

THE ROLE OF QFD METHOD IN CREATING INNOVATION

14.1 INTRODUCTION

The issues of innovation are very important for the modern economy. Increase competitiveness through innovation is one of the priorities of both the European Union and Polish. Basic concepts of innovation can be defined as follows:

- innovation - the result of creative activity, aimed at introducing changes in the system of the organization concerning products, processes or management that meets the needs of the organization and brings benefits in terms of growth, profits and prestige.
- innovative activities - the whole of the organization's activities focused on the development and implementation of the necessary and beneficial innovation.
- innovation process - a process involving clarification of the needs of innovative, idea generation, its design, implementation and operation.

The aim of the paper is to analyse the possibility of creating various types of innovations by using QFD method. We analyse this from types of innovations points of view and compare with other lean management methods to estimate potential usefulness of the QFD method in the innovation process planning.

14.2 QFD METHOD

QFD (Quality Function Deployment) can be defined as: a method of planning and development of a product or service that enables research teams to make precise specification of customer needs and requirements, and then translate them into the parameters of the product or service, its components and parameters of the production process [2, 9, 11, 20-23].

Currently, the method QFD often includes methods of marketing research. However, QFD is something more, because it serves to structural planning and development of a product or service that enables research teams to make precise specifications of the needs and expectations of customers, and then assess each proposed abilities (opportunities) from the perspective of its impact on meeting the needs postulated [5-7].

Quality function deployment is not only a tool for quality management, but also an important planning tool. This is because it allows for the inclusion of the so-called „voice of the customer" throughout the development of new products and services.

The main element of the method is the so-called House of Quality (House of Quality), so named because of the specific shape of the diagram. Home Quality is defined as the first array used in the method QFD (in the basic version of the method only), which is used to provide links between the needs of the customer and technical attributes of the product [10, 12, 14].

The method is based on the submission requirements of the customer to the appropriate action the company in all phases of development of the product quality. For this reason, sometimes also called Design-controlled by the Customer (Customer Driven Engineering) or an array of the Product Planning (Matrix Product Planning).

Quality function deployment was developed by Japanese engineers to ensure the quality of the product already in the design phase of the product. During the Second World War, the Japanese economy suffered huge losses. After the war, production was based mainly on the production of low-quality copies of American products. Then, influenced by the ideas presented by Deming and others who came to Japan specialists in quality management Japanese engineers realized that only innovative products of high quality can ensure their success [17, 19, 20].

During this time the Japanese auto industry is in a rapid growth phase. Continually developed new models and introduced improvements to existing ones. To meet the situation Yoji Akao and Shigeru Mizuno have developed a method to improve the design of products. On the basis of their work in 1978 jointly they published the first book on the method QFD: Quality Function Deployment: A Company Wide Quality Approach.

The impetus for the development of methods of QFD was that a decisive factor in the financial condition of the company is the buyer produced its products or indirectly - affect institutions to take customer decision about their purchase. Even if a product is from an engineering standpoint it performed correctly - its production may be misguided, if this product does not accept the market. Quality function deployment to help resolve issues with the fact that mass production or large series give the company a small possibility of direct contact with a potential client. This is particularly important at a time when the products become more and more advanced, and additionally usually one device meets the many different needs.

14.3 TYPES OF INNOVATIONS

In the literature, the most common division of innovation is their division for innovation [13]:

- product,
- process,
- service.

These types can be defined as follows [4, 8, 25]:

- product innovation is the introduction of a product whose technological features or destiny differ significantly from those of previously manufactured products or whose action has been significantly improved, and at the same time it can provide the consumer with objectively new or increased benefits;

- a process innovation is the adoption of new or significantly improved methods of manufacturing or delivery of products. They can be attributed to this change in organization, technology, human resources, working methods, equipment, or a combination of such changes;
- innovation Services is the launch of a service that is new or is perceived by someone as new. It is therefore a service which offers consumers a new benefit or value. Such innovation is changing the characteristics of an existing service, or proposes a new one. Innovation service in a number of divisions is defined together with product innovation.

Product and process innovations can be called a total term technical innovations. In Addition to technical innovations in the literature also apply the concept of organizational innovation. The concept of organizational innovation can be understood as a project associated with the change in the organization of production departments, jobs and ancillary departments (internal transport, storage, etc.), Including Realized within Their Own works, inventions and projects related to the purchase of computer software, the introduction of computers to control and adjusting production processes, as well as the installation of computer networks [1, 3, 15, 17, 19, 27].

Another division of innovation is promoted in the manual Guidelines for Collecting and Interpreting Technological Innovation Data. According to him, there are four types of innovation [14]:

- product innovation,
- process innovations,
- organizational innovations,
- marketing innovations.

(Marketing innovations will not be discussed here, because they do not lie on the issues discussed in this paper).

The final division of innovations that are worth mentioning in this publication is a division of innovation from the point of view of a situation that leads to the existence of the innovation. In this case, there are three types of innovation:

- innovation routine - involve the introduction of some changes in the products or services that are designed to maintain the attractiveness of the product of the product;
- innovations forced - rely on making changes caused critical situation (economic crisis or when the product or service they are declining);
- innovations resulting from the way - are mostly implemented by the company, which may allocate significant resources to research - development. Thanks to these measures the company replaces existing products, expand its services, and refine manufacturing processes - technology.

14.4 THE INFLUENCE OF USING QFD METHOD ON INNOVATION DEVELOPMENT

Speaking of innovation is worth at this point to consider, what is the impact of the application of selected methods of quality management innovation, paying particular attention to the method QFD. Tab. 14.1 and Tab. 14.2 made statements showing what types of innovations result from the use of the methods of quality management (bolded method QFD). Wherein respectively, in Tab. 14.1 shows the distribution of the innovation in terms of the type, and in Tab. 14.2 in view of the situation, which leads to the occurrence. The tables used the following symbols:

- + - a weak impact
- ++ - a strong impact,
- +++ - very strong influence.

Tab. 14.1 The impact of the application of selected methods of quality management for the formation of innovation - the situation division

Methods	Types of innovations		
	Product innovations	Process innovations	Organisational innovations
QFD	+++	++	++
FMEA	++	+	+
5S		+	+++
Kaizen	++	++	++
Just in Time		+++	+
Kanban		++	++
SMED		+++	++
TPM		++	++
VSM		+++	+++

Source: own elaboration

The distribution of generic focuses on three types of innovation: product innovation, process innovation and organizational innovation. The analysis of the data in the table shows that among the methods of quality management method QFD has the greatest potential in terms of shaping innovation in all its aspects - products, in the process, and innovation. In particular, it is worth noting that, together with FMEA and Kaizen is particularly suited to creating product innovations. QFD is therefore a method with which to develop new innovative products, as well as improve existing ones (high impact on the innovation process).

Given the division of situational innovation, again should be noted that all listed in Tab. 14.2 of the most important methods for the formation of any kind of innovation is the method QFD. It can be used in the first place for innovation routine - with the planned introduction of new products on the market - and this is the classic, basic application. However, the method also works pretty well when you want to innovate forced or arising out of the way. However in this case, because the most innovations

need to be made quickly, focus on the basic, simplest, method of QFD. However, in the case of innovation routine, depending on your time of its introduction can take advantage of the 4-matrix or even 30-matrix expand it ensures a much more detailed analysis of all aspects of the innovative product.

Tab. 14.2 The impact of the application of selected methods of quality management for the formation of innovation - the generic division

Methods	Types of innovations		
	Routine innovations	Forced innovations	Way innovations
QFD	+++	++	++
FMEA	+++	+	+
5S	+++		
Kaizen	++	+	
Just in Time	+	++	+
Kanban	++	++	+
SMED	++	++	+
TPM	++	++	+
VSM	+++	++	

Source: own elaboration

Where in the QFD method taking into account, the innovation process approach is not suitable for each of the sub-assembling on it. The process approach to innovation distinguishes fact:

- The process of preparation of innovation:
 - awareness of the need for creativity,
 - identification of needs and sources of innovation,
 - inspiring innovative activities,
 - generating innovative ideas,
 - the evaluation,
 - selection and choice of processes for implementation.
- The process of implementation of innovations:
 - the creation of project teams,
 - designing and planning the implementation of the idea,
 - the implementation of innovative projects,
 - monitoring and evaluation of innovative projects,
 - the assessment of the effects of introduced innovations.
- Operation implemented innovations:
 - standardization implemented innovation,
 - implementation of innovations,

- improvement of applied innovationon,
- transfers applied innovation
- withdrawal of outdated innovation.

Taking into account the typology QFD method is used, in particular, the phase of the process innovation. In this case, ideally suited for implementing, all the points in this process. If a process of preparation of innovation method, can be used, but to a limited extent and in conjunction with other methods, for example. Brainstorm. In fact, the data that is obtained in the process of preparation of innovation are inputs to the method QFD, because we select ideas and solutions, which may be drawn up House of Quality. In the case of operation process implemented innovation classic version of the QFD method is not suitable for use (e.g., although full 30 matrixes develop also contains some elements of the process).

CONCLUSIONS

Creating innovation, especially product innovation requires the careful planning of all the features and parameters of a new product. Such planning is possible due to the implementation of the method QFD. As part of the planning advocates, the principle of harmonious taking into account the requirements of all parties, which are participants in the supply chain, as well as having even passive contact with the product cycle of its existence.

Continuous improvement, thanks to the method QFD aims to achieve not only customer satisfaction, but also other stakeholders. As a result, the company may incur lower costs associated with product development, shortens the process of its development, and as a result meet customer requirements, increasing sales.

The implementation of methods and tools of quality management for example QFD method gives rise to the development of good practices in this field, as well as through methodical procedure facilitates innovation. As a result of application of the method QFD, in particular expansions four or more matrix can be at the violence shape the various elements of the new project from the overall concept to the planning of specific parameters of the manufacturing process.

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Abstract: *Starting from the classical divisions of innovation on product innovation, process and organizational innovation and the concept of the routine, and the resulting forced to celebrate the aim of the publication was to determine the applicability of QFD methods for different types of innovation. In addition, we attempt to compare the role of QFD methods in this field in comparison with other tools used in quality management.*

Key words: *QFD, quality management, innovation, quality management methods*

ROLA METODY QFD W KREOWANIU INNOWACJI

Streszczenie: *Wychodząc od klasycznych podziałów innowacji na innowacje produktowe, procesowe oraz organizacyjne oraz z koncepcji innowacji rutynowych, wymuszonych i wynikających z okazji celem publikacji było określenie możliwości zastosowania metody QFD w przypadku poszczególnych rodzajów innowacji. Dodatkowo podjęto próbę porównania roli metody QFD w omawianym zakresie w porównaniu z innymi narzędziami wykorzystywanymi w zarządzaniu jakością.*

Słowa kluczowe: *QFD, zarządzanie jakością, innowacje, metody zarządzania jakością*

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