

ISCKMC 2022**International Scientific Congress «KNOWLEDGE, MAN AND CIVILIZATION»****DEVELOPMENT AND DEPLOYMENT OF PROCESS
INNOVATIONS IN ECONOMIC ACTIVITY OF MODERN
ENTERPRISES**

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Abstract

The basis for provision of stable and successful functioning of enterprises throughout the economy is their innovative development. Topicality of technical innovation application in economic activities of an enterprise is determined by fast-changing customer preferences and a necessity to ensure national economic security. Efficiency of activity of a modern enterprise is determined by continuous analytic market assessment, supply and demand analysis, application of modern production technologies, implementation of innovative products and production methods. This paper presents substantial analysis of process innovation classification, shares analysis of indicators reflecting mastering of process innovations on behalf of Russian enterprises and defines further prospective directions for increasing innovation-related activities. Process innovations are understood as innovations that assume production of a new product or that of an existing product/service by means of improved technology. Direction of process innovations lies in obtaining and use of new knowledge for solving high-priority tasks in the field of ensuring efficient operation of hardware and production in an organization. Prerequisites for appearance of process innovations are deemed to be technological advances in the economy and society as a whole. Innovations are needed at enterprises of any sector of economy; such innovations are deemed a set of managerial decisions aimed at improving economic activity by means of perfecting principal attributes of a product and processes involved in its production.

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1. Introduction

Development of enterprises is impossible without implementation and use of innovation in the enterprise's activities. While the process of creating and implementing innovations is a risky one, it is necessary to any company, independent of its form of incorporation, scope of activity and size.

Process innovations are innovations that provide for creation of a product or a service by means of application of state-of-the-art production processes. The process innovations are aimed at obtaining and application of new knowledge in order to solve various tasks in provision of functioning of hardware and production processes at an enterprise. The process innovations are determined by the influence of technological advances. The process innovations shall be developed accounting for a comprehensive complex analysis of economic activities of a modern enterprise and market trends, supply and demand, customer preferences. Market studies and customer preference analysis are a foundation of process innovations.

2. Problem Statement

The main directions of development of enterprise, strategic alternatives in increasing efficiency of activities are based on comprehensive analysis of economic activities, as well as that of external factors. Priority development directions for an enterprise are determined on the basis of forecasts for efficiency indicators and analysis of results of the enterprise's economic activities. Process innovations are implemented with the aim of increasing the enterprise's economic activity efficiency and improving use of available resources, increasing competitive advantage and business activity.

Innovations become a necessary practice and a challenge for both private and government-owned enterprises in developing countries (Chang & Jin, 2021). Enterprises throughout the economy are in need of innovations, which are a set of managerial solutions aimed at improving the quality of economic activity by means of improving various characteristics of product and the process of its manufacture.

3. Research Questions

Development of process innovations is a certain set of activities aimed at optimizing economic activities with the aim of increasing competitiveness and improving financial results of an enterprise, it is of the methods of non-price competition. Price of a new product may be higher than that of goods in the market, and due to a high demand it may increase revenue and end results of economic activities. Results of implementation of process innovations are reflected in certain indicators of production and economic activity and predicted demand for the enterprise's products. Development of process innovations allows determining the current position of the enterprise, assessing its development prospects, forming a development strategy, increasing business activity, improve market share and competitiveness.

4. Purpose of the Study

The purpose of this study is to analyze activity of Russian enterprises in implementation of process innovations and identify prospective directions of development.

5. Research Methods

Methodological foundation of this research is formed by works of Russian and foreign scholars in the field of innovation-driven development of production enterprises at various functional levels. During this research, the authors applied both general scientific methods (analysis and synthesis, systemic approach to studying the problem) and specific methods (statistical analysis of data, analysis of innovation-related activity).

6. Findings

The main operant forth behind innovative activity is innovative entrepreneurship, which is a specific innovative process of producing new products, technologies and services that is accompanied by formation of corresponding methods of production organization and management. The main task here is a commercial application of technical and process innovations with corresponding financial responsibility for results of such activities. Unfortunately, today development of innovative entrepreneurship in Russia is influenced by a number of additional factors. Among them are legal framework, state of the actual economy, investment climate, long and unpredictable COVID-19 pandemic.

Necessity to use process innovations is determined by active development of technological advances, increasing speed of digitalization and informatization of society. Process innovation is an innovative activity of enterprises. Through several recent decades, enterprises assimilated various process innovations, which were largely differentiated by sphere of application, implementation mode, sector of industry and sources of financing.

Practical innovation activity of Russian enterprises allows for identifying principal criteria for classification of process innovations.

Depending on genesis, the following types of innovation are distinguished:

- external (exogenous) – appearing as a result of market changes. The changes may be due to a necessity in appearance of new technologies, as well as due to an increasing demand for new developments;
- internal (endogenous) – appearing due to transformation related to internal dynamics of the enterprise.

Classification of process innovations by field of application may be as follows: innovations in industrial production, construction, communication, agriculture, health care and social services, etc.

Classification of process innovations by their novelty may be as follows:

- basic (radical) – aimed at assimilation of radically new products and technologies;
- improving (incremental) – improvement in characteristics of goods and services, or in production technologies;
- microinnovations that improve specific parameters of the product range and applied technologies as a result of application of small-scale inventions;
- pseudoinnovations (rationalizing) – partial improvement of characteristics of existing and largely becoming obsolete products, technologies, etc.

By the form of assimilation, process innovations may be divided into product innovations and proper process innovations.

Product innovations are understood as development and bringing onto market of new products, broadening the product range, improvement of existing goods. The nature of the product innovation lies in development of new goods and successful product launch. Product innovation include application of new materials, new semi-finished goods and parts, production of radically new goods. Product innovations assume that the product is renewed by means of increasing the quality of an existing product, which is expressed in improvement of the most consumer-demanded qualities of the goods, release of new products pertaining to a different product group and aiming at a new group of consumers.

Features of proper process innovations are largely related to mastering of new methods of production organization; at the level of enterprise management they may be related to creation of new organizational structures within the enterprise. This type of innovation includes development and implementation of technologically new or significantly improved production methods, including product distribution (delivery) methods. Proper process innovations are based on application of more modern equipment, new organizational methods in production, as well as on active application of results from research and development. Usually, such innovations are aimed at increasing the efficiency of a production process of product distribution methods.

Studies into forms of process innovations allows concluding that changes may be aimed at improvement of specific characteristics of goods, or at a radical change in the production process. As a result, the enterprise creates a radically new product that have not existed previously and was not known to consumers. Depending on degree of efficiency, process innovations may be divided into low-profit, mid-profit, high-profit. Various types of innovations may have differing efficiency. So, under conditions of solvent demand and growing markets, product innovations are efficient. At the same time, in mature and saturated sectors proper process innovations are more efficient.

Analysis of statistical data on innovative activity of Russian enterprises (Gorodnikova et al., 2019; Gokhberg et al., 2020), one may conclude that only a small share of enterprises pertain to actually innovative enterprises, as they actually perform research and development and sell innovative products. Most of the Russian enterprises are oriented onto acquisition of state-of-the-art production assets, usually imported (Table 01); additionally, enterprises actively purchase software packages and data bases. To a lesser degree, enterprises use training of personnel in the field of innovations, even fewer enterprises still are oriented towards acquisition of rights to use intellectual property results.

Table 1. Distribution of organizations by types of innovative activity, (%)

Types of innovative activity	2016	2017	2018	2019
Research and development	40.8	39.5	38.7	41.8
Fixed asset acquisition	53.5	53.9	53.5	50.3
Marketing	4.3	4.3	4.1	8.2
Training of personnel	16.2	15.2	14.4	16.2
Design	7.7	6.7	6.1	4.6
Engineering	16.7	16.0	16.1	14.1
Development and acquisition of software and data bases	28.9	27.1	27.5	25.4
Acquisition of intellectual property rights	9.2	8.7	8.7	9.7

On average, during the period of 2017-2020, about a fifth of Russian enterprises performed various process innovations; the level of activity differs very much by territory (Table 02). In 2020, mastering of new technologies and production of new types of goods was largely the aim of enterprises located in the Central federal district (26,5 %), the lowest innovative activity is typical of the enterprises of the North Caucasus federal district. The main causes for such high differentiation lies in production specialization of regions, natural conditions, availability of financing. Regions specializing in agricultural production show significantly lower values of innovation-related indicators.

Table 2. Territorial distribution of enterprises involved in process innovations, (%)

Federal District	2017	2018	2019	2020
Central	24.6	23.9	28.1	26.5
North-West	21.4	22.3	22.2	23.0
Southern	18.5	14.8	17.8	19.1
North Caucasus	11.3	7.3	7.1	10.1
Volga	19.9	20.2	22.5	27.1
Urals	24.6	23.3	20.9	21.7
Siberian	17.0	16.0	16.4	19.6
Far East	18.2	16.1	15.4	15.4
Russia as a whole	20.8	19.8	21.6	23.0

Process innovations are used mainly by enterprises involved in processing industry (Table 03), in 2020 their share amounted to 29.2 % of the total enterprises involved into innovative activities. Processing industry enterprises form an entrepreneurial innovative core in the country. Correspondingly, in the context of digitalization of all the areas of economic activity, increase in the number of enterprises involved into innovation in the area of software development is expected.

Table 3. Distribution of enterprises involved in process innovations, (%)

Scope of activities	2017	2018	2019	2020
Industrial production	19.6	18.5	20.0	21.5
including				
– natural resource extraction	9.5	9.0	9.7	9.5
– processing industry	28.8	27.9	28.0	29.2
Provision of electricity, gas and steam	8.8	7.7	9.3	10.9
Water supply and disposal	4.5	3.7	5.6	6.5
Construction	10.2	9.1	8.4	11.1
Telecommunications	17.6	15.8	18.9	19.9
Software development	15.2	15.5	20.8	23.0
Information technologies	12.2	9.4	12.3	12.1
Research and development	78.4	79.6	77.8	80.1

Enterprises involved in innovations usually operate with product innovations and proper process innovations, so, during the period of 2017–2019, majority of enterprises (67,3 %) applied product innovations, while a little fewer (62.6 %) enterprises applied proper process innovations during the same period. Distribution of organizations involved in product and proper process innovations depends on their scope of activities. In 2020, proper process innovations were of higher priority for organizations involved

in natural resource extraction, while product innovations were of higher priority for processing industry enterprises (Table 04).

Table 4. Distribution of organizations involved in innovative activities by their scope of activities in 2020, (%)

Scope of activities	Product innovations	Proper process innovations
Industrial production	74.6	58.3
including		
– natural resource extraction	38.3	70.9
– processing industry	82.4	55.1
Provision of electricity, gas and steam	37.6	74.9
Water supply and disposal	47.3	69.1
Agriculture	53.9	66.1
Construction	54.7	62.1
Telecommunications	64.5	87.5
Software development	77.5	5.4
Information technologies	66.4	67.2
Research and development	80.8	54.3

According to the data from the Federal State Statistics Service (Gokhberg et al., 2020), the results from implementation of the proper process innovations in 2020 were: product development and production methods (25.1 % of the total number of enterprises with completed innovations); logistics, delivery and distribution methods with respect to feed materials and goods (12.8 %); information processing and transmission methods (27.9 %); business methods, corporate management, accounting (23.0 %); practical business relations and external communications (11.1 %); human resource management methods (13.6 %); marketing methods for promotion and pricing of goods (13.5 %).

American scientists Michael Porter stated that efficiency and competitiveness of economy is determined by a ratio of “science – technology – hardware – production”, which may differ at various stages of economic development (Porter & Kramer, 2006). Marketing support of innovation activity of an enterprise is an important condition for successful implementation of intellectual property objects into practical activity of the enterprise. Economic success resulting from innovation technologies requires paying enough attention to forming marketing strategy for technology transfer. Formation of the marketing strategy for technology transfer follows marketing laws, in particular, the classical 4Ps (product, price, place and promotion) (Kotler, 2007).

The term *breakthrough technology* was coined by C.M. Christensen in his book *The Innovator’s Dilemma*. In the book, Christensen uses a more general term breakthrough innovation, as he acknowledges that few technologies are destructive or continuous by their nature. Rather, destructive effect comes from their strategic use. Christensen distinguishes, on the one hand, a lower boundary aimed at customers who do not need all the characteristics of the upper market, and, on the other hand, shift to new markets, aimed at customers who have not been previously served by established companies (Christensen, 1997; Christensen et al., 2010).

The model of demand generation for innovative technologies gained credence among global experts. Technology transfer is a highly professional type of commercial activity and is one of the

principal mechanisms providing connection between science and production. The process of technology commercialization is starting not from research and development, but rather from assessment of business opportunities (Tiurina & Ippolitova, 2015).

Systemic analysis and practical implementation of individual new technologies allows identifying product and process innovations resulting from the Fourth Industrial Revolution: MOOCs, Internet-enabled electronic appliances; e-banking, e-business, 3D printing of industrial and household items; 3D printing of transplants; Internet-enabled driverless cars; automatic unmanned plants connected through the Internet to products and their consumers; new forms of labor organization; robotic pharmacists; AI in management; accelerated technological change; electronic control; hybrid wars that blur the lines between war and peace. Dadaev (2019) wrote:

Under current conditions—prevalence of changes initiated by the Fourth Industrial Revolution., finalization of the fifth technological paradigm and beginning of transition to the sixth one (2020–2025)—there appears a chance due to a transition to an advanced development path. (p. 42)

Innovative Russian enterprises demonstrate slow and patchy development as for mastering process innovations. In this context, especially important is the issue of creating a national innovation system that provides domestic production of modern plant and machinery, systemic training of personnel in the field of innovation-related activities. The innovation-oriented enterprises need governmental support, stimulation of purchase of equipment and intellectual property in the domestic market.

Let us note that innovation activity is a complex process of creating technologies when creative ideas and engineering thought are transformed into new inventions, useful models, production samples or new technological knowledge, which may become the object of the intellectual property rights. This activity is based upon a complex of scientific, technological, organizational, financial and marketing measures, implementation of new production methods, purchase of machinery and equipment and other assets, expenses due to innovation implementation, which taken all together facilitate appearance of new technologies. In the end, such technologies get innovative properties by a qualitative market property, namely, efficiency of the process from the costs point of view, competitiveness of the manufactured product in use.

7. Conclusion

Application of process innovations in economic activities plays a significant role in perfecting the operation of a modern enterprise. Process innovations provide for creation of a new type of product following a new production process, thus improving the product's consumer properties. Process innovations facilitate increasing economic activity and competitive advantage of enterprises. The performed research into forms of process innovations allows concluding that changes may be aimed at improvement of specific characteristics of goods, or at a radical change in the production process. As a result, the enterprise will create a radically new product that have not existed previously and was not known to consumers. Development of innovations is a complex and labor-intensive process, where in

some cases only individual consumer properties need to be changed, while in others there is a need for serious changes.

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