

MODEL SELECTION OF APPROPRIATE DESIGN METHODS OF NEW DEVELOPMENT PRODUCTS

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Abstract—The goal of the study is to present the model for the best selection methods of new product designs. This topic is of crucial significance for successful development of new products, thanks to the information systems and tools of parallel engineering, thus the development itself is relatively easier. However, the issue of the market success is always present, to come to the new products in the current conditions is much simpler than in the previous periods. Through the work we display the model that uses the paradigm of design methods. This model will set approximate solution that can serve companies to achieve market success in the launching process of a new product.

Keywords—design methods, management of the development, new products, information systems, parallel engineering.

I. INTRODUCTION

NEW product development is a complex phenomenon that requires a great commitment of the entire organization. Fortunately the theory and practice know a number of methods and techniques of development, but the product itself is not sufficient for market success. A number of parameters determine the market success of new products, some of the parameters are well-known and are included to the development of new products already in the early stages. The problem occurs when there are some new parameters to be included in the process of launching of a new product. The techniques of parallel engineering additionally accelerate the process of development, with information technology in addition to the speed you get certain flexibility. However, no techniques and technologies can not completely overcome errors of poor planning. Through proper development planning and selection of appropriate tools is achieved a lower degree of risk. Unfortunately, the risk is a constant fellow traveller of the process of new product development, the risk may scare the decision-makers in organizations. The result of the fear of risk leads to avoid of the same, which can

lead to the abandonment of the new process development or even worse not to overview all aspects of a new product.

II. NEW PRODUCT DEVELOPMENT

According to some authors "development is the evolution which is directly focused to increase effectiveness. The most important aspect of innovation is that the technical systems to be included in the process of transition from one state to another in such a way that there is a future development reflection process of technical systems.." [1] This leads to the fact that it is possible to monitor the process of new technology creations. Also the process of innovation is not so chaotic and elusive as it seems at first sight, but it's a system that can be managed.

The process of development and innovation are very similar, it's possible to monitor both phenomena and directly manage with them. When we say directly we think to management of human resources in the domain to increase innovative power of the organization or the introduction of a model of development. And yet, the development process is always accompanied by a relatively high degree of risk.

The development of new product is multidisciplinary problem that in addition to technical characteristics involves many others. According to many authors (... the product's affective and emotional properties (or "Kansei" in Japanese) have recently emerged as important factors in the successful marketing of products.)" [2]

This leads to a number of problems related to the choice of the new product development methodology, problems in communication are also present, and the influx of market information is of crucial importance. With the advent of new elements in the development of new product is necessary to take account of customers' future preferences. "We cannot predict what we cannot know. What we can do is to prepare ourselves to deal with the unknown when it arrives." [3]

Continuous testing of customers' wishes on one hand and the development of technical capacity on the other hand has to be carried out in parallel. Today, it is not difficult to produce any product, it is extremely to produce a product that is successful in the market. However, information technology and relatively well-developed methodology for new product development facilitates a number of important decision-makings. On the other hand, the time becomes „precious“ resource that has less and less, so that more is moving to speed up the process of new product development.

III. PARALLEL ENGINEERING

To shorten time to market for new technologies, firms are working simultaneously to develop component and insertion technologies to be introduced at the time the product is prototyped. [4]. In the last few years more and more is talked about the parallel or integrated new product development. It concerns to a phenomenon that attempts drastically to reduce the time of development. The speed of development process depends on the market success of new products, the sooner a new product is launched in the new market there will be a return on the investment and it is easier to build recognizable brand unless there is a strong competition.

Thanks to information systems and technologies that monitor information systems made the development to be greatly facilitated. In addition to information systems and the nature of the product is an important factor, for example, the modularity of the product can play an important role in acceleration of the development process. Modularity, when determined by the axiomatic approach, tends to shorten development times because most, if not all, of the modules can be developed more or less independently of each other, provided that the *FRs* are either uncoupled or decoupled.) [5]. Of course, all products can not be of modular type, and it often happens that modularity introduces additional complexity.

Various software packages provide the ability to share information in the design process of the product, the product also can be tested in a „virtual reality“ without making an expensive prototype. On the other hand, the well-developed methodologies provide clear instructions on what and how to do.

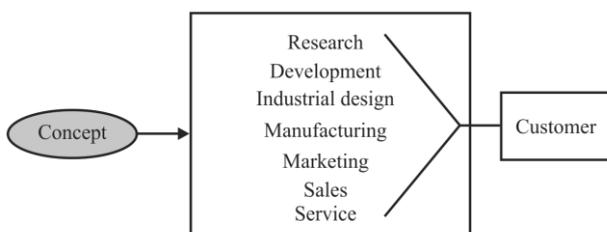


Fig. 1: Concurrent engineering for product innovation [4]

IV. DESIGN OF METHODS

There is a rough classification of design methods [6], and that is a division of creative methods and rational methods. Methods of creative groups stimulate creativity and information sharing, these methods are particularly useful in cases where there is no clearly defined criteria for decision-making. At a time of major market changes and advents of new technologies, creative methods are more suitable. On the other hand, there are rational methods that tend to the systematic approach to solving the problems of new product creation, it should be noted that rational methods do not rule out a creative component. Many rational methods are moving to identify problems, create subsystems and identify relationships among subsystems. However, there are rational methods that tend the creation of functional models to create a new product, creating alternatives, etc.

Depending on the needs that requires the product is chosen a design method. For example, if a new product is requested to be easy for manufacture than at various stages of the development are built in components related for the production, this is called design for manufacture. On the other hand, if the product is required to be environmentally „clean“ then is used the method of design for the environment. In other words, to the required demands are inserted the suitable methods of design. There should be noted that these methods are often used in early stages of development.

V. DESIGN FOR X

Design for X presents management paradigm of a new product development by means of design methods, this method is highly correlated with the product life cycle. DfX is an integrator of all methods, regardless whether from the group of rational or creative methods.

The purpose of DfX method is an early influx of information important to further management of the product life cycle. The backbone of DfX method is life cycle management of the product. For DfX, the most commonly is used the basic life cycle model of a product, which consists of the following four phases:

1. Stage of development,
2. Stage of manufacture,
3. Stage of use and
4. Stage of delay

Each of these stages have their own characteristics to which an attention must be paid when creating a new product. Also, it should be noted that to some stages affect legal norms and regulatives. For example, many countries of the world prescribe minimum that a product must meet, and is related to the safety of its use. This is particularly visible in the toy and equipment designed for children. Then, due to major climate change and increasing environment pollution, laws often determine the method of collection and disposal of used products.

If during the new design of a new product takes care to avoid materials that pollute the living environment, then the companies can not only to create cost savings by avoiding costly process of collecting and disposing of used products but they can create positive image.

VI. MODEL SELECTION OF APPROPRIATE DESIGN METHODS OF NEW DEVELOPMENT PRODUCT

The displayed model would have to support parallel engineering with respect to market requirements and all relevant regulations. In other words, the proper use of the model requires a large inflow of information and processing possibility of the same ones.

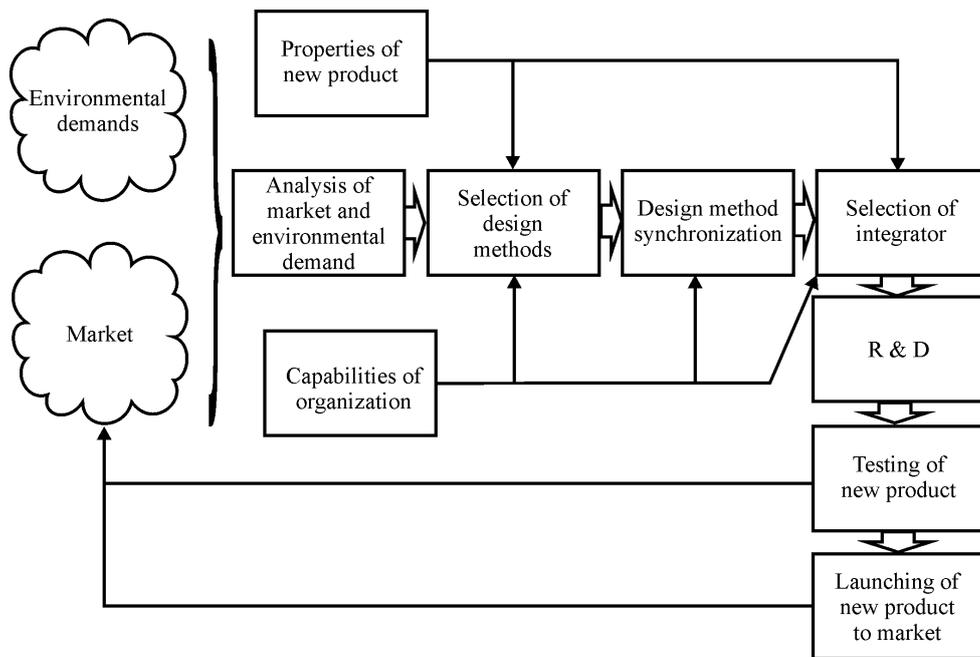


Fig. 2: Model selection of appropriate design methods of new product development

In the previous figure we can see a model for selection of appropriate design methods. The starting point of this model is in market requirements, environmental requirements, information on the nature of the new product, and finally, information about the company's abilities. To facilitate the understanding of the model will require a bit more detail to explain these elements. The market demands have already been dealt so we will not repeat here, we shall say only that the overall development process is focused towards the market as the main goal of the product development. Environmental requirements are not the same as the market demands, under the environment we primarily mean the legal framework within which the company operates, as well as various regulatory bodies, etc. Failure to comply with environmental requirements can lead to large costs or even to a new product prohibition (if the product is unsafe for the living environment, dangerous to use, etc.). The nature of a new product depends on the choice of design methods and possibility to take an advantage of parallel engineering. Capabilities of the company are very important parameters on the basis of which the development will be commenced or abandoned. Sometimes the needs of the market are too high so it is impossible to fulfill all

expectations, on the other hand, sometimes a part of the job has to be „thrown out“ outside the framework of the organization. In any case, this parameter has a direct impact on development costs.

After analyzing the market, demands of the environment and the inflow of other information, it is possible to make a selection of design methods. It's moving to how to create the best mix design method, it should be noted that it's always better to choose a small number of methods due to easy management with the development process. After the selection, it is necessary to carry out the synchronization of the method in order to find out which methods should be „pushed“ to the fore. The most important method can serve as an integrator and a basis for the creation of parallel development process, in this way introducing the elements of parallel engineering. Then, follows the the development process in which is going to be tried as soon as possible to get usable prototype. Product testing is the penultimate element of the model that can show the shortcomings of the new products, in this segment there is a strong influence of market information. Finally, follows the launching of the product.

VII. CONCLUSION

The model uses many elements that are an instant hit in the world literature and practice, however, the use of realistic models lacks many elements. First of all, holders of information for this model must be in an electronic form, the strong coordination of actions and people is also very important. In other words, the role of the leader is very important factor in the success of the model.

This model is excellent as a framework model based on which is possible to construct a realistic model. It should be noted also that this model can significantly shorten the development time, but at the same time increase the quality of the development process. The speed is achieved by using parallel actions in conformity with the parallel engineering, and quality of the new product is predetermined by proper choice of design methods. By proper selection of design methods we achieve to create a new product with the required characteristics, in this way are avoided costly repairs and subsequent insertion of important functions to the product.

REFERENCES

- [1] Orloff, A., M. (2006) "Inventive Thinking through TRIZ - a Practical Guide" second edition, Springer, Berlin, Germany (str. 205).
- [2] Barone, S., Lombardo, A., and Tarantino, P. "Analysis of User Needs for the Redesign of a Postural Seat System" in *Statistics for Innovation, Statistical Design of "Continuous" Product Innovation*, Erto, P., Ed., Verlag, Italia: Springer, 2009, pp. 4.
- [3] Koulopoulos, M., T., *The Zone Innovation How Great Companies Re-innovate For Amazing Success*, Mountain View, USA: Davies-Black Publishing, 2009, pp. 4.
- [4] Kumar, S., A., Suresh, N. *Operations Management*, New Delhi: New Age International, 2009, pp. 159.
- [5] Magrab, B., E., Gubta, K., S., McCluskey, F., P., Sundborn, A., P. *Integrated Product and Process Design and Development, The Product Realization Process*, second edition, London: CRC Press, 2010 pp. 134.
- [6] Filippi, S., Cristofolini, I. (2010) „The Design Guidelines Collaborative Framework - A Design for Multi-X Method for Product Development”, London: Springer, pp. 13.