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## INNOVATION APPROACHES AND PRINCIPLES FOR PROJECTS PREPARATION IN PRODUCTION SYSTEMS

*This article describes innovative approaches and principles governing the preparation of projects in production systems. It focuses on innovative methods and principles in their application. Its foundation is innovative customer needs and utilizes a methodology of innovation opportunities. Use of innovation within production systems allows honing the structure, leading to increases in the productivity and competitiveness.*

**Keywords:** project preparation, production system, innovation

### Introduction

The production system is a cluster of machines to manufacture components. The role of production system is implementation of technological process so that the intermediate component formed with prescribed geometric and qualitative characteristics as is in technical documentation. The production system can be understood as a unit of production machines or manufacturing system is considered whole undertaking all activities, processes and equipment that are necessary for the production of components (i.e., construction, technology, production). The production system is made manufacturing process [1]. The production process is the sum of all processes and activities to ensure implementation of the components, respectively it is the sum of all technological and non-technological operations in the production system. These are activities in which the blank is transformed into a finished product - component. The production system may be divided into the external and internal subsystem. In the internal subsystem are ongoing technological processes under conditions that were determined by external subsystem [2].

The concept of innovation, according to the document of the European Union "Green Paper on Innovation" is understood as a synonym for the successful production, assimilation and use of novelty in the economic and social spheres. Innovations generally offer new solutions to the problems caused by changes in business environment, customer requirements, and the technological developments in globalization and other activities in the current period [3]. The role of innovation is to create new products and services into the market that meet the growing needs of customers on product features, its variability, performance, efficiency, quality, reliability, durability, operation, design, as well as environmental performance.

Customers prefer products with novelty, individuality, reasonable price, availability and convenience of use in accordance with the technical, economic and social progress. Dual page into the manufacturing innovation is technological innovation [4]. Activities such as flexibility, productivity, elimination of redundant resources, job security and automation, use of the potential of knowledge workers and their creativity and other factors are sources of numerous technological innovations.

Design principles of production systems can be divided into four main stages. Each of the stages has an important function, thus any under-developed stage has a significant impact on quality of project production system [5].

- the first phase focuses on the compilation of data and knowledge base necessary for the development of system and its detailed analysis,
- the second phase focuses on compiling of virtual model - to determine of basic structural elements of system and their relations and functions,
- the third stage consists from compiling of constructive model - detailed design documentation,

- the fourth stage enables implementation of proposed production system at real production area.

Design of production systems can be divided into the follows modules:

- processing of input data and target functions in technical assignment terms,
- profiling of products and production facilities,
- quantification of needs and resources - capacity calculations,
- synthesis structures of production workplace – system,
- solution for zonal and spatial relationships, material and information interfaces,
- processing of functional mode of operation and the simulation,
- calculations of technical and economic indicators,
- drawing up of output documentation.

### **Principles of innovation**

Analysis of customer needs – information resources

Customer-oriented innovations used as a source of ideas for new products services and the innovative production systems, especially for their own analysis of customer needs [6]. When analyzing the needs are examined following characteristics:

- needs identification,
- target group of customers,
- amount of needs (intensity),
- time duration of needs,
- needs must to be included in the system (relationship, preferences and the like.),
- used techniques for needs analysis and customer wishes,
- observation of customers behavior,
- marketing researches (inquiry, competitions,...),
- discussions with chosen customers,
- classification of claims and complains.

Very often (especially in technical products, or in production systems) are used the principle of the most important customers. Resources traders are an alternative to the previous method [7]. The advantages are direct contact knowledge with customers and professional traders (vendors). Successful companies with the design of production system use this technique as a working tool. As further tool to promote innovative ideas on collection is analysis and processing of information.

In practice, problems arise with lots of information, evaluation of their usefulness, archiving and distribution and so on [8]. For any innovative business - production system therefore is recommended the use of comprehensive information system. If necessary, it can be an advanced computer system or only file cabinet ideas and supporting documents. Example of an information system for innovative ideas is located in the flow chart in Fig. 1.

### **Innovative opportunities**

The innovative idea is necessary but not sufficient condition. Analysis of opportunities show us if idea is feasible and meets the conditions of potential success. The process of identifying opportunities can be likened to the finding of gold nuggets. If the innovative ideas likened to gold-bearing sand, then sifting through the system network is finding opportunities [9]. This procedure is confirmed by statistical data about decommissioning of new innovative ideas, see Fig. 2. The managerial terminology seeks opportunities that correspond with situational analysis, evaluation and feasibility for testing assumptions. Evaluation of innovative ideas in many cases is more complex than their own creation. Existing risks:

1. The early expression of ideas. Good idea, which would require altering some features, is a strict system of discard. This shows the overall conservatism entrepreneur.

2. The continued development and commercialization of bad idea. The evaluation of incomplete or excessive freedom does not fulfill its function.

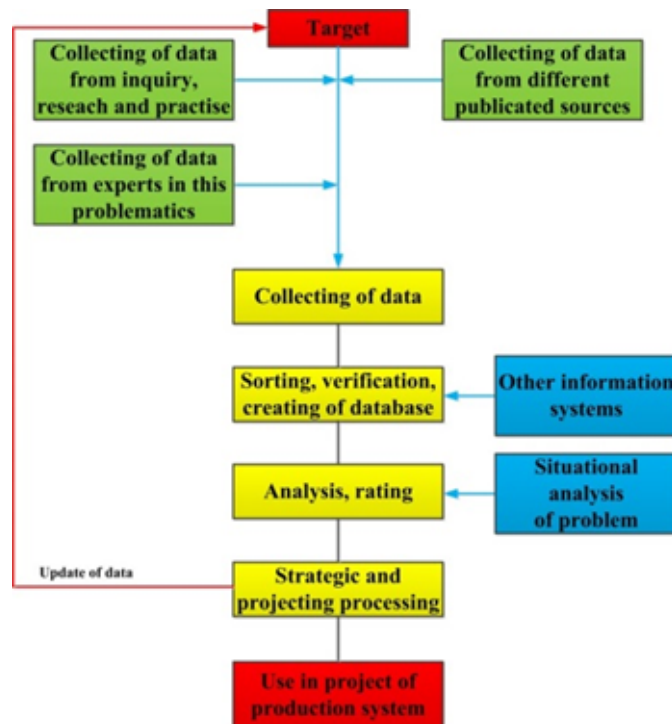


Fig. 1 Flow diagram for innovative ideas

Main problems with assessment of innovative opportunities are:

- Businessman doesn't have all information at this phase. This information is complex and the processing after business plan. It is true, if idea is more specific, than it is better evaluated. Vague ideas must be completed and then are possible evaluate them.
- Often is necessary assessed a large number of ideas. Sometimes tens or hundreds ideas. Assessment should therefore be quick and simple, but good quality.
- Evaluation requires experience and special know-how. For beginners businesses this is typically lack. Missing practice of cooperation with experts and consulting firms.
- The phenomenon of one side vision. Designer prefers technical novelty solutions and underestimating risks and implementation of customer interest, for example. Economically based entrepreneur sees risks mainly in the capital and security of technological issues that often underestimates.
- Practical connection of assessment together with improving, modifying and developing of innovative ideas.

In addition of self-evaluation should be considered with feedback, i.e. solve of founded problems by corrections and improvement ideas, making connections and divisions of etc. The result is identified by business opportunity with determined potential value. In the professional practice is result recorded in documentation (feasibility of study) [10]. The diversity of business, changing of external conditions and entrepreneurial attitudes are reflection of variation at assessment systems occasion.

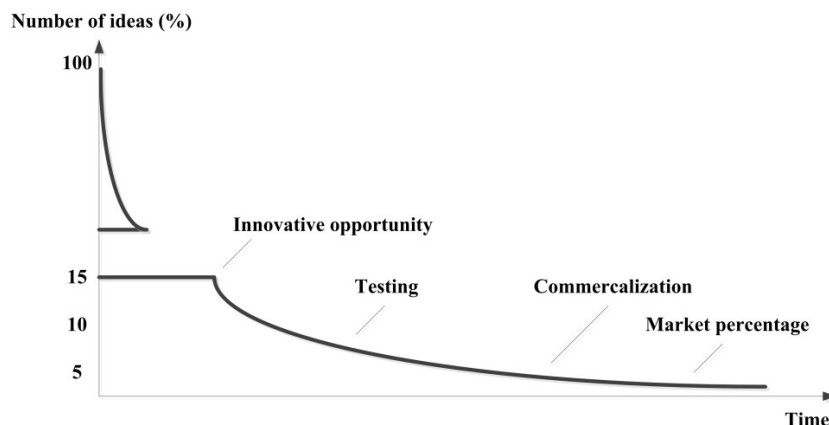


Fig. 2 Sorting of innovative ideas

### Conclusion

In context of the innovation process based on project preparation principles in production systems should be based on appropriate input information. Only on the basis of appropriate information can be properly designed an innovative process, which will lead to an increase of productivity, quality and other important parameters. The selection, processing and evaluation of input data decides if the innovation process in production system will lead us to the achievement of the required parameters or we achieved opposite. Therefore, it is necessary to consider the level of innovation and seek innovate production system to the extent, that we are competitive with the least possible risk.

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