Development of innovative processes at the instrument engineering enterprise

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Abstract. Domestic instrument engineering enterprises at the present stage of market development are faced with the problem of aggravated competition, therefore, the issues of increasing competitiveness are becoming very urgent. The solution to the problem can only be the implementation of innovative strategies, which will enable Russian enterprises in the instrument engineering industry to compete equally with foreign enterprises. Such a transition to innovative strategies can be carried out only through the formation of a new innovative and technological vector and a radical improvement in the regulation of this area by the state.

Innovation processes are a key characteristic of our time, covering all spheres of human activity and levels of the public.

An innovation is an improvement or novelty that is aimed at providing a qualitative increase in a product or process that is in demand in the market [4].

The need to enter the innovative path is dictated by the natural processes that the modern market is going through. And first of all, this is the strongest competition, for which simple development of the activities of enterprises is no longer enough, in order to win and take a leading position in the market, they must innovate and strive for an innovative breakthrough.

Achieving high and sustainable rates of economic growth and, accordingly, a high standard of living in countries with economies in transition, including Russia, is currently impossible, if not thoroughly adhere to the innovative vector of development of the country as a whole and the economy in particular.

In this regard, for the innovation processes of domestic instrument engineering enterprises, the key goals are [1]:

• firstly, increasing the efficiency of enterprises by updating the production system and base;
• secondly, the creation of stronger competitive advantages of enterprises due to the existing potential: scientific, technical, intellectual, creative, etc.

The main task of the instrument engineering industry development is to enter an innovative path and find growth reserves, which will make it possible to reorganize enterprises on the scientific and technical basis that already exists with additions and innovations.

However, the trends of innovative development emerging in our country indicate the following [5]:

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• weak use of scientific and technical potential of enterprises;
• a vague understanding of the essence of innovation and the characteristics of the mechanisms for their implementation.

For comparison: in the countries of Central and Eastern Europe, national innovation systems (hereinafter - NIS) have already been created. In these countries, they realized in time that without decisive and serious innovative reforms and without accelerating the convergence of NIS within the European Union, there is no opportunity to reach a new level of development, and they even face the loss of the status of developing countries.

The CIS countries are currently inertly using the scientific heritage of the USSR and are in no hurry to form their own innovation base. As the experience of European countries shows, it is impossible to independently create such a base without creating a NIS.

An important conditioning factor for the innovation activity of enterprises is the obsolescence of the production base and technologies. Therefore, there is a need to get rid of everything old, which prevents progressive development. Achievement of the desired result is facilitated by [3]:

• certification of products and technologies;
• constant market analysis.

Such an analysis will allow enterprises to make timely decisions on how to improve the quality of their products and make them more profitable for the consumer relative to competitors. This will become the starting point for the development and implementation of innovations at the enterprise [3].

State financial instruments that are available today are aimed at stimulating the innovation activities of enterprises. This is mainly expressed in providing the opportunity to use special tax regimes for certain types of activities.

The use of various financial incentives for the development of innovations should be based on an assessment of their effectiveness according to the following criteria [7]:

![Figure 1. Criteria for assessing the effectiveness of financial incentives.](image-url)
Let us take a closer look at each of the criteria presented.

- **Clearness**: financial authorities and enterprises should have a clear understanding of the purpose of introducing a particular financial instrument and the scope of application, that is, to support what type of activity they are being introduced.
- **Simplicity**: each business entity should easily and with a minimum of time and labor costs understand how the introduced financial incentive functions, should understand the mechanism of its application and the benefits received from it.
- **Clarity**: the introduced financial incentive should provide stimulation (its immediate goal) of an innovative project throughout the entire period of its implementation, at all stages of functioning.
- **Quality**: the introduced financial incentive in the legal aspect should not contradict the current legislation and diminish it.
- **Efficiency**: the result of the introduced financial incentive should actually be carried out at the enterprise in its maximum expression.

Innovations can be not only a new product, technology, technique, but also concern other production, organizational, marketing, environmental, etc. processes [2].

There are certain factors that affect the success of the innovation processes of instrument engineering enterprises:

- the enterprise must have a strong scientific and technical potential;
- large investments are required, which today are not so easy to attract;
- the enterprise must have a good, updated and powerful production and technical base;
- the management system should be arranged so that the enterprise accepts innovations flexibly and without unnecessary conflicts of interest, reacting rationally to changes, which should take place both at the management level and at the production level, both at the level of managers and at the level of all employees of the enterprise [6].

Considering these factors and building competent management, you can get an effective result in the implementation of an innovative strategy.

For the implementation of innovations at instrument engineering enterprises today there is not enough methodological base, namely:

- methodology for managing scientific and technological progress;
- methodology for identifying the effectiveness of innovation [7].

Without the development of these methodologies, the activation of innovation processes can lead to not the best results. The introduction of innovations should not be chaotic, but a systematic, competent, clearly verified process.

Innovation in the instrument engineering industry needs to be intensively introduced into production activities and stimulated at the level of individual enterprises. When a whole network of such innovative enterprises is formed, a new scientific and technical base will appear in the instrument engineering industry.

When introducing innovations, the following points must be taken into account [7]:

- the innovation process must be carried out continuously;
- the innovation process does not occur by itself as some part of additional actions, it requires competent management;
• it is necessary to take into account certain interrelationships between the internal and external authors of the innovation process.

Due to their specific characteristics, small and medium-sized enterprises have to be more active and entrepreneurial in the market, as they are more flexible and faster to adapt to changes and market requirements. That is why more often this sector of the economy becomes the pioneers of new products and technologies.

The innovative activity of enterprises allows them to survive more successfully in the face of intense competition.

In addition, the production of innovations provides a turnover “money - innovation – money”, that is, first investing in innovation, as in an investment project, then creating an innovation, then selling and receiving money. Received funds [6]:

• cover the costs incurred in connection with the development and creation of an innovation;
• provide profit;
• finance subsequent innovations, that is, they act as investment capital.

It should be noted that not all industry today is innovatively active.

According to statistics, innovative processes are actively implemented in four industries: chemical, food, mechanical engineering and metallurgy. They account for 70% of industrial enterprises, which show a high level of innovation activity: in metallurgy, this figure is 16.7%; in the chemical industry - 14.8%; in mechanical engineering - 14.1%.

An important factor in why these particular industries is developing innovatively is their great scientific potential. For comparison, in other industries the level of innovation activity is about 2-5%.

In addition, statistics show that the share of instrument making in GDP is only about 20%, in exports 10%, and this is two times lower than in developed countries.

Instrument engineering enterprises in their traditional form in developed countries no longer exist. Today it is a system of R&D centres distributed around the world. This system organizes and controls all the creation of an innovative product.

Over the course of 25-30 years, Russian instrument engineering enterprises first adapted to the emerging market conditions, and then survived under the influence of its various factors; instrument engineering all over the world underwent significant qualitative and systemic changes. Therefore, unfortunately, for many domestic enterprises in this industry, such barriers were established in a natural way that it is practically impossible to enter the international market, and for some it is even impossible.

Consequently, in order for Russian instrument engineering not only to survive, but to develop within Russian Federation and be able to compete in the world market, urgent innovative modernization is needed.

A big plus and potential is the fact that the necessary base for this already exists at its minimum. These are [3]:

• a sufficiently high level of education of current and potential employees;
• highly developed science at its fundamental level;
• the rapid development and high-tech production of the military-industrial complex;
• large capacity of the commodity market.

But along with this there is also a very acute problem - it is completely worn out fixed assets, which slow down not only the introduction of innovative processes, but also make the current activities of enterprises ineffective. That is why there is a huge gap from Western competitors, and in the field of instrument engineering, Russia as a whole lagged behind by half a century.

There is also one more problem: often the owners and managers of instrument engineering enterprises simply do not understand what innovative projects they need, and therefore cannot formulate
their demand. This is because many enterprises do not have their own clear development strategy. In such conditions, even the most advanced scientific and technical proposal will be aggravated by the fact that its implementation will stretch to such an extent that innovative development in its essence will simply lose economic sense.

In addition, an echo of the past also gives rise to the problem, since instrument engineering enterprises, having inherited huge, fixed assets of a non-production nature (land, buildings, communications) from the Soviet planned economy, now carry out huge costs for their maintenance, which will simply block the economic effect of the introduction of any innovation.

Considering all the above, we can conclude that there are two ways of development for medium-sized enterprises in the instrument engineering industry.

1. To produce products in the interests of big business, while remaining a legally separate economic unit, that is, it is necessary to conclude contracts with large enterprises.

2. Directly compete with each other, including with large enterprises. In this case, such advantages of medium-sized businesses as: a quick reaction to changing market conditions and emerging new requirements, the required significantly smaller start-up capital, the presence of niches that do not attract large market players, rather high prices of large enterprises should contribute to this.

Thus, in order to overcome the listed problems of the instrument engineering industry, a long-term innovative strategy is required with the involvement of the integration of small and medium-sized businesses. This is the only way to increase the competitiveness and investment attractiveness of this industry.

To solve problems, an integrated approach is required, which is based on the coordination of actions at four levels - federal, regional, sectoral and local.

The entire process of implementing an innovative strategy in the instrument engineering industry can be summarized as follows [5]:

The first stage - at the level of the Ministries of Industry, information is collected and analysed on the state and problems of innovation potential in the instrument engineering industry.

The second stage is to prepare a scientifically grounded forecast of the industry’s innovative development for the long and short term.

The third stage - the concept of innovative development of the industry is being developed.

Fourth stage - regional orders are placed among enterprises that are innovative assets. The contractor is selected on a competitive basis. A contract is concluded with him. He starts his work.

The fifth stage - the results of completed innovative developments are introduced and sold at auctions.

Summing up, it can be concluded that the transition to an innovative path for instrument engineering enterprises is extremely necessary. Otherwise, it will soon be impossible to overcome the existing gap with developing countries in this sector. The state, in turn, must provide financial and legal stimulation of innovative processes in this industry.

References
[1] Gryaznova A G 2017 Macroeconomics Theory and Russian Practice (Moscow: KNORUS) p 78-119
[2] Bezrukova T L 2014 Information support of the financial management system risks International Journal of Applied and Fundamental Research 10-1 59-61
[3] Detkovsky S S 2019 Development of innovative processes at the instrument-making enterprise Interexpo GEO-Siberia 1 167-71
[4] Bezrukova T L 2013 Improving approaches to managing innovative development at enterprises of industries Aktual'nye Napravlenia Nauchnyh Issledovanij XXI Veka: Teorii i Praktiki 3 262-7
[5] Demchenko A F 2012 Development of management relations in regional management systems Agro-Industrial Complex: Economics, Management 4 23-7
[6] Bezrukova T L 2014 The role of innovation processes in the functioning and development of the
world economy *International Journal of Applied and Fundamental Research* 10-1 62-3

[7] Boris O A 2013 Scientific and methodological approach to the classification of enterprises on the basis of financial security of innovation activity *Financial Analytics: Science And Experience* 13 16-22

[8] Parahina V N 2014 State support for creation and development of socially – oriented innovative enterprises *Asian Social Science* 1 0 215-22