Innovative process as an object of management

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The article explores the term "innovation", for which the authors use modern approaches to its understanding. According author's mind, In the world economic literature, "innovation" is interpreted as the transformation of potential scientific and technological progress into real, embodied in new products and technologies. The issue of innovations in our country has traditionally been developed in the framework of economic research of scientific and technical progress. The term "innovation" has been actively used in the transition economy of Georgia, both independently and to denote a number of related concepts: innovation activity, innovation process, innovation solution, etc. To clarify the concept of innovation, we consider different views on its essence. After giving their own definition of the term, the authors proceed to the classification of innovations and note that their diversity and heterogeneity require some kind of work.

According to the classification of the authors of the study, innovations are divided according to innovative potential, technological parameters, content, place in the enterprise, causes, nature of the needs being satisfied, degree of territorial novelty.

The authors think that the innovation process as an object of management is much more complex than a routine production process. Any business performed by a person or an organization for the first time is nothing more than an innovation process (table), which causes a lot of difficulties and mistakes, requires alterations and adjustments. Routine processes, on the contrary, are repeated regularly, which leads to specialization and automation of personnel knowledge and skills, reduction of errors in the technological process, and development of a clear and effective algorithm of actions.

In the process of research, the authors compiled a comparative description of the innovation and production processes and gave the concept, structure, content of the work of innovation processes at its main stages.

In conclusion, the authors note that as F. Kotler notes, the development of a new product is most effective in those cases where from the very beginning there is close cooperation between the research and development department and the technical, manufacturing, marketing and financial departments of the company.

Keywords: innovation; classification; comparative characteristics.

Introduction

In the world economic literature, "innovation" is interpreted as the transformation of potential scientific and technological progress into real, embodied in new products and technologies. The issue of innovations in our country has traditionally been developed in the framework of economic research of scientific and technical progress.

The term "innovation" has been actively used in the transition economy of Georgia, both independently and to denote a number of related concepts: innovation activity, innovation process, innovation solution, etc. To clarify the concept of innovation, we consider different views on its essence.

The Term "Innovation", Modern Approaches to its Understanding. Innovation is most often understood as "investment in innovation". Innovation (innovation) - is the

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result of intellectual activity, which is the object of civil law relations, which has the following features: novelty, i.e. new qualities; practical applicability from the point of view of consumer utility and safety; economic efficiency (competitiveness).

Innovation is:

- The complete process from the idea to the finished product sold on the market (J. Cook, P. Myers);
- A process in which an invention or idea acquires an economic content (B. Twiss);
- A process involving such activities as research, design, development and organization of production of a new product, technology or system (D. Messi, P. Quintas, D. Wild);
- This is the end result of creative activity, which was embodied in the form of a new or improved product or technology that is practically used and is able to satisfy certain needs (A. Surin).

Most modern theorists and practitioners adhere to the concepts of "innovation", adopted in documents known as the "Frascati Manual" and the Oslo Manual.

The first one is constantly being adjusted and improved by a group of national experts on science and innovations of the Organization for Economic Cooperation and Development (OECD). The first version of the Guide was a recommendation for the collection, processing and analysis of information about science and innovation, was adopted in the Italian city of Frascati in 1963. The second document, contributing to the formation of a common approach to the concept of innovation, was adopted in Oslo in 1992 and was a technique for collecting data on technological innovation.

It is precisely this that was taken as the basis for the development of the regulatory framework for innovation in our country, in the development of concepts, programs and other strategic documents on innovation activities.

Following this interpretation and according to the fashion law "On Innovation", "innovation" (innovation, innovative product) is the result of innovation activity, which has received practical implementation in the form of a new product, service, production method (technology) or other socially beneficial result. According to the Federal Law "On Science and a new or significantly improved product (product, service) or process introduced into use, a new sales method or a new organizational method in business practice, workplace organization or external relations.

Innovation equally has three properties:

- Scientific and technical novelty,
- Manufacturing applicability,
- Commercial feasibility.

The concepts of "invention" and "discovery" are closely related to the concept of "innovation".

Under the invention understand the new devices, mechanisms, tools, and other devices created by man.

The discovery is the result of obtaining previously unknown data or observing a previously unknown phenomenon of nature.

The discovery differs from innovation in the following ways:

- 1) Discovery, like an invention, arises, as a rule, at a fundamental level, and innovation takes place at the level of technological (applied) order;

- 2) Discovery can be made by a single inventor, and innovation is produced by teams (laboratories, departments, institutes) and embodied in the form of an innovative project;

- 3) The discovery does not pursue the goal of gaining, innovation is always aimed at obtaining tangible benefits, in particular a greater inflow of money, a greater amount of profit, an increase in labor productivity and a reduction in production costs through the use of a specific innovation in technology and technology;

- 4) Discovery can happen by chance, and innovation is always the result of scientific research.

The term and the concept of "innovation" as a new economic category was introduced into scientific circulation by the Austrian (later American) scientist Joseph Schumpeter (1883 - 1950) in the first decade of the XX century.

In his work "The Theory of Economic Development" (1911) J.A. Schumpeter considered the issues of "new combinations" (innovation issues) and gave a complete description of the innovation process. Later, the term "new combination" was replaced by the term "innovation."

J.A. Schumpeter singled out the following types of combinations:

- 1) The use of new technology, technological processes or new market supply of production;
- 2) The introduction of products with new properties;
- 3) The use of new raw materials;
- 4) Changes in the organization of production and in its material and technical support;
- 5) The emergence of new markets.

The term "innovation" by Y.A. Schumpeter was used in the 30s. XX century. At the same time, under the innovation of Y.A. Schumpeter meant a change in order to introduce and use new types of consumer goods, new production, vehicles, markets and forms of organization in industry.

Classification of Innovations. The diversity and heterogeneity of innovation require a certain classification work.

1. According to the innovation potential, the following types of innovations are distinguished:

- Radical (basic) are the industry forming and represent the release of a new, not previously produced products or the use of new technology. With the advent of radical innovations, the formation of a new technological structure, new sectors of the national economy, begins, with many industries that have lost their relevance, are beginning to die off;

- Modernizing (improving) - these are changes (essential) of individual characteristics of already manufactured products or the technology used;

- Modifying (pseudo-innovations) imply a change in appearance or a slight change in certain characteristics of already manufactured products.

2. According to technological parameters:

- Product innovation involves the development and introduction of technologically new and improved products. Product innovations should be new for a particular enterprise, but not necessarily new to the market.

Such innovations are aimed at the economic effect that is obtained as a result of the launch of a new or improved product on the market;

- Innovation-process involves the development and implementation of technologically new or technologically significantly improved production methods (but not products). Innovations of this kind can be based on the use of new production equipment, new methods of organizing the production process, etc.

3. By content:

- Managerial (organizational) is the implementation of a new method in the conduct of business, the organization of workplaces or external relations. These innovations are aimed at increasing the efficiency of the organization by reducing administrative and transaction costs;

- Marketing - the implementation of new or significantly improved marketing methods, for example: significant changes in the design and packaging of products, the introduction of new sales methods, new methods of promotion, etc.;

- Social - introduction of changes in the social processes of an organization or even an entire country. For example, at the level of a separate organization, this may be the introduction of an additional flexible social package for employees of an enterprise, and at the level of the country's economy, the introduction of maternal capital;

- Technological - the activities of the organization associated with the development and implementation of technologically new products or processes, as well as significant technological improvements in products and processes; technologically new or significantly improved services, new or significantly improved methods of producing (transmitting) services.

4. According to the place at the enterprise:

- Innovations at the entrance, which include innovations in the process of logistics of production;

- Innovations at the output, which include innovations in events, procedures, sales schemes of finished products;

- Innovations in the system structure, which include various kinds (product and process) innovations implemented in the enterprise.

5. For reasons of occurrence:

- Reactive ensure the survival of the company on the market. They arise as a reaction to innovations implemented by competitors in order to maintain competitiveness;

- Strategic, their introduction is proactive in order to obtain decisive competitive advantages for the long term. Strategic innovations create conditions for organizations

similar to a temporary monopoly. Such enterprises are pioneer producers or technological leaders in the industry.

6. By the nature of the satisfied needs:

- Innovations focused on existing needs. The introduction of such innovations is associated with a moderate level of risk, since supply and demand are already known in the market. Understanding the degree of satisfaction of demand (not fully or partially satisfied) allows us to more accurately determine the size of the market;

- Innovations focused on the formation of new needs. The introduction of such innovations is associated with a high level of risk, since demand and supply in the market, its capacity can only be predicted. The introduction of such innovations is based on anticipating consumer expectations. As a rule, such innovations are radical and strategic. A classic example of a brilliant vision of future needs is the development of the Sony Walkman player, when the head of Sony, Akio Morita, despite all skeptical forecasts (predicting that the product will not be in demand) continued the implementation of this project, and the company achieved success.

7. According to the degree of territorial novelty:

- Innovations on a global scale, when innovation is introduced that has no analogues in any country in the world;

- Innovations for a country or industry, when an innovation known in international practice begins to be mastered within a particular country or industry where it was not previously;

- Innovations for the enterprise, when the innovation is already known in the country or industry, but it is introduced in a particular enterprise for the first time.

Innovation Process as an Object of Management.

Innovation can be considered both in a dynamic and in a static aspect. In the latter case, it is presented as the end result of the research and production cycle. The terms "innovation" and "innovation process" are close, but not unambiguous. The innovation process is associated with the creation, development and dissemination of innovation.

The innovation process as an object of management is much more complex than a routine production process. Any business performed by a person or an organization for the first time is nothing more than an innovation process (table), which causes a lot of difficulties and mistakes, requires alterations and adjustments. Routine processes, on the contrary, are repeated regularly, which leads to specialization and automation of personnel knowledge and skills, reduction of errors in the technological process, and development of a clear and effective algorithm of actions.

Table 1

Comparative Characteristics of Innovation and Production Processes (Author's)

Process characteristic	Innovation process	Production Routine Process
Final goal	Satisfying a new social need	Satisfying social needs
Ways to achieve	Numerous and indefinite	Few, optimal known
The risk of achieving the goal	Tall	Low
Process type	Discrete both in place and in time	Continuous
Manageability planning ability	Low	High
Plans	Long-term, adjustments are possible	Short-term, have the nature of hard policy tasks
The development of the system in which the process takes place	The system moves to a new level	Saving at this level
Interaction with a complex system of interests of participants in the process	Clash	Based on interests
The degree of coincidence of interests of participants in the process	Low	High
Distribution of responsibilities	Redistributes	Stabilizes
Process organization form	Flexible with poorly structured systems	Rigid, based on norms and regulations

The higher complexity in the management of innovation processes is due to the fact that they are influenced by many more factors of both the external and internal environment

than on the production process. Factors affecting the flow of innovation processes are presented in Figure 1.

Fig. 1. Factors Affecting Innovation Processes (Author's)

Innovation Process: Concept, Structure, Content of Works at the Main Stages

Innovation as a result should be considered inextricably with the innovation process. An innovation process is a process aimed at developing and implementing the results of completed scientific research and scientific and technological achievements in the form of a new or improved product sold on the market, a new or improved technological process used in practical activities.

The innovation process is a targeted chain of actions to initiate innovation, to develop and introduce new products and operations, to market them and to further diffusion.

An innovation process is the process of transforming scientific knowledge into innovation, which can be represented as a sequential chain of events, during which innovation ripens from an idea to a specific product, technology or service and is distributed through practical use.

In the most general form, the structure of the innovation process can be represented as a sequence of the following stages: fundamental (theoretical) research (FI) - applied research (PI) - development work (R & D) - development of innovation (IT) - industrial production (PP) - marketing and sales (MIS) - diffusion (D). Each stage sets its own goals and solves certain tasks.

Fundamental research (FI) is aimed at obtaining new scientific knowledge and identifying the most significant regularities. Basic research is divided into theoretical and search.

The result of theoretical studies are scientific discoveries, new concepts and ideas, the creation of new theories. Search research includes research, the task of which is to discover new principles for creating products and technologies, previously unknown material properties.

Applied research (PI) is aimed at identifying ways of practical application of the open fundamental science of the phenomenon and process. Their implementation is associated with a high probability of obtaining negative results (5-10% of the results of basic research are continued in the form of applied research).

OCD is the most important link in materializing the results of previous R & D. Based on the results of research, new products are created and tested. At the R & D stage, a technical assignment (TZ), technical proposal, draft design and technical design, development of working documentation for the manufacture and testing of a prototype are being developed; preliminary tests of the prototype are carried out; state (departmental) prototype tests; testing documentation of test results.

Fig. 2. The Main Stages of the Innovation Process (Author's)

At the stage of development of innovation (IT), technical preparation of production is carried out, i.e. mastering the production of a product obtained as a result of the ROC, under conditions of a specific production

Industrial production (PP) involves launching a series of a product with its subsequent launch on the market (MIS).

Diffusion (D) represents the spread of the innovation once mastered and used in new conditions or places of use.

According to the theory of innovations Y.A. Schumpeter, the diffusion of innovation is the process of cumulatively increasing the number of imitators innovating in the wake of the innovator in anticipation of higher profits.

The period that begins with the performance of theoretical studies, and ends with the moment when the

"new" technique is to be replaced with a more efficient one, is called the life cycle of innovation.

The life cycle of innovation includes the following steps:

- The emergence of the need for innovation and its creation (the acquisition of rights to use the innovation from its owner);
- Mastering in production;
- Diffusion (replication at other sites);
- Routineization (stable, unchanged, use).

Approaches to the organization of the innovation process have undergone evolutionary changes. Historically, the first approach is based on the "technological push" model (Figure 3), when innovation becomes the result of the progressive development of scientific and technological progress.

Fig. 3. Model of "technology push" (Technology push); 1950s - 1960s (Author's)

With the development of market relations, the intensification of the competitive struggle, organizations come to understand that it is not science, but business that should initiate innovations based on consumer unmet needs.

A new approach to the organization of the innovation process is starting to take shape, based on the "market pull" model (Figure 4).

Fig. 4. Model "pull the market" (Market pull); 1960s - 1970s (Author's)

Fig. 5. Model of parallel organization of the innovation process, 1980 (Author's)

In the 1970s twentieth century previous linear models were considered only as special cases of a more general process, combining science, technology and the market. Researches of such authors as R. Rothwell (R. Rothwell), C. Freeman (S. Freeman), A. Horsley (A. Horsley), A. Jervis (A. V. Jervis), D. Townsend (J. Townsend), D. Mowery (D. Mowery) and N. Rosenberg (N. Rosenberg), confirmed the importance of marketing, market and technical factors for successful innovation. The third-generation innovation process, dating back to the late 1970s-early 1980s, according to Rothwell, is still consistent, but with feedback.

The peculiarity of this model lies in the selection of coherent, functionally separate, but interacting and interdependent stages. Its advantage is the presentation of innovations as a result of the mutual addition of

technological capabilities and market needs within an innovation firm and the rejection of a linear description of the innovation process.

The integrated model (fourth generation) of the innovation process, which emerged in the practice of companies in the second half of the 1980s, marked the transition from considering innovation as a predominantly sequential process to understanding innovation as a parallel process, including both elements of research and development, development of a prototype, production and etc.

According to R. Rothwell, the model of the fourth generation corresponds to the best modern world practice. In figure 5 depicts the process of developing a new product at Nissan (an example of an integrated innovation process).

Fig. 6. Model of parallel organization of the innovation process, 1980 (Author's)

The idea put into the product should be analyzed from the point of view of marketing, and all development stages should be coordinated by a special inter-functional group. Studies show that the success of new products by Japanese companies is largely determined by the extensive use of cross-functional groups (see Figure 6).

Conclusion. As F. Kotler notes, the development of a new product is most effective in those cases where from the very beginning there is close cooperation between the research and development department and the technical, manufacturing, marketing and financial departments of the company.

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