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**MODERN APPROACHES TO INNOVATIONS AND  
INNOVATION-RELATED ACTIVITIES**

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**Abstract**

This article explains the essence of the need to rethink and redefine the principles that are the basis of approaches to innovation in terms of changing the perception of the innovation process, as well as the term «innovation» itself. For this purpose, considerable attention will be paid to the theoretical features of this issue, since the definition of the methodology is a fundamental step in the study of this phenomenon. Also, more detailed consideration was given to the principles of accelerating the introduced technological changes, the digital transformation of modern society, and the peculiarities of the development of artificial intelligence. It should be noted that the current approaches seem to be insufficiently developed for making specific decisions and assessing the innovation process. Thus, on the basis of all the considered terms, classifications, and methods, it is required to develop certain recommendations in the field of the development of innovative projects and the principles of their implementation.

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## 1. Introduction

The introduction of innovations, as well as the ability of enterprises to implement them, are key factors in terms of the operational efficiency and competitiveness of any enterprise. Innovation is the driving force for economic development. Thanks to the use of approaches that are described by foreign and Russian economists, it becomes possible to more accurately define the term "field of innovation", as well as the relationship of innovation with economic cycles. Within the framework of this study, it is proposed to create a classification of criteria by types of innovative projects, as well as to consider approaches to assessing the efficiency of enterprises, sources of financing, and investment capital. Also, in the course of this study, the transformation of some models of innovative development of society is considered based on the use of convergent technologies, digital transformation of society, as well as the fusion of science and artificial intelligence. It should be understood that a significant number of different factors affect the development of innovation. In addition to scientific progress, as well as new discoveries, the trajectory of innovation development is influenced by the current ideology of technological change and the geopolitical situation in the world.

All modern innovative approaches imply convergence and development in an extremely tough competition in a globalized economy. It should be understood that such processes can even lead to the complete elimination of globalization in the understanding in which it now exists. The current geopolitical situation raises a large number of religious, national, demographic, military, and economic issues. At the moment, even pollution can become an instrument of the political game. All this is further exacerbated by the rapid pace of development of the Internet, which creates additional difficulties in its regulation from the point of view of technology and ethics. Based on this, we can conclude that the trajectory of development of modern innovation processes depends not only on the rate of scientific progress but also on a set of political factors.

From the point of view of the legislation of the Russian Federation, «innovation activity» is defined as a special approach to innovation through the use of scientific research or technological change. The term «innovation» is used by Russian scientists when it is necessary to designate a new project, process, or field of activity, or potential novelty that a given object or phenomenon can bring.

At the moment, innovative activity is based on the use of information and information from a wide variety of industries. This allows the most complete implementation of the process of their development by taking into account all the existing specifics, and also greatly simplifies the process of their further implementation in the industry. In the course of developing innovative projects, knowledge is used that was obtained as a result of R&D. However, the introduction of such methodologies strictly requires a list of criteria by which to evaluate the entire process, as well as its individual components. Evaluation is an important step in gaining an understanding of the success and effectiveness of a particular device.

Thanks to the interdisciplinary analysis of the latest structures of the innovation paradigm, it becomes possible to provide solutions related to the structure of problems and the specifics of activities related to innovation, which allows organizing the process of management and dissemination of innovative developments. This is due to the fact that the task of promoting and disseminating advanced innovations falls within the competence of R&D but requires the involvement of a significant amount of resources and

financial resources. In modern discussions of the problems of innovation, special attention should be paid to the regulatory activities of the government in this direction. It must search for new solutions in the industry in order to ensure the maximum rate of its development. To this end, a number of mandatory procedures and principles should be introduced into the economy of the Russian Federation, which will make it possible to significantly improve the national innovation system.

## **2. Problem Statement**

In modern discussions of the problems of innovation, special attention should be paid to the regulatory activities of the government in this direction. It must search for new solutions in the industry in order to ensure the maximum rate of its development.

To this end, a number of mandatory procedures and principles should be introduced into the economy of the Russian Federation, which will make it possible to significantly improve the national innovation system.

At the moment, the following shortcomings can be identified in the legislative framework:

- 1) insufficient level of development of institutions for the protection of intellectual rights;
- 2) lack of a number of rules and regulations for R&D;
- 3) insufficient coverage of the rights and obligations of subjects of innovation.

It should be borne in mind here that all legislative provisions in the field of innovation should address the regulation of the rights and obligations of the subjects of innovation, as well as the specifics of their interaction with government agencies and departments. At the same time, normative acts that exist in this legislation and regulate the relationship of its objects will act as the legislative environment for innovation. It should be borne in mind here that the strategy can imply a revolutionary or evolutionary development, with the diffusion and integration of innovations in most aspects in the modern geopolitical conditions, which require a significant degree of social control and regulation of unnecessary risks.

Thus, the discussed paradigm of innovations is the initial stage of the innovation process, and its methodology requires a specific justification, taking into account the potential possibilities of using artificial intelligence for forecasting, analyzing data structures and scaling innovations.

## **3. Research Questions**

At the moment, the research demonstrates the lack of theoretical knowledge on this issue among both Russian and foreign researchers. Information technology, bio- and nanotechnology currently have a strong impact on the development of society and its individual industries, which allows us to define the innovation paradigm as a way to solve various emerging problems in ecology, economics and technology. When analyzing the structure of innovations, it is required to organize a search for practical solutions to these problems, as well as the subsequent coordination of such solutions, taking into account all the achievements in research, technological cycles and issues of digital transformation of society.

At the moment, convergent technologies can be classified as breakthrough technologies that use synergy to transform and reorganize the existing model of innovative and scientific and technical changes, as well as innovative development trajectories. The first positive results have already been obtained, among which one can single out a reduction in the transition time from the development of innovations to their global distribution and implementation. This affects applied and basic research. However, in parallel with this, serious problems arise with the control and regulation of such activities. All of humanity must tackle this problem. This requires identifying potential solutions in providing definitions of «innovation domain» as well as the relationship between innovation. This requires identifying potential solutions in providing definitions of «innovation domain» as well as the relationship between innovation. In addition, we must take the classification criteria into account and formulate specific evaluation criteria.

#### **4. Purpose of the Study**

Thus, the paradigm of innovation, which is currently being discussed, is the initial stage of the innovation process, while its methodology requires a specific justification, taking into account the potential possibilities of using artificial intelligence for forecasting, analyzing data structures, and scaling innovations.

#### **5. Research Methods**

The modern global economy can be described as an economy with an extremely sensitive perception of innovation as a phenomenon. In the framework of this study, innovation is considered as the process of creation and dissemination before the stage of commercialization of a technology, product, or production process, which can lead to added value or increased productivity, as well as the creation of new consumer value.

If we turn to the work of Joseph Schumpeter, a famous German economist, in the framework of his research, when describing the dynamics of the economy, he emphasized a serious difference between the definitions of economic growth and economic development. Also, it was Schumpeter who was the first scientist who formulated the definition of «innovation» from an economic point of view, after which he created a classification based on the main features.

Any company that wants to reap the benefits and benefits must regularly innovate in production and update it on an ongoing basis.

Economic growth is based on constant modernization and technological change. Thus, we can conclude about the importance of innovation as a key tool for the development of modern human society.

The field of innovation can be viewed in different ways by referring to different sources in the literature. For example, the field of innovation can mean a certain set of industries that, in the course of their activities, generate use-value, including intangible assets (Gerasimova & Eronkevich, 2018). All the results of such activities can become the basis for future high-tech production (Fagerberg et al., 2011). Another point of view states that the field of innovation is a specific sector of the national economy dealing with the transformation of R&D in order to obtain additional knowledge on the development of science-intensive products and their commercialization.

Such definitions and theoretical developments formed the basis for the research of the Russian economist Kondratyev (1920) and the German economist Gerhard Mensch (1975) (as cited in Shcherbakov, 2019). They both categorized innovation by value.

If we turn to the approach of Christopher Freeman, then innovation can be defined as a non-linear process that provides a comfortable environment for the knowledge-intensive process and all organizations participating in it. Freeman also emphasized the need to study the process of innovation in a complex, implying the need to study the features of the diffusion of innovations in society and their impact on the formation of various fundamental industries (Fagerberg et al., 2011; Lewis, 2020).

Researchers have proposed another point of view, which focuses on the ability of an organization or a specific business to modernize, innovate, and technological change as the main factors in the development of economic growth. At the same time, within the framework of the study, the significant contribution of Schumpeter (Wixe et al., 2021) to the development of the theory of the innovation process and the creation of its definition is emphasized.

After enterprises realized the new realities of digital transformation, the introduction of artificial intelligence, they also realized the need to adapt to such realities. For this reason, they have embarked on redesigning and improving production facilities and distribution chains with a strong emphasis on innovative approaches.

Such experts as Friedrich von Hayek, Douglas North, Robert Solow, Christopher Freeman, and many others (Shcherbakov, 2019) were engaged in the development of the theoretical foundations of dynamic economics. It is worth noting Freeman here, who emphasized the use of an interdisciplinary approach in the study of innovation, which allowed him to develop a systematic approach to learning.

For the further course of the study, it is proposed to agree with the definition of innovation processes presented in (Ryapukhina et al., 2016), according to which the project can be implemented due to the perceived atmosphere of trust. At the same time, thanks to the introduction of interactive management (Kim et al., 2021) into the innovation system, it becomes possible to ensure the participation of almost all industries and institutions in the development of innovative activities.

Also, the implementation of innovative projects has a serious impact on various components of the internal environment of an individual economic entity and the entire industry. In this regard, certain differences are formed in the understanding and assessment of initiatives, as well as the potential perception of the results and benefits of the project (Ershova, 2019).

In this regard, it is required to define a set of classification criteria for categorizing innovation processes. The use of the main incentive, which is the basis for the start of the company's innovative activities, allows creating the following classification of projects:

- 1) reaction to actual changes in factors and conditions of the company's external environment;
- 2) projects that are the implementation of previously developed and approved programs with a multi-stage procedure for integrating an innovative project into the production and organizational structure of the company in accordance with the concepts of the general development strategy of the company;

- 3) projects, the essence of which is aimed at financing R&D from private business, with the prospect of subsequent commercialization. This category also takes into account the prospects based on the increasing demand for 6G technology, digital twins, and immersive reality (Allam & Jones, 2021).

Most of the relevant research additionally emphasizes the importance of acquiring and accumulating technological resources (Fauth et al., 2021). Achieving this effect requires a continuous process of reorganization and revaluation of available resources. The results of the analysis of macroeconomic problems demonstrate that the concept of open innovation is extremely effective in targeting stakeholders in providing profitable solutions in the innovation process.

If we start using a more general approach, then the sphere of innovation can be defined as the interaction between the subjects of innovations that generate and disseminate them. It is worth noting here that the term innovative product is used in most cases to describe the final product of development.

Based on this, it should be noted that the «innovative product» is currently defined differently by different researchers. The criteria for the definition are material and intellectual results that are associated with the process of creating a given product (Kim et al., 2021).

One of the popular classification methods is the types of innovations, which subsequently find practical implementation in innovative projects. Thanks to this approach, the following categories of projects can be distinguished:

1. Environmental innovation projects (Shi et al., 2021). Their essence is aimed at achieving balance and harmony between measures to protect the environment, as well as the speed and efficiency of production modernization. This helps to protect the environment from excessive threats from aggressive human activities.

2. Marketing innovation processes (Rudakova & Molchanova, 2020). Such processes are often based on the use of innovative marketing tools and techniques that are specially created to improve the efficiency of promoting innovative products in various market segments, which creates additional incentives for consumers to switch to these products. This is only possible with full awareness on the part of the customer base of all the technological advantages of a particular product.

3. Information innovation projects. This category includes the development and subsequent implementation of advanced systems for automated resource management of the company, systems for organizing interaction with the customer base and its service. This can also include automated control systems.

4. Technological innovation projects (Kobeleva & Ivashina, 2019). This category implies reengineering of existing business processes, which in most cases is accompanied by the modernization of existing production facilities.

5. Digital innovation projects. The use of digital innovations opens up a chance to organize new opportunities for various business initiatives and transformation of business processes through the use of the most advanced solutions and options for practical implementation (Dornberger & Schwaferts, 2021).

Several studies, such as (Wichmann et al., 2021), demonstrate a serious concern at the state level with the development of additional and new business models in the face of rapidly growing customer

demand. In this case, the constant development and implementation of new technologies in smart cities open up unique opportunities for adopting new digital potential to the practical needs of consumers, industry, and society as a whole.

However, it should be noted here that digital transformation (Molchanova, 2020) requires a significant degree of company additivity, as well as a constant need to create, implement and control the use of organizational and structural changes.

The results (Scuttari et al., 2021) of studies demonstrate that the importance of the possibility of integrating methodological and technical approaches from borrowed information systems is increasing for companies to ensure sufficient development and modernization of existing and using information systems that are used in making management decisions, working with enterprise architecture. and its administration.

Such stable technical and digital development creates a significant need for the constant training of highly qualified personnel (Shakina et al., 2021; Tarik et al., 2021), which could support existing technologies, as well as engage in their constant integration and adaptation into the production and innovation cycle, which would reduce the impact of demand shocks on the modern labor market.

You can create the following classification according to the scale of the effect of the implementation of an innovative project:

- 1) projects that are implemented by the object of management;
- 2) projects that are implemented at the level of an industry or a specific sector of the economy;
- 3) projects that are implemented at the regional level;
- 4) projects that are implemented at the national level;
- 5) projects that are implemented internationally.

One of the main features of all innovative projects is their extremely long preparatory stage, which is logical, given the high rate of time spent on the development of science-intensive products and technologies. Here, one should take into account the huge level of risk of such investments, which is associated with a high level of uncertainty in forecasts of future rates of demand for a specific innovative product developed in various market segments.

When evaluating the effectiveness of specific innovative projects, it is usually necessary to take into account factors that can have a significant impact on the benefits obtained from the participation of a particular company in the project, as well as the overall effectiveness of the project in question (Krylov et al., 2018). Based on this approach, the following classification was developed:

- assessment of the budgetary efficiency of the project, which is formed on the basis of the size of receipts to the federal budget and local budgets;
- evaluation of the effectiveness of the project from the point of view of the owners and shareholders of the company, who provide funds for investment in the project;
- evaluation of the effectiveness of projects for various sectors and industries of the economy, as well as manufacturing enterprises integrated into an interconnected production cycle, to which the machine-building cluster can be attributed.

In addition to using the criteria for assessing the effectiveness of an innovative project in monetary terms, which was considered above, you can also use the criteria for assessing the qualitative effect of innovative projects, depending on the assessment of project results. Here the following categories of factors become important:

- 1) availability of various resources, including human (Maglio, 2021), financial, technological;
- 2) the interest of all participants in the process in determining the level of risk;
- 3) the impact of the project on the development of business processes and infrastructure of a knowledge-intensive manufacturing enterprise;
- 4) the likelihood of completing all stages and points of the project;
- 5) impact of the project implementation on the general parameters of reliability;
- 6) the degree of ability of the planned innovative project (Kiani Mavi & Kiani Mavi, 2021) to ensure the solution of practical research problems through the testing of new methods and technologies;
- 7) impact on the restructuring of the economy and its individual sectors.

All parameters that are related to the market, in most cases, include some numerical variables related to the commercial potential of the project, the types of promotion to create demand, the degree of price elasticity. Despite the existence of a wide range of approaches that can be used in assessing the feasibility and effectiveness of innovative projects, it is necessary to use a number of the following principles in the analysis:

- 1) compare various options for implementing a specific project;
- 2) conduct a dynamic analysis of the available characteristics and parameters, taking into account the vector of project development;
- 3) predict the impact of the project implementation on various market segments;
- 4) assess the social costs and benefits that are associated with the implementation of the project;
- 5) determination and selection of the optimal development trajectory to obtain maximum benefits;
- 6) agree on the performance indicators used;
- 7) integrate the effects of the degree of uncertainty into the model for assessing the effectiveness of the project;
- 8) correct the dynamics of exchange rates in the case of using foreign currency in the estimate;
- 9) analyze the results of the project, namely, the impact on the environment external to the project;
- 10) apply a multi-stage model for assessing the effectiveness of the project;
- 11) assess potential changes in the cost of funding sources if the entire project is based on funds that are borrowed at a floating interest rate;
- 12) determine the impact of inflation rates on the decrease in the purchasing power of money capital inflows;



- 13) take into account the interests of all interested parties, taking into account potential disagreements between them, as well as the subsequent minimization and elimination of these disagreements by various regulatory methods;
- 14) take into account changes in working capital that are required for the implementation of the project at various stages of its life cycle;
- 15) use mathematical tools and models to predict project parameters in the form of time series, which serve as the basis for calculating the components of cash inflow and outflow.

A wide range of parameters can be used to create an overall assessment of the effectiveness of a specific innovative project. Their exact number, as well as quality, will be influenced by the features of the project, the industry of its use, the tasks and goals. It is worth noting here that using these parameters, you can check the level of readiness of a particular enterprise for the implementation of this innovative project for further successful use.

## 6. Findings

Evaluation of efficiency primarily means the assessment of economic results. It is also required to pay sufficient attention to the social and environmental effects that are formed in the course of the introduction of innovation.

By complying with this requirement, the choice will be determined by a comparative and absolute assessment of the benefits of the project. Due to the use of the comparative advantage methodology, it becomes possible to identify and select the optimal option among all those proposed with a subsequent calculation, which is performed to assess certain indicators.

When formulating a specific assessment of the effectiveness of new products and processes, a great deal of attention should be paid to direct selection among the milestones that are proposed during the project.

This procedure requires a comparative analysis of options in terms of time factors, production volumes, as well as the corresponding qualitative, social and environmental factors (Chen & Chou, 2021; Shi et al., 2021). In this case, the following factors become important components:

- at the stage of compiling an R&D portfolio, it is required to take into account the indicators of the most suitable machines and equipment for the project;
- at the stage of planning an innovative product, use the indicators of replacement machines and possible analogs.

At this stage, the economic and technological justification of the chosen option requires that all approaches include the following points (Ershova, 2019):

- assessment of the effectiveness of the project, taking into account the existing positive and negative results in other sectors and sectors of the national economy;
- calculations require the use of a full range of estimated variables and values.

- carrying out calculations of performance indicators, which are necessary to form an assessment of the impact of innovation on national interests and policies, as well as the interests of producers and consumers.

Based on the above judgment, it can be assumed that at the moment the term «innovation» is being revised as technology develops, as well as digital transformation is carried out.

The existing approaches are primarily influenced by new projects in the field of:

- 1) study of the fundamental laws of nature and matter;
- 2) advances in design and technology;
- 3) implementation of innovations in products and technologies;
- 4) modification of the object of innovation;
- 5) changing the functional characteristics of the object of innovation;
- 6) achievements in the development of additive manufacturing;
- 7) creation of global value chains;
- 8) using approaches based on collective intelligence and intelligence
- 9) advances in converged technologies.

Evaluation of the effectiveness of the innovation process includes the identification and selection of a specific optimal implementation option as a basis for making future management and administrative decisions. This industry should receive much wider applications than is currently available. When forming an assessment of the effectiveness of the project, it is required to use comparative advantages, since this is a factor in justifying the projected profitability of potential investments.

A similar effect can be achieved by levelled or complementary indicators of the feasibility of the new product. In this case, it is required to compare the indicators of the efficiency of growth and efficiency with similar products.

The methodology that is used to create an assessment of the effectiveness of innovation implies the use of a scorecard that reflects national interests along with the interests of developers, producers, consumers, and the budget. Thanks to this approach, it becomes possible to form a general comprehensive assessment of the effectiveness of innovations when determining the contribution and share of each of the stakeholders in this level of efficiency.

From the point of view of the modern economy, the skills of organizations to introduce innovations and modernization are extremely relevant, since this is one of the key conditions for ensuring the survival of these organizations in economically important industries.

In this case, the most important point of research is the possibility of transforming discoveries and development into a global experience.

Based on the degree of novelty of the innovation implemented by the project, the following classification was proposed:

- innovative project;

- progressing project;
- modernization project;
- disruptive and supportive innovation;
- closed innovations;
- joint innovations in the form of market partnerships;
- open innovation (Fauth et al., 2021);
- social innovation (Figueiredo et al., 2021; Mantulenko & Goryachev, 2021; Prim & Dandolini, 2021);
- flexible innovation;
- convergent innovation.

At the moment, the development and integration of computer-aided design and manufacturing systems, as well as administration and control, requires a reorganization of existing business processes, which allows opening up new business opportunities.

One of the breakthroughs of innovative technologies began to highlight the cluster of convergent technologies, which includes information, cognitive, biological and nanotechnology. Their use should allow for a significant transformation of the model of scientific innovative human development (Maglio, 2021).

At the same time, the paradigm discussed above is gaining more and more popularity around the world and is becoming an advanced agenda of world scientific research, which is aimed at improving the level and quality of life of each person, as well as preserving nature around us.

## **7. Conclusion**

Information technologies, bio-, and nanotechnology currently have the strongest impact on the development of society and its individual industries, which allows us to define the innovation paradigm as a way to solve various emerging problems in ecology, economics, and technology.

At the moment, convergent technologies can be classified as breakthrough technologies that use synergy to transform and reorganize the current model of innovative and scientific and technical changes, as well as trajectories of innovative development.

The study is aimed at developing a systematic representation of the problem-oriented paradigm of innovation and the system, which provides an opportunity to create solutions to global problems, taking into account all potential scenarios for further social, economic, and technological development.

In the era of modern industrial revolutions, high-quality and efficient solutions for improving value chains must be formed as a result of the convergence of the most advanced technologies, as well as the fusion of innovative thinking and intelligent systems.

The most characteristic feature we can state is the incredible rate of acceleration of the development of innovations, the greatest number of discoveries, inventions, and R&D involved in the process.

At the same time, it is worth noting the geometric nature of the development of these dynamics.

Approaches to innovations that were formed in the course of the historical formation of a person have moved to a completely new level. This condition can serve as a vivid example of the dialectical principle of quantitative changes when multiplication leads to a qualitative transformation.

The main question that arises at such a pace of development is the ability of humanity to control and regulate this process, as well as the pace of development of innovations.

Are there limits to the development and acceleration of innovation and can go beyond these limits pose a threat to humanity? Humanity will have to find out the answers to these questions in the future. However, the current activity makes us believe in an optimistic scenario.

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