

THE ESSENCE OF INNOVATION – STRATEGY FOR THE IMPLEMENTATION OF INNOVATION

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(Received 24 August 2018, Accepted 26 September 2018)

Abstract: The article presents issues related to innovation, its meaning and objectives. The development of the concept of innovation over the years is presented. The division of innovation by the area of activity to which it refers was made. The essence of innovation is briefly discussed. On the example of a vehicle, the strategy of innovation implementation was also characterized. The methods and tools used during the implementation of innovations are presented. Computer modelling and simulations as well as other tools for implementation of innovations are characterized.

Keywords: innovation, new product, implementation strategy, methods and tools

1. INTRODUCTION

Globalization is the right word to describe today's economic reality. On the world market, similar goods are mass-produced. Competitiveness makes it possible for companies to benefit only if they constantly introduce new products to the market. In short, there is a need for innovation, which is necessary in situations where products no longer meet the expectations of customers and do not find their customers on the market [12].

2. THE CONCEPT OF INNOVATION

At the beginning of the 20th century, innovation was mainly understood as a new technical solution. This was due to the importance of capital, production and land. After the Second World War, new definitions of the concept of innovation began to appear. At that time, definitions presented innovation as an invention with a specific purpose [9].

In the following years, innovation started to be seen not from the technical but from the economic perspective. The main author of this definition is P. Drucker. He believed that *"systematic innovation consists in a deliberate and structured search for change and in a systematic analysis of the*

opportunities for social or economic innovation that such a change could make possible" [5].

One of the most modern and most frequently cited definitions of innovation is the definition found in the New Oxford Dictionary, which states that innovation is the implementation of something new. However, in order to understand this definition in detail, it needs to be clarified [7].

A more developed definition of innovation was provided in 2009 by D. O'Sullivan and L. Dooleya. They define innovation as the process of implementing large and small changes, radical and gradual, in products, processes and services, as a result of which the organisation's knowledge increases [4].

3. THE ESSENCE OF INNOVATION AND ITS OBJECTIVES

Supporting by various organisations, innovative activity was one of the main tasks of the Lisbon Strategy, co-implemented by the members of the European Union in the years 2010-2016. Its aim was to increase the competitiveness of the economies of the Member States of the European Union [13].

In Poland, the definition of innovative activity has been created by the Central Statistical Office, which explains it as scientific, technical, organisational, financial and commercial activities aimed at

developing and implementing new or significantly improved products and processes. They must be new to the enterprise in question [7].

4. TYPES OF INNOVATION

The concept of innovation can be classified according to various criteria. The allocation of innovation makes it possible to determine in general terms the impact of innovation on progress and to classify it in the appropriate category of human activity [2].

The most commonly known criterion for dividing the type of innovation is the division by the area of activity to which it relates. In this division, one can distinguish: product, process, marketing and organisational innovation (Figure 1) [1].

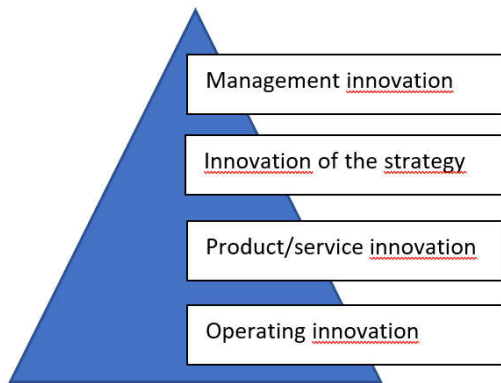


Fig. 1. The innovation pyramid [5]

4.1. Marketing innovation

Marketing innovation is aimed at implementing a new marketing method related to changes in product design, distribution, promotion or pricing strategy [7].

4.2. Organisational innovation

An organisational innovation is the introduction of a new organisational method in the rules of operation adopted by the company, in the organisation of the workplace or in relations with the environment. An organisational innovation may be the introduction of primary integrated management or control techniques in the company [7].

4.3. Product innovation

A product innovation is the implementation of a product or service that has been significantly improved in terms of its features or applications. These may include changes in the areas of technical specifications, components and materials, software,

user-friendliness and other functional features. A product innovation may also aim at extending the assortment structure to include a new, technologically speaking, product.

4.4. Process innovation

Process innovation is aimed at introducing a new or significantly improved production or delivery method. This may consist of changes in the equipment or production organisation, or a combination of both, as well as the use of new knowledge.

Examples of process innovations include automation of production lines, computerisation of the quality control process or the use of new types of software.

5. INNOVATION IMPLEMENTATION STRATEGY

Innovation is a purposeful and organized change that is supposed to bring positive effects; therefore, the process of its implementation must be properly thought out and prepared.

A German psychologist K. Lewin, who specializes in the process of organisational research, believed that each change must be carried out in three stages: thawing, change and freezing.

1. Thawing is a stage in which there is an awareness of the need to change the current state. This stage is the most difficult of the whole process of introducing changes. For defrosting to occur, there must be a stage of dissatisfaction with the current situation and a desire for a change with new benefits.
2. The next step is a change. This stage must be well planned in order to be successful.
3. The last stage is freezing, and therefore such support that will make the change part of the whole system [8].

5.1. A new product development strategy

The process of developing a new product is a complex procedure in which many case versions have to be considered. An example of a new product development strategy is presented in Figure 2.

It is a strategy of developing an innovative product which is a vehicle. A simplified implementation model for the new product has been developed by the Automotive Action Industry Group (AAIG) automotive manufacturers' association. This model is shown in Figure 3.

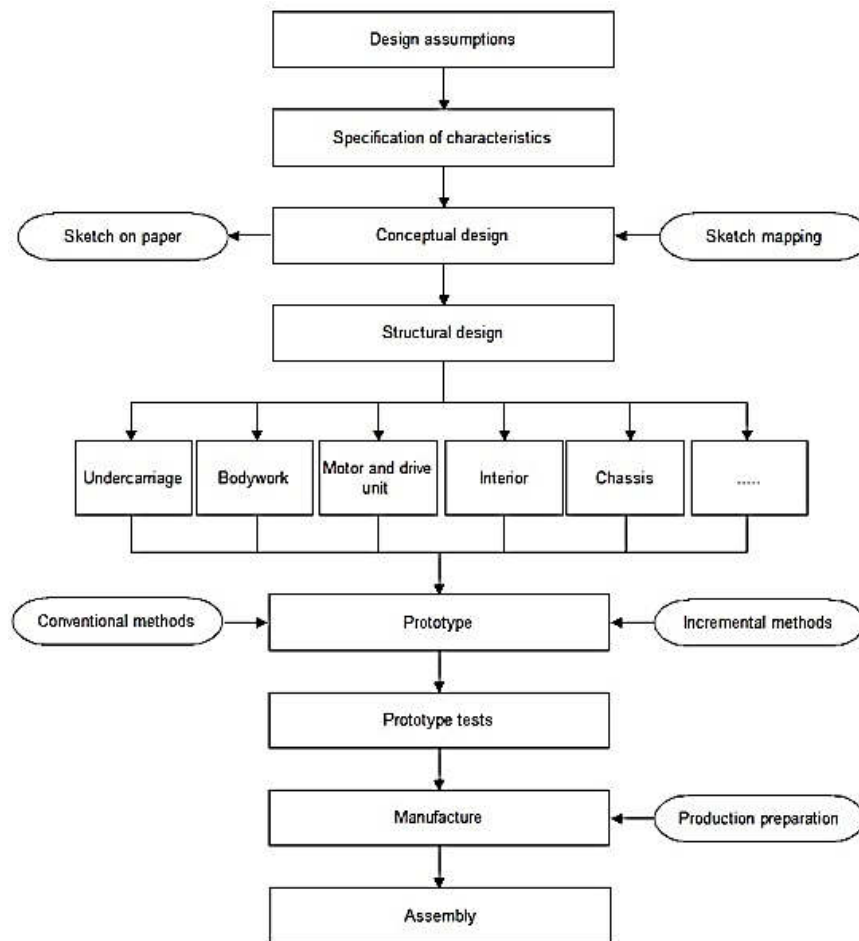


Fig. 2. Procedure of developing an innovative product on the example of a vehicle [10]

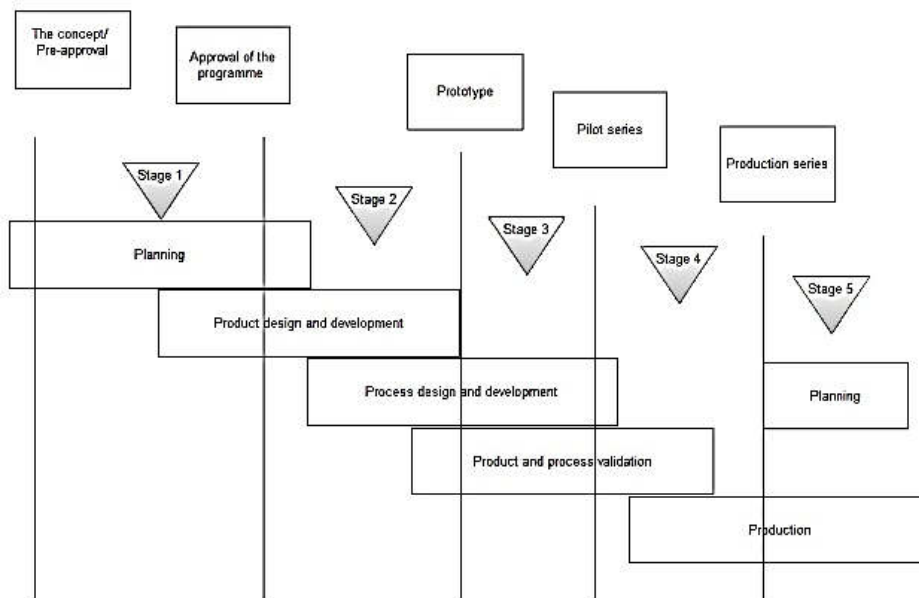


Fig. 3. Model of new product implementation according to AAIG

In this model, the process of implementing a new product is divided into five phases.

1. The first phase is the planning phase. At this stage, new product concepts are developed. This phase ends with an approval of the plan.
2. The second phase includes the design and development of the product. At the end of this phase, a prototype of a new product is created.
3. The third phase is the phase in which the design and development of the process takes place. Phase three ends with a pilot run.
4. In phase four, the product and process validation is carried out. It ends with the start of production.
5. In the fifth phase, the production of an innovative product is carried out.

6. METHODS AND TOOLS USED IN THE IMPLEMENTATION OF INNOVATION

In order for the implementation of innovation to be successful, the process of its implementation must be properly organised. This can be done through various analyses.

6.1. Curve S

One of the main tools supporting the process of innovation implementation is the S curve. This tool forms the basis for making decisions related to the implementation of innovations. It is a model used to carry out an analysis of the life cycle of innovation, and it also allows to create a competitiveness strategy. The basic assumption of the S-curve is that the evolution of all technologies forms a certain pattern. In

the first stage, the development of technology is slow until the solution of fundamental technical problems. In the next stage, the pace of technology development increases rapidly until a certain maximum is reached. This maximum can be, for example, the strength of the material.

6.2. Computer modelling and simulation

The process of computer modelling and simulation is very helpful in the implementation of innovations. It allows one to check how the implementation process will proceed and what its effects will be.

The use of computer modelling and simulation techniques allows us to solve problems arising already at the stage of production preparation as well as during production [9].

Modelling and simulation allow a quick analysis of the individual variants of production methods. Modelling does not aim at a mathematical description of facts but it aims at presenting functional relations between particular elements of the analyzed system and external factors [9].

Simulations can be carried out with the use of computer software. These are e.g. the following programs: AnyLogic, Arena Simulation Software or Simul 8 [14], [15].

Computer modelling and simulations can also be performed in planning and scheduling programs. One of the programs that offers such a possibility is Project Professional 2013.

Figure 4 shows an example of a simulation from AnyLogic.

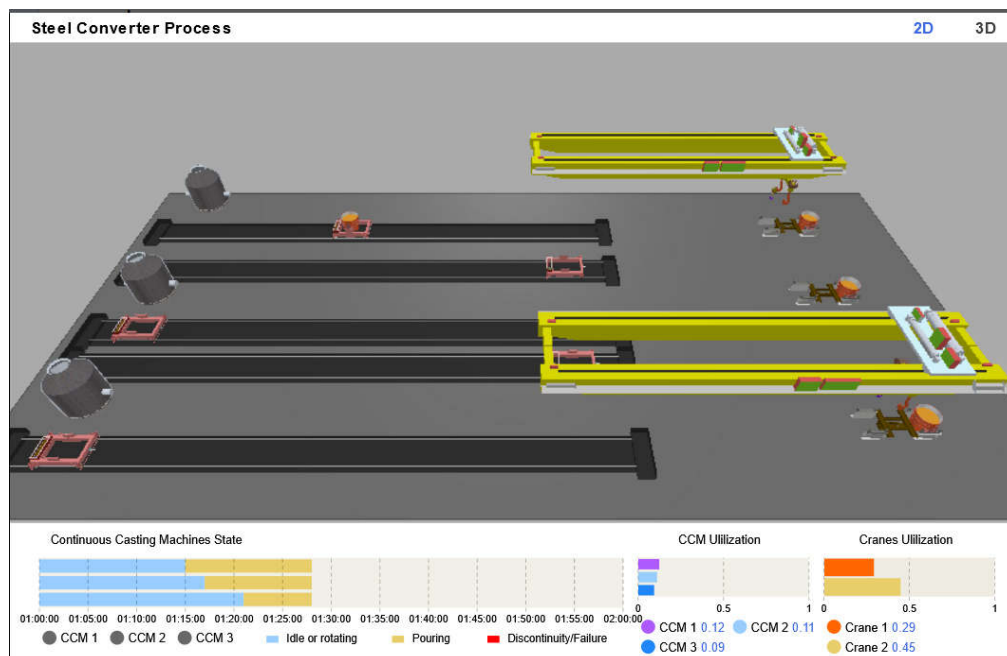


Fig. 4. Example of computer simulation [16]

6.3. Planning and scheduling

Planning and scheduling is the basis for most companies. Each activity should be carried out after it has been planned in advance. Schedules are a reflection of tasks planned at a certain time. Schedules show the length and order of each task necessary to perform during the implementation of a specific plan.

There are many methods of scheduling activities. The most common are: network diagram, Gantt diagram, production cyclogram.

1. A network diagram is a diagram on the basis of which Gantt charts are developed. It shows the order and interrelationships between individual tasks (Fig. 5) [3].

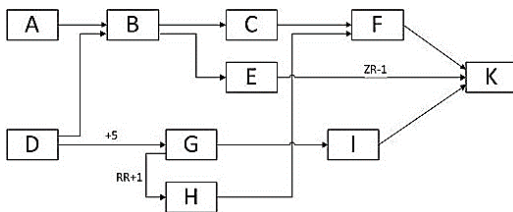


Fig. 5. A network diagram [17]

2. The Gantt Chart is a graphical planning method developed by Henry Gantt. In this method, each task from the project has a specific time and date of its realization. The Gantt chart is based on a network diagram. All the tasks are represented by rectangles, the length of which depends on the date of the commencement and

completion of the task. Gantt schedules should not be drawn up significantly in advance. This is due to the fact that introducing any changes will make the schedule obsolete (Figure 6) [3]

3. The production cycle shows the course of machining and assembly of the product. It is a graphical method used to determine the length of the production cycle. There are two types of cyclograms [3]:
 - detailed, which includes all the parts of the product and operations included in the developed technological process,
 - framework, consisting of a part of products, without division into operations.

7. CONCLUSIONS

Competitiveness makes it possible for companies to benefit only if they constantly introduce new products to the market. There is a need for innovation, which is necessary in situations where products no longer meet the expectations of customers and do not find their customers on the market. Innovation is an important area in which companies have to devote a significant part of their time, but it can be shortened by using methods and tools supporting the implementation of innovation. These methods and tools are: computer modelling and simulations, Gantt's schedules and network diagrams. Modelling and simulations allow one to check how the company will behave during the implementation of innovations and also after the implementation.

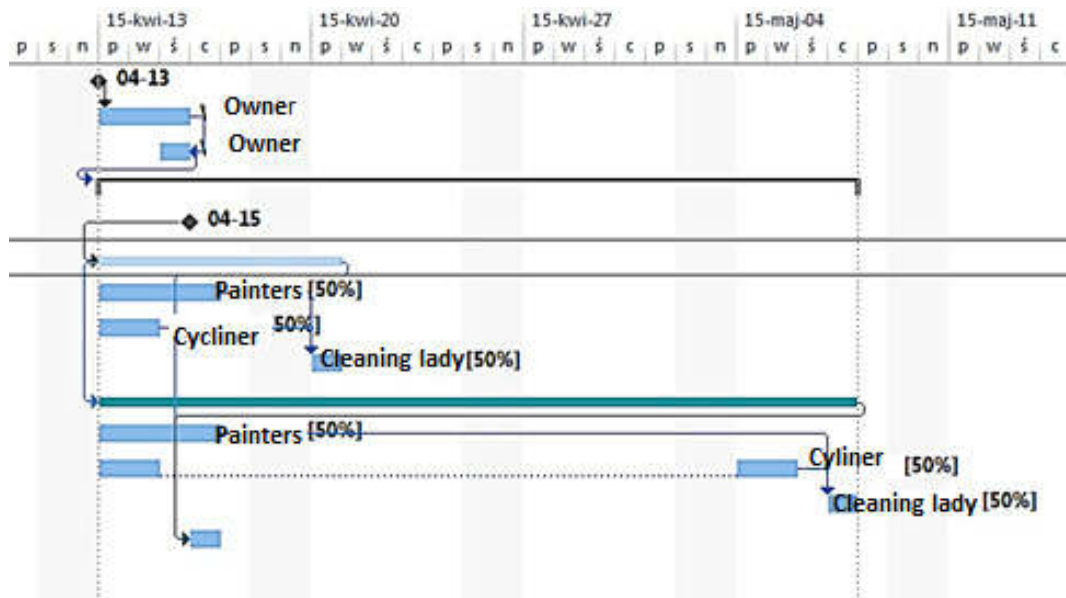


Fig. 6. A network diagram [17]

The process of innovation implementation must be well thought out and planned. This makes it possible to increase the probability of a successful implementation of innovations.

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Biographical notes



Emilia Gierszewska received her B.Sc. degree in Management and Production Engineering from the Faculty of Mechanical Engineering at the Koszalin University of Technology in 2016. Her scientific interests focus on problems concerning the implementation of innovative processes and products, rapid prototyping and reverse engineering methods as well as abrasive machining processes. She has presented the results of her work in one international and two national conferences. She is the author and a co-author of 4 scientific papers in conference proceedings.



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