

ECONOMIC MECHANISM OF INNOVATIVE DEVELOPMENT OF HIGH-TECH ENGINEERING AT THE COUNTRY REGION LEVEL

Mikhail Abrashkin, Victoria Barkovskaya, Bogdan-Nicolae Mucea

Department of Management, Institution State Educational Institution of Higher Education Moscow Region "University of Technology" (UNITECH), 41 070
Russia, Moscow region, Korolev, ul. Gagarin, 42
E-mail: abrashkinms@mail.ru

Department of Management, Institution State Educational Institution of Higher Education Moscow Region "University of Technology" (UNITECH), 41 070
Russia, Moscow region, Korolev, ul. Gagarin, 42
E-mail: barkovskaya@ut-mo.ru

Doctoral School of Sociology, University of Bucharest, 010181, Romania,
Bucharest, St. Schitu Magureanu 9, sector 1
E-mail: bogdanmucea@yahoo.com

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Abstract:

The article presents a study to assess the impact of high-tech engineering on the development of the region's economy and its innovative potential, which gives an undoubted increase in its competitiveness. Based on the analysis of literary sources, a theoretical justification was given for increasing the regional competitiveness of the economy. Tools for regional support of high-tech engineering enterprises and a model of the organizational and economic mechanism of innovative development of the industry at the regional level were proposed. It was proved that the innovative development of high-tech engineering affects the improvement of the competitiveness of the region.

Introduction

High technology engineering is one of the main areas of national economy. It makes it possible to provide various sectors of the economy with production equipment, and, first of all, enterprises of the innovation type and related to the manufacturing industries (Veselovskiy et al., 2019). This industry

determines the state of the production and innovation potential of the domestic economy and affects the material and material intensity of the GDP of a product, labour productivity, industrial safety and the country's defence capability. High-tech engineering is a driver for the innovative development of regions and other sectors of the national economy. The development and improvement of its competitiveness affects the growth of the competitive advantages of a region (Brocas, 2003). Therefore, the main objective of the work was to develop a model of the organizational and economic mechanism for the innovative development of high-tech engineering at the regional level. On the basis of this goal, the tasks of substantiating the influence of this industry on other sectors of the region and areas of increasing regional competitiveness and developing the innovation component of the region were also solved.

The authors of this article also analysed a large amount of information about management of high-tech engineering and innovative development, methods of forming competitive advantages of regional territories. General approaches to the development of high-tech mechanical engineering are reflected in the collective monograph “Sovershenstvovanie mekhanizmov povysheniia innovatsionnoi aktivnosti promyshlennykh predpriatii” (Veselovskiy et al., 2017), as well as in the collective monograph “Innovatsionno-tekhnologicheskaya transformatsiya promyshlennosti v regionakh Rossii kak instrument dostizheniya strategicheskikh tseley na puti stanovleniya tsifrovoy ekonomiki” (Veselovskiy et al., 2019). M. Abrashkin and V. Barkovskaya took part. Final works were prepared under the guidance of the authors of the articles. The solution of the tasks set in the investigation was carried out using the methods of analysis and synthesis of information as well as logical statistical analysis and graphical interpretation of the results.

1. Evaluation of state support for the development of high-tech engineering

For a long time, there has been a tendency of continuous development of innovation processes and innovation activity in general. Recently, in the field of innovative technologies, the greatest attention has been paid to the study of issues of science engineering. The problem of insufficient attention on the part of state authorities regarding the high-tech engineering enterprises is most acute. Nevertheless, I would like to point that there are still some reserves that give impetus to their priority development (Costa & Dierickx, 2005). These should include Russia's own energy and raw materials base, a developed communication infrastructure, and research, production, and per-

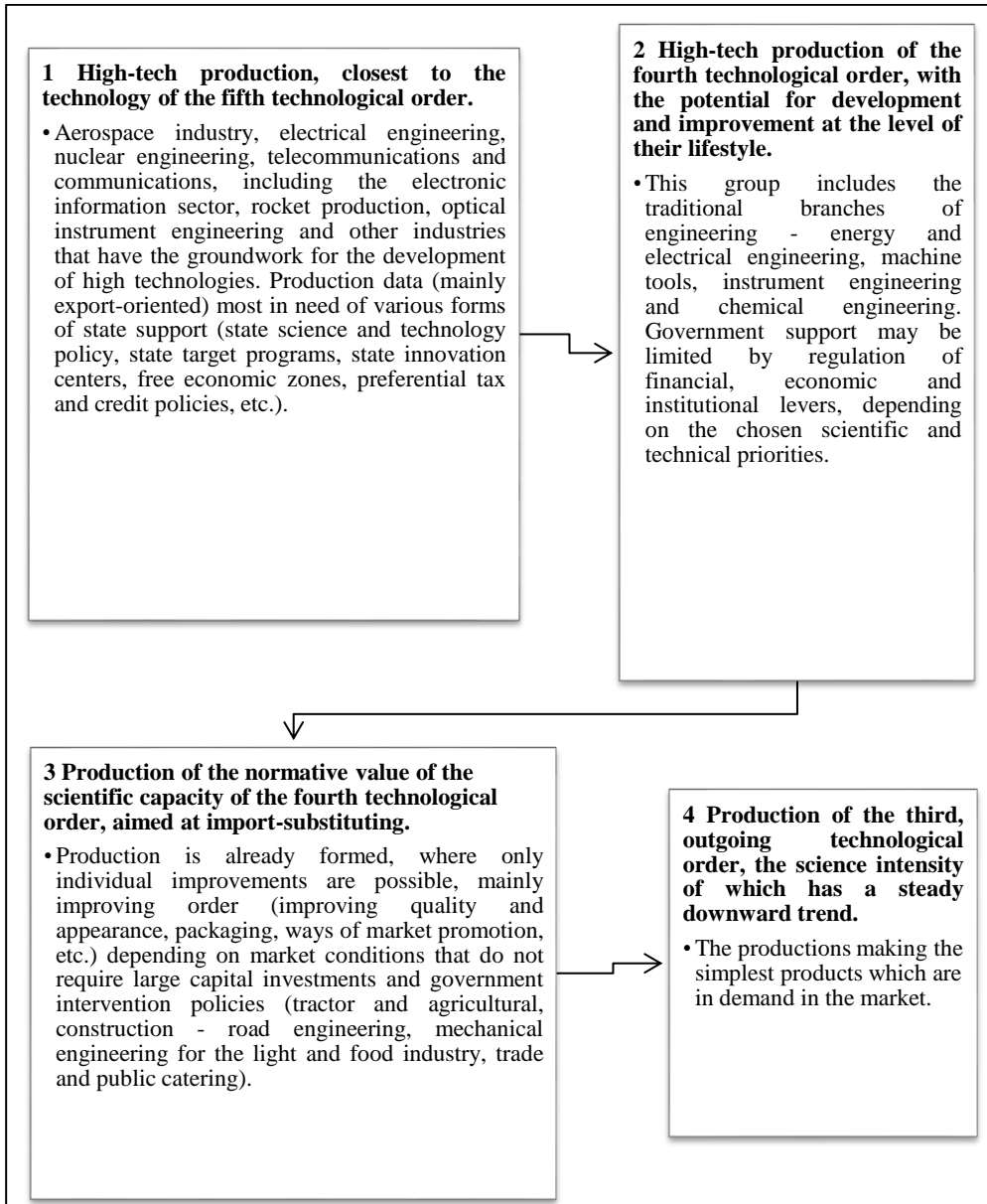
sonnel potential formed during the period of the USSR economy. The reserve for increasing the efficiency and development of high-tech engineering enterprises is also the improvement of the regulatory framework by changing federal and regional legislation, fiscal and customs regulations.

Federal authorities require, mainly, financial support and tax preferences. The US experience in implementing the Empowerment Zones program has convincingly proved that it is necessary to support not poverty, but regions that are in decline (Chatterji, Glaeser, & Kerr, 2014). Tax cuts can act as an impetus for development, since “a temporary tax cut will allow for a higher level of tax collection in the future due to business growth” (Chatterji, Glaeser, & Kerr, 2014). However, two important points need to be taken into account when supporting business and subsidizing them: “the quality of business support programs” and “limiting opportunities to participate in programs of friends or close people to the creators of laws on this support” (Lerner, 2013), otherwise will count on the low efficiency of these budget allocations. According to the author, the degree of state support should be determined on the basis of their orientations and the compliance of enterprises with technological structures.

The experience of certain countries shows that in the current conditions of globalization and the development of the world economy it is possible to transfer a number of engineering industries to third world countries. Due to the high probability of loss of national economic sovereignty, this experience in Russia is of little use. It can be concluded that the object of state support should be a set of enterprises of the machine-building complex, which covers all sectors and sub-sectors. When identifying the priorities of this state support for any particular industries, it is advisable to build on the needs of the innovative development of the country's economy as a whole (Veselovskiy et al., 2017). On a national scale, priority levels of machine-building enterprises can be distinguished, depending on the competitiveness and knowledge-intensiveness of the products produced. The most appropriate option seems to support the production, presented in Figure 1, where priority is given to high-tech industries of the highest technological structures.

An important role in the support of high-tech engineering should be assigned to regional authorities. Taking into account the fact of “spatial effects of innovation spill overs” and the spread of “specialization and diversification of the economy” to neighbouring territories (Li Ting & Fu Wenying, 2015), support and strengthening of the development of spatial regional economic relations are needed.

Figure 1: *Priorities of state support for high-tech engineering enterprises*



Source: authors

Despite the fact that some scientists see innovations and negative trends associated, for example, with a possible reduction in employment (Dachs, Hud, Koehler, & Peters, 2016), the author still believes that there are more advantages. And the decrease in employment of the population is a temporary

phenomenon, since the effect of innovation leads in the future to the creation of new enterprises and, accordingly, new jobs. Also, when pursuing a regional policy to support high-tech engineering, it is necessary to focus on their “competitive advantages, which increase their competitiveness and contribute to their development” (Dachs et al, 2016).

Taking into account the existing reserves of high-tech engineering for the formation of "growth poles" of regional economies, the author divided the regions into two groups, offering tools to increase their competitiveness.

The first group of regions includes the disclosure of reserves that are associated with the general state of the machine-building complex: the growth of GRP due to the development of high-tech engineering and its increasing share in the regional structure, the growth of the economic security of the region in the manufacturing sector, increasing the capacity of the market for engineering products and strengthening competitive advantages of high-tech engineering (Schmidt, 2008). The second group of regions includes the disclosure of reserves that are not related to the current state of the machine-building complex, but at the same time determine the potential of its development as “growth poles”: improving the efficiency of the commodity, financial and labour markets in the region with machine-building specialization, increasing innovation and entrepreneurial activity, increasing socio-economic potential, accelerating the adaptation of the region to changes in its internal and external environment.

2. Organizational and economic mechanism of innovation development of the science intensive engineering industry

The author suggests the following tools for the development of high-tech machine building, which increase the competitiveness of the region in the medium and long term:

- designing in the region high-tech machine-building complexes, the centres of which are regional supporting machine-building enterprises, and connecting enterprises are manufacturers of components attracted to the created infrastructural industrial parks, and enterprises - inno-generators;
- selection of a group of knowledge-intensive machine-building enterprises in the region with the aim of priority regional support for their development (based on the calculation of the group weighted average figure proposed in the work);

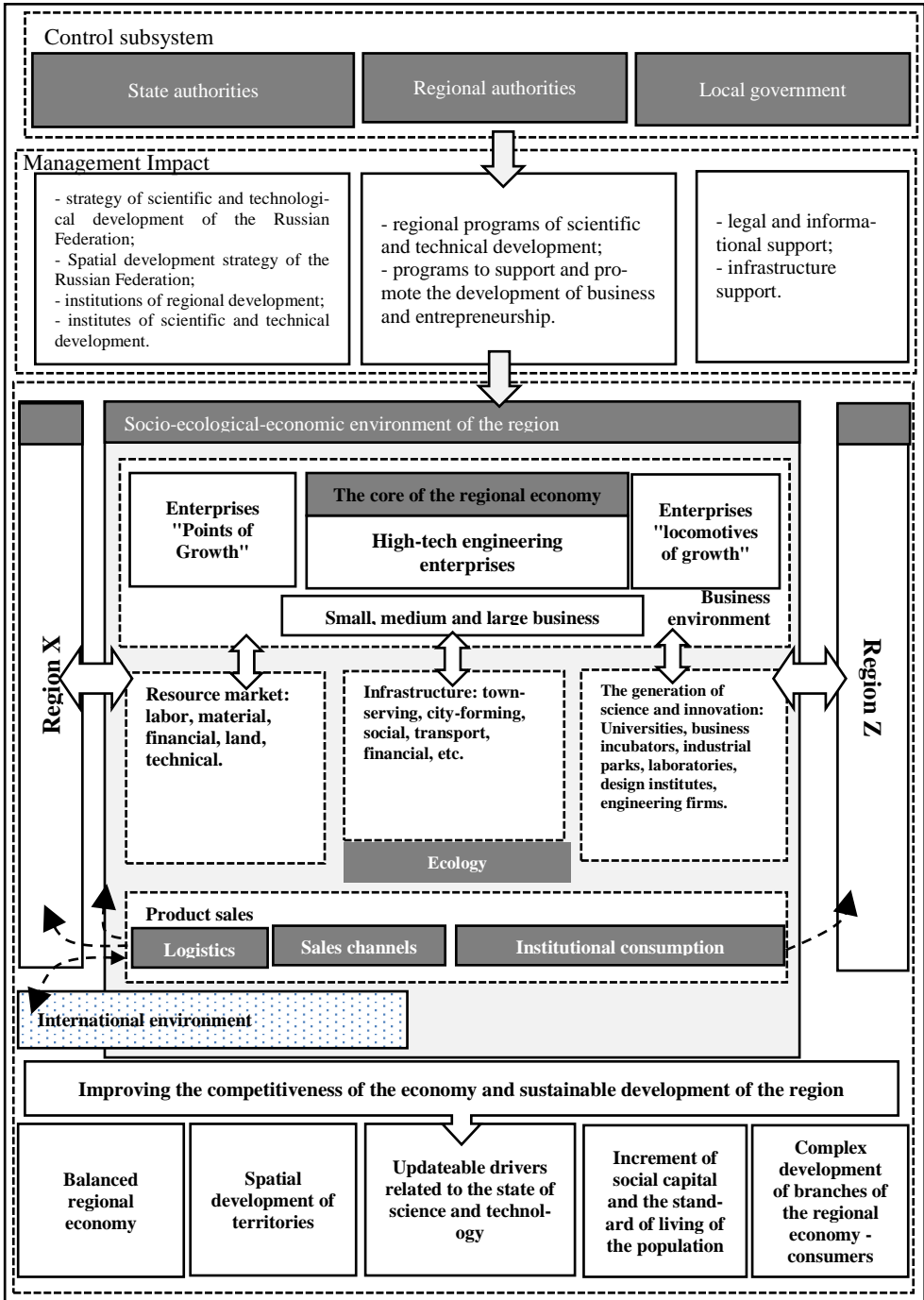
- attraction of world manufacturers of component parts of the final high-tech machine-building products to the infrastructure industrial parks for close cooperation with the core enterprises of the region and non-regional consumers (due to the “points of growth” of the regional economic policy).

The findings fit organically into the model of the organizational-economic mechanism for the regional development of high-tech engineering (Figure 2), which was obtained on the basis of the Multi-element model of technology-based growth model (Tassej, 2016).

Since an important condition for building a model is the requirement of “forming open business models for developing innovations” (Weiblen, 2014), and the need to take into account the needs of organizations to acquire new and unfamiliar technologies outside the organization (Janney & Dess, 2004), the author included external international space.

Along with the proposed tools, improvement of regional economic policy is necessary. The list of tools for its implementation and implementation may include measures to support high-tech engineering, aimed at increasing the competitiveness of the region. The list of such tools is very large, but the degree of applicability is limited by the possibilities of budget support. As practice shows, the most effective measures are concessional loans to priority machine-building industries, increasing demand for their products, changing technical regulations for high-tech products and the regulatory framework for its production, the creation of machine-tool enterprises in the region with mechanical engineering and strengthening the mechanisms of public-private partnership in regions with a high reserve of high-tech engineering, including in the development and implementation of innovations. In general, increasing the competitive advantages of high-tech engineering in the long term will contribute to strengthening the innovation and infrastructure components of the development of the region and its business environment.

Figure 2: Mechanisms of regional development of high-tech engineering



Source: authors

3. The impact of high-tech enterprises of machine-building on the innovative level of development of the region and its economy as a whole (confirmation of the hypothesis)

This investigation is aimed at assessing the impact of high-tech engineering on the regional economy, as well as the development of an appropriate mechanism for the development of these industries in the conditions of the formation of a new technological order. The work is based on the methods of theoretical and empirical knowledge. The factual base of the research was built on the basis of free access information resources.

As a result of collecting and analysing information on the activities of knowledge-intensive engineering enterprises, it was possible to confirm hypotheses about their high impact on the regional economy and industrial sector, regardless of the sectoral specialization of the region. It is necessary to form an appropriate policy at the state level and the level of the subjects of the Russian Federation. The high reliability of the results obtained is based on the works of such scientists as Kh. R. Lashuen, J. Lenrer, T. Veblen, and others. The main feature of the investigation is the rethinking of the accumulated theoretical base and the practice of assessing the impact of high-tech engineering on regional economic growth, highlighting this sector as a driver and accelerating the development of other enterprises and economic growth. The investigation meets the criterion of reliability. Separate research provisions formed the basis of the monograph and were discussed with university scientists and business representatives in Russia's largest space science city, Korolev.

Conclusion

Currently, there is a need for reorientation of approaches to regional management of high-tech machine building due to the improvement of their forms and on the basis of the formation of self-organized and self-regulating structures of the organization to counteract the touristic effects of the environment and crisis states of the economy. The main findings from the investigation:

1. High-tech engineering is a driver for the development of the regional economy, its “growth pole”.
2. The mobilization of hidden reserves to improve the competitiveness of a region is associated with the formation of competitive advantages of science-intensive machine building, and the identification

of such reserves is the basis for the further development of a strategy for managing regional competitiveness.

3. Bodies of state and regional authorities in the model of scientific and technological development and economic growth require a revision of tools to support the development of high-tech engineering, depending on the priorities of the output of new technological structures.

The measures proposed by the author and the organizational and economic mechanism will help build an effective regional policy to support science-intensive engineering, enhance the materialization of scientific and technological progress, master the new technological order, and increase the investment climate for doing business.

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