Mapping of industrial innovations of the fifth technological mode within the framework of industrial park structures of the Sverdlovsk region

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Abstract. The main objective of the research presented in this article is to determine the priorities for the technological development of production based in industrial park structures of the Sverdlovsk region. The method of mapping technological innovations is used as the main research methodology, the information base is the plans and programs for the technological development of industrial enterprises in the Sverdlovsk region. The study develops a comprehensive methodology for assessing the technological and innovative development of industrial park structures based on the experience of Russia, Belarus and Moldova. Based on the results of the analysis, proposals are developed for adjusting the innovative development programs of regional industrial park structures.

1. Introduction
The tasks facing the modern economy of Russia are directly related to the growth of industrial production, which requires the formation of a new methodology for managing this process. The transformation of organizational forms of entrepreneurship and the need for accelerated growth are reflected in the search for modern tools for managing the interaction of entrepreneurs with a view to developing the growth of innovative activity, forming an effective strategic position of domestic industrial enterprises. The solution of these problems is carried out within the framework of the creation and effective management of industrial park structures, integrative objects, the territories of which should become zones of innovative development.

An analysis of the current scientific research base suggests that the methodology for assessing technological and innovative development within the park structure is closely related to the provisions of the cluster approach.

The cluster paradigm provides for the modeling of the structure, location and subsequent dynamics of the development of industrial complexes located in relative proximity. The cluster assumes the orientation of companies on the continuous improvement of competitive advantages due to various innovations: technological, organizational and marketing. This level of innovation activity always implies the involvement of the scientific and educational infrastructure in the activities of the cluster participants.
2. Theoretical base and research methodology

It can be stated that foreign researchers are currently focusing more attention not so much on the creation or formation of park structures, but rather on increasing their efficiency, optimizing objects that are already functioning for a sufficient time, including due to the improvement of the strategies developed earlier in view of the changing environmental conditions.

Thus, the article by Chen J.K.C., Altantsetseg P. [2] considered management aspects within the framework of the largest innovative park structures of the United States, similar studies were conducted by Chudobiecki J., Wanat L. [5], Colapinto C. [6] Liberati D., Marinucci M., Tanzi G.M. [9] and Chiao T.C. [3] with examples of park structures in Poland, Italy and Taiwan, respectively.

In terms of their innovativeness, the following types of park structures are distinguished: highly innovative, medium-innovative, and low-innovative.

Highly innovative industrial park structure - a geographically concentrated group of interrelated organizations specializing in the generation and commercialization of interrelated innovations, including suppliers of equipment, components, specialized services, innovative development companies and manufacturers based on the latest technological structure, operating around centers of ideas and scientific knowledge (research institutes, universities, technology parks, business incubators). Signs of a highly-innovative industrial park structure can be: the technological base of companies corresponds to the modern technological structure (currently the 6th); the inclusion of innovative elements into the industrial park structure (scientific and educational centers, research institutes, universities, etc.); the main purpose of creation is the generation and commercialization of innovations.

Medium-innovative industrial park structure - a structure whose members provide and implement on a systematic and regular basis innovative activities aimed at developing and producing innovative and high-tech industrial products.

Low-innovation industrial park structure is a structure that is more focused on achieving the effect of scale of production, while using all the possibilities of a single site, including cost reduction, tax and other preferences.

So in the works of many authors conclusions about the effectiveness of the use of industrial parks as tools for innovative development of the regional economy in the socio-economic aspect. Chih-Lun Chen [4] in his paper emphasizes the importance of park structures for the strategy of sustainable development of regional innovation systems.

Figure 1 shows the interrelated stages of the methodology used to assess the innovativeness of an industrial park structure.

| Method stage | Indicator |
|--------------|-----------|
| Stage 1 - Assessment of innovation performance | R & D volume |
| Stage 2 - Mapping the innovation of the industrial park structure | The share of innovative products in the total output |
| | Number of registered patents for innovative developments |
| | Graphic method |
| | In the context of residents of the industrial park structure |
| | Innovation map of industrial park structure |

Figure 1. Method of mapping innovative industrial park structures.
At the first stage, the innovative activity of the industrial park structure is identified by the following indicators: R & D volume, Share of innovative products in the total output, Number of patents registered for innovative developments. These characteristics are given in the context of residents of industrial park structures.

At the second stage, a map of innovative activity of the industrial park structure is constructed; the first vector characterizes the level of the indicator of innovative activity of the industrial park structure; the second vector is the production volume on the territory of the industrial park structure.

3. Results of the study
Consider the map in terms of the R & D volume of residents of industrial park structures, figure 2.

![Figure 2. Map of industrial park structures of the Sverdlovsk region in terms of the R&D volume of residents of industrial park structures.](image)

The greatest activity of investments in R & D is observed among residents of the "Tagil Chemical Park", this industrial park is characterized by a high level of development and the presence of cluster relationships between residents.

Next, we consider a map of industrial park structures in terms of patent registrations of enterprises located in industrial park structures of the Sverdlovsk region, figure 3.

![Figure 3. Map of industrial park structures of the Sverdlovsk region in terms of Russian patents registrations of residents.](image)
The analysis showed a generally low activity of residents of the industrial park structures of the Sverdlovsk region in terms of patent registration, the greatest value is observed in the Special economic zone "Titanium Valley". These patents are registered by "Zibus" LLC, which specializes in the production of instruments and implants in demand on the market for neurosurgical operations, which are currently purchased abroad. At the moment, the resident has established the release of three types of products: trephination drill, osteotomic cutters and titanium clips (implants for cranioplasty).

The analysis shows that among the industrial park structures of the Sverdlovsk region, the share of innovative products is higher for the Special economic zone "Titanium Valley". This fact corresponds to the purpose of the creation of this park structure, the creation and development of which is aimed at supporting and stimulating promising industries - the production of titanium products, components and equipment for metallurgy, mechanical engineering and the production of building materials, woodworking.

4. Discussion and conclusions
The results of the study led to the conclusion about the high efficiency of such a form of organization as industrial park structures, as the experience of leading Russian regions shows, is one of the most successful tools for economic development, allowing to create conditions for locating modern competitive industries, attract investment resources and modernize existing industries. Foreign experience also allows us to talk about industrial park structures as an effective platform for the sustainable development of the regional economy. In order to form an evidence base, the authors developed and tested a technique to evaluate the innovative activity of industrial park structures. The analysis shows the insufficiency of the methodological component in making certain decisions in the development of innovative activity within the framework of industrial park structures. The issue of improving the methodological support of the processes of development and implementation of certain regulatory documents, the central of which, from the point of view of the effective development of the industrial complex, could be a program of regional industrial policy implemented on the basis of industrial park structures.

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