

The Implementation of Innovative Technologies at the Enterprises

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Abstract

The modern stage of the science development is characterized by a large number of production tasks. The process of innovative development requires comprehensive assessment of the effectiveness of technology options, equipment, process organization, as well as the cost-effectiveness analysis of the project implementation for the introduction of innovative equipment in production.

Effective innovative activity of the enterprise depends on the quality of the implemented innovative technologies, meeting the requirements of time and economic situation. Innovations are currently fundamental prerequisite of competitiveness. Therefore, the introduction of new equipment and technologies at the enterprise today is not a whim, but the need for survival, preservation of competitiveness and further prosperity. Enterprises create and strengthen their image by introducing new technologies in production, updating main facilities, releasing new types of products and increasing their quality.

To date, the most common innovations, implemented in the territory of the Republic of Tatarstan, are technological innovations, although non-technological, organizational and marketing innovations have a great importance for the innovation potential of the region and the country.

The introduction of innovative technologies has a huge impact not only on the process of product promotion on the market, effective communication infrastructure, including the field of human resource development management, but also is the basis of economic growth and effective innovation activity of industrial enterprise.

Key words: Innovative development, Implementation, Innovations, Technologies, Production

INTRODUCTION

Innovations become the basis for the competitiveness of enterprises, lead to greater efficiency, better quality of products and services. The process of innovative activity requires of the enterprise to develop and to implement a mechanism for managing innovation activities, which is adequate to the requirements of market economy. Moreover, for the process of implementation of innovative technologies at the enterprise, it is necessary a clearly formulated strategy for the development of innovation

activity at the level of country, region, industry and enterprise. [1]

Taking into account all the above, it can be noted, that a competent policy in the field of innovation is not only a problem of the state, but also a problem of every enterprise, the basis of competitive advantages of which should be the implementation of innovative technologies and application of the results of scientific and technological progress. Scientific and technological progress also means the development of information and communication technologies in the economic sectors. Sure, it has a direct effect on the innovation activity of organizations [2].

MATERIALS & METHODS

The research methodology is represented by the methods of graphical analysis, synthesis, connection of historical

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and logical, normative and positive analysis, as well as the methods of expert assessment.

RESULTS

More business enterprises lay stress on the international opportunities, innovation activities and competitive advantages [3]. Kováč sees innovation as a strategy for determining long-term fundamental business objectives, and determines the activities and resources for achieving these goals [4]. Innovations directly depend on the effectiveness of innovation at the enterprise.

The issue of evaluating the innovation performance requires an analysis of its current state, as well as development trends in this area. The analysis also takes into account key indicators – the principles of Lisbon and Barcelona Strategy. The multicriterial evaluation concentrates its attention on the development of the conditions for the transition to the knowledge-based economy, which is becoming the epicenter of the competitiveness. The evaluation of innovation performance is based on the analysis of 25 indicators, which are divided into 5 groups (Pro Inno Europe, 2008) [5].

The first three groups include innovation inputs, and the last two groups of indicators include innovation outputs:

1. Innovation drivers (5 indicators), which measure the structural conditions, required for innovation potential;
2. Knowledge creation (4 indicators), which measure the investments in research and development (R&D) activities; they are considered to be the key determinants for the development of knowledge-based economy
3. Innovations and entrepreneurship (6 indicators), which measure the efforts, focused on the innovations of companies, small and middle businesses, own and co-operational, expenses on R&D, risk capital/GDP;
4. Applications (5 indicators), which measure innovation performance, expressed through business activities, and the share of the employed people and their added value in innovative sectors;
5. Intellectual property (5 indicators), which measure the results, achieved in the form of successful know-how as patents (EU, USA), brands, new design.

The following table (Table 1) presents 5 main categories (groups) and within them 25 indicators with a respective data and information source for each indicator.

The European Commission evaluates and also compares the application of Barcelona and Lisbon strategy, by multicriterial evaluation of the innovation performance of the EU countries. A long-term sustainable competitive ability of an economy can only be achieved by a strategy,

based on innovation comparative advantages [6]. There are several authors, who share a similar opinion, which is shown in a number of interesting and valuable scientific studies [7, 8, 9, 10]. This strategy is based on the performance evaluation of the innovative technology implementation in production, carried out on the basis of integrated analysis. When applying an integrated approach, technical, environmental, economic, organizational, social aspects of activities and their interrelationships should be taken into account.

So, to perform the analysis of technical feasibility of innovative technology implementation, it is necessary to:

1. Establish the possibility of manufacturing parts for machinery, in full accordance with the technical conditions, operating in production: the parts must be wear-resistant, competent and have all the necessary physical and mechanical properties, as provided for by the design documentation;
2. Identify the advantages and disadvantages of methods, in terms of their compliance with advanced trends in the area under study;
3. Identify the methods of manufacturing parts, with the help of which maximum quality is achieved.

When analyzing the organization of production and workplaces, an assessment is made of the possibility of manufacturing the required volume of products, within a given time, with the unchanged organization of the workshops structure in production. The advantages and disadvantages of the compared methods are revealed, for example, shortening the duration of the production cycle, operating mode (interchangeability, utilization ratio, etc.), or accelerating of production preparation. This analysis has the same particular application as the analysis of technical feasibility.

Comprehensive analysis must be completed by economic analysis. Economic analysis makes it possible to draw a conclusion about the advisability of making a decision when choosing a certain technique, and includes determining the economic effect, obtained as a result of applying various innovations, the economic efficiency of capital investments, and the optimal technical and technological parameters, ensuring the rational use of technology.

Complex analysis is shown in Figure 1 in the form of the following scheme:

The next stage is the calculation of economic efficiency of the project implementation for the introduction of innovative equipment. Calculations of economic efficiency of innovation technology implementation are carried out at all stages of design and planning. The choice of

Table 1: Indicators of innovation inputs and outputs of European innovation scoreboard

European innovation scoreboard	Data source
I. Input – Innovation drivers	
1. The share of university graduates per 1000 population, aged 20-29	Eurostat
2. The share of postgraduates per 100 population, aged 25-64	Eurostat, OECD
3. Broadband penetration rate (number of broadband lines per 100 population)	Eurostat
4. Participation in life-long learning per 100 population, aged 25-64	Eurostat
5. Youth education attainment level (% of population aged 20-24, having completed at least upper secondary education)	Eurostat
II. Input – Knowledge creation	
1. Public R&D expenditures (% of GDP)	Eurostat, OECD
2. Business R&D expenditures (% of GDP)	Eurostat, OECD
3. Share of medium-high-tech and high-tech R&D (% of manufacturing R&D expenditures)	Eurostat, OECD
4. Share of enterprises, receiving public funding for innovation	Eurostat
III. Input – Innovation and entrepreneurship	
1. SMEs innovating in-house (% of all SMEs)	Eurostat
2. Innovative SMEs co-operating with others (% of all SMEs)	Eurostat
3. Innovation expenditures (% of total turnover)	Eurostat
4. Early-stage venture capital (% of GDP)	Eurostat
5. IT expenditures (% of GDP)	Eurostat
6. SMEs using organisational innovation (% of all SMEs)	Eurostat
IV. Output - Applications	
1. Employment in high-tech services (% of total workforce)	Eurostat
2. Exports of high technology products as a share of total exports	Eurostat
3. Sales of new-to-market products (% of total turnover)	Eurostat
4. Sales of new-to-firm products (% of total turnover)	Eurostat
5. Employment in medium-high and high-tech manufacturing (% of total workforce)	Eurostat
V. Output – Intellectual property	
1. Number of patents (EU) per million population	Eurostat
2. Number of patents (USA) per million population	Eurostat, OECD
3. Patents per million population	Eurostat, OECD
4. New trademarks per million population	OHIM*
5. New community designs per million population	OHIM

Source: Pro Inno Europe: European Innovation Scoreboard, 2006

*/OHIM - Office for Harmonization in the Internal Market (Trade Marks and Designs)

an economically effective option will be determined by the least amount of costs for implementing innovative technology. Variant of the introduction of new equipment into the existing production is also possible. Then, it is necessary to take into account the costs for additional equipment of production facilities, such as, for example, control and management automation equipment, etc.

The term of efficiency has different meanings, attached in the theory and the practice [11]. In our case, economic effect of the new technology implementation in the current production is determined in the comparison of the cost of production in the current production and after the introduction of innovations, as well as the value of production facilities. It should be noted, that with the implementation of new technology, there may be a situation, where a part of the main facilities (for example, equipment) will not be used in the production process. If this equipment can be used in other technological processes, the losses from replacing old equipment with new equipment will be absent.

The development of a project for implementing innovative technology can be considered appropriate, in case when [12]:

1. Additional capital expenses for the introduction of new equipment are repaid within the regulatory period by the braches;
2. Technical indicators (for example, material utilization factor, productivity, cutting width, thermal impact zone, energy consumption, etc.) are better than analogous indicators of the equipment, which was used for production similar products;
3. When it becomes possible to produce products that can not be produced on existing equipment.

The issues of organization and management become particularly important in the process of the transition of any economic system to innovative type of resources reproduction. Therefore, we believe, that the Russian economy, as a whole and its regions in particular, need to search for new management, organizational solutions, which are based on a systematic approach to innovative modernization and new management mechanisms, naturally built into all types of innovative processes of economic life, in the center and in places [13].

The Republic of Tatarstan is fully engaged in federal target programs, its enterprises implement most of investment

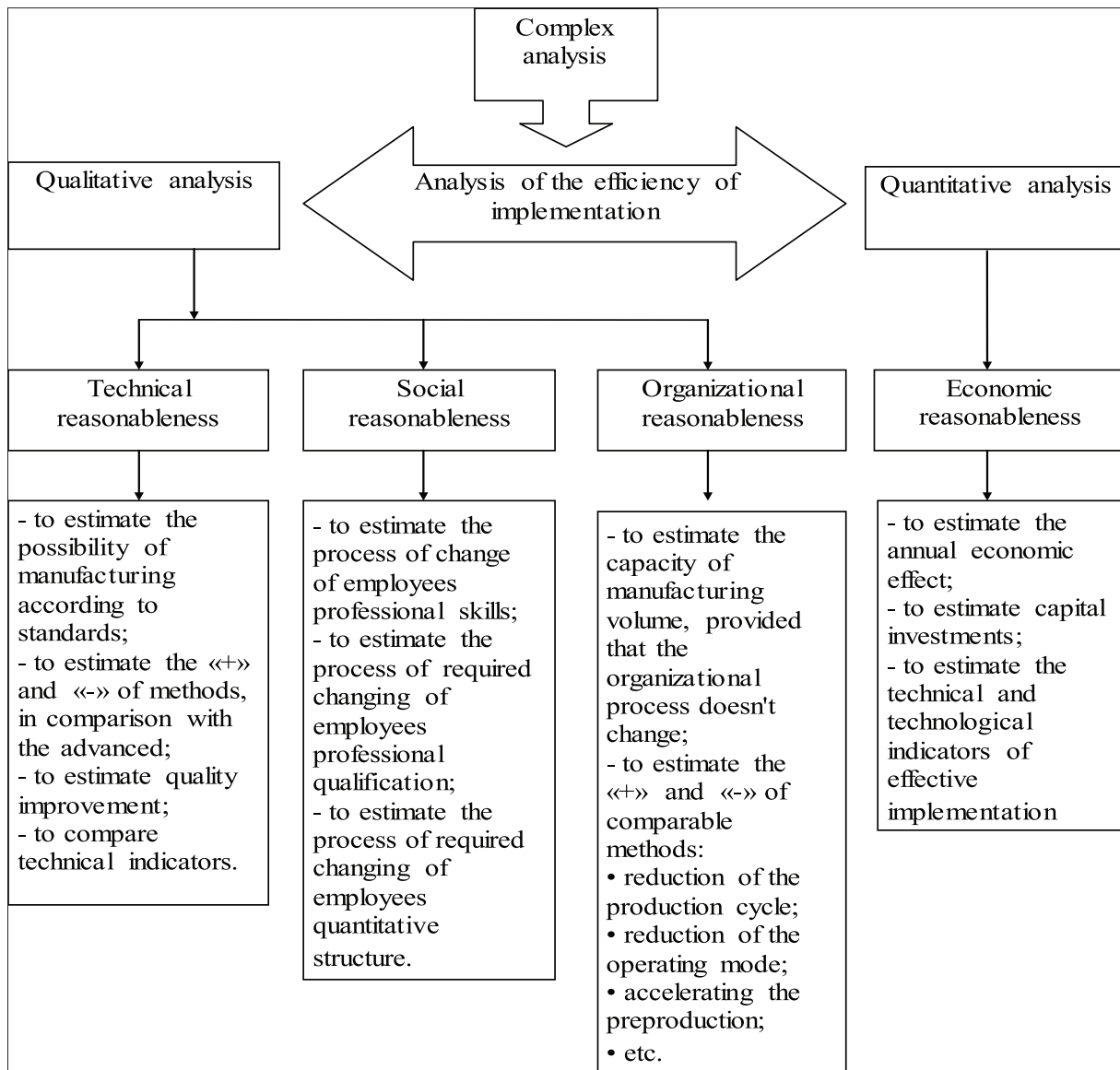


Figure 1: Complex analysis of the implementation of innovative technologies at the enterprise

programs with the use of own resources [14]. The process of innovative technologies implementation at the enterprises of the Republic of Tatarstan will be analyzed, depending on the industries and activities. Figure 2 presents the structure of organizations, implemented innovations, according to the economic complexes and types of production in the Republic of Tatarstan [15]:

The overall picture of innovation processes in the country is determined by industrial complexes, the share of which is about 90% of all innovative organizations. At the same time, the main innovation activity (62%) is concentrated in the two leading sectors of industry: mechanical engineering and petrochemistry.

Modernization and innovative development of economy are two interrelated sides of one fundamental process, by

which the state can optimize the accumulation, updating, distribution and use of tangible and intangible assets, to increase capacities for sustainable development [16].

Since the innovative development of the region's economy is directly interrelated not only with quantitative, but also with qualitative characteristics of innovations, various types of innovations, implemented at the enterprises of the Republic of Tatarstan is shown in Table 2 [15]:

The average level of organizations, implementing technological innovation in the Republic of Tatarstan is 12.5%. Nevertheless, in recent years, non-technological - organizational and marketing innovations have become very important for increasing the efficiency of production. The importance of these innovations is great, as for the increasing of production efficiency, as for activating the most innovative activity.

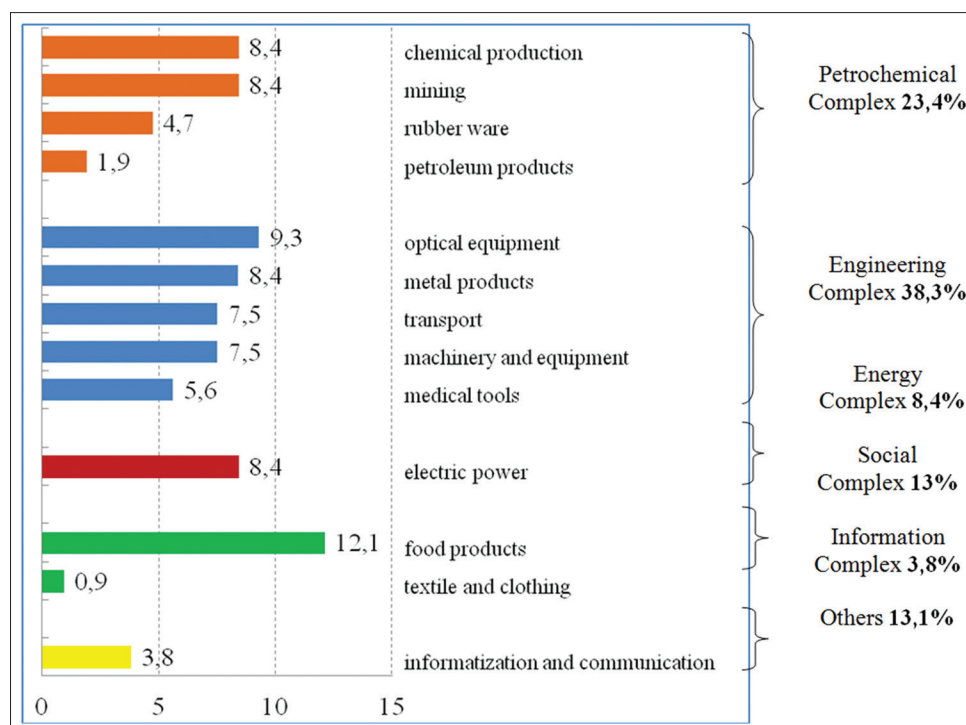


Figure 2: Structure of the organizations, implemented innovation in economic complex, and the types of production of the Republic of Tatarstan, percent

Table 2: The types of innovation, implemented at the enterprises of the Republic of Tatarstan, percent

Type of innovation	Organizations	Industrial enterprises from them
Technological innovation	12.5	14.8
Marketing innovation	3.5	4.2
Organizational innovation	4.9	5.4

DEDUCTIONS

Innovations should cover not only the creation of new technologies, their implementation into production, but also the promotion of products on the market, an effective communication infrastructure. At many enterprises of the Republic of Tatarstan, such innovations have not yet received adequate distribution, that limits, in particular, the innovative potential of the enterprise, its effective use, and generally hinders the innovative economic activity. The aim of creating innovative strategies is to find a balance between the potential for innovation, enterprise and all relevant factors of the internal environment [17].

CONCLUSIONS

Under the conditions of innovative development of the national economy, no one enterprise will be able to exist for a long time without making significant improvements to

its work. As a result of implementation of new equipment and technologies, the quality of products and the product characteristics are improved, the means, methods and organization of the production process are developed. The implementation of innovative equipment into production is a long, complex and costly process for any enterprise. For its performing, the enterprise system requires the introduction of comprehensive analysis of production activities, the use of effective calculation mechanism, and the cost-effectiveness analysis of project execution for implementation of innovative technology into production.

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