

## Consolidation of the New Product Development Process

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**Abstract** The article aims at creating a consolidated model for new product development (NPD). The methodology of this study consists of a cabinet study. The scope of the research are full text publications on models for NPD. The limitation of the research is focusing on methodologies for NPD. The main finding is that the proposed model decreases the total time for research and development. The classical NPD processes are extended by software assisted processes for NPD. The practical implication concerns the usefulness of the proposed NPD models for generating new corporate know-how. The main conclusion is the existence of the real possibility of minimizing the time for NPD when modeling the process for it with specialized software.

**Key words:** NPD, NPD process, new product.

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### 1. Introduction

According to BCG (The Boston Consulting Group, 2005) in 2005, less than 49% of companies in the United States are satisfied with the return on their R&D investments. Furthermore, the absence of a direct correlation between the amount of investment and the growth of sales, profits, and returns is also demonstrated.

According to the data of the Nielsen (Lempert, 2008) In 2007, only 3% of new products in the United States crossed the \$1 million turnover limit. Only 0.2% crossed the \$10 million limit, and 0.01% reached a turnover of more than \$50 million. Each store spent an average of \$270 to present a new product, meaning that in 2007, stores in the United States spent more than \$956,000 on product presentations who have failed. The success rate of new products in 2007 is 11.6%, with an average success rate of about 10% over the past twenty years. The percentage of successful products is maintained, but this happens in a lot of changing conditions in which the management staff of each organization has to make their decisions.

At the same time, account must also be taken of the fact that "successful" new products are mainly introduced by large companies that are established in the respective markets and for every 10 new brands, nine it is about the extension of an existing brand (Lempert, 2008).

According to the data of the PDMA Research Foundation (Markham and Lee, 2013) in 2012, 56.8% of new products introduced to the European market are successful. By comparison, in North America, the success rate is 67.5%. For the period 1990-2012, the average success rate of new products increased from 58% to 61%. In Europe in 2012 success and profitability rates are 51.8%, sales revenue from them amounted to 29.2%, their profit is 31.5%, and the product development process started with the generation of an average of 10.2 ideas. Overall, the NPD process used 48.9% of companies and Structured Portfolio Management at 70.8%. New Product Development Cycle Time averages are 134.6 weeks for "Radical," 66.4 for "More Innovative" and 32.7 for "Incremental" processes.

The reasons for these relatively unsatisfactory results can be sought in different directions. It is a matter of management to minimize the possibility that forces outside the company will influence this. For example, for suppliers, it is necessary to be carefully aware of the aspects of their relationship with them (Milusheva, 2016) to avoid any delay in the development of new products. We can give similar examples of external forces such as competitors, consumers, etc., but also for entirely managerial solutions, such as who produces the (Milusheva, 2019) the new product to optimize the process. However, excluding the reasons under which structural organizational problems are based, one of the key factors is the time it takes to develop a new product, following

classical formal procedures. This requires initially paying attention to the models themselves for the development of new products.

## 2. Classic models for NPD

Agrawal (Agrawal, 2003) adaptation of the model for the development of a new product of Booz, Allen, and Hamilton (1982), defining the essence of the individual stages as follows:

- New Product Strategy – making the connection between the process and development of the new product and company goals;
- Idea Generation – search for product ideas that meet company goals;
- Screening and Evaluation – includes an initial analysis aimed at identifying ideas worth considering in more detail in the next stages;
- Business Analysis – initial assessment of ideas based on quantitative factors such as profit, return on investment, sales volume, etc.;
- Design and Development – creating a prototype that can be demonstrated and is therefore ready for production;
- Testing – conduct commercial tests to confirm the earlier management assessments;
- Commercialization.

Lilien and Rangaswamy (Lilien and Rangaswamy, 2004) present a model including the following stages:

- Opportunity Identification – the stage includes: Market definition; Idea generation;
- Design – includes: Identifying customer needs; Product positioning; Segmentation; Sales forecasting; Engineering; Marketing-mix assessment;
- Testing – the areas of testing are: Advertising and product testing; Pretest and prelaunch forecasting; Test marketing;
- Introduction – the stage includes: Launch planning; Tracking the launch;
- Life-Cycle Management – includes Market response analysis and fine-tuning of the marketing mix; Competitive monitoring and defense; Innovation at maturity.

According to Kotler and Armstrong (Kotler and Armstrong, 2011) “companies can’t just hope that they’ll stumble across good new products. Instead, they must develop a systematic new-product development process”. In their view, this process should include the following stages:

- Idea generation – the systematic search for ideas for new products, and the sources for them can be:
  - Internal – most often this is the Research and Development Department. But several companies also incentivize staff (scientists, engineers, production staff, sales staff) to generate ideas. All this should not be a random process, but rather intercompany programs can be built, stimulating the creativity of their subordinates;
  - External – such sources may be: *consumers* – by identifying their unmet needs, which can be turned into a product idea; *distributors* – they are close to the market and therefore easier to collect information from it; *suppliers* – they are the carrier of information on new technologies and production techniques that can allow the development of new products; *competitors* – they must be looking after and, accordingly, pay attention to the slightest 'hint' of their new product;
- Idea screening – at the previous stage, a maximum number of ideas are collected, which need to be assessed to isolate the value and therefore reject non-essential ones. Generally speaking, at this stage, the company should be primarily interested in which ideas can become profitable products, looking for an answer to several questions related to whether the idea is tied to a real need and, accordingly, will be bought by consumers, would it bring satisfaction; are there competitive advantages available and, accordingly, is it in the company's power to succeed, i.e. are there resources to do so; the product with the company's development strategy, would the product provide the desired levels of profit. To move forward with the development of a product, at this stage the idea must have received positive answers to the questions;
- Concept development and testing – the concept is seen as an improved and more complete version of the product idea, already featuring causes relevant to consumers. Once created, the concept needs to be tested. This is most often done with a small group of users;
- Marketing strategy development – the positive assessment of the previous stage allows us to proceed with the next actions, which are expressed based on this detailed picture of the product to develop a variant of a marketing strategy for its future commercialization. According to the authors, this strategy should include the following three parts:

- a description of the target market; the intended value of the product; sales, market share, and target profit in the first year;
- planned price, distribution, and marketing budget for the first year;
- planned long-term sales, non-profit objectives, and product marketing mix strategy;
- Business analysis – it includes the examination of sales, costs, and profit. They need to be evaluated to assess whether they match the company's goals. Sales are usually planned based on historical company data for similar products. Once the estimated value for sales is available, it is now also possible to estimate the costs to be incurred for these quantities to be realized. Therefore, an estimated amount of profit that would be recognized can also be calculated;
- Product development – at this stage, the idea must become something real, because a situation is also possible in which the idea cannot be realized in a product according to the parameters and specifications set out in the preceding stages. Typically, several versions of products are developed, which are tested mainly according to the performance and security criteria. Real users often participate in these tests;
- Test marketing – after passing the concept testing and the product test, the marketing plan is tested. It's a test that's as close to reality as possible. It can be organized in two ways: test in controlled trial markets – conducted in a real market environment; test in simulated markets (laboratory test) – conducted in an isolated environment that maximizes the real market. Conducting these tests is an expensive and resource-intensive procedure. Sometimes it takes a long time. In the real market test, there is an opportunity for the company's competitors to unravel its intentions;
- Commercialization - positively, those who have passed the previous stage are transitioning to a real market. At this stage, production issues, the time frame for starting sales, and distribution channels are already being addressed. In general, work begins on the developed marketing plan.

In the stylistics of the above NPD models can also be indicated the models of McCarthy and Perreault (McCarthy and Perreault, 1987); Cravens, Hills, and Woodruff (Cravens, Hills and Woodruff, 1987); Mercer (Mercer, 1992); Been and Radford (Bean and Radford, 2000), etc. All of them (models for developing new products) show a different way of organization of the development process. It is important to note that regardless of the separation of the NPD process into a different number of stages, the activities included in them as type and sequence of performance are relatively the same. In other words, the group of activities is different, but not their nature, which speaks to a similarity of the opinion of the authors regarding the essence of the process of developing new products.

What is important to know is that the transition to each subsequent stage takes place after a decision has been taken on the previous one (even if it is not defined as an explicit management decision, it is necessary at the previous stage to provide the necessary information and, accordingly, to decide by those involved in the process whether the objectives of this stage have been achieved and can therefore be further developed). In other words, at the end of each stage, there is an intermediate "stop/go" one where the decision to move forward or to suspend the project must be taken. Thus, in the case of models presented, where the stages are between 5 and 8, these intermediate stages will be between 4 and 7, i.e. so many times it is necessary to decide on the continuation or suspension of the development of a new product. As a result, the more stages we have, the more the development process is expected to continue over time.

Realizing that one of the key factors for a company's success on the market is its handling of the limited time available to respond and, accordingly, the placing of new products on the market, and given the above, their importance should not be denied because they map out the mandatory sequence of activities (regardless of how grouped) that need to be realized to carry out an optimal and effective process of developing a new product.

### 3. Consolidated NPD model

Market dynamics and strong competition require shortening the time for the placing of new products on the market while maintaining normal levels of financial return. However, as noted at the outset, the ROI for new products is 51.8%. At the same time, only 48.9% of companies have any formal process for developing a new product. This leads us to that to cope with today's dynamic and turbulent conditions, many companies rely on "intuition" rather than a well-structured approach.

At the same time, several authors link the development process to the general innovation process in companies and from this point of view offer a grouping of activities in a different way. Jaruzelski, Dehoff, and Bordia (Jaruzelski, Dehoff and Bordia, 2005) the process of developing new products in the context of innovation in companies:

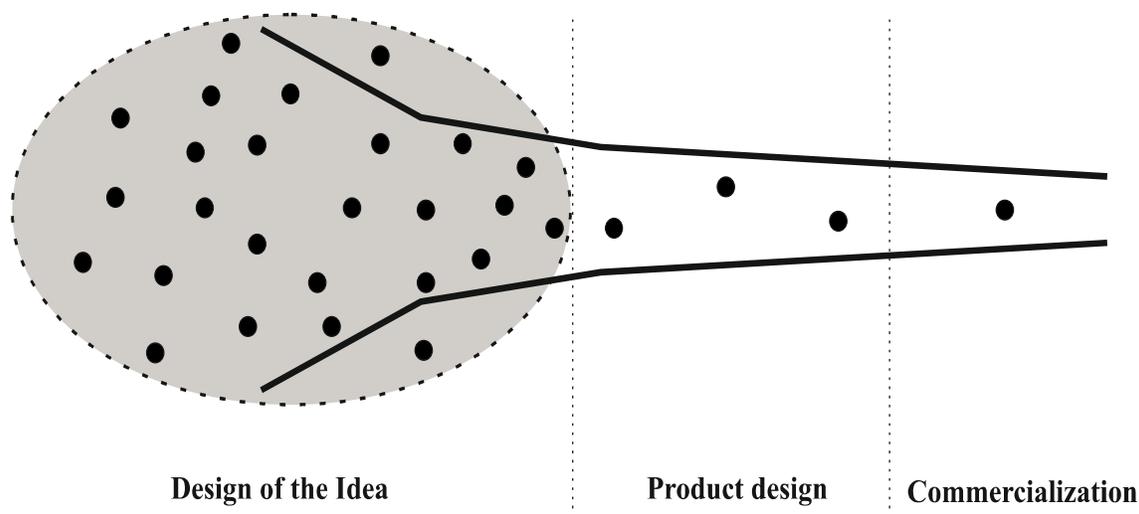
- Ideation – disclosure by company employees of opportunities for new products;
- Project Selection – based on sales and profit forecasts of future products;

- Development – the stage at which the idea must become a real product that meets consumer needs and is, therefore, possible to produce;
- Commercialization – the final stage during which the developed product is already heading to the market.

A similar view of the organization of the process of developing new products is Bussey (Bussey, 2005).

By looking at new products in the context of the innovation activities of the organizations, it is necessary to synchronize the two processes (innovation and NPD processes), resulting in compaction of development activities and thereby reducing the “stop/go” intermediate stages.

In the organization of the process of development of new products, it is also useful to pay attention to modern understandings about the conduct of procedures in project management. In this regard, the concept of the so-called "no-go zones" becomes particularly relevant. "Funnel of the new product development process", which can be seen by Propp (Propp, 2010) and Goffin, Lemke, and Koners (Goffin, Lemke and Koners, 2010). Within the framework of this concept and based on everything said so far, a process of development of new products can be brought up, organized into three main stages (fig. 1): Design of the idea; Product design; Commercialization.



**Figure 1.** The NPD process Funnel  
Source: Created by the author

### ***Design of the idea***

The stage should start with market analysis with the main purpose of identifying the potential customers of the company. By knowing in detail our future users, we can do a comprehensive analysis of their needs. In addition to consumers, at the beginning of the process, we also need to have an idea of competition and for this purpose, we need to develop a reliable competitive analysis. The market, mainly through consumers and competitors, provides us with the necessary information for follow-up activities in the development of the new product. It is also of particular importance at this initial stage to prepare a technological assessment for the sector in which the organization concerned is interested. The essence of the stage begins with the generation of a sufficient number of ideas that are needed to carry out an effective development process. Sources of ideas can be the customers themselves (through knowledge of their needs, problems, etc.), competitors, company employees, state and local authorities, scientific units, etc. Each idea must then be evaluated to be able to compare it with the others and choose the most appropriate. The evaluation is done through so-called screening based on common indicators for all ideas. Practice shows that a leading criterion in the evaluation of ideas is the ROI indicator. It is also necessary to calculate the market potential of the products concerned. Naturally, other indicators can be mentioned, but more importantly, it is to know that, in addition to quantitative ones, there are also qualitative indicators, the assessment of which must be organized in a way that is adequate to all ideas and equally understandable by the managers who will make the relevant management decisions. However, the stage is such that due to the lack of real products, the estimates will be relatively rough and inaccurate, but at the same time, they will be enough to compare and rank the ideas. Ideas deemed appropriate must be deployed in concepts and

tested in consumers. As a result of testing the concepts, the number of ideas must be limited to carry out the next stages more efficiently.

### ***Product design***

At this stage, the ideas selected at the previous stage need to be further developed. A marketing strategy is initially prepared for them. The strategy examines both the product in its essence and all the necessary details related to its future commercialization. In the presence of a marketing strategy, it is switched to business analysis. It must carry out with particular precision analyses relating to market potential, revenue, and expenditure from activities, profit, etc. The assessment must be made both in the short and long term. Through business analysis, it becomes possible to selection of an appropriate idea for a new product to be produced. Here the idea already enters the engineering development units to develop a realistic prototype of the product (this stage takes place only in tangible products). Successfully created prototypes can be directed to the necessary tests – laboratory and/or market. If a test is successfully passed, a new product can now be talked about and its production organized accordingly.

### ***Commercialization***

The stage is related to the introduction of the product to the market or, in other words, to the beginning of its life cycle management. An important aspect here is that, in addition to the ongoing management of market performance, monitoring is also carried out. First, it aims to monitor in dynamics whether there is no deviation from the planned parameters and, where appropriate, to take corrective measures. But no less important is the generation of information that is useful in subsequent developments.

Such a way of organization of the process of developing new products does not exclude activities compared to classical productions, but this compaction reduces the working time, at least by reducing the intermediate "stop/go" stages. At the same time, merging more activities into a common group means that more ideas will be enabled to be developed and therefore the decision on the appropriateness of one idea or another will be taken based on a more detailed projection picture. At first glance, this should lead to an increase in development costs, given that more ideas will be considered at the same time, and these initial phases of design are in practice the most resource-intensive in the whole process. But here we have to take some facts into account. Firstly, as noted above, 9 out of 10 new products are from large companies with experience. This in practice means that organizations have the know-how they need to optimize activities at different stages. Secondly, much of the information needed for the development process should be collected by organizations operating, not specifically for the development of new products. Knowledge of the market and competition, as well as monitoring technological innovation in the sector, is hard information to be collected to develop new products. Thirdly, in modern process management in the organization, managers are increasingly helped by software solutions. The exception is not the process of developing new products. An example of such a solution can be pointed to Teamcenter® SIEMENS PLM Software, but similar solutions have most companies offering ERP software on the market. In practice, most product lifecycle management software currently has a module for preliminary analysis as part of its development process. But even if it is not a complete software solution, one can be found for specific problems. The software can mainly facilitate prognostic analyses, but also much of the analysis is related to the screening and selection of ideas and concepts. Software nowadays can be optimized even in the process of generating ideas. Account must also be taken of the fact that it is becoming increasingly difficult to extract the data we need at sea from information that surrounds us.

## **4. Conclusion**

In the article, based on the classic productions for the process of developing new products and accordingly considering modern perspectives about it (mainly tying it to the general innovation process and the process of project management in the organization), a consolidated NPD model is displayed. Organized in three stages (design of the idea, product design, and commercialization), it does not reject activities compared to conventional models, but groups them in a fundamentally new way. The inclusion of all these activities ensures the correct choice of the appropriate idea, concept, strategy, prototype, and product that will be introduced to the market. Such a complex process would help optimize the time from the idea to the commercialization of products by reducing the number of "stop/go" stages on the one hand and the ability to work simultaneously on several activities on the other.

At the same time, it should be noted that the process of developing new products have a positive effect if organizations considered the importance of generating their know-how in the field concerned, organizing the ongoing recruitment of the information relevant to the management of their business and exploiting the

opportunities and absorbing the advantages that modern software solutions give them (whether complete or separate modules for a particular problem).

### Literature

- Agrawal, A. (2003) Critical Success Factor and Metrics for New Product Development Success. Concordia University.
- Bean, R. and Radford, R. (2000) Powerful Products: Strategic Management of Successful New Product Development. AMACOM.
- Bussey, P. (2005) Winning Through Innovation: Managing New Product Development for Profitable Growth. SAP AG.
- Cravens, D., Hills, G. and Woodruff, R. (1987) Marketing Management. Illinois: Irwin.
- Goffin, K., Lemke, F. and Koners, U. (2010) Identifying hidden needs: Creating breakthrough products, Identifying Hidden Needs: Creating Breakthrough Products. doi:10.1057/9780230294486.
- Jaruzelski, B., Dehoff, K. and Bordia, R. (2005) 'Money Isn't Everything', Strategy+Business [Preprint], (41). Available at: <https://www.strategy-business.com/article/05406?pg=all>.
- Kotler, P. and Armstrong, G. (2011) Principles of marketing, 14th ed. Pearson Prentice Hall.
- Lilien, G. and Rangaswamy, A. (2004) Marketing Engineering: Computer Assisted Marketing Analysis and Planning, Revised Second Edition. Trafford Publishing.
- Markham, S.K. and Lee, H. (2013) 'Product development and management association's 2012 comparative performance assessment study', Journal of Product Innovation Management, 30(3), pp. 408–429. doi:10.1111/jpim.12025.
- McCarthy, J. and Perreault, J. (1987) Basic Marketing: 9th Edition. Illinois: Irwin.
- Mercer, D. (1992) Marketing. Oxford: Blackwell Business.
- Milusheva, P. (2016) 'Aspects of companies' relationships with suppliers', Economics and Computer Science, (1), pp. 6–10. Available at: [http://eknigibg.net/spisanie-br1-2016\\_pp.4-11.pdf](http://eknigibg.net/spisanie-br1-2016_pp.4-11.pdf).
- Milusheva, P. (2019) 'Some aspects of the decision to buy, not to produce parts and components, Economics and Computer Science, (2), pp. 64–67. Available at: [https://eknigibg.net/Volume5/Issue2/spisanie-br2-2019\\_pp.64-67.pdf](https://eknigibg.net/Volume5/Issue2/spisanie-br2-2019_pp.64-67.pdf).
- Phil Lempert (2008) 'Facts, Figures & The Future'. Available at: <http://retailvelocity.blogspot.com/search?q=product+success+rate>.
- Propp, J. (2010) Metrics for New Product Development. San Francisco: PMI Silicon Valley.
- The Boston Consulting Group (2005) 'Innovation 2005'. Available at: <https://web-assets.bcg.com/25/0d/308587c24c6a9f3271301b1fc57f/2005-innovation-report.pdf>.