NPD. The Stage-Gate model developed in the 1980s was proposed as a new tool for managing new products development processes. This was mainly applied to the consumers goods industry

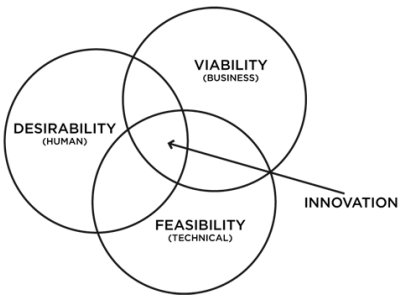

Fig2. a concept of IDEO Model

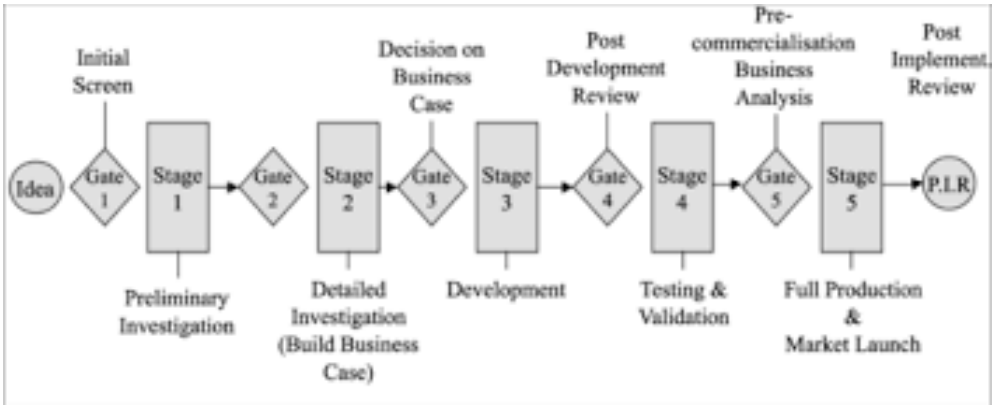

Fig3. Stage gate model

The 2010 APQC benchmarking study reveals that 88% of U.S. businesses employ a stage-gate system to manage new products, from idea to launch. In return, the companies that adopt this system are reported to receive benefits such as improved teamwork, shorter cycle time, improved success rates, earlier detection of failure, a better launch, and even shorter cycle times – reduced by about 30%.[14]

These findings highlight the importance of the stage-gate model in the area of new product development.

Over the last few years, the Lean Startup movement has grown in popularity, challenging many of the assumptions inherent in the stage-gate model.

6. Stage gate model

The stage-gate model was developed and first suggested by Robert G. Cooper (McMaster University) in his book Winning at New Products, published in 1986.[1] The stage-gate model is based on empirical findings of numerous "NewProd" Studies conducted by R.G.Cooper (e.g. 1985, 1992, 1994,2010).[2], [3], [4]

The stage gate model refers to the use of funnel tools in decision making when dealing with new product development. “Gates” or decision points are placed at places in the product development process that are most beneficial to making decisions regarding continuance of product development. These production areas between the gates are idea generation, establishment of feasibility, development of capability, testing and validation and product launch. At the conclusion of each of these areas of development of a new product, it is the responsibility of senior management to make a decision as to whether or not the product should continue to be developed. The passing of gate to gate can be accomplished either formally, with some sort of documentation, or informally, decided upon based on the preferences and culture of the organization.

A common model is composed of the following stages: ideation, preliminary analysis, business case, development, testing, launch. A stage-gate model is a conceptual and operational road map for moving a new project from idea to launch - a blueprint for managing the new-product process to improve effectiveness and efficiency. The traditional Stage-Gate process has five stages and five gates. The stages are:[5]

1.Scoping
2.Build Business Case
3.Development
4.Testing and Validation
5. Launch

Conventionally, the gates between stages have the same number as the stage following them.

7. Conclusion

As It is Considerable new product development is a vital Strategy for Companies to be active in Market and to Achieved to Market Goals.

There have been several Searches in literature about new product development and new models of doing so. The research was a review around the new product development and the capable models of it.

As it has been illustrated the stage gate model is the most famous model of new product development but still it has some gap problems in use.

There should be some indicators in each step to measure the correct performance of each gate.

Even the indicators need to have some value and the value should be detected very carefully.

By this knowledge of new product development and its models we could have the chance to focus on the indicators and value of each gate during the process. Which We aim to have it on our future research.

References:

[1]. Balakrishnan, A. (1998). Concurrent engineering: Models and metrics. Master dissertation, McGill University, Canada.

[2]. Belliveau, P., Griffin, A., & Somermeyer, S. (2002). Meltzer, R. in The PDMA toolbook for new product development, New York: John Wiley & Sons.

[3]. Booz, Allen, & Hamilton. (1982). New product management for the 1980's. New York: Booz, Allen & Hamilton, Inc.

[4]. Journal of Industrial Engineering and Management - http://dx.doi.org/10.3926/jiem.334

[5]. Clark, K., & Fujimoto, T. (1988). Product development in the world auto industry: Strategy, organization, and performance. Boston: Harvard Business School.

[6]. Cooper, R. (1980). Project NewProd: What makes a new product a winner? Quebec Industrial Innovation Centre.

[7]. Cooper, R.G., & Kleinschmidt, E.J. (1987). New products: What separates winners from losers?. Journal of Product Innovation Management, 4(3), 169-184. http://dx.doi.org/10.1016/0737-6782(87)90002-6

[8]. Cooper, R. (1993). Winning at new products: accelerating the process from idea to launch (1st Ed.). Massachusetts: Perseus Publishing.

[9]. Cooper, R. (1998). Product leadership: Creativity and launching superior new products. Massachusetts: Perseus Books, Reading.

[10]. Cooper, R. (1999). From experience: The invisible success factors in product innovation. Journal of Product Innovation Management, 16, 115-133. http://dx.doi.org/10.1016/S0737-6782(98)00061-7

[11]. Cooper, R., Kleinschmidt, E., & Edgett, S. (2000). New problems, new solutions: Making portfolio management more effective. Research Technology Management, 43(2), 18-33.

[12]. Cooper, R. (2001). Winning at new products: Accelerating the process from idea to launch (3rd Ed.). Massachusetts: Perseus Publishing.

[13]. Cooper, R., & Edgett, S. (2008). Maximizing Productivity In Product Innovation. Research Technology Management, 51(2), 47-58.

[14]. Cooper, R., & Kleinschmidt, E. (1995). Benchmarking the firm's critical success factors in new product development. Journal of Product Innovation Management, 12, 374-391. http://dx.doi.org/10.1016/0737-6782(95)00059-3

[15]. Cooper, R., & de Brentani, U. (1984). Criteria for screening new industrial products. Industrial Marketing Management, 13, 149-156. http://dx.doi.org/10.1016/00198501(84)90027-0

[16]. Crawford, C. (1979). New product failure rate-facts and fallacies. Research Management, 9-13.

[17]. Journal of Industrial Engineering and Management - http://dx.doi.org/10.3926/jiem.334

[18]. Crawford, C. (1992). The hidden costs of accelerated product development. Journal of Product Innovation Management, 9(3), 188-199. http://dx.doi.org/10.1111/15405885.930188

[19]. Crawford, C. (1987,1997). New product management. (2nd Ed. & 5th Ed.). Illinois: Richard D. Irwin.

[20]. Daniel, R. (1961). Management data crisis. Harvard Business Review, Sept-Oct, 111-112.

[21]. de Brentani, U. (1989). Success and failure in new industrial services. Journal of Product Innovation Management, 6, 239-58. http://dx.doi.org/10.1016/07376782(89)90077-5

[22]. Griffin, A. (1997). PDMA research on new product development practices: Updating trends and benchmarking best practices. Journal of Product Innovation Management, 14(6), 429-458. http://dx.doi.org/10.1016/S0737-6782(97)00061-1

[23]. Lilien, G., Morrison, P., Searls, K., Sonnack, M., & Hippel, E. (2002). Performance assessment of the lead user idea generation process for NPD. Management Science, 8(8), 1042-1059. http://dx.doi.org/10.1287/mnsc.48.8.1042.171

[24]. Kaplan, R., & Norton, D. (1996). The Balanced Scorecard, Boston. Massachusetts: Harvard Business School Press.

[25]. Lynn, G., & Reilly, R. (2000). Measuring team performance. Industrial Research Institute Inc., March-April 48-56.

[26]. Rockart, J. (1979). Chief executives define their own data needs. Harvard Business Review, 57(2), 238-241.

[27]. Rosenau, M., Griffin, A., Castellion, G., & Anschuetz, N. (1996). The PDMA Handbook of New Product development. John Wiley and Sons, Inc.

[28]. Scheuing, E. (1974), New product management. Hinsdale: The Darden Press.

[29]. Song, M., & Parry, M. (1996). What separates Japanese new product winners from losers. Journal of Product Innovation Management, 13, 422-439. http://dx.doi.org/10.1016/0737-6782(96)00055-0
[30]. Souder, W. (1987). Managing new products innovations. Massachussetts: D.C. Health and Company.
[31]. Journal of Industrial Engineering and Management - http://dx.doi.org/10.3926/jiem.334
[32]. Ulrich, K.T. & Eppinger, S.D. (2011). Product Design and Development. McGrawHill.
[33]. Urban, C., & Hauser, J. (1993). Design and marketing of new products. New Jersey: Prentice-Hall.
[34]. Wheelwright, S., & Clark, S. (1992). Revolutionizing product development. New York: The Free Press.
[35]. Wind, Y. (1982). Product policy: Concepts, methods, and strategy. Reading, Mass: Addison-Wesley.